

# Land Reform and the Origins of the Sicilian Mafia: a model and a test.

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March 24, 2000

PRELIMINARY DRAFT

## **Abstract**

The Mafia originally developed in Western Sicily as a supplier of private protection. This paper models and tests the conditions that favoured its rise, focusing in particular on the effect of the land reform that followed the abrogation of feudalism. Using a menu-auction model, the paper shows that if a given quantity of land is divided among many, the demand for protection increases even if the value of the assets in need of protection is unchanged. The result follows from the fact that, if it is not complete, protection involves an externality in the sense that each protected landlord is better off if he is the only one or one of the few to receive protection. Landlords will then be willing to pay to more if others are not protected because that makes their own protection more valuable. In other words, land reform increases the competition for protection and hence the surplus received by the Mafia. Using qualitative information from a 1881 Parliamentary Inquiry, the empirical analysis suggests that the predictions of the model are consistent with the evidence from a sample of seventy Sicilian towns. The estimates show that Mafia was more likely to be active in towns where land had been divided rather than in those where it had not.

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\* I would like to thank James Anderson, Richard Arnott, Dilip Mookherjee, Fabio Schiantarelli and seminars participants at the World Bank, Boston College and at the LSE for useful comments and suggestions on previous versions of the paper.

*The Mafia is, essentially, nothing but the expression of a need for order,  
for the control of a State.*

Giovanni Falcone<sup>1</sup>

## **1. Introduction.**

For more than a century the Sicilian Mafia has attracted the attention of a broad range of scholars and has been depicted, more or less accurately, in countless movies and novels. The origins of the Mafia are, however, not well known to the general public nor have they been analysed by economists. Besides being interesting in itself, analysing the origins of the Mafia is relevant for a full understanding of contemporary issues and for identifying the potential for Mafias in other societies. Both the Russian and the Japanese Mafia, for instance, have developed in surprisingly similar circumstances. The aim of this paper is to model and test the conditions that promoted the rise of the Sicilian Mafia, with a particular focus on the effect of the land reform that followed the abrogation of feudalism. The paper is, at least to my knowledge, the first to model these issues using economic theory and to attempt a formal test using qualitative data from a parliamentary survey (Damiani, 1881).

The Mafia<sup>2</sup> first appeared after the abrogation of feudalism (1812) but before the creation of the Italian State (1860) and it developed almost exclusively in Western Sicily.<sup>3</sup>

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<sup>1</sup> Judge Giovanni Falcone devoted most of his career to fighting the Mafia, often very successfully. He was killed on May 23<sup>rd</sup>, 1992. The quote is from Falcone (1991).

<sup>2</sup> The word itself was first used in a theatrical play written by Giuseppe Rizzotto (1863) “I mafiusi de la Vicaria” which describes the behaviour and the activities of a group of “*mafiosi*”, momentarily imprisoned in Palermo’s jail (the Vicaria). The word “*Mafia*” made its first official appearance in a report by the chief prosecutor in Palermo, Filippo Gualtieri, in 1865. Some scholars trace its origins back to the 17th and 18th centuries, identifying as mafiosi the armed guards who were paid by the barons to patrol their estates. Still, these guards were essentially employees of the barons and the practice of hiring criminals as private guards was not uncommon in other areas of Italy, where the Mafia did not develop. Other scholars maintain that the Mafia emerged only after Italian Unification (1860). This view is inconsistent with the fact that the first reports on the Mafia by Italian prosecutors already describe well-established organisations that could not possibly have developed in a few years. Furthermore, in 1838 the chief prosecutor in Trapani, don Pietro Ulloa, notified the Minister of Justice of the existence of Mafia activity.

Although a commonly accepted definition does not exist, it is agreed that the Mafia had a private monopoly over the use of violence, which it employed to defend its own interests and to sell protection to others.<sup>4</sup> Originally, the main function of the Mafia was to offer protection against theft, to enforce contract rights, and to settle disputes in exchange for compensation. Mafia members were organised in groups known as *cosche*. The relationship between different groups was quite loose: groups recognised each other and occasionally co-operated but they were not centrally co-ordinated.<sup>5</sup>

The Mafia developed in a socio-economic context characterised by weak public enforcement of property rights, frequent predatory attacks to private property and at a time when, due to the abrogation of feudalism, landholdings had just been divided. (See Section 2) The absence of publicly provided security combined with the presence of thieves and bandits generated a strong demand for private protection. The rise of the Mafia, however, cannot be explained on the basis of these factors alone. Since both the lack of publicly provided security and widespread banditry had been present for a much longer time, the third factor, that is land reform, must have played a role. An almost contemporary observer notes that: “*The difference in social relationships brought about by the abolition of feudalism came down to this: Just like wealth, tyrannical acts became accessible to a greater number of people, and the class of villains, who before had been at the service of the barons, became independent; so in order to obtain their services it became necessary to deal with them as equals.*”<sup>6</sup>

Section 3 develops a menu-auction model to show that land reform increases Mafia’s profits and hence fosters its development. Intuitively, land reform generates an increase in the number of

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<sup>3</sup> Official documents dated as early as 1874 state that Eastern Sicily was not affected. See Russo (1964).

<sup>4</sup> Much confusion arises from the fact that some authors define the Mafia by its function, for instance as an “industry of violence” (Franchetti 1925) or as a “protection agency” (Gambetta 1993); while others focus on the common attitude of its members – “Mafia is a philosophy of life, a moral code” (Barzini 1965) or “a sentiment” (Lorenzoni, 1910).

<sup>5</sup> The reports of Sicilian Prefects to the Ministry of Interior (1874, reproduced in Russo 1964) agree that there was no centralised co-ordination. The first co-ordinations attempt at the provincial and, later, at the regional level took place in the late 50s, see Gambetta (1993).

landowners, which, in turn, increases the competition for protection. Interestingly, the model shows that landlords might compete for protection even if the assets in need of protection are unchanged. The result follows from the fact that when a landlord buys protection he imposes a negative externality on other landlords. Since for a protected landlord protection is more valuable if only a few landlords are protected, each landlord will pay a higher price if he is the only one or one of the few to receive protection.<sup>7</sup> It follows that, for a given level of assets in need of protection, if there are more landlords there is more competition and the Mafia gains a higher surplus. Similarly, for a given number of landlords, Mafia's revenues are higher if there are more assets in need of protection. Finally, the model suggests that Mafia is "more active", i.e. it offers more protection, in areas where landholdings are more divided.

Although data on Mafia's profits are, not surprisingly, unavailable, information on Mafia's presence in different towns can be used to assess whether the predictions of model are consistent with the empirical evidence. To the extent that higher potential profits increase the probability that Mafia is active in a town, the variables that have a positive impact on profits increase the likelihood of observing Mafia activity in that town. Qualitative information on the distribution of landholdings and on Mafia activity in seventy Sicilian towns has been extracted and coded from the 1881 Parliamentary Inquiry. The coefficient estimates (Section 4) indicate that the Mafia was more likely to be active in towns where land was more divided, where there were more assets in need of protection and that the intensity of Mafia activity was positively correlated with the degree of land fragmentation. Although, due data limitations, a rigorous test of the theory is not feasible, the results clearly show that the predictions of the model are at least consistent with the available empirical evidence.

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<sup>6</sup> Franchetti (1925), translated in Catanzaro (1992), p.59.

## 2. The Context: History and Economic Conditions in 19th Century Rural Sicily.

In early 19<sup>th</sup> century Sicily feudalism had not yet disappeared. Since the foreign governments that ruled Sicily during the previous centuries always relied on the local upper classes to manage public affairs in the island, power resided traditionally in the hands of a few noble families. Each family ruled over vast extensions of land (fiefs) and maintained an army to protect the fields and police the peasants. Agriculture was the most important economic activity; the aristocracy owned most of the land and farmed it on an extensive basis. Since most aristocrats lived in Palermo or Naples, they generally appointed wealthy tenants, called *gabelloti*, to manage their land.

Feudalism was officially abolished in 1812 but the land-owning aristocracy retained most of the old privileges, such as imposing taxes on the peasants, who were made even poorer by the abolition of common rights. The Bourbons, who ruled from 1816 to 1860, tried to ameliorate this situation by promulgating laws to effectively remove feudal institutions and by promoting land redistribution to create a new class of small landowners to replace the powerful aristocracy.<sup>8</sup> To the same purpose in 1862 the Italian State promulgated land reforms.

Although they were partially successful at reducing the size of landholdings the land reforms did not succeed in creating a class of “rural entrepreneurs” Huge fiefs were divided into smaller properties<sup>9</sup> but few farmers managed to purchase land. Those who did generally bought small plots nearby the towns, while wealthy bourgeoisie and former *gabelloti* purchased the land in the inner part of the island. Land reform did not enhance efficiency; most new owners often

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<sup>7</sup> Car alarms are a nice illustration of the idea that protection involves an externality: a car is less likely to get stolen if it is the only one that has an alarm installed. If all the cars in the neighbourhood have alarms the probability that a particular car gets stolen is higher.

<sup>8</sup> The most relevant laws to eliminate feudalism were promulgated in 1820 (abolition of primogeniture and seizure of land in settlement of debts) and in 1841 (order of giving to the peasants at least one fifth of the land where common rights were enjoyed before 1812).

lived far from the land and did not improve on the production methods previously adopted by the feudal lords. The plots were still farmed on an extensive basis and rented to new *gabelloti*. The latter usually subleased the land to small farmers and live far from the countryside as well. Since they were appointed for a short period of time, *gabelloti* had no incentive to invest their earnings in the land.<sup>10</sup>

The situation of the landless peasants worsened rapidly after the abrogation of feudalism: they were deprived of common rights without receiving compensation and were still treated as serfs by the new land-owning class. Even those who owned a small plot of land often had to work on the large estates at the service of the *gabelloti*. The farming techniques did not require permanent workers, implying that most workers were employed daily. Those who owned a mule and a plough were hired seasonally to cultivate some small plots often distant from each other. Since they had to travel between the different plots and had to be physically present at the market for daily workers, the peasants lived in the closest town and travelled daily to the fields. The life standard of the peasants declined steadily during the 19<sup>th</sup> century; Mack Smith (1960) reports that between 1798 and 1861 population increased by 0.4 millions while, due to the unchanged production structure, agricultural output remained fairly constant.

Many of the peasants turned to banditry, especially during the periods of high unemployment. Banditry strongly increased during the 19th century with six major risings in 1820, 1837, 1848, 1860, 1866 and 1893. The most common crime was cattle rustling, favoured by the lack of a permanent presence on the land, especially at night. Publicly provided security

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<sup>9</sup> It has been estimated that the number of large landowners increased from 2,000 to 20,000 in the period 1812-1860 (see Mack Smith 1968). Damiani (1881) reports that large properties (more than 200ha) were predominant only in 15 towns out of 71.

<sup>10</sup> Improvements like irrigation and land manuring, would have notably increased the land value (according to Mack Smith (1968) up to twenty times), still the *gabelloto* would not invest since his investment would mainly benefit those who came after him. Similarly, shifting from cereals to more profitable cultivation (like vines or oranges) was not an attractive option for the *gabelloto* since this cultivation would not bring any income for about four years.

was quite insufficient: *“Twenty-five ‘Companies at Arms’ policed the countryside, but altogether there were usually less than 350 policemen for the whole island. Two or three times a year a company of troops would arrive in each town and round up a token number of malefactors, but this would be followed by another few months of complete impunity”* (quoted from Mack Smith 1960). The situation did not improve when the Italian State took over.

Widespread banditry and the inadequacy of publicly provided security generated a strong demand for private protection and since the armed guards formerly at the service of the feudal lords were now unemployed, suppliers were not hard to find. Land reform was crucial for the development of the Mafia: after the abrogation of feudalism the guards gained autonomy and offered their services to a larger number of clients.<sup>11</sup>

The conditions that promoted the rise of the Mafia in Western Sicily can be summarised as follows:

- Inability of the State to guarantee effective protection of persons and property.
- Land reform, hence more landlords in need of protection.
- Landlords absenteeism coupled with no fixed settlement on land.
- Poor peasants who often resorted to banditry.
- Large supply of unemployed agents accustomed to the use of violence.

Note that land reform is a necessary but not sufficient condition. There was no Mafia in Eastern Sicily although land reform took place at the same time. In Eastern Sicily the new class of landowners promoted the transition to a capitalistic structure of production that entailed capital investments, crops diversification and longer tenancies.<sup>12</sup> Landowners often lived on the

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<sup>11</sup> The importance of autonomy is thoroughly discussed by Franchetti (1925) and Gambetta (1993).

<sup>12</sup> I am not aware of any theory that convincingly explains the difference in landlords' behaviour.

land and managed it directly, social tensions were almost irrelevant, and banditry was rare. In this context the demand for protection was low thus there was no market for Mafia.<sup>13</sup>

### **3. The model: land division and the rise of the Mafia.**

The analysis above suggests that land reform played an important role for the development of the Mafia. This section analyses the effect of land reform in the context of two-stage game in which the landlords offer the Mafia a monetary reward in exchange for protection and the Mafia then decides who to protect in order to maximise their surplus. It will be shown that even if the assets in need of protection do not increase, land reform generates competition for protection, which promotes Mafia activity. In particular it will be shown that: (i) for a given level of protection, the surplus of the Mafia generally increases as the number of landlords increases; (ii) the optimal level of protection offered by the Mafia increases as the number of landlords increases.

#### ***3A. Set up.***

There is a fixed amount of land that yields income  $Y$ . Assume that, as a consequence of reform, the land is divided equally between  $n$  landlords. Assume also that as the number of landlords rises total land income remains constant, which is consistent with the evidence presented in section 2. The assumption is without loss of generality as it will be shown that if land income were to increase, land fragmentation would increase the demand for protection even further.

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<sup>13</sup> Franchetti (1925) first noted that the different behaviour of the landlords in the East could account for the lack of Mafia activity there. Other so-called "naturalistic" explanations stress the different cultures in the two parts of the island (Greek-Normann in the East and Arab in the West) or even the difference in climate (warmer in the West).

It is assumed that each landlord faces a positive probability of getting his income stolen and he can buy protection from the Mafia to decrease this probability. Finally it is assumed that:

- (i) if a landlord is not protected all his income is stolen<sup>14</sup>
- (ii) the Mafia can successfully protect an exogenously fixed share  $\pi^*$  of total land income (this assumption will be relaxed in section 3.c).

As shown below, (i) and (ii) imply that if a landlord buys protection the probability of having his income stolen depends on how much of total income the Mafia can successfully protect and on the number of landlords who are protected.

Denote by  $\mathbf{p}^k$  the vector of protection<sup>15</sup> such that  $k$  landlords are not protected and  $(n-k)$  are. Denote by  $(1-\pi_{n-k}(\mathbf{p}^k))$  the probability that one of the  $(n-k)$  protected landlords gets his income stolen. Since landlords who are not protected get all their income stolen and since the Mafia-group can at most protect a share  $\pi^*$  of total income, the income stolen from the unprotected landlords plus the income stolen from the protected landlords must be at least  $(1-\pi^*)Y$ . Thus when  $k$  landlords are not protected it must be true that:

$$ky + (n - k)(1 - \pi_{n-k}(\mathbf{p}^k))y \geq (1 - \pi^*)Y \quad (1)$$

(1) implies that if a landlord buys protection his income is stolen with probability:

$$(1 - \pi_{n-k}(\mathbf{p}^k)) = \max \left\{ 0, 1 - \frac{n}{n-k} \pi^* \right\} \quad k = 0, \dots, n-1$$

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<sup>14</sup> It is assumed that this is true for every choice of the other landlords. Assuming that when nobody buys protection, everybody is stolen with the same probability (different than one) yields similar results. For convenience the probability is normalised to one.

<sup>15</sup> A protection vector is a vector  $(n \times 1)$  whose elements are 0s and 1s; 0 for the unprotected landlords, 1 for the protected ones.

That is, if a landlord is protected and there are many unprotected landlords (that is if  $k > (1-p^*)n$ ) then the probability of his income being stolen is zero. If many landlords are protected (that is if  $k < (1-p^*)n$ ) each protected landlord gets his income stolen with probability  $(1-n/(n-k)p^*)$  which is higher the lower the number of unprotected landlords. The constraint in (1) reflects the fact that each landlord values protection more if he is the only one or one of the few to be protected. This implies that landlords compete for protection because every protected landlord imposes a negative externality on the others, making their protection less valuable.

To buy protection, a landlord must pay a non-negative contribution  $f(p)$  to the Mafia; the landlord's net payoff is equal to  $q = p(p)y - f(p)$ , where  $p$  is the vector of protection chosen by the Mafia.

By assumption, the cost of providing protection does not depend on the number of landlords that actually get it. Since the protection offered by Mafia-groups was more a matter of reputation rather than of effective patrolling the assumption is quite realistic. An interview with a former *gabelloto* (reported in Blok 1968, p.146) provides an illuminating example: “...cattle rustling were rampant at the time (...) when we employed a *campiere-mafioso*<sup>16</sup> the robberies stopped. We paid the man a regular yearly salary, but he only rarely inspected our farm. Now and again he would turn up. (...) he did not need to bother about much more than just these occasional visits, since he let it be known that he kept watch over that particular estate.”

The model does not deal with the acquisition of reputation, it assumes that it is exogenously determined by the previous activity of the *mafiosi* as armed guards of the baron on the same land. Indeed: “...frequently a field guard enjoys the reputation of having already committed one or two murders. Once he is surrounded by this aura his career is made and he has become a person who must be feared... a necessary

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<sup>16</sup> “Campiere” is the traditional name for the armed guard.

and therefore better paid person” (Cutrera 1900) and “...once the mafioso has succeeded in successfully playing the part of protector he is soon regarded as competent in those things...The smooth progress of his enterprise is guaranteed less by actual physical force and increasingly by this competence attributed to him” (Hess 1973).

### **3B. Solution Concept and Results.**

The timing of the game is as follows: in the first stage landlords make offers conditional to the vector of protection chosen by the Mafia in period two, in the second stage the Mafia decides how many landlords they will protect in order to maximise the sum of contributions. The equilibrium concept used here is that of coalition-proof Nash equilibrium. The analysis is based on Bernheim&Whinston (1986)’s work on menu auctions.  $(\{f_i\}_{i=1}^n, p^*)$  is a Nash equilibrium if and only if<sup>17</sup>:

(i)  $f_i(p) \geq 0$  for every  $i$  and  $p$ ;

(ii)  $p^* = \arg \max \sum_{i=1}^n f_i(p)$ ;

(iii)  $p^* = \arg \max \left( p_i(p) y_i + \sum_{j \neq i} f_j(p) \right), \quad \forall i, p$ ;

(iv) there exists  $p_i$  that satisfy (ii) such that  $f_i(p_i) = 0$  for all  $i=1 \dots n$ .

Condition (ii) must hold since the Mafia is assumed to maximise its payoff. Condition (iii) must hold otherwise landlord  $i$  could be better off by offering an infinitesimally bigger contribution for the  $p$  in which (iii) is violated. Finally condition (iv) is needed because if there was not such a

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<sup>17</sup> For the formal proofs of this and other general results see Bernheim&Whinston (1986).

value, landlord  $i$  could be strictly better off by lowering his offers for every choice without affecting the Mafia's decision.

Bernheim&Whinston (1986) show that every truthful Nash equilibrium, defined as a Nash Equilibrium supported by truthful strategies<sup>18</sup>, is coalition-proof; that essentially truthful equilibria are the only coalition-proof equilibria; and that players can choose to play truthful strategies at no cost (i.e. every player's best response correspondence contains a truthful strategy). Formally,  $f_i(.)$  is a truthful contribution schedule if and only if:

$$f_i(p, W_i) = \max(0, \mathbf{p}_i(p)y - W_i)$$

Where  $W_i$  is some base level of welfare.

A truthful strategy is such that for every  $p$  the landlords offer their "net willingness to pay" that is, for every  $p$  they offer an amount that is equal to the difference between their gross payoff at  $p$  and some base level gross payoff.

Bernheim&Whinston (1986) provide a characterisation of the set  $F(p)$  of net payoffs ( $q$ ) that bidders receive in a truthful Nash equilibrium. Since landlords are identical in this model the set of payoffs is:

$$\Phi(p) \equiv \left\{ q \in R^n \mid \forall k = 1 \dots n, kq \leq n\mathbf{p}(p)y - (n-k)\mathbf{p}(p^{-k})y \right\} \quad (3)$$

and its Pareto efficient frontier:

$$E(p) \equiv \left\{ q \in R^n \mid q \in \Phi(p) \text{ and there does not exist } q' \in \Phi(p), \text{ with } q' \succ q \right\} \quad (4)$$

The following lemmas characterise the solution.

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<sup>18</sup> Formally,  $ky + (n-k)(1 - \mathbf{p}_{n-k}(p^{-k}))y \geq (1 - \mathbf{p}^*)Y$  is a Truthful Nash Equilibrium (TNE) if it is a Nash equilibrium and  $(\{f_i\}_{i=1}^n)$  are truthful strategies with respect to  $p^*$ .

**Lemma 1.** *The TNE vector of protection must satisfy:*

$$p^* = \arg \max \sum_{i=1}^n p_i(p) y \quad (5)$$

**Lemma 2.** *The protection vector  $p=[1,1..1]$  (every landlord buys protection) is always a TNE protection vector.*

**Lemma 3.** *If  $p^* > (n-1)/n$ ,  $p=[1,1..1]$  is the unique TNE. If  $k$  s.t. for all  $k < k'$   $p^* < (n-k)/n$ ; then all the vectors such that  $k (< k')$  landlords are protected are TNE protection vectors.*

**Lemma 4.** *The sum of landlords' contributions is the same in any TNE.*

In what follows only the equilibrium such that every landlord is protected will be analysed. This is without loss of generality since all equilibria are equivalent with respect to the sum of the contributions received by the Mafia.

**Lemma 5.** *The equilibrium contributions are uniquely determined. In the equilibrium where every landlord is protected, each landlord pays:*

$$f(p^*) = (n-1) \left( \min \left\{ 1, \frac{n}{n-1} p^* \right\} - p^* \right) y$$

Proof: see Appendix.

Intuitively, the last landlord has to pay enough to make the Mafia-group indifferent between protecting everybody and protecting everybody but him. That is, he has to compensate for the fact that the (n-1) protected landlords are willing to pay more to leave him out. The term on the RHS represents the difference between what the (n-1) protected landlords would pay if the last landlord were left out and what the (n-1) protected landlords would pay if the last landlord were protected as well.

Lemma 1 to 5 yield the following:

**Proposition 1:** *The payoff of the Mafia-group is always non-decreasing in the number of landlords. For given  $Y$  and  $p^*$ , mafiosi's payoff is increasing in  $n$  until  $n=1/(1-p^*)$ , and constant thereafter.*

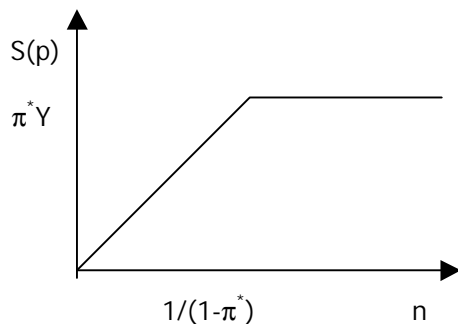
Proof :

From lemma 3 mafiosi's payoff in the TNE is given by:

$$\begin{aligned}
 S(p^*) &= \sum_{i=1}^n f_i(p^*) = (n-1)(1-p^*)Y & n < \frac{1}{1-p^*} \\
 &= p^* Y & n \geq \frac{1}{1-p^*}
 \end{aligned}
 \tag{6}$$

Taking the derivative of (6) with respect to  $n$  proves the result.

**Figure 1. The Mafia's payoff (when  $\pi^*$  is exogenous).**



Intuitively, the Mafia's payoff depends on  $n$  in two ways. First, as  $n$  increases the number of landlords willing to pay to keep just one without protection increases (this is captured by the  $(n-1)$  term in (6)). Second, the probability of getting one's income stolen when all but one landlord are protected is increasing in  $n$  for  $n$  large. That is, when the land is divided among a few, the share of each is such that if only  $(n-1)$  are protected their probability of being robbed is zero. In

other words the income of the unprotected landlord is high enough to satisfy the constraint in (1). Then, the difference in gross payoff for each of the  $(n-1)$  protected landlords in the case when the  $n^{\text{th}}$  is not protected and when he is, equals  $(1-p^*)y_i$ . For  $n$  sufficiently large the share of the last unprotected landlord is too small and something must get stolen from those who are protected. In this case the difference in gross payoffs is equal to  $\left(\frac{n}{n-1}p^* - p^*\right)y$ , which is decreasing in  $n$ . Since when  $n$  is small relative to  $p^*$  the first effect prevails, for  $n$  small the Mafia's payoff is increasing in  $n$ . When  $n$  is large the surplus received by the Mafia is constant in  $n$  because the increase in the number of landlords who are willing to pay to keep just one out is exactly matched by the decrease in the difference of gross payoffs.

From (6) it is possible to infer the following:

**Fact 1.** *Given  $n$  and  $p^*$ , an increase in the assets in need of protection ( $Y$ ) increases the payoff of the Mafia.*

Fact 1 implies that if as a consequence of land fragmentation the assets in need of protection increase, the effect of land fragmentation on the profits of the Mafia is even stronger.

### **3C. The level of Mafia activity.**

The model can be modified to take into account that, even if in the short run the Mafia's policing technology has an exogenous upper limit, in the long run the Mafia will choose  $\pi^*$  in order to maximise its profits. Formally  $\pi^*$  can be endogenised by transforming the game into a three stage game in which the Mafia chooses  $\pi^*$  in the first stage. Equation (6) leads to:

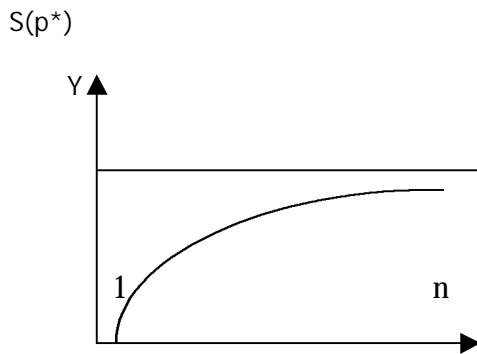
**Proposition 2.** For any  $Y$ , the Mafia-group's payoff is maximised when  $p^*=(n-1)/n$ . Hence the Mafia will offer more protection (higher  $p^*$ ) when there are more landlords.

Intuitively, the Mafia's surplus is increasing in the level of competition between landlords, which, in turn, is maximised when up to  $(n-1)$  landlords can receive their full income.

Proposition 2 leads to:

**Fact 2.** The surplus of the Mafia is equal to  $S=(n-1)Y/n$ , which is increasing in  $n$  and  $Y$ . Moreover, the effect of an increase in the number of landlords on the profits of the Mafia is stronger if there are many assets in need of protection. Similarly, the effect of an increase in the assets in need of protection is stronger if there are many landlords.

**Figure 2. The Mafia's payoff (when  $\pi^*$  is endogenous).**



**3D. Related Issues.**

The model is “demand” driven, in the sense that by offering contributions the landlords play an active role. Alternatively one could assume that the Mafia behaved as a monopolist, setting the price and forcing payment. A model in which landlords play an “active” role, however, is better suited to explain the rise of the Mafia than a model in which a newly formed

group is assumed to be able to impose its decisions on other, traditionally more powerful, people.

In the model, the Mafia is treated as a single agent. This assumption rules out the analysis of the internal structure of the groups and of the competition among different groups. The internal dynamics of the group bear no consequence for the analysis since the group interacted like a single entity with the outside world. Each group was characterised by a well defined hierarchical structure, norms for “career advancement” were very precise, as were punishment for betrayal or failure. Generally members of the same family covered the most important positions, while common criminals or desperate peasants were occasionally employed for casual, often “dirty”, jobs. The management of the group was transferred from father to sons to maintain the “name” and hence the reputation. Ruling out competition among different groups is of no consequence either. Indeed, although groups might sometimes have competed for the control of a certain territory, the landlords could not benefit from it. Due to the way it was conducted, competition ended quite rapidly and landlords in a given area would always face only one group, even if a different one from time to time.

#### **4. Theoretical Predictions and Empirical Evidence.**

The model predicts that the profits of the Mafia depend positively on the number of landlords ( $n$ ) and on the quantity of assets in need of protection ( $Y$ ). Since landlords compete for protection, an increase in the number of landlords increases the Mafia’s profits for any level of  $Y$ . Moreover, the effect of land fragmentation on the Mafia’s profits is stronger the higher the need for protection; i.e. the higher  $Y$ .

Data on profits are unavailable but since higher profits increase the probability that a Mafia is active in a town, the predictions of the model can be tested with data on the presence of Mafia in different towns. Using the information on Mafia activity from the 1881 Parliamentary Inquiry, the following variables were coded for seventy towns:

- (i) **presence of Mafia-groups (Mafiad).** Mafiad=1 if there is evidence of Mafia activity in the town. This information was extracted from interviews with the Chief Prosecutor of each town.<sup>19</sup>
- (ii) **intensity of Mafia activity (Mafia).** Mafia=0,1,2,3 if there is no Mafia activity, if there is some Mafia activity, if there is Mafia activity and if Mafia activity is very strong. This information was extracted from interviews with the Chief Prosecutor of each town as well.
- (iii) **proxy for number of landlords (frag).** The information on the degree of land fragmentation is used as a proxy for the number of landlords in each town. Information on land fragmentation was extracted from interviews with town mayors, who were asked to report whether most of the land was concentrated in small, medium or large landholdings. The data are well suited for the purpose of this paper because it is possible to separate towns in which land was divided, that is where “small” and “medium” holdings prevailed, from towns in which land still belonged to a few –sometimes just one- noble families (“large” landholdings). Unfortunately, since different mayors had different opinions about the size of “small” and “medium” landholdings, the latter

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<sup>19</sup> Since they were not asked to “name names”, Prosecutors were not likely to deny the existence of Mafia out of fear.

distinction might not be very reliable. In the regressions,  $frag = 1$  if the mayor reported that most of the land was concentrated in small or medium holdings.<sup>20</sup>

- (iv) **proxies for the need of protection (*thefts and vines*).** *Thefts* is a dummy variable that equals 1 if rural thefts (cattle, equipment and produce) are frequent. Since the need for protection is stronger in towns where thefts are frequent the variable is used as a proxy for Y. The information on thefts was collected through interviews with the town Chief Prosecutor. *Vines* is the ratio of vineyards to total cultivated land. Since vines are more valuable than grain crops and hence need more protection; the variable *vines* is thus used as a proxy for Y.
- (v) **province dummies ( $prov_i$ )** The sample towns are located in four different provinces. Since justice and other State services were managed at the province level, province dummies are included in the regressions to control for different service quality.

Table 1 reports Mafia activity by province and shows that, as discussed above, Mafia activity was not common in Eastern Sicily.

**TABLE 1 – MAFIA ACTIVITY BY PROVINCE**

Province	Towns where Mafia is active <sup>1</sup>	Towns for which data is available	Mafia towns as % of total
Catania (East)	2	24	8%
Siracusa (East)	2	20	10%
Messina (East)	3	25	12%
Palermo (West)	8	23	35%
Caltanissetta (West)	6	15	40%
Trapani (West)	6	13	46%
Girgenti (West)	11	19	58%

1) Towns in which Mafia activity is reported to be medium or strong.

<sup>20</sup> The author of the survey reports that on average small landholdings were smaller than 20ha, medium were larger than 20ha and smaller than 200ha and large were larger than 200ha (often larger than 1000ha). Unfortunately many of the mayors who used a different criterion did not report it precisely enough.

Table 2 presents some descriptive statistics for the Western towns in the sample: it shows that Mafia was active in more than half of the towns and very active in eleven cases. It also shows that Mafia did not generally exist in towns where large landholdings prevailed. There is indeed evidence of significant activity only in 3 towns out of 15. Conversely, the Mafia was quite active in about 50% of the towns with medium and small landholdings.

**TABLE 2 – MAFIA ACTIVITY AND LANDSIZE**

<b>Land Distribution → Mafia Activity ↓</b>	<b>Small or Medium</b>	<b>Large</b>	<b>TOTAL</b>
<b>None</b>	22 (40%)	9 (60%)	31 (44.3%)
<b>Some</b>	5 (9%)	3(20%)	8 (11.4%)
<b>Medium</b>	17 (31%)	3(20%)	20 (28.6%)
<b>Strong</b>	11 (20%)	0 (0%)	11 (15.7%)
<b>TOTAL</b>	55 (78.6%)	15 (21.4%)	70 (100%)

The first column of Table 3 estimates the probability of Mafia being active as a function of the number of landlords and of thefts, which proxies the need of protection. In the model both variables have a positive effect on the profits of the Mafia and the effect is stronger if the variables increase jointly. The presence of Mafia in a town is a signal that its profits are high enough to make the enterprise viable; hence the effect of land reform and of the need of protection on profits is partially reflected on their effect on the probability of observing Mafia activity in a town. The results show that Mafia was more likely to be active in towns where both the competition for protection (many landlords) and the need for protection (proxied by thefts) are strong; that is the coefficient on the interaction term *frag\*thefts* is positive and significant.

Since both the coefficients on the number of landlords and on thefts are not significant separately, the data suggest that if there is not much need for protection (*thefts=0*) the

competition among landlords is not strong enough to generate Mafia activity. In other words, if there is not much need for protection the competition among landlords might still increase the profits of the Mafia but not enough to make the enterprise viable. At the same time, if there is no competition for protection ( $frag=0$ ) the need for protection *per se* does not generate Mafia activity either.

Since the Mafia sold protection, the number of thefts in equilibrium is likely to be endogenous.<sup>21</sup> Note that, however, because of endogeneity, the coefficient is biased *downwards* as there should be less thefts in towns where Mafia protection is available.

**TABLE 3 – THE PRESENCE OF MAFIA ACTIVITY**

Probit Estimates. Dependent Variable  $Mafiad=1$  if there is Mafia activity in the town.

	(1)	(2)	(3)	(4)
frag	-.22 (-.42)			
thefts	.24 (.32)			
frag*thefts	1.54 (1.72)	1.62 (3.52)	.81 (1.59)	.94 (2.02)
vines			1.98 (.99)	
frag*thefts*vines			5.29 (1.94)	3.61 (2.14)
prov <sub>1</sub>	.60 (.96)	.44 (.84)	.44 (.82)	.44 (.86)
prov <sub>2</sub>	-.99 (2.16)	-1.02 (-2.22)	-1.09 (-2.28)	-1.13 (-2.29)
prov <sub>3</sub>	-1.14 (-2.21)	-1.18 (-2.33)	-1.09 (-2.09)	-1.15 (-2.33)
Pseudo-R <sup>2</sup>	.31	.30	.33	.33
NOBS	70	70	70	70

T-statistics (based on robust standard errors) in parenthesis.

The third and fourth columns of Table 3 include the variable *vines* as a proxy for assets in need of protection. The coefficient of the interaction term is positive and significant, suggesting

that an increase in the need for protection magnifies the effect of land fragmentation on the profits of the Mafia. The coefficient on *vines* alone is not significant, which suggests that if there is no competition for protection an increase in the need of protection does not increase the Mafia's profits enough to generate Mafia activity.

Table 4 estimates the intensity of Mafia activity as function of the variables above. The results are similar but the estimates are less precise.

**TABLE 4 – THE PRESENCE & INTENSITY OF MAFIA ACTIVITY**

Ordered Probit Estimates. Dependent Variable: Mafia=0,1,2,3 if Mafia activity in the town is zero, weak, medium, or strong.

	(1)	(2)	(3)	(4)
frag	.09 (.18)			
thefts	.38 (.59)			
frag*thefts	1.07 (1.46)	1.42 (4.60)	1.08 (2.41)	1.07 (2.72)
vines			.03 (.02)	
frag*thefts*vines			2.10 (.94)	2.14 (1.45)
prov <sub>1</sub>	.66 (1.59)	.64 (1.65)	.72 (1.83)	.72 (1.83)
prov <sub>2</sub>	-.37 (-.93)	-.33 (-.86)	-.37 (-.94)	-.37 (-.94)
prov <sub>3</sub>	-.80 (-1.72)	-.78 (-1.72)	-.80 (-1.71)	-.80 (-1.73)
Pseudo-R <sup>2</sup>	.16	.16	.17	.17
NOBS	70	70	70	70

T-statistics in parenthesis.

Finally, Table 5 estimates the intensity of Mafia activity in the sub sample of towns where Mafia is active. The results show that Mafia is more active where land is more fragmented; that is the coefficient of *frag* is positive and significant. Interestingly, thefts seem to matter for the existence

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<sup>21</sup> On the other hand, since the Mafia started after land reform, there is no reason to suspect reverse causality for the *frag* variable.

but not for the intensity of Mafia activity: the coefficient on the variable *thefts* is never significant in the sub-sample with positive Mafia activity. The results suggest that, conditional on Mafia being active, its level of activity mostly depends on the competition among landlords. Column (2) uses *vines* instead of *thefts* as a proxy of the need of protection. The results show that, again, the coefficient of *frag* is positive and significant. The coefficient of *vines* is positive, as expected, but not significant.

**TABLE 5 – THE INTENSITY OF MAFIA ACTIVITY**

Ordered Probit Estimates. Dependent Variable: Mafia=1,2,3 if Mafia activity in the town is weak, medium, or strong.

	(1)	(2)	(3)
Frag	1.62 (1.88)	1.53 (2.54)	1.39 (2.41)
Thefts	.35 (.29)		
frag*thefts	-.30 (-.22)		
vines*			1.70 (1.11)
prov <sub>1</sub>	.15 (.27)	.16 (.31)	.34 (.65)
prov <sub>2</sub>	1.22 (1.79)	1.32 (2.51)	1.28 (2.17)
prov <sub>3</sub>	-.09 (-.14)	-.05 (-.08)	-.10 (-.17)
Pseudo-R <sup>2</sup>	.15	.15	.16
NOBS	39	39	39

T-statistics in parenthesis. \* The interaction term *frag\*vines* is excluded because it is strongly (.95) correlated with *vines*.

The empirical analysis has two main limitations. First, all the variables, except *vines*, are based on subjective judgements and therefore are likely to be measured with error. It is, however, hard to find a reason as to why the bias should go in a particular direction. Second, since there are no controls apart from the province dummies, omitted variables might be driving the results. For instance, similar estimates would be obtained if publicly provided security were systematically lower in towns with more land fragmentation –which might occur because larger landowners are

more effective at lobbying for public resources— even if there were no competition among landlords.

Conditional on these inevitable limitations, however, the available empirical evidence seems to be at least consistent, and certainly not against, the predictions of the model.

## **5. Conclusions.**

The Mafia developed in nineteenth-century Western Sicily as an autonomous supplier of private protection. The menu-auction model presented in this paper shows how land reform strengthened the demand for protection and fostered the rise of the Mafia. The result follows from the intuition that since by buying protection a landlord imposes a negative externality on the others, an increase in the number of landlords generates competition for protection and increases the profits of the Mafia. The model shows that land fragmentation generates competition for protection even if the assets in need of protection do not increase and that the competitive effect of land reform is larger where there are more assets in need of protection. The model has also predicts that the Mafia is more active in areas where landholdings are more divided. The predictions of the model seem to be consistent with the evidence from a sample of 70 Western Sicilian towns in 1881. The estimates suggest that the Mafia was more likely to be active in towns where land was more divided and the need of protection stronger.

In contrast with theories that maintain that the Mafia emerged because landlords lost their power after the abolition of feudalism, this paper illustrates how monopoly over violence was voluntarily transferred from landlords to the Mafia with mutual advantage to both parties. There is indeed no evidence that the abolition of feudalism curtailed the power of the landlords: the aristocracy did not lose their ancient privileges and the new landlords rapidly acquired them. Rather, landowners maintained the tradition of paying a private army for protection. But, since

landholdings were now much smaller, the same army could serve more than one party and gain from their competition.

Although there are many unsettled issues that should be addressed in future research, I think that two are particularly well suited for economic analysis. First is the study of the Mafia as an institution; that is, the study of the rules that regulate the behaviour within and among Mafia groups. Over the years, institutional rules have guaranteed stability and have easily adapted to new situations so that the Mafia has managed to survive the end of the conditions that promoted its development in the first place. The second is concerned with the effect of the Mafia on economic development and is closely related to investment incentives. It is commonly accepted that the Mafia deterred investment in Western Sicily since it would capture a considerable share of the potential returns. This has often been offered as an explanation for the lack of productive investments and the consequent economic under-development of Western Sicily. Still, if the increase in income was to be captured by the Mafia, one should wonder why the Mafia itself did not promote investment on the land. It is known that, instead, Mafia members used the proceedings of their activity to rent land or to buy some of their own. Indeed “...*the Mafia-bosses can always be found among the big tenants and landowners*” (Cutrera, 1900), but they always had poor origins (see Hess, 1973 for some good examples). Intuitively, investing might have been sub-optimal because it would have undermined the conditions that were at the basis of the Mafia’s existence. More productive farming methods required workers to reside permanently on the land: if these methods were adopted, patrolling needs and the demand for protection would have been reduced. Also, investment would have improved the living standards of the peasants thus reducing their need to steal. Since as a consequence of economic development the demand for its services would have fallen drastically, promoting development was not in the Mafia’s best interest.

## APPENDIX

### 1. PROOFS

#### PROOF OF LEMMA 1:

From condition (ii) we know that  $p^* = \arg \max \sum_{i=1}^n f_i(p)$  which implies:

$\sum_{i=1}^n f_i(p^*) \geq \sum_{i=1}^n f_i(p)$ . From the definition of truthful strategy we know that:  $\mathbf{p}_i(p^*)y_i - \mathbf{p}_i(p)y_i \geq f_i(p^*) - f_i(p)$  for all  $i, p$ . Therefore the condition above implies that  $\sum_i \mathbf{p}_i(p^*)y_i \geq \sum_i \mathbf{p}_i(p)y_i \Rightarrow p^* = \arg \max \sum_i \mathbf{p}_i(p)y_i$ .

#### PROOF OF LEMMA 2:

It must be proved that  $p=[1,1,1..1]$  satisfies (5). That is, for every  $k=1\dots n$  it must be true that:

$$n\mathbf{p}^* y_i \geq (n-k) \min \left\{ 1, \frac{n}{n-k} \mathbf{p}^* \right\} y_i \quad (6)$$

Indeed, for  $\mathbf{p}^* \geq \frac{n-k}{n}$  (6) reduces to  $n\mathbf{p}^* \geq n-k$  which is verified.

For  $\mathbf{p}^* < \frac{n-k}{n}$ , (6) requires  $n\mathbf{p}^* \geq n\mathbf{p}^*$

#### PROOF OF LEMMA 3:

If  $\pi^* > (n-1)/n$  then  $n\mathbf{p}^* y_i > (n-k) \min \left\{ 1, \frac{n}{n-k} \mathbf{p}^* \right\} y_i$  thus  $p=[1,1..1]$  is the unique TNE.

If  $\exists k'$  s.t. for all  $k < k'$   $\pi^* < (n-k)/n$ ; then for all  $k < k'$  (6) is verified with equality thus all the vectors such that  $k (< k')$  landlords are protected are TNE protection vectors.

#### PROOF OF LEMMA 5:

The constraints in (3) can be written as:

$$kf(p^*) \geq (n-k)(\mathbf{p}_{n-k}(p^{-k}) - \mathbf{p}^*)y_i \quad (7)$$

for  $k=1\dots n$

The intuition is that when  $k$  landlords are not receiving protection, to receive it they must pay enough to make *Mafia*-groups indifferent between receiving higher contributions by the  $(n-k)$  protected and receiving lower contributions from everybody. (7) derives from (1), (3) and the definition of truthful strategy.

I show that if (7) is satisfied for  $k=1$ , it is satisfied for all  $k$ .

Using (1) and  $k=1$ , (7) implies:

$$f_i(p^*) \geq (n-1) \left( \min \left\{ 1, \frac{n}{n-1} p^* \right\} - p^* \right) y_i \quad (8)$$

There are 3 cases depending on the magnitude of  $\pi^*$ :

♦ *Case I*

$$p^* > \frac{n-1}{n} \Rightarrow p^* > \frac{n-k}{n}, \forall k$$

(8) implies:

$$f_i(p^*) \geq (n-1)(1-p^*)y_i \Rightarrow kf_i(p^*) \geq k(n-1)(1-p^*)y_i$$

Thus (7) is satisfied for every  $k>1$  since:

$$k(n-1)(1-p^*)y_i > (n-k)(1-p^*)y_i$$

♦ *Case II*

$$p^* < \frac{n-k}{n}, \forall k$$

(8) implies:

$$f_i(p^*) \geq p^* y_i \Rightarrow kf_i(p^*) \geq k p^* y_i$$

(7) is satisfied since its RHS is equal to  $k\pi^*y$ .

♦ *Case III*

$$p^* < \frac{n-1}{n}$$

$$\exists k' | \forall k > k', p^* > \frac{n-k}{n}$$

for all  $k < k'$  see case II.

For  $k > k'$ , (7) is satisfied since:

$$k p^* y_i > (n-k)(1-p^*) y_i$$

$$\text{for } p^* > \frac{n-k}{n}$$

Fact 3 follows from (4).

#### **PROOF OF LEMMA 4:**

I will show that for any TNE, the sum of total contributions is the same as in the TNE where every landlord is protected. Take the TNE protection vector  $p^*$  in which  $k^*$  landlords are not protected. Equilibrium offers are uniquely determined and are equal to:

$$f(p'') = \frac{n}{n-k''} p^* y$$

Therefore since only  $(n-k'')$  landlords pay, the Mafia-group's surplus is equal to  $S(p'') = \pi^* Y$ , which is equal to  $S(p^*)$ , as required.

To prove that  $f(p'')$  are the equilibrium offers for  $p''$ , rewrite the constraints in (3) as:

$$(k - k'') f(p'') \geq (k - k'') \frac{n}{n-k''} p^* y - n p^* y + (n - k) \min \left\{ 1, \frac{n}{n-k} p^* y \right\}$$

then one can prove that if the expression above holds for  $k''+1$ , it holds for any  $k$ .

## 2. DATA SOURCES

I have coded the information contained in the "Inchiesta Iacini: Atti della Giunta per l'inchiesta agraria e sulle condizioni della classe agricola" –Vol XIII part I and II, books 1 to 5– Relazione del delegato tecnico per la Sicilia Abele Damiani. Pages and volumes number as reported below.

### 1. DATA ON MAFIA ACTIVITY, MAFIA ACTIVITY INTENSITY, AND THEFTS

Vol XIII, part 2, book A: pp 373-85 (Caltanissetta), pp 421-443 (Girgenti), pp 473-93 (Palermo), pp 509-520 (Trapani), pp521-543 (summary tables).

### 2. DATA ON LAND FRAGMENTATION

Vol XIII, part 2, book A: pp 1-35 (Caltanissetta), pp 95-147 (Girgenti), pp 205-267 (Palermo), pp 313-351 (Trapani).  
Vol XII, part 1, book B: summary tables.

### 3. DATA ON VINEYARDS

Vol XII, part 1, book B: summary tables.

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