Social Capital and the Monopoly of Violence: An Empirical Analysis of the Rise of Sicilian Mafia*

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Abstract

Organized crime has long been understood as a private sector response to lack of property rights enforcement by the State (Gambetta, 1996). However, it remains an empirical question why some regions characterized by weak formal institutions develop mafia type organisations and others do not. We rely on a new dataset of socio-political variables at the municipal level to investigate the determinants of the rise of the Sicilian mafia at the turn of the 20th century. Opposite to a recent literature emphasizing a natural resource-curse type of mechanism (Buonanno et al., 2015; Dimico et al., 2017), we find social capital of local landowners and their (in)ability to cooperate to be a key determinant of early mafia location within Sicily. On the other hand, we find little evidence that variation in formal institutions or the social capital of the lower classes (amoral familism) affected early mafia activity.

Keywords: Crime economics, mafia, social capital, institutions, property rights.

JEL classification: K42, P48, N00.

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Contents

1 Introduction

The Sicilian mafia and other criminal organizations have been threatening the rule of law in and outside Italy since the end of the 19th century. While their economic impact has been shown to be large (Pinotti, 2015), research into their determinants has been relatively limited until recently. Works by sociologists such as Gambetta (1996) have highlighted the role of mafia-type organizations as suppliers of private protection. When public institutions and the State monopoly of violence are lacking, demand for privately enforced property rights arises and is met by criminal organizations such as the mafia. Gambetta argues post-Feudal Sicily, with its chronic institutional weakness aggravated by the Italian unification, to be a case in point in this respect. His framework has since been succesfully applied to different mafia-type organizations around the world (Varese, 2001) and formalised by a seminal paper by Bandiera (2003).

While Gambetta's model sheds important lights on the mechanism through which mafia arises, it still remains an empirical question why some areas characterized by weak institutions develop mafia activity and others do not. This paper provides new evidence on the determinants of mafia-type organizations by analyzing the heterogeneity in mafia activity intensity within Sicily at the turn of the 20th century. Recent attempts at accounting empirically for the rise of the Sicilian mafia have focused on a resource-curse type of argument. A sudden positive shock to the value of geographically concentrated natural resources, be it sulphur (Buonanno et al., 2015) or citrus (Dimico et al., 2017), fosters demand for private protection of property rights, in the absence of effective enforcement by the State.

We depart from this approach and, relying on a vast newly compiled dataset at the municipal level for the unification years, we test for institutional determinants of mafia activity in 1900, with a focus on informal institutions. In particular, in line with Gambetta's framework, lack of social capital and trust should be associated with higher demand for private protection and thus higher mafia activity. Our work therefore relates to a significant literature investigating the economic outcomes of lack of mutual trust. In a seminal work, Putnam et al. (1994) argued that differentials in social capital within Italy, shaped by middle ages local political regimes, explained the persistent economic gap between the North and the South of the country. More recent works have shown empirically a strong effect of trust on financial development within Italy (Guiso et al., 2004) and cross-country growth differentials (Algan and Cahuc, 2010). The key hypothesis of the paper is that the

effect of post-feudal disruption to property rights on the demand for mafia varied with local social capital. We argue that not only lack of trust in itself is likely to increase the value of the services provided by the mafia, but inability to cooperate and social conflict is also likely to increase the bargaining power of the mafia at the expense of the traditional elites. We investigate empirically formal institutions efficiency as well as two dimensions of social capital.

First, we use data on resort to local court and their efficiency as a proxy for spatial variation in the effectiveness of the State's monopoly of violence. Second, we ask whether "amoral familism" (Banfield, 1967), i.e. the general inability of Southern Italy's population to cooperate outside of the structures of the nuclear family, might have played a role in fostering demand for private protection. We would expect areas of Sicily with higher prevalence of nuclear families (as opposed to more cooperative-oriented extended families) to exhibit higher demand for mafia. Second, we focus on the ability of elite landowners - the key clients of mafia's protection services - to act cooperatively. We proxy elite ability to cooperate using the concentration of electoral votes at municipal elections.

Our results indicate that local landowners' social capital is a key explanatory factor for within-Sicily variation of early mafia intensity. We address a potential, even if unlikely, endogeneity bias by instrumenting elite cooperation with local land tenure characteristics dating back to the 17th century. Interestingly, the difference in social attitudes of local elites was one of the key factors highlighted by contemporary accounts (Franchetti and Sonnino, 1877) to explain variations in violence and mafia activity across Sicilian regions. On the other hand, we find no association between local mafia activity and the general population social capital ("amoral familism"). Also, resort to local courts and their efficiency have no statistical relationship with mafia intensity, suggesting that formal institutions were uniformly weak throughout Sicily and were not a sufficient condition for a surge in demand for mafia. Our findings are robust to spatial auto-correlation as well as to controlling for pre-mafia levels of local violence, proxied by the number of armed men enrolled by Garibaldi's militias in 1859 in each municipality. Importantly, we find only limited support for the resource-curse hypothesis so far put forward in the empirical literature.

Our results confirm the role of lack of trust and social capital as a key impediment to the ability of agents to transact. While the State ability to enforce a monopoly of violence has been chronically weak throughout Sicily, mafia activity arose more intensively in areas

where lack of trust and social conflict among landowners were more intense, preventing an autonomous resolution of conflicts and contract enforcement. In those area, providers of private protection such as the mafia were able to gain more power and eventually overthrow traditional elites. On the other hand, higher level of cooperation among landowners in other areas of Sicily, particularly where small landowning was more widespread, decreased the cost of contract enforcement and, in turn, demand for protection services, preventing the mafia from taking over.

2 Historical Background

2.1 A History of Foreign Domination and Ancien Rgime Persistence

The history of Sicily is one of foreign domination[1]. After Greek, Roman, Byzantine and Arab domination, Normal rule occurs from the 12th century onward. It is under the Normans that a class of local barons, receiving land in exchange for military service or through usurpation of non-Latins, began ruling the island, while nominally being subject to a foreign king. Following the death of Fredrick II, political, fiscal, military and judicial power were delegated to the feudal lords. Spanish rule from the 14th century onward further reinforced feudal tenure of the land. Barons were seen as the most effective way to rule Sicily without maintaining an army there and were then allowed to bequeath fiefs to collateral branches of the family, without land being returned to the crown. Feudal land rights were not transferable even to repay debt. The persistency of Ancien Regime political organization delayed the formation of a modern urban bourgeois class. Land concentration also implied low productivity, which increasingly became inconsistent with the lavish lifestyle of the court of Palermo. In the 17th century a partial reversal of land concentration occurred, as indebted barons founded new villages and conceded long term or perpetual land leases ("enfiteusi") to raise funds. However, with the great inflation most of the land was organized around the "gabella", a short term lease that entrusted a new bourgeois class of "gabellotti" the management of the estates. This difference in land tenure, going back to the 17th century, is important in our identification of social conflict and lack of trust as driver of mafia demand. Where land was delegated to "gabellotti" under short term leases, principal-agents conflicts were likely higher, as was the chance of social conflict between the old aristocracy and the *homines novi* managing their estates.

Social and political conflict around land property rights came to light under Bourbon rule, from the 18th century onward. On the one hand, a slow reform process of reform of feudal rights, focusing on taxation and the possibility to transfer feudal land rights, was opposed by barons till the 19th century. On the other hand, uncertainty over property rights increased with the reform of customary law, while successive uprisings and military occupation made Sicily accustomed to a high level of violence. While Sicilian feudalism was nominally abolished in 1812 under British occupation, the island returned to the

[1]See Smith and Finley (1968) for a detailed account.

Bourbons after the Congress of Vienna, continuing a slow transition from Ancien Regime to modernity.

The key consequences of this long transition were threefold. First, property rights distribution and enforcement were disrupted, with customary and feudal rule progressively abolished without being replaced by an effective property right system. Second, uncertainty over land property rights increased the power of the "gabellotti", who were increasingly able to acquire land property rights at the expense of the old aristocracy or the customary holders. Third, the experience of "independence" under British rule during the Napoleonic period fuelled Sicilian nationalism, with regular uprisings against the Bourbons leading to widespread circulation of armed militias throughout the island.

The Italian unification in 1861 further exacerbated those features, with the end of all feudal privileges, more land reform and, above all, widespread violence. As military rule was imposed on the island for more than a decade post-unification, conditions were favourable to "protection entrepreneurs" willing to fill the gap left by the State in ensuring the monopoly of violence.

Date	Event
1806	Napoleonic wars: British Occupation
1812	Formal abolition of the ancien regime
1816	The island is returned to the Bourbons under the Two Sicilies Kingdom
1816	I land reform: trading in land becomes possible
1820	II land reform: Abolition of primogeniture
1838	Share of common land auctioned off
1841	Order giving peasants property rights over at least 1/5 of the common land
1860	Sicily incorported in the Kingdom of Italy
1860 - 1863	Share of Church land auctioned off
1866	Remaining share of Church land auctioned off

2.2 The Rise of the Mafia

Gambetta (1996) defines the early mafia as a business of privately supplying protection and (in)formal contracts enforcement, thriving when publicly supplied protection and trust are lacking. He argues post-feudal Sicily to be a case in point in this respect. Since the early 19th century, violence, weak law enforcement and changes in property rights definition and distribution boosted demand for private protection by Sicilys landowners. In order to meet this demand, a new class of protection entrepreneurs arose, benefiting from a democratization of violence.

In this paper we are able to measure early mafia activity in 1900, when the criminal organization was well known at the national and international level as the key power broker in the island. On the other hand, we collect data on potential institutional determinants of the mafia in the earlier period, particularly in the first years of Italian unification. We argue that, based on historical scholarship, that it is safe to assume our right-hand side variables are not influenced by the mafia itself as they go back to a period where mafia-type organizations, while active, were still marginal. In particular, the balance of power between the elite landowners and the mafia will only flip in favor of the latter by the end of the 19th century.

We distinguish three stages in the rise of the Sicilian mafia. First, prominent historian of the mafia Lupo (2004) identifies as "proto-mafia" an autonomous supplier of protection, who is able to emancipate itself from its lord with the collapse of the feudal system and provide its services to one or more barons as a private actor. This stage is characterized by what contemporary observers such as Franchetti and Sonnino (1877) defined as "democratization of violence", when the monopoly of violence is no more in the hands of the barons but not yet in the ones of the State.

A second stage in the evolution of the mafia is well described by Romano (1966). While the Italian state is unable, despite martial law, to ensure the monopoly of violence in the island, criminal organizations start to emerge out of the private protection business, acting as mediators and enforcers of contracts and expanding into traditional criminal activities. The two decades following the Italian unification are characterized by a progressive shift in bargaining power between local traditional elites, new bourgeois arose from the "gabellotti" class and mafia organizations. A third and final stage in the evolution of early mafia occurs in the 1880s, when the mafia increasingly become an autonomous power broker,

indistinguishable from the local elite. A turning point in this respect is the 1882 electoral reform. The latter significantly enlarged the political franchise, bringing entitled voters from 2% to around 7% of the population. It also made political institutions permeable to mafia influence. The influence of the mafia became apparent at the national and international level in 1893, when prominent banker and politician Emanuele Notarbartolo is murdered by mafiosi, showcasing the reach, as well as the protection, enjoyed by the organization.

3 Literature Review

While the theoretical insights of (Gambetta, 1996) and Bandiera (2003) are helpful to think about the determinants of mafia, it still remains an empirical question why some areas where the monopoly of violence has been lacking developed mafia-type organizations and others did not. This is true for Sicily and Southern Italy, which shared a number of characteristics with other regions of the Mediterranean, but also within Sicily itself. Early observers of the mafia phenomenon noted that violence and the protection business were more widespread in the Palermo area, while some of the Eastern provinces of Sicily did not experience much criminal activity. To a certain extent, spatial heterogeneity in mafia activity throughout Sicily persists to this day. A recent literature has attempted, by coding early survey of local mafia intensity, to empirically analyze the determinants of the early spatial location of the mafia.

3.1 Natural Resource Curse

Some historical studies (Colajanni, 1885; Dickie, 2004; Lupo, 2004) identify the profitable production of goods as important determinants of mafia presence. Particularly, it is commonly understood that early mafiosi tended to be employed in certain high value commodity exporting industries, such as sulphur and citrus.

A recent economic literature has attempted to provide empirical evidence to link local resources to the rise of Sicilian Mafia. They argue that the origins of mafia lie in the shock induced by a sudden increase in the value of the commodity produced locally, increasing demand for private protection in the absence of an effective monopoly of violence by the State.

Buonanno et al. (2015) analyse the importance of sulphur production as a well identified shock in local commodity prices leading to demand for private protection. During the 19th century the value of sulphur boomed, due to the sharp increase in demand from industrialised countries. Due to abundant and superficial availability, Sicilian sulphur extraction correspondingly skyrocketed, covering up to 80% of the world sulphur market by the end of the century. The authors exploit the exogenous distribution of sulphur reserves across Sicilian municipalities. Their results suggest mafia presence in the 1880s and 1900s to be strongly associated with sulphur production.

Dimico et al. (2017) focus instead on the production of citrus. In the absence of a strong national and international demand before the 19th century, lemons were mainly used for decorative purposes and for extracting essences. As in Buonanno et al. (2015), an unexpected demand shock affected the Island at the beginning of the 19th century, following Linda's discovery that citrus fruits cured scurvy. The authors claim that the market structure of citrus was uniquely suited to boosting demand in private protection. The market value and profitability of citrus was unusually high, while large fixed costs made producers sensitive to predation, which in turn was relatively easy and cheap. Again, the authors are able to document a strong relationship between commodity production and mafia intensity by the end of the 19th century.

While we believe the resource-curse argument to be credible and their empirically strategy is certainly convincing, we would also argue that commodity production alone is unable to fully account for early mafia spatial heterogeneity. It is easy to see this when comparing visual patterns of mafia presence at the municipal level (Figure A1) to the geographical clustering of citrus production (Figure A3) and, especially, sulphur caves presence (Figure A2).

3.2 Socialist Threat

Another recent empirical contribution by Acemoglu et al. (2017) attempted to explain mafia intensity at the turn of the century through the prism of the socialist threat by Peasant Fasci organization of the 1890s, which might have prompted landowners to increase their demand for private protection. The authors show the location of peasant Fasci to be both exogenously driven by drought and correlated with the presence of Mafia. We would argue that, although fascinating, the hypothesis proposed is relatively inconsistent with historical accounts which show the mafia. The latter was already well established and permeated society and political institutions by the 1890s, making it hard to argue that its causes lied in events occurring in the subsequent period.

3.3 Land Tenure

Bandiera (2003) presents a theoretical framework suggesting that land fragmentation promoted mafia activity through an increase in the demand for private protection. Bandieras

key contribution is to design externalities arising from the purchase of protection services. The intuition is that by buying protection, each landowner deflects thieves on others properties. Because of the negative externality that protection entails, every landowner rationally purchased protection, even if this lead to an inferior equilibrium for the landowning class as a whole. At the same time, the surplus received by the mafia increases with the degree of land fragmentation.

While our approach might at first seems inconsistent with Bandiera's, as we argue that areas with longstanding land fragmentation exhibited more social capital and less demand for mafia, it is important to remember that Bandiera's empirical analysis focused on the Western part of the island alone. In that part of the island land fragmentation was much more recent, and indeed was likely to increase social conflict in the absence of trust among landowners.

4 Formal Institutions, Social Capital and the Market for Private Protection

This paper tries to fill a gap in the above mentioned empirical literature by looking at institutional determinants of early mafia location, over three dimensions: formal institutions, general population social capital and elite landowners' social capital.

While it is commonly assumed that State inability to enforce a monopoly of violence was uniform throughout post-unification Sicily, this has not been empirically tested so far. To do so, we collect data on the local courts, the "Preture", who administered small to medium claims at the "mandamento" level[2] in the early 1880s. We are interested in both the degree to which local citizens bring litigation forward to the courts, as well as the ability of the courts to deal with cases in a timely manner. We would expect demand for mafia to be higher in the presence of lower efficiency of the courts, signalled by low levels of litigations or a slower turnout of judgements.

The paper's focus however lies in the role of informal institutions as a constraint to transaction and contract enforcement. We measure social capital, understood, in line with Banfield (1967) as trust and ability to cooperate outside of the inner family, at two levels.

First, we compute a measure of social capital for the general population directly inspired by the seminal approach of Banfield. He argued that one of the causes of Southern Italy's under-development lied in the lack of cooperation and trust outside of the nuclear family circle. We investigate whether variations in the prevalence of "amoral familism" within Sicily might also explain higher demand for private protection, by relying on 1861 census data.

Second, we focus on the ability to cooperate and trust each other of the key clients of mafia protection services, the landowning elite. We use electoral data to proxy social capital, adapting a well established measure to the context of an oligarchy. We argue that given similar encompassing interest of a very small electoral franchise of rich landowners, political fractionalization should be very low in the presence of social capital.

Our hypothesis is that the effect coming from disruption of property rights on demand for mafia varied with the social capital of landowners. This hypothesis is well rooted in

[2] A mandamento was generally formed by around three municipalities.

historical literature so far neglected by empirical works. Barone (1989) argues that in towns where local elites were divided by internal conflicts, the State found it difficult to enforce a monopoly of violence since landlords resorted to local protectors. An indirect reference to landowners' social capital is made in the contemporary accounts by Franchetti and Sonnino (1877), who explained the absence of violence and mafia activity in large parts of Sicily

> *(...) largely because the landowners there know how to prevail with alternative means (...). The landowning class has been able to retain the monopoly of violence and avoided sharing it with the troublemakers of the lower classes. More generally, be it because of nature or tradition, the population there is more likely to use subtlety rather than violence.*

In other words, bearing in mind the principal-agent model of Bandiera (2003), our approach implies that the characteristics of the principals matter for the equilibrium in the market for private protection and the location of the mafia. Inferior equilibria without cooperation may arise when there are no relevant social ties, nor credible punishments for the cheaters: this means that the agent (the mafia) is able to gain bargaining power and extract more rent. This might have been the case for towns where the newly empowered "gabellotti" disputed among themselves and with the old aristocracy what remained of feudal privileges. On the other hand, where a larger class of small landholders existed, "modern" cooperative behaviours might have been more widespread, reducing incentives to resort to mafia protection.

5 Data

Our paper completes existing datasets used in the empirical literature with a wide array of socio-political characteristics of Sicilian municipalities in the mid of the 19th century.

5.1 Mafia

We measure mafia intensity relying on data compiled by Cutrera (1900) and coded by Buonanno et al. (2015). Cutrera, a former law-enforcement official and one of the major experts of the phenomenon at the time, compiled a map of mafia activity in 285 Sicilian municipalities in the last decades of the nineteenth century. The intensity of mafia was assessed base on its personal experience on the field and information from police headquarters. The map can be coded into an ordinal measure of mafia activity ranging from 0 (no mafia) to 3 (high mafia intensity).

5.2 Geographical Controls and Local Production

Unless otherwise stated, geographical controls and measures of local commodity productions are taken from Buonanno et al. (2015) and Dimico et al. (2017).

We however improve on their measure of remoteness of each municipality by computing travel time distance by foot from the main town in the Province for each municipality, using Google Map API. This measure can be considered as a reliable proxy of market access at the time. Any proximity measure built using linear distances between towns or shortest path distance computed using modern roads would not be able to correctly assess the actual market access in the 19th century. On the contrary, current travel time distance by foot is likely to be proportional to the travel time distance by foot or horse at the time.

We also introduce an alternative variable to capture the effect of sulphur production, computing the concentration of ownership of caves in each municipality from the same official source employed by Buonanno et al. (2015). The sulphur variable used in the literature, the simple count of active caves, can be considered a good proxy of the sulphur endowment of each municipality. However, it does not provide any information on the

ownership distribution. Higher local competition can be a critical factor in the way supply shocks affected the demand for private protection.

5.3 Pre-Mafia Violence

We introduce a key control variable, absent from the existing literature, by introducing the level of violence prevailing in the proto-mafia period in each municipality. We proxy the availability of armed men by the number of volunteers enrolled by the Garibaldi's militias in each municipality during the 1860 invasion of Sicily. We extract more than 3,000 Sicilian volunteers from the complete list of men enrolled in the Southern Army of Garibaldi compiled by the State Archives of Turin[3], and assign each of them to their municipality of origin to compile a measure of armed volunteers per capita.

5.4 Formal Institutions

We proxy variation in formal institutions using data on the claims brought before and judged by the lower local courts ("preture"). The level of aggregation of the variable is therefore slightly bigger than a municipality and typically encompasses a small number of towns.

We test whether mafia intensity is associated with the amount of litigations per capita, the number of judgements the pretura is able to issue in a year per capita as well as the ratio of the two, as a proxy for efficiency of the local courts. The data refer to a two years average of the earliest period available and are taken from the 1881 Annuario di Statistica Giudiziaria e Civile.

5.5 Social Capital

5.5.1 Amoral Familism

We measure the potential for "amoral familist" patterns of social relationships in each municipality by, quite intuitively, computing the ratio of houses per number of house-

[3]Accessible at this address: http://archiviodistatotorino.beniculturali.it/naviga-patrimonio/progetti/alla-ricerca-dei-garibaldini-scomparsi/

holds according to the 1861 Italian Census. A number close to one of the ratio indicates prevalence of the nuclear family pattern, which was associated by Banfield (1967) to individualistic behaviours and inability to cooperate outside of the inner family circle typical of "amoral familism".

5.5.2 Social Capital of the Landowning Elite

We proxy the ability to cooperate of the landowning elite by computing the share of votes obtained by the most voted municipal councillor in the 1865 municipal elections, the first to be held in the post-unification period. As highlighted above, we adapt to an oligarchic setting a common strategy consisting in relying on electoral data to proxy social capital. We argue that low levels of vote concentration denote scarcity of social capital and inability to cooperate among landowners. This is reasonable in an environment where less than 2% of the population is entitled to vote and, as in Sicily, voters belong to a homogenous social group with encompassing interests. Figure A4 depicts the spatial variation in voting concentration patterns. It is important to note that vote concentration is note driven by small size municipalities.

5.6 Long Run Land Tenure Patterns

We also collect data on the historical prevailing land tenure in each municipality. We want to identify municipalities which, through the establishment of new villages and long run land leases, experienced early on small land holding, from the ones which only became exposed to property fractionalization after the abolishment of feudalism.

We argue that concentration of population in the town center, as opposed to population living in scattered houses or "secondary" villages, in 1861 reflected long run trends in land tenure in each municipality. Particularly, a scattered mode of residence is likely to have been associated with small landholdings dating back to the 17th century "enfiteusi" contracts, while a concentrated mode of residence is more typical of the latifundia, dominated by large properties and wage laborers.

6 Empirical Strategy

6.1 Basic Specification (OLS)

Our baseline specification, first estimated through OLS, reads

$$Mafia_m = \beta_0 + \beta_1 VC_m + \beta_2 NF_m + \beta_3 G_m + \beta_4 J_d + \beta_5 S_m + \beta_6 Y_m + \beta_7 Geo_m + \epsilon_m$$

- $Mafia_m$: Mafia intensity in 1900
- VC_m: Elite Social Capital (Vote concentration) in 1865
- NF_m: General Population Social Capital (Nuclear family) in 1861
- J_d: Formal institutions (Judicial efficiency at the district level) in the 1880s
- G_m: Violence (Garibaldini per Capita) in 1861
- S_m: Sulphur caves
- Y_m: Suitability to production of citrus, olives and cereals
- Geo_m: Geographic and spatial controls
- ϵ_m: Unobserved error term.

We confirm our baseline results with an instrumenting strategy and controlling for spatial-autocorrelation.

6.2 IV

We believe that our variable of interest is exogenous to mafia, as it reflects trust/cooperation levels in a "proto-mafia" environment. However, we address a possible, even if unlikely, endogeneity concern through an IV estimation.

We employ as an instrument for elite social capital the historical prevalence of the latifundia in the municipality, measured as the share of the married population living in

the town center. Our instrument is unlikely to reflect current land tenure conditions. We believe that, by and large, it reflects historical patterns of land tenure which implied different path dependences in the mode of residence of the municipality. In particular, a scattered mode of residence is likely to be the consequence of long run land lease contracts ("enfiteusi"), exogenous to current conditions in the 1860s:

1. Most of enfiteusi went back to the 17th century, when some barons attempted to attract new farmers to unused land with attractive long term or perpetual leases.

2. Water scarcity is an important condition for the intensive culture that characterises enfiteusi.

We argue that where property was historically more widespread, a class closer to a modern bourgeoisie emerged, with encompassing economic and political interest allowing for cooperative behaviours to emerge. On the other hand, the latifundia encouraged the rise of a few "gabellotti" in competition between themselves and with the traditional aristocracy for what de facto remained of the feudal privileges, leading to social conflicts and higher levels of mistrust.

6.3 SLX

Social conflicts in neighbouring areas might impact the mafia activity in a certain municipality. That is to say, exogenous characteristics of nearby observations directly affect our outcome variable. In this case, spatial concentration of social conflicts might determine an upward bias. In order to address this issue, we estimate a spatial lagged model (SLX), controlling for the average vote concentration in the 4 nearest municipalities.

$$Mafia_m = \beta_0 + \beta_1 VC_m + \beta_2 (VC_m, s) + \beta_3 NF_m + \beta_4 G_m + \beta_5 J_d + \beta_6 S_m + \beta_7 Y_m + \epsilon_c$$

- $Mafia_c$: Mafia intensity in 1900
- VC_c: Informal institutions (Vote concentration) in 1865
- (VC_m, s): average vote concentration in the 4 nearest municipalities.

7 Results

Tables 1 to 3 in Section 7.1 show the estimation results for our different specifications. We omit coefficient estimates for our formal institutions variables as they are never statistically significant above customary levels. In column (1) of Table 1, we report the results of a naive univariate regression of mafia intensity on vote concentration. The estimates are negative and significant, suggesting our measure of elite social capital in the 1860s in the 1860s to have a positive effect on the mafia intensity at the beginning of the 20th century.

In column (2), we control for violence prevailing in the proto-mafia period, measured as the share of citizens who joined the Garibaldi army in the war against the Borbons. We also control for the local endowment of citrus, cereals, olives and caves, in order to account for the exposition to demand shock that a recent literature links to the rise of Mafia. Results confirm a positive and significant relation between mafia intensity of local endowment of sulphur, cereals, and olives, corroborating findings by Buonanno et al. (2015). However, our estimated coefficients for the local production of citrus runs in the opposite direction we might have expected based on Dimico et al. (2017). As expected, the local supply of armed men played a role in the location of mafia activities. Interestingly, even controlling for these important factors, the coefficient of our main explanatory variable does not change significantly.

In columns (3), we control for geographical factors, market access and individualistic behaviours. The coefficient for amoral familism runs in the opposite direction from what one might expect. Different interpretations from the one by Banfield have been given to the prevalence of the nuclear family in the anthropological literature - Todd (1983) argues that it is associated with the development of liberal values in the 20th century - which might explain our results.

In column (4) we control for population density and cave ownership distribution. Again, results suggest vote concentration to have a negative effect on mafia intensity. The coefficients are highly significant in all our specifications with a magnitude that is economically meaningful. As an example, according to our OLS specification, a municipality with a

100% concentration of votes on the most voted municipal councillor (a rare occurrence but nonetheless present in our dataset) would experience a decrease in mafia intensity by 1.5 notches out of 3 in Cutrera's mafia intensity score. A more detailed comparison of the magnitude of the effect of social capital with respect to other factors can be gathered from standardized coefficients in Section A. Interestingly, we find a similar result for cave owneship concentration, corroborating the idea that, besides the local endowments of natural resources, social conflicts among elites could have played an important role in fostering the rise of Sicilian Mafia.

In Table 2, we replicate our main specification, instrumenting vote concentration with water scarcity and the share of the married population living in the town center. Results in columns (1) to (4) are consistent with the ones found in the OLS models. Contrary to the previous model, we do not find significant effects of proto-mafia and caves' ownership concentration on mafia intensity. On the contrary, distance from the main centre is found to positively affect the location of Mafia activities.

In Table 3, we control for spatial autocorrelation, estimating a spatial leg model. Vote concentration in the four nearest towns is found to have a negative and significant effect on our dependent variable. However, although the magnitude decreases by 40%, vote concentration in the local council is still found to have a negative and significant effect on intensity of mafia activities.

7.1 Main Specifications

Table 1: OLS

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
vote concentration	-1.798***	-1.482***	-1.412***	-1.552***
	(0.282)	(0.289)	(0.346)	(0.344)
Garibaldini		245.5***	289.9***	286.0***
		(77.43)	(76.14)	(71.68)
Citrus suitability		-0.0604***	-0.0640***	-0.0702***
		(0.0156)	(0.0159)	(0.0173)
Cereal suitability		0.0342***	0.0352***	0.0396***
		(0.00989)	(0.00991)	(0.0103)
Olive suitability		0.0214***	0.0340***	0.0322***
		(0.00812)	(0.0105)	(0.0109)
Caves				0.0975
				(0.355)
caves ownership distribution				-1.164***
				(0.439)
Population Density				0.000463
				(0.000553)
Urban dummy				-0.177
				(0.235)
Distance to port			-0.0118***	-0.0132***
			(0.00434)	(0.00480)
Distance from main center			0.337	0.461
			(0.333)	(0.338)
Nuclear Family			-0.0870**	-0.0810**
			(0.0391)	(0.0395)
Terrain ruggedness			0.00265***	0.00276***
			(0.000909)	(0.000894)
caves (N)		0.0329***	0.0315***	
		(0.0118)	(0.0106)	
Constant	2.557***	1.901***	1.633***	2.847***
	(0.226)	(0.303)	(0.577)	(0.711)
Observations	316	315	267	266
R^2	0.104	0.262	0.280	0.315
IV	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: IV

VARIABLES	(1) IV	(2) IV	(3) IV	(4) IV
vote concentration	-8.991***	-9.967**	-10.12**	-10.48**
	(2.440)	(3.910)	(4.224)	(4.483)
Garibaldini		219.7	257.9	254.6
		(170.3)	(183.8)	(183.3)
Citrus suitability		-0.0111	-0.00263	-0.00690
		(0.0398)	(0.0487)	(0.0512)
Cereal suitability		0.0448**	0.0278	0.0394
		(0.0222)	(0.0262)	(0.0271)
Olive suitability		-0.0384	-0.0454	-0.0605
		(0.0314)	(0.0408)	(0.0486)
Caves				1.156*
				(0.696)
caves ownership distribution				-1.199
				(0.745)
Population Density				0.000388
				(0.000985)
Urban dummy			-0.632	-0.672
			(0.474)	(0.481)
Distance to port			-0.00699	-0.00756
			(0.0100)	(0.0102)
Distance from main center			2.390**	2.752**
			(1.171)	(1.350)
Nuclear Family			0.00657	0.0316
			(0.0894)	(0.0899)
Terrain ruggedness		-0.00106	-0.00259	-0.00209
		(0.00235)	(0.00297)	(0.00292)
caves (N)		0.0469***	0.0484**	
		(0.0180)	(0.0210)	
Constant	7.953***	9.306**	9.624**	10.86**
	(1.833)	(3.866)	(3.928)	(4.229)
Observations	276	275	237	236
R^2	-1.609	-1.893	-1.620	-1.608
IV	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: SLX

VARIABLES	(1) SLX	(2) SLX	(3) SLX
vote concentration	-0.980***	-0.907***	-0.867**
	(0.312)	(0.290)	(0.348)
SL Vote Concentration	-3.103***	-2.788***	-2.790***
	(0.452)	(0.456)	(0.548)
Garibaldini		201.0***	230.3***
		(67.32)	(65.18)
Citrus suitability		-0.0542***	-0.0439**
		(0.0149)	(0.0171)
Cereal suitability		0.0406***	0.0350***
		(0.00958)	(0.0108)
Olive suitability		0.00641	0.0127
		(0.00814)	(0.0113)
caves_tot		0.0357***	0.0344***
		(0.00952)	(0.00942)
Population Density			0.000650
			(0.000441)
Urban dummy			-0.0289
			(0.231)
Distance to port			-0.00534
			(0.00458)
Distance from main center			0.348
			(0.316)
Nuclear Family			-0.0965**
			(0.0416)
Altitude, dummy			0.000375**
			(0.000165)
Terrain ruggedness			0.000582
			(0.000978)
Constant	4.265***	3.797***	3.522***
	(0.305)	(0.420)	(0.685)
Observations	316	315	266
R^2	0.222	0.346	0.372

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

8 Robustness Checks

We run different specifications to check the robustness of our results. In Annex B, we show results to be consistent when we drop the cities with more than 250,000 inhabitants. We find similar results when dropping smallest towns (below 10,000 inhabitants).
Our results are also robust to the inclusion of all the control variables found in Buonanno et al. (2015) and Dimico et al. (2017) and not shown in our main specifications.

9 Conclusion

Our analysis of the institutional determinants of the rise of Sicilian mafia finds that social capital and the (in)ability of local elites to cooperate played a critical role in the early geographical spread of the Mafia. We provide empirical support to Gambettas model of the Mafia as an answer to state and markets failures, accounting for the institutional channels through which demand for private protection arises. We also corroborate early findings regarding the role of social capital as a key constraint to the ability of agents to establish contracts, particularly in trust lacking Southern Italy.

We argue that the origins of the Mafia go back to a wide ranging reform of property rights, enacted in a context of low state capacity combined with low social capital amongst landowners. This led to an increase in the demand for private protection by the mafia and the eventual overthrow of the traditional elite by the mafia itself.

Our findings are consistent with contemporary observations by Franchetti and Sonnino (1877) that the difference in violence levels across Sicilian municipalities was driven by the ability of some of the local ruling classes in resorting to alternative means, cooperating to maintain the monopoly of violence.

All in all, our paper confirms the key role of trust in driving economic development and sustaining democratic institutions. Particularly, it provides another example of the adverse consequences a longstanding pattern of mistrust has had on social and economic outcomes in Southern Italy.

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Appendix

A Standardised coefficients

Table 4: OLS

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
vote concentration	-0.322***	-0.266***	-0.253***	-0.278***
	(0.0506)	(0.0518)	(0.0621)	(0.0616)
Garibaldini		0.169***	0.200***	0.197***
		(0.0533)	(0.0524)	(0.0494)
Citrus suitability		-0.406***	-0.430***	-0.471***
		(0.105)	(0.107)	(0.116)
Cereal suitability		0.336***	0.346***	0.389***
		(0.0971)	(0.0973)	(0.102)
Olive suitability		0.235***	0.374***	0.354***
		(0.0893)	(0.116)	(0.120)
Caves				0.0271
				(0.0987)
caves ownership distribution				-0.240***
				(0.0908)
Population Density				0.0550
				(0.0657)
Urban dummy				-0.0557
				(0.0743)
Distance to port			-0.209***	-0.234***
			(0.0769)	(0.0850)
Distance from main center			0.0698	0.0957
			(0.0691)	(0.0701)
Nuclear Family			-0.0954**	-0.0887**
			(0.0428)	(0.0433)
Terrain ruggedness			0.260***	0.272***
			(0.0895)	(0.0880)
caves_tot		0.0284***	0.0272***	
		(0.0101)	(0.00918)	
Constant	0	-0.0427	-0.00845	0.0390
	(0.0533)	(0.0511)	(0.0550)	(0.0521)
Observations	316	315	267	266
R^2	0.104	0.262	0.280	0.315
IV	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: IV

VARIABLES	(1) IV	(2) IV	(3) IV	(4) IV
vote concentration	-1.612***	-1.786**	-1.814**	-1.879**
	(0.437)	(0.701)	(0.757)	(0.804)
Garibaldini		0.151	0.178	0.175
		(0.117)	(0.127)	(0.126)
Citrus suitability		-0.0748	-0.0177	-0.0463
		(0.267)	(0.327)	(0.344)
Cereal suitability		0.440**	0.273	0.387
		(0.218)	(0.258)	(0.266)
Olive suitability		-0.422	-0.499	-0.665
		(0.345)	(0.449)	(0.535)
Caves				0.321*
				(0.193)
caves ownership distribution				-0.248
				(0.154)
Population Density				0.0461
				(0.117)
Urban dummy			-0.199	-0.212
			(0.149)	(0.152)
Distance to port			-0.124	-0.134
			(0.178)	(0.180)
Distance from main center			0.496**	0.571**
			(0.243)	(0.280)
Nuclear Family			0.00720	0.0346
			(0.0979)	(0.0985)
Terrain ruggedness		-0.104	-0.255	-0.206
		(0.231)	(0.292)	(0.287)
caves_tot		0.0404***	0.0418**	
		(0.0155)	(0.0181)	
Constant	-0.0193	-0.0780	0.00901	0.0665
	(0.0971)	(0.110)	(0.107)	(0.104)
Observations	276	275	237	236
R^2	-1.609	-1.893	-1.620	-1.608
IV	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: SLX

VARIABLES	(1) SLX	(2) SLX	(3) SLX
vote concentration	-0.176***	-0.163***	-0.155**
	(0.0559)	(0.0519)	(0.0625)
SL Vote Concentration	-0.374***	-0.336***	-0.336***
	(0.0544)	(0.0549)	(0.0660)
Garibaldini		0.138***	0.159***
		(0.0463)	(0.0449)
Citrus suitability		-0.364***	-0.295**
		(0.100)	(0.115)
Cereal suitability		0.399***	0.344***
		(0.0941)	(0.106)
Olive suitability		0.0705	0.140
		(0.0895)	(0.124)
caves_tot		0.0308***	0.0297***
		(0.00822)	(0.00813)
Population Density			0.0772
			(0.0524)
Urban dummy			-0.00912
			(0.0727)
Distance to port			-0.0946
			(0.0812)
Distance from main center			0.0722
			(0.0655)
Nuclear Family			-0.106**
			(0.0456)
Altitude, dummy			0.168**
			(0.0737)
Terrain ruggedness			0.0573
			(0.0963)
Constant	0	-0.0472	-0.0191
	(0.0498)	(0.0481)	(0.0521)
Observations	316	315	266
R^2	0.222	0.346	0.372

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B Excluding large cities

Table 7: OLS

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
vote concentration	-1.861***	-1.490***	-1.406***	-1.545***
	(0.284)	(0.290)	(0.355)	(0.351)
Garibaldini		441.2***	425.1***	421.3***
		(124.4)	(125.5)	(118.9)
Citrus suitability		-0.0569***	-0.0617***	-0.0655***
		(0.0155)	(0.0158)	(0.0172)
Cereal suitability		0.0327***	0.0337***	0.0368***
		(0.00992)	(0.00981)	(0.0103)
Olive suitability		0.0193**	0.0321***	0.0299***
		(0.00806)	(0.0105)	(0.0109)
Caves				0.105
				(0.356)
caves ownership distribution				-1.133**
				(0.440)
Population Density				0.000386
				(0.000667)
Urban dummy				-0.0813
				(0.240)
Distance to port			-0.0117***	-0.0122**
			(0.00435)	(0.00488)
Distance from main center			0.262	0.371
			(0.342)	(0.350)
Nuclear Family			-0.0953**	-0.0816*
			(0.0442)	(0.0441)
Terrain ruggedness			0.00254***	0.00266***
			(0.000943)	(0.000933)
caves_tot		0.0319***	0.0308***	
		(0.0118)	(0.0106)	
Constant	2.601***	1.903***	1.735***	2.848***
	(0.228)	(0.303)	(0.578)	(0.732)
Observations	309	308	260	259
R^2	0.112	0.271	0.284	0.317
IV	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: IV

VARIABLES	(1) IV	(2) IV	(3) IV	(4) IV
vote concentration	-8.458***	-8.582***	-8.476***	-8.743***
	(2.106)	(2.946)	(2.958)	(3.065)
Garibaldini		416.1**	238.1	256.9
		(206.0)	(248.9)	(227.3)
Citrus suitability		-0.00927	-0.00779	-0.0111
		(0.0348)	(0.0395)	(0.0413)
Cereal suitability		0.0362*	0.0213	0.0300
		(0.0200)	(0.0241)	(0.0242)
Olive suitability		-0.0317	-0.0337	-0.0457
		(0.0252)	(0.0299)	(0.0343)
Caves				0.922*
				(0.515)
caves ownership distribution				-1.176*
				(0.651)
Population Density				0.000323
				(0.00103)
Urban dummy			-0.572	-0.589
			(0.426)	(0.424)
Distance to port			-0.00830	-0.00876
			(0.00828)	(0.00843)
Distance from main center			2.016**	2.306**
			(0.937)	(1.045)
Nuclear Family			0.00689	0.0422
			(0.0775)	(0.0817)
Terrain ruggedness		-0.000934	-0.00227	-0.00181
		(0.00206)	(0.00246)	(0.00240)
caves_tot		0.0428***	0.0440**	
		(0.0161)	(0.0182)	
Constant	7.556***	8.146***	8.376***	9.472***
	(1.588)	(3.017)	(2.888)	(3.089)
Observations	271	270	232	231
R^2	-1.360	-1.255	-0.958	-0.921
IV	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: SLX

VARIABLES	(1) SLX	(2) SLX	(3) SLX
vote concentration	-1.027***	-0.905***	-0.832**
	(0.319)	(0.294)	(0.359)
SL Vote Concentration	-3.027***	-2.696***	-2.729***
	(0.465)	(0.462)	(0.558)
Garibaldini		384.1***	344.0***
		(117.6)	(108.9)
Citrus suitability		-0.0518***	-0.0405**
		(0.0149)	(0.0171)
Cereal suitability		0.0386***	0.0319***
		(0.00984)	(0.0108)
Olive suitability		0.00541	0.0123
		(0.00809)	(0.0113)
caves_tot		0.0348***	0.0336***
		(0.00963)	(0.00941)
Population Density			0.000734
			(0.000570)
Urban dummy			0.0540
			(0.237)
Distance to port			-0.00443
			(0.00463)
Distance from main center			0.259
			(0.325)
Nuclear Family			-0.106**
			(0.0447)
Altitude, dummy			0.000395**
			(0.000169)
Terrain ruggedness			0.000554
			(0.00101)
Constant	4.236***	3.714***	3.450***
	(0.307)	(0.422)	(0.697)
Observations	309	308	259
R^2	0.223	0.348	0.370

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

C Excluding small towns

Table 10: OLS

VARIABLES	(1) OLS	(2) OLS	(3) OLS	(4) OLS
vote concentration	-1.765***	-1.478***	-1.439***	-1.555***
	(0.291)	(0.296)	(0.358)	(0.356)
Garibaldini		234.1***	281.4***	276.6***
		(76.75)	(76.53)	(72.84)
Citrus suitability		-0.0573***	-0.0593***	-0.0645***
		(0.0165)	(0.0171)	(0.0185)
Cereal suitability		0.0327***	0.0311***	0.0351***
		(0.0102)	(0.0104)	(0.0109)
Olive suitability		0.0209**	0.0321***	0.0305***
		(0.00851)	(0.0112)	(0.0116)
Caves				0.0484
				(0.351)
caves ownership distribution				-1.154***
				(0.432)
Population Density				0.000445
				(0.000585)
Urban dummy				-0.0990
				(0.245)
Distance to port			-0.0127***	-0.0130***
			(0.00450)	(0.00494)
Distance from main center			0.346	0.439
			(0.337)	(0.341)
Nuclear Family			-0.0990**	-0.0939**
			(0.0401)	(0.0402)
Terrain ruggedness			0.00227**	0.00239**
			(0.000973)	(0.000962)
caves_tot		0.0319***	0.0300***	
		(0.0116)	(0.0104)	
Constant	2.573***	1.923***	1.916***	3.050***
	(0.232)	(0.312)	(0.632)	(0.752)
Observations	300	299	253	252
R^2	0.101	0.250	0.263	0.296
IV	NO	NO	NO	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: IV

VARIABLES	(1) IV	(2) IV	(3) IV	(4) IV
vote concentration	-9.022***	-9.837***	-10.50**	-10.81**
	(2.441)	(3.695)	(4.311)	(4.530)
Garibaldini		201.1	240.3	244.0
		(172.2)	(197.1)	(194.0)
Citrus suitability		-0.00900	0.00404	-0.000353
		(0.0412)	(0.0513)	(0.0535)
Cereal suitability		0.0389*	0.0188	0.0302
		(0.0230)	(0.0287)	(0.0294)
Olive suitability		-0.0362	-0.0492	-0.0637
		(0.0301)	(0.0419)	(0.0494)
Caves				1.098
				(0.693)
caves ownership distribution				-1.183
				(0.757)
Population Density				0.000191
				(0.00110)
Urban dummy			-0.725	-0.766
			(0.557)	(0.566)
Distance to port			-0.00956	-0.0101
			(0.0103)	(0.0105)
Distance from main center			2.389**	2.739**
			(1.170)	(1.335)
Nuclear Family			-0.00925	0.0240
			(0.0927)	(0.0946)
Terrain ruggedness		-0.00163	-0.00372	-0.00315
		(0.00252)	(0.00331)	(0.00324)
caves_tot		0.0436**	0.0461**	
		(0.0174)	(0.0209)	
Constant	8.026***	9.398**	10.57**	11.71***
	(1.835)	(3.739)	(4.207)	(4.461)
Observations	260	259	223	222
R^2	-1.680	-1.902	-1.869	-1.849
IV	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 12: SLX

VARIABLES	(1) SLX	(2) SLX	(3) SLX
vote concentration	-0.903***	-0.854***	-0.822**
	(0.317)	(0.295)	(0.358)
SL Vote Concentration	-3.389***	-3.095***	-3.179***
	(0.453)	(0.460)	(0.547)
Garibaldini		178.1***	212.0***
		(65.29)	(65.29)
Citrus suitability		-0.0507***	-0.0363**
		(0.0156)	(0.0181)
Cereal suitability		0.0396***	0.0302***
		(0.00981)	(0.0115)
Olive suitability		0.00454	0.00633
		(0.00841)	(0.0117)
caves_tot		0.0345***	0.0323***
		(0.00911)	(0.00879)
Population Density			0.000538
			(0.000453)
Urban dummy			0.0653
			(0.233)
Distance to port			-0.00444
			(0.00459)
Distance from main center			0.308
			(0.312)
Nuclear Family			-0.109***
			(0.0419)
Altitude, dummy			0.000308*
			(0.000168)
Terrain ruggedness			1.12e-05
			(0.00103)
Constant	4.475***	4.057***	4.207***
	(0.313)	(0.429)	(0.739)
Observations	300	299	252
R^2	0.242	0.353	0.371

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

D Graphs

Figure A1: Mafia Intensity at the Turn of the 20th Century According to

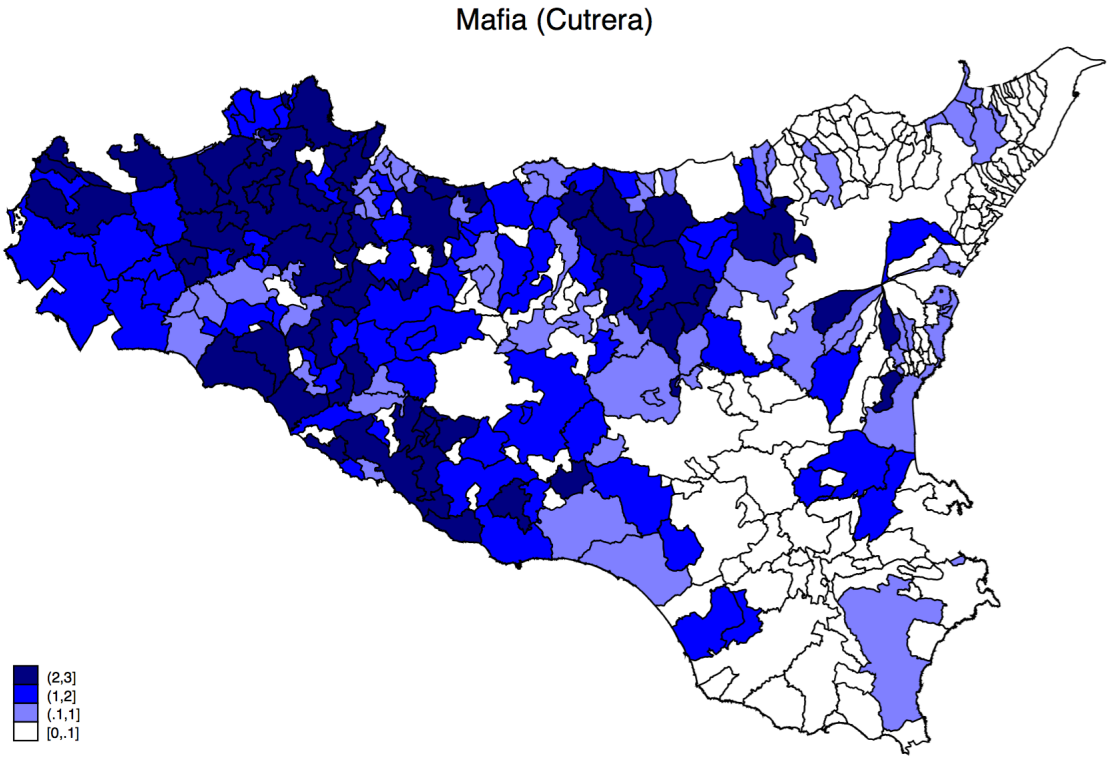

Figure A2: Presence of Sulphur Caves in Sicilian Municipalities

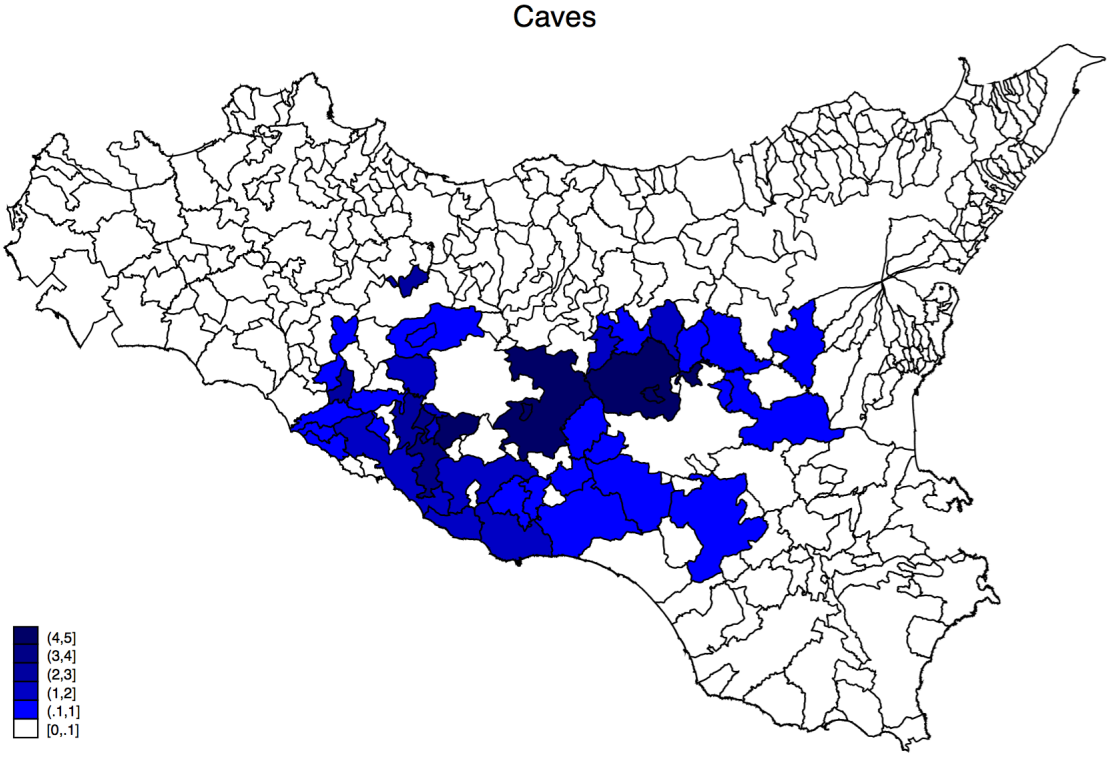

Figure A3: Production of Citrus in Sicilian Municipalities

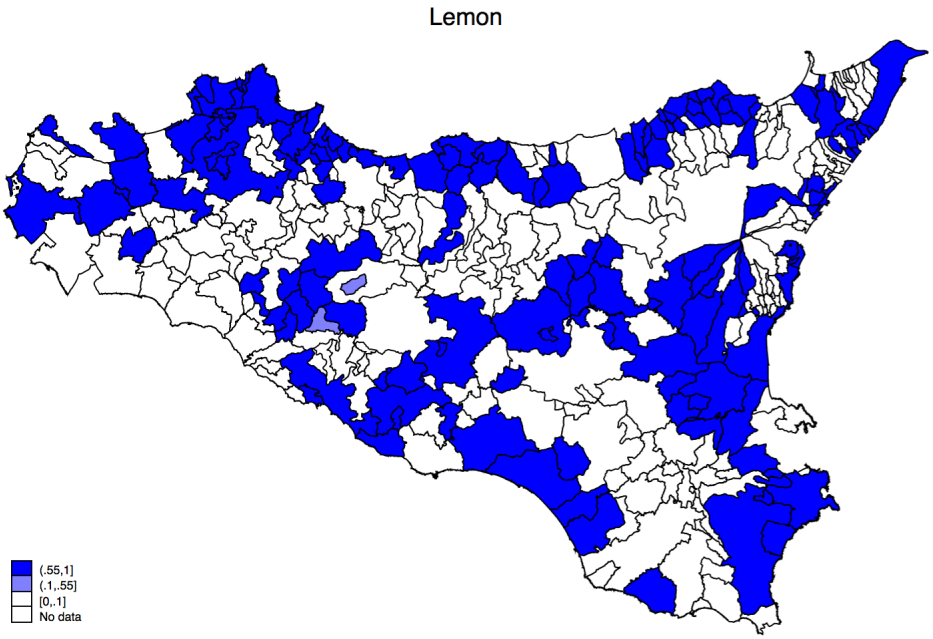

Figure A4: Votes Concentration at the 1865 Municipal Elections

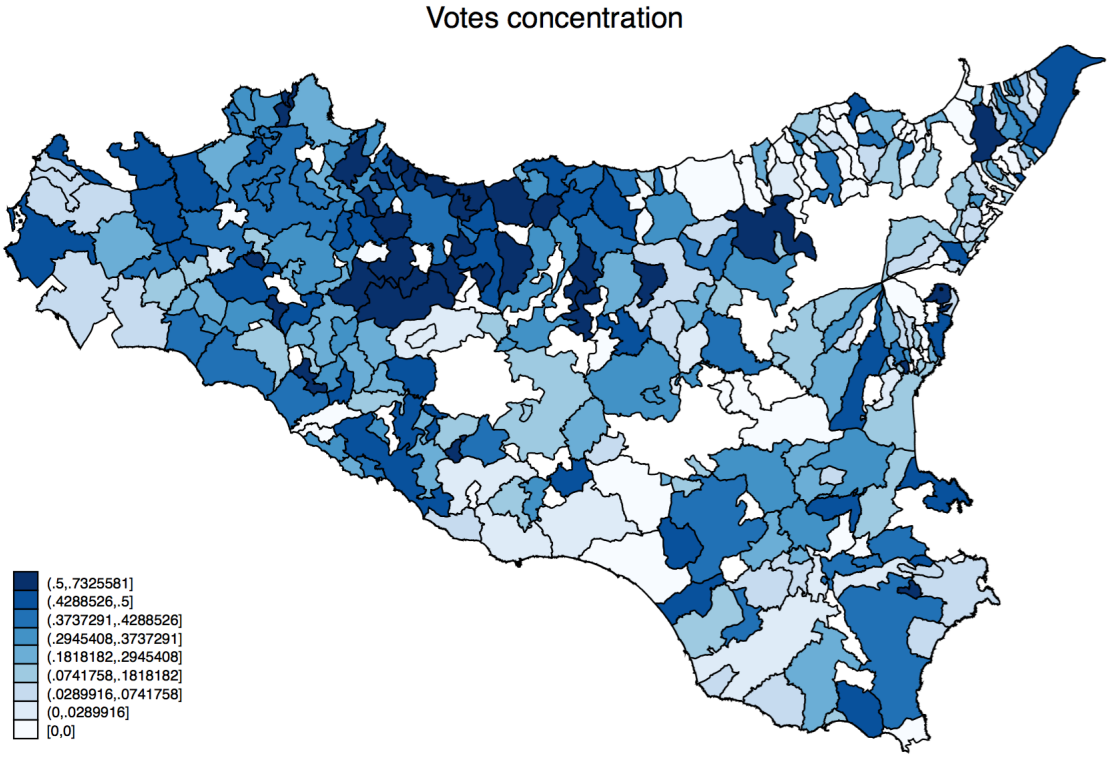

Figure A5: Share of Married Population Living in the Town Center