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Weak States: Causes and Consequences of the Sicilian Mafia[*]

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Abstract

We document that the spread of the Mafia in Sicily at the end of the 19th century was in part caused by the rise of socialist Peasant Fasci organizations. In an environment with weak state presence, this socialist threat triggered landowners, estate managers and local politicians to turn to the Mafia to resist and combat peasant demands. We show that the location of the Peasant Fasci is significantly affected by a severe drought in 1893, and using information on rainfall, we estimate the impact of the Peasant Fasci on the location of the Mafia in 1900. We provide extensive evidence that rainfall before and after this critical period has no effect on the spread of the Mafia or various economic and political outcomes. In the second part of the paper, we use the source of variation in the strength of the Mafia in 1900 to estimate its medium-term and long-term effects. We find significant and quantitatively large negative impacts of the Mafia on literacy and various public goods in the 1910s and 20s. We also show a sizable impact of the Mafia on political competition, which could be one of the channels via which it affected local economic outcomes. We document negative effects of the Mafia on longer-term outcomes (in the 1960s, 70s and 80s) as well, but these are in general weaker and often only marginally significant. One exception is its persistent and strong impact on political competition.

Keywords: criminal organizations, economic development, Mafia, political competition, weak states.
JEL Classification: P16, K42, H11, H75.

1   Introduction

The criminal syndicate known as the Mafia has played a defining role in the Sicilian economy and politics over the last 150 years, and has often been proffered as one of the prime reasons why Sicily has lagged behind the rest of Italy in economic and social development.[1] Though the Sicilian Mafia has significantly weakened after the Maxi trials of the 1980s and its further confrontation with the Italian state in the 1990s, it is still active in many Sicilian municipalities; between 2001 and 2014, 43 municipalities were put under external administration to weed out the extensive involvement of the Mafia in local governments and public procurement (Ministero dell'Interno, 2015).

Though many aspects of the Sicilian Mafia are unique to the economic and social conditions of the island and its particular history, there are also several commonalities between the Mafia and other organized crime syndicates in Italy (such as the Camorra in Naples and 'Ndrangheta in Calabria) as well as the various drug gangs in Mexico, Colombia and Central America. All of these organizations appear to have partly filled the void created by a weak state, and may have contributed to the continued weakness of state institutions and to economic underdevelopment. In this paper, we seek to contribute to the literature on the causes and consequences of the Sicilian Mafia and other criminal organizations.

The first part of the paper proposes an explanation for the Mafia's expansion throughout Sicily in the last decade of the 19th century. Though the Mafia's roots extend back to the 1860s and the organization was certainly well established by 1885 in the capital Palermo and its rich suburbs as well as some mining areas such as Favara and Grotte in the Girgenti province, its major expansion in rural areas did not take place until the early 1890s. This was preceded by the rise of the Fasci (*Fasci dei Lavoratori*), the first mass socialist movement in Italy, which articulated demands for better pay, greater security (longer-term contracts), land redistribution, and lower local indirect taxes for staples.[2] The Fasci gained significant momentum following the very severe droughts of 1893, which caused massive drops in agricultural output and amplified the hardships of peasants. In the absence of a strong state capable of countering the rise of the socialist movement and its demands, landowners and the managers of large agricultural estates turned to the Mafia. The involvement of the Mafia in the suppression of peasants was not a new phenomenon in Sicily. As the former chief prosecutor at the Palermo Court of Appeal, Diego Tajani, noted in a parliamentary debate in 1875, "The Mafia in Sicily is not dangerous or invincible in itself. It is dangerous and invincible because it is an instrument of local government." (Quoted in Dickie, 2004, p. 73). But this role of the Mafia grew beyond recognition around 1893. John Dickie (2004, p. 136) describes this as

> "Over the 60 years and more that followed the flowering of the Fasci movement, mafiosi would intimidate and murder countless socialists, Communists and trade union leaders — so many, in fact, that it came to seem as if the Mafia's very purpose was to batter the organized working class in the countryside into submission."

In line with this theory, we document that the Peasant Fasci were much more likely to emerge in parts of Sicily where the 1893 drought was more severe, and crucially the Mafia was much more likely to spread to municipalities with more severe drought in 1893 as well. This relationship is robust to controlling for various determinants of

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[1] In 2015 GDP *per capita* in Sicily was €17,100 compared to €27,000 for Italy as a whole. Child mortality in Sicily was 0.48% compared to the national average of 0.35% (see ISTAT, 2016).

[2] Despite their common etymological root, which comes from the word *fascio* meaning bundle, there is no link between the Peasant Fasci movement and the subsequent fascist movement.

the Fasci movement, other potential causes of the Mafia (such as its previous strength in the area, the presence of sulfur mines or citrus groves) and various geographic factors. More importantly, we show that weather conditions before 1892 and after 1893 do not have a similar effect on either the Fasci's location or on the Mafia, bolstering the case that it was the effect of the severe drought of 1893 during the critical juncture created by the ongoing mobilization of the Fasci that prepared the conditions for the spread of the Mafia throughout Sicily.

The second part of the paper exploits the relationship between the drought of 1893 and the Mafia to estimate the crime syndicate's effects on local economic development and other social outcomes. Formally, we estimate medium-term and long-term effects of the Mafia in a two-stage least squares (2SLS) setup using drought in 1893 as an excluded instrument. We verify that economic and social indicators before 1893 are not correlated with drought in 1893 and that rainfall in other years does not predict subsequent outcomes, increasing our confidence in this instrumental-variables strategy.

We estimate fairly large effects of the Mafia on economic outcomes in the early 20th century such as literacy rates in the 1920s and 30s. These negative effects likely reflect, at least in part, the lower capacity of the local governments to provide public goods. We also identify one of the potential mechanisms via which the Mafia impacts both the local state's capacity and other economic outcomes — its dominance over politics. Specifically, we find a striking increase in the concentration of votes across candidates in parliamentary elections. These results suggest that the Mafia became heavily involved in politics, and either prevented some candidates from campaigning in municipalities it controlled, or directly or indirectly manipulated which candidate would capture the great majority of the votes.

We estimate similar, though somewhat smaller and less precise, negative effects of the Mafia on long-term economic outcomes as well: municipalities with the heaviest presence of the Mafia have lower rates of high school education and lower coverage of various public goods in the 1970s. Moreover, we also see the effects of the Mafia on political competition have persisted to the later decades of the 20th century.

Our paper is related to a few literatures. First, a small theoretical literature models lawlessness and the economics of private protection. In addition to general treatments in Dixit (2004), Fiorentini and Pelzman (1995), and Abadinsky (2012), particularly relevant to our context is the seminal contribution of Gambetta (1993) who emphasizes the importance of the Mafia as provider of private protection to landowners and businesses with specific investments in an otherwise lawless environment.

Second, several recent papers investigate the origins of organized crime, focusing on the emergence of the Sicilian Mafia. Following Gambetta (1993), a number of studies identified specific features or economic activities whose characteristics and potential profitability may have attracted the Mafia, shaping its early geographic distribution in Sicily. For example, Bandiera (2003) argues that land fragmentation increases the demand for private protection, and provides evidence consistent with this prediction from three Western Sicilian provinces. Del Monte and Pennacchio (2012) document greater presence of the Mafia in areas with greater land productivity and rich mines, which they interpret as reflecting the greater willingness to pay for private protection by more productive landowners. In a similar vein, Dimico et al. (2017) show that areas where citrus fruits are the main crop are more likely to house the Mafia, which reflects not just the productivity of citrus farming but its greater vulnerability to vandalism and disruptions of irrigation. Buonanno et al. (2015), on the other hand, link the development of the Mafia to sulfur mines. Our theory for the spread of the Mafia is new relative to this literature, especially because we are emphasizing not permanent structural differences across parts of Sicily, but events during a critical juncture

created by the rise of peasant organizations as the key determinant of the spread of the Mafia at the end of the 19th century.

Third, a growing literature investigates the economic consequences of the weakness of local state institutions, focusing on several of the same outcomes as in our paper, such as literacy and the provision of various public goods (e.g., Gennaioli and Rainer, 2007; Dell, 2010; Bandyopadhyay and Green, 2012; Michalopoulos and Papaioannou, 2013; Acemoglu et al., 2015), but has not focused on the role of organized crime. More closely related to our focus is Barone and Narciso (2015), which investigates the impact of the Mafia on public subsidies to firms between 2004 and 2009. These authors argue that the Mafia was more likely to originate in areas with greater land value in the 1860s and exploit variation in rainfall in the 1850s relative to 1800-1850 (which is only available at a more aggregated level than municipalities) as a proxy for land value.[3]

Finally, and partly related to the origins of state weakness, a recent nascent literature investigates linkages between criminal organizations and political actors (Acemoglu et al., 2013; Fergusson et al., 2013). In the Italian context, De Feo and De Luca (2017) document that between 1946 and 1992, the Mafia supported the Christian Democratic Party, and in return obtained economic advantages in the construction sector. Buonanno et al. (2016) extend this analysis to the 1994-2013 period and show that after the collapse of the Christian Democratic Party, Silvio Berlusconi's Forza Italia obtained a larger share of votes in municipalities with significant Mafia presence. Alesina et al. (2018) provide evidence that Italian regions with strong presence of criminal organizations experience an increase in the number of murders in pre-election years. For Sicily, in particular, they show that the killing of politicians has a negative effect on leftist parties' vote share and on the anti-Mafia activities of elected officials. Daniele and Geys (2015) and Di Cataldo and Mastrorocco (2016) focus on the infiltration of organized crime into local councils and provide evidence of its negative impact on local tax collection, quality of local government expenditure and the education level of elected officials in southern Italy. Similarly, Daniele and Marani (2011) analyze provincial data for Italy and show that the presence of organized crime appears to reduce the flow of foreign direct investments. Relatedly, Pinotti (2015) uses synthetic control methods to estimate the negative effects of organized crime on GDP per capita into southern Italian regions. None of these papers focuses on the historical evolution of the Mafia, which is our main focus and source of variation in this paper.

The rest of the paper is organized as follows. Section 2 provides a brief historical overview of the situation in Sicily and the development of the Peasant Fasci and the Mafia at the end of the 19th century. Section 3 describes our data sources and provides descriptive statistics on our main variables. Section 4 presents our results on the effect of the Peasant Fasci on the spread of the Mafia after 1893. Section 5 presents our analysis of the effect of the Mafia on economic and political outcomes in the early 20th century, while Section 6 focuses on longer-term outcomes. Section 7 includes concluding comments. Additional results and robustness checks are presented in our online Appendix A.

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[3]There are also several papers using fluctuations in rainfall as a source of variation in their analysis of civil wars, democratic transitions, revolutions, protests and other political economy outcomes. See, among others, Brückner and Ciccone (2011); Dell (2012); Dell et al. (2014); Madestam et al. (2013); Miguel et al. (2004); Bonnier et al. (2015); Hsiang et al. (2011, 2013); Waldinger (2013).

2 Historical Context

In this section, we provide a brief historical context on the Sicilian Mafia, the state of agriculture in Sicily at the end of the 19th century, and the Peasant Fasci.

2.1 The Origins of the Mafia

There is a large historical literature on the origins of the Mafia, starting with the important accounts of contemporaries such as Villari (1878), Franchetti (1877), Alongi (1887, 1904) and Cutrera (1900). The consensus view today (e.g., Gambetta, 1993; Dickie, 2004; Lupo, 1996) places the Mafia's origins in the context of the tumultuous process of the fall of the Bourbon Kingdom (which had included southern Italy and Sicily) and the unification of Italy. At the time of Italy's unification, Sicily already lagged behind the rest of Italy along almost every social indicator. In 1862, in Sicily there were on average 221.7 meters of roads and 5.4 meters of railways per 1000 inhabitants as compared to 365.2 meters roads and 49.2 meters railways in the southern regions formerly under Bourbon rule and to 579.9 meters roads and 126.7 meters railways for Italy as a whole. The pattern looks similar when one turns to human capital: Sicily housed 0.35 primary school teachers and 0.41 university students per 1000 inhabitants compared to 0.4 primary school teachers and 1.39 university students in the southern regions and 1.00 primary school teachers and 0.72 university students in Italy as a whole (Direzione Generale della Statistica, 1864). Despite the consistent presence of troops on the island, the faraway Italian state was weak and largely incapable of enforcing the law. This void was partially filled by the private protection provided by various groups and most importantly by the Mafia.

Early works (e.g., Romano, 1966; Mack Smith, 1968; Brancato, 1976) emphasized the role of the abolition of feudal land relations and identified the origins of the Mafia in the rural areas of Sicily, where a new class of landowners, managers and public administrators used criminal methods to grab land that should have been distributed to the peasants and developed coercive labor relations in latifundia specializing in wheat production. Recent scholarship has instead concluded that, despite its archaic rituals, the origins of the Mafia lie in the more urban, richer and export-oriented areas around the former capital, Palermo (e.g., Lupo, 1984; Pezzino, 1985, 1987; Catanzaro, 1988), where the vacuum of law enforcement created demand for protection, especially from smallholders specializing in citrus (lemon and orange trees), which required investment several years before the trees bore fruit, uninterrupted irrigation and extensive protection. Dickie (2004, pp. 38–39) summarizes this recent view as

> "The Mafia emerged in an area that is still its heartland; it was developed where Sicily's wealth was concentrated, in the dark green coastal strip, among modern capitalist export businesses based in the idyllic orange and lemon groves just outside Palermo."

The Mafia was also present in areas with sulfur mines, such as Favara and Grotte in the Girgenti province. The earliest trial against the Mafia was held in 1885 in Girgenti, and involved the Favara brotherhood, which mainly consisted of sulfur miners.

The recent important work by Benigno (2015) instead emphasizes the systematic use of crime syndicates in both Sicily and Naples by the government and local politicians against political opponents (see also Mosca, 1900).

Echoing our quotation from Dickie (2004) in the Introduction, he highlights the common practice of using the Mafia against republicans and then socialists. Indeed, police reports and contemporary observers leave no doubt that the Mafia was not only active in much of Sicily, but had become part of the social and political order by the early 20th century.

In this context, our work can be viewed as bridging the gap between the three schools of thought mentioned above. We document that in the 1890s the Mafia spread from its original surroundings in the most urban parts of Sicily and some of the mining areas to the more rural parts of the island, and this was in large part because of more intensive use of the Mafia's coercive capacity by landowners and local politicians against the Peasant Fasci movement.[4]

The Mafia's role in Sicily declined considerably during Mussolini's fascist dictatorship, especially after the administration of Prefect Mori starting in 1925. But it did not disappear, and after the American invasion, former members of the Mafia once again exploited the turbulent environment to reconfigure their crime syndicate. After the war, the Mafia formed close relations with the Christian Democrats, which became the dominant party in Italy (e.g., De Feo and De Luca, 2017). The Mafia's reach appears to have started declining after the Maxi trials of 1986-87 and the subsequent confrontation with the Italian state following its murder of two judges in the Maxi trial, Giovanni Falcone and Paolo Borsellino.

Though information about how the Mafia functioned in the 19th and early 20th centuries is patchy, we have fairly extensive evidence about its more recent practices. Besides the highly profitable business around illicit drug production and trafficking, the Mafia has traditionally focused on private protection and racketeering, and on private and public construction.[5] The well-established reputation of the Mafia for damaging vineyards or orchards and stealing livestock in the past, and for burning down or placing bombs in shops or industrial plants more recently, guaranteed a high rate of compliance from local businesses (Lorenzoni, 1910a; Pezzino, 1990). A vivid account of a Sicilian citizen, reported by Lorenzoni (1910a, pp. 649–650), describes the extent of the problems faced by the agricultural sector in the province of Trapani at the end of the 19th century:

> "If you care about understanding the conditions of our agriculture in order to improve it, then start by this social plague, the Maffia, which is an unsurmountable barrier on the way to agricultural development. You can introduce new policies aiming at improving economically agriculture. But what will be the use of them, if farmers, constantly scratched by the powerful nails of the maffia, won't be able to farm their land, as their draught animals are stolen or their harvest burned, because they refused to pay the money asked by the maffia?"

Construction activities require close connections with local authorities for obtaining permissions and overcoming regulations and have consistently attracted the interest of the Mafia (e.g., Pezzino, 1990). In return, as we already mentioned in the Introduction, the Mafia appears to have offered support and services to some politicians. As Lorenzoni (1910a) puts it, the Mafia started acting early on as "electoral canvasser, supporting its protector, or a candidate friend of its protector, or whoever paid for its backing". The reasoning reported by Franchetti (1877, p. 190) exemplifies how the illicit deal may come about: "Let's imagine a man, whose name and wealth allow

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[4]This is also consistent with Gambetta's argument that the main driver of the Mafia's expansion in rule areas was the demand for policing the peasants, which significantly intensified after the emergence of the Peasant Fasci (Gambetta, 1993, pp. 90-93).

[5]The discussion in Alongi (1887) suggests that the Mafia's practices in the second half of the 19th century were similar.

reaching a high position among his citizens. [...] He's got the chance to acquire authority and reputation through administrative, political or other elections. An individual with a known influence on the local population offers him his services; he knows that others exploit similar connections, and that the public opinions does not condemn this. He knows that the man committed some killings, [...] but those homicides only increased the respectability and reputation of its perpetrator. [...] Why not using the tool commonly used by others? So, he accepts the support offered."

There is also evidence that a similar relationship has long existed between the Mafia and the central Italian government, which has had tenuous control in Sicily since unification (Pezzino, 1990, p. 59). Pezzino (1990, p. 74) discusses the range of activities the organization used for manipulating elections:[6]

> "Mafia bosses controlling packages of votes, manipulated electoral lists, stuffed with individuals who do not have the right to be included or conversely precluded to political opponents, rigged municipality elections, implemented without the very creation of an electoral office, or with falsified reports, harsh contests between factions or families leading to assassinations and violence [...]."

Voters intimidation became more widespread whenever direct ballot stuffing was not viable.[7] Hess (1973, p. 148) describes this as: "Time and again we read that *uomini di rispetto* loiter around the polling box, that some of them are even armed, that men known as violent criminals and employees of a mafioso form the so-called *posto del blocco* outside of the polling station or in front of the polling box itself, that they stop the voters, talk to them menacingly, sometimes beat them up and accompany them right to the booth."

Some of the most pernicious effects of the Mafia's involvement in the economy and local politics are well summarized by Lorenzoni (1910a, p. 677) when he writes:

> "In a State in which citizens for any reason do not trust justice and do not trust their own force, it is the evil ones who manage to impose themselves, and the ones who did not want to bow to justice are then forced to bow to them and be enslaved by them. So the Mafia emerges."

2.2 The State of Sicilian Agriculture and the Drought of 1893

Sicily provides ideal conditions for various crops, including lemon and oranges mentioned above, grapes, and olive oil. But the crop that has played the most defining role has always been wheat, and in the 19th century, most Sicilian latifundia specialized in wheat production. As US exports of wheat to Europe ceased during the American Civil War, prices increased and wheat production spread further throughout Sicily. In 1884, grains occupied 44% of the total area of Sicily (Damiani, 1884, p. 96).

The main wheat variety cultivated in Sicily is the durum, sowed in November and harvested in late June. Production relied on cheap labor and made little use of capital or fertilizers. This made yields heavily dependent

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[6]See also Hess (1973, pp. 144-150).

[7]Violence appears to become particularly important when various factions compete for local control. In the words of Franchetti (1877, p. 14): "Each one of the contending factions tries to strengthen by extending its alliance in the endless reservoir of bullies, criminals, and assassins. [...] The fight gets harsher, it spreads, it lights up throughout the municipality, and sometimes to neighbouring ones. It then starts the war of tricks, gunshots, ambushes, which sometimes degenerate into actual skirmishes." The electoral involvement of the Mafia, however, comes at a high cost. Lorenzoni denounced how public authorities were "tolerating that well known mafiosi steered municipalities, acted as petitioners in public offices, and become intermediaries between the authorities and the public." (Lorenzoni, 1910a, p. 682)

on rainfall during the mid-season of the crop, which is between early March and late May.[8] A Parliamentary inquiry on the condition of agriculture in Sicily summarizes the situation as "the level of production depends on the rain that, in order to ensure an excellent harvest, has to occur up to the month of May. But if it stops before April the harvest is poor" (Damiani, 1884, p. 26).

The 1880s brought several difficulties for Sicilian agriculture. Spain became the major exporter of oranges to France and the UK, and huge investments in the cultivation of oranges in Florida reduced the demand for Sicilian exports to the United States, which was previously the main market for Sicilian citrus fruits. The same decade also witnessed a steady decline in the price of wheat because of increased competition from the United States and Russia. The demand for Sicilian agricultural products further declined as a result of the protectionist policies adopted in other key markets. In particular, a commercial war between Italy and France starting in 1888 led to the complete shutdown of the largest export market for Sicilian wine.

The conditions of agricultural workers and peasants in Sicily were dismal. Several visitors in the 19th century commented on the extent of poverty of Sicilian peasants (e.g., Sonnino, 1877; Rossi, 1894; Paton, 1898). These workers were either day laborers, recruited daily according to the need in the farm, or farmers renting small plots of land from the large estates. Day laborers were the largest class of rural workers in Sicily and small farmers also engaged in occasional day work to supplement their income.

Both groups experienced growing hardship starting in the 1880s as conditions facing Sicilian agriculture deteriorated. By this point, sharecropping arrangements had been replaced by short-term fixed rent contracts (of typically one or two years), leaving farmers more exposed to the risk of bad harvests. Day laborers were also vulnerable to bad harvests because of the reduced demand during the harvest season (Sonnino, 1877, p. 32).

It was against this background that the drought of 1893 hit. The severity of the drought was quite unprecedented. Extensive cultivation of grains throughout Sicily and their aforementioned dependence on weather conditions made the consequences of the drought even more pronounced. As reported by di San Giuliano (1894), the yield in 1893 was about half of the usual amount, and this came following the already bad harvest in 1892, accentuating the hardship. Wheat was not the only crop that was adversely affected. Olive oil, oats and barley also experienced bad harvests (di San Giuliano, 1894). Using district-level data from Direzione Generale dell'Agricoltura (1886-1896), Figure A1 in the Appendix shows the drop in production in 1893 relative to the average production in 1885-1895 across Sicily, and indicates that some areas experienced drops of almost 50% in total agricultural production.

Peasants and agricultural laborers felt the full force of the drought of 1893. The newspaper *Il Giornale di Sicilia* described the situation in Carlentini in October 1893 as

> "The state of the countryside is disheartening: the olives fall dried and drenched from the trees, lemon and orange trees are suffering, pasture is most rare, and the poor peasants are unemployed and bear more than anyone else the effect of such calamity. Misery is immense here, as all over the island."

These harsh conditions provided an ideal environment for the Peasant Fasci movement, which started spreading throughout much of Sicily in the early 1890s.

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[8]Brouwer and Heibloem (1986, chapter 3) identify the crop water needs as the product of a crop-specific coefficient that varies according to growing season and an evapotranspiration coefficient that depends on the climate and temperature. Their calculations indicate that for wheat, the rainfall between March and May is most critical.

2.3 The Peasant Fasci and the Spread of the Mafia

The Peasant Fasci was the first popular socialist movement in Italy. The first leagues were founded in 1891 and organized mainly industrial workers and artisans in the largest cities. The first peasants' organization emerged late in 1892 but it was the drought of 1893 that, by significantly worsening the conditions of Sicilian peasants, acted as the major impetus to the Fasci movement. The Fasci articulated many of the grievances of the peasants and day laborers of Sicily. Chief among their demands were higher wages, land redistribution, better working conditions, longer-term contracts for land leases, the return to sharecropping arrangements, and reduction in indirect taxes which fell heavily on peasants (Romano, 1959; Renda, 1977; Casarrubea, 1978a).

Indirect taxation was a longstanding battleground in Sicily and a symptom of the deeper problem of taxation without representation.[9] The Sicilian local elites, who controlled the councils, made a disproportionate use of such taxes in order to reduce the fiscal burden on their properties. This made indirect taxes on staple consumption in Sicily twice as large as in the rest of Italy, while taxes on land and buildings were a third of the Italian average (De Viti De Marco 1894, p. 132). The situation for the peasantry deteriorated during the drought of 1893, when many Sicilian municipalities obtained authorization from the central government to further raise indirect taxes above the national statutory upper bound (Romano, 1959, p. 320).

From its headquarters in the Palermo province, the Fasci movement quickly spread to provinces most affected by the drought, including Girgenti, Trapani, and Caltanissetta. By the end of 1893, there were hundreds of thousands of members of the 177 Fasci organizations in 161 municipalities, and the majority of these organizations were affiliated with the Socialist Party. At the first National Congress of the Italian Socialist Party in 1893, half of the party members were from Sicily (Degl'Innocenti, 1983, p. 8).

Though Sicily was no stranger to peasant revolts, the scale, duration and organization of the Peasant Fasci were completely unprecedented, and the threats to landowners and rural estate managers were amplified by the fact that the Fasci were part of the nascent Socialist Party.

The Fasci's demands for better working conditions and lower consumption taxes faced the fierce resistance of the landlords and the rural middle class in control of the local administrations. They sought the intervention of the Italian army to suppress the uprisings. But there was no decisive action from the central government, reflecting its weakness in Sicily and its initial ambivalent attitude towards the Socialist Party.[10] As Clark (2014, p. 125) explains,

> "These novel organizations, and the successful strikes over agricultural contracts, naturally alarmed the landowners and larger tenants. [...] The Giolitti government showed little sympathy. Strikes were not illegal, and Giolitti was well aware of the state of local government on the island."

In this context, landowners and the rural bourgeoisie turned to the rural guards, "whom we recognize as man-

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[9]De Viti De Marco (1894) describes this problem, as perceived by contemporaries, as: "If a class of citizens who do not pay taxes does not have political representation [in the councils] is something I understand and, as a matter of principle, I consider desirable. But that the class that bears the heaviest burden of local taxes [is not enfranchised and] is at the mercy of a greedy and sectarian minority is intolerable." (De Viti De Marco (Siculus), 1894, p. 135)

[10]This initial ambivalence is confirmed by Giolitti himself in his memoires. For example, Giolitti favored the return of one of the leaders of the Fasci movement to Sicily from his exile in Tunis ensuring him that the jail sentence hanging over him would not be enforced. He also tried to use the Fasci movement to weaken the support for his political opponents in Sicily who controlled the few workers' organizations there. See Romano (1959, p. 244) and Manacorda (1962, p.105).

ifestations of Mafia power" (Lupo, 1996, p. 183).[11] From this point onwards, the Mafia became heavily involved in violently suppressing peasant uprisings and organizations (Brancato, 1976; Dickie, 2004, p. 232).[12]

The first documented case of Mafia action against peasant uprising is the bloodshed in Caltavuturo in January 1893 when a rally of peasants demanding redistribution of the common (municipality-owned) land encroached by some of the local administrators was met with violence. The incidents were provoked by mafiosi, who started the shooting and prompted the intervention of the military force, which then indiscriminately fired into the crowd, causing 11 deaths and 40 injured among the peasants (Romano, 1959, pp. 168-177; Lupo, 1996, p. 183).

A few months later, peasants demonstrated against local taxes, the local administration and the rural guards in the central square of Giardinello, a small rural center of the Palermo province. As the demonstrators were leaving at the end of the rally, shots from the mayor's house overlooking the square killed five peasants (Siragusa, 2007). The subsequent intervention of the military force led to the death of two more demonstrators (Romano, 1959, p. 448-454).

In Lercara, a large town in the Palermo province with rich sulfur mines, on 25 December 1893, and in Gibellina in the Trapani province on 2 January 1894, rallies against local administrators and taxes were violently suppressed by the rural guards. In both cases armed guards hidden in the bell tower overlooking the central square shot on the crowd and then the successive intervention of the army increased the death toll.[13] Similar events were reported in Belmonte Mezzagno where two peasants were killed and several were injured (Siragusa, 2007).

After months of strikes and rallies, in which many peasants lost their lives in the hands of the mafiosi and the army, in early January 1894 the Fasci were declared illegal, their leaders were arrested, and a state of emergency and curfew were declared. In the words of Santino, "The Fasci movement was bloodily repressed by the joint action of the Institutions and the Mafia" (Santino, 2000, p. 24).

3   Data and Descriptive Statistics

Our database comprises data from 333 municipalities for which the Sicilian cadastre of 1853 provides information.[14] These municipalities belong to 24 districts in seven provinces. Data for subsequent periods, which are at times more disaggregated, are mapped to the 333 original municipalities.

The data on the presence of the *Fasci dei Lavoratori* are taken from Renda (1977, pp. 339-344) who lists all the *Fasci* organizations established in Sicily between 1891 and January 1894. Renda provides information about 177 organizations active in 161 municipalities. We separately code the Peasant Fasci and industrial workers' organizations using several additional historical sources.[15] Overall, we identify 106 municipalities that had leftist Peasant Fasci, and 58 municipalities with Fasci of industrial workers. In Figure 1 we map the presence of Peasant

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[11]For the role of rural guards in the Mafia organization, see also Romano (1966, pp. 175–177).

[12]Lupo (1996) discusses a handful of cases of members of the Fasci who joined the Mafia, but this seems to have been not a general pattern, and usually, it was short lived.

[13]See Romano (1959, p. 454) on the events in Lercara, and Colajanni (1895, pp. 181–183) for an account of the massacre in Gibellina and the role of the rural guards.

[14]In 1853 there were 348 municipalities in Sicily; however, the data from the Bourbon Cadastre in Mortillaro (1854) were aggregated for several municipalities, while the data for two of them were lost. Other municipalities lost their autonomy in the aftermath of the Italian unification, reducing the number of municipalities by 15.

[15]These additional sources include Colajanni (1895) for the provinces of Enna and Catania, Amato and Battaglia (1976) for the province of Messina, Casarrubea (1978a,b) for the Palermo province, Costanza (1993) for the Trapani province, Miccichè (1981) on Ragusa and Siracusa provinces, Barnabà (1981) for the province of Caltanissetta, and Rossi (1894) and Giannone (2014) on the Girgenti province.

Fasci organizations in the period 1893-1894.

The information on historical rainfall are from Eredia (1918), who compiled data from several sources including the weather stations of public institutions like the Ministry of Agriculture, and the Ministry of Public Works, as well as private sources such as the Electrical Society of Eastern Sicily, the Society of the Palermo Aqueduct, and the Marquise Casses Eaton. These data include the coordinates and altitude of the weather stations and the monthly rainfall in millimeters. We use 39 stations which were active in Sicily in the early 1890s that could be matched with the data provided in the Hydrological Annals for the Sicilian Hydrological Basins for the period 1916-1941.[16] We obtained municipality-level rainfall data using the standard interpolation method (following the Climatic Research Unite at the University of East Anglia). In particular, we calculate relative rainfall (the percentage difference from mean rainfall between 1881 and 1941) for each weather station, and then interpolate from these weather stations using weights inversely proportional to distance to obtain municipality-level (relative) rainfall (e.g., New et al., 1999). We exclude any weather stations more than 30 km away from the municipality.[17] In Figure 2 we report the interpolated relative rainfall for the spring of 1893 as well as the locations of the weather stations. We also compute the variance of our relative rainfall measure and average absolute rainfall, which we use as controls for climate characteristics in our regressions.

- District boundaries
- Province boundaries
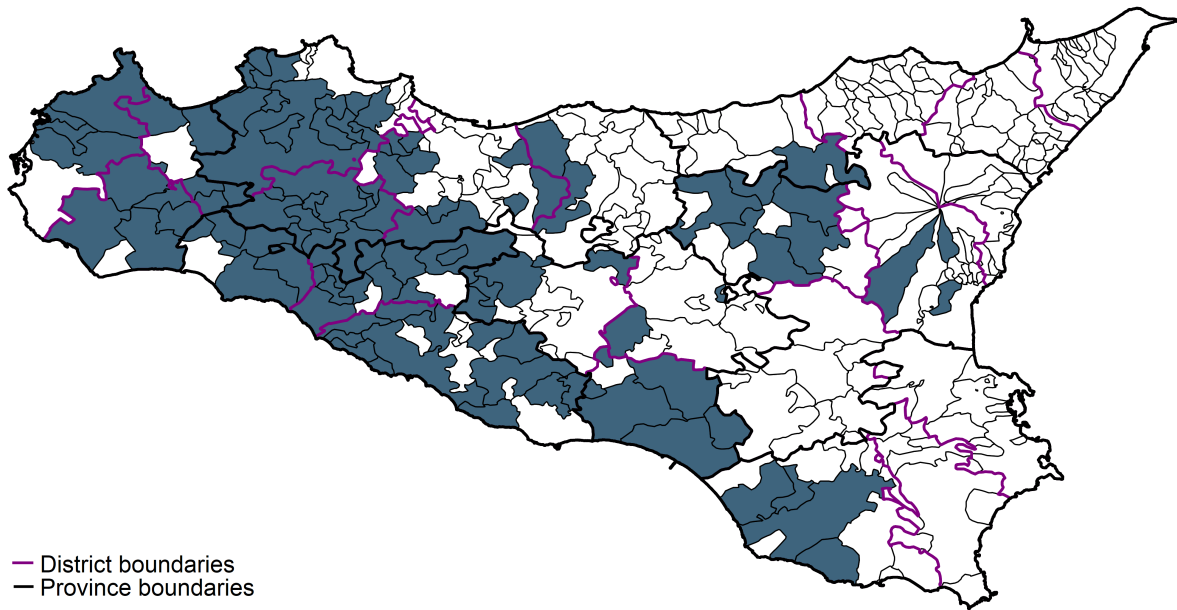
Figure 1: Presence of Peasant Fasci organizations in Sicily in the period 1893-4. Source: Renda (1977).

Our measure of Mafia prevalence by municipality in 1900, a few years after the rise of the Fasci movement, comes from Cutrera (1900). Cutrera was a police inspector in Sicily and put together this information based on his own experience and research, and emphasizes that this information is not based on the number of crimes or any other criminal statistics, "because I am convinced that the Mafia density cannot be represented with numbers [of

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[16]These publications are available from the website of the ISPRA, Agency of Environmental Protection and Research of the Italian Environment Ministry.

[17]In our robustness checks, we also use an alternative method where we interpolate the absolute level of spring 1893 rainfall across the weather stations and then divide it by average spring rainfall, also interpolated to the municipality level. In further checks we alternatively exclude weather stations 25 km or 35 km away or exclude municipalities that do not have at least two weather stations within a 30 km radius.
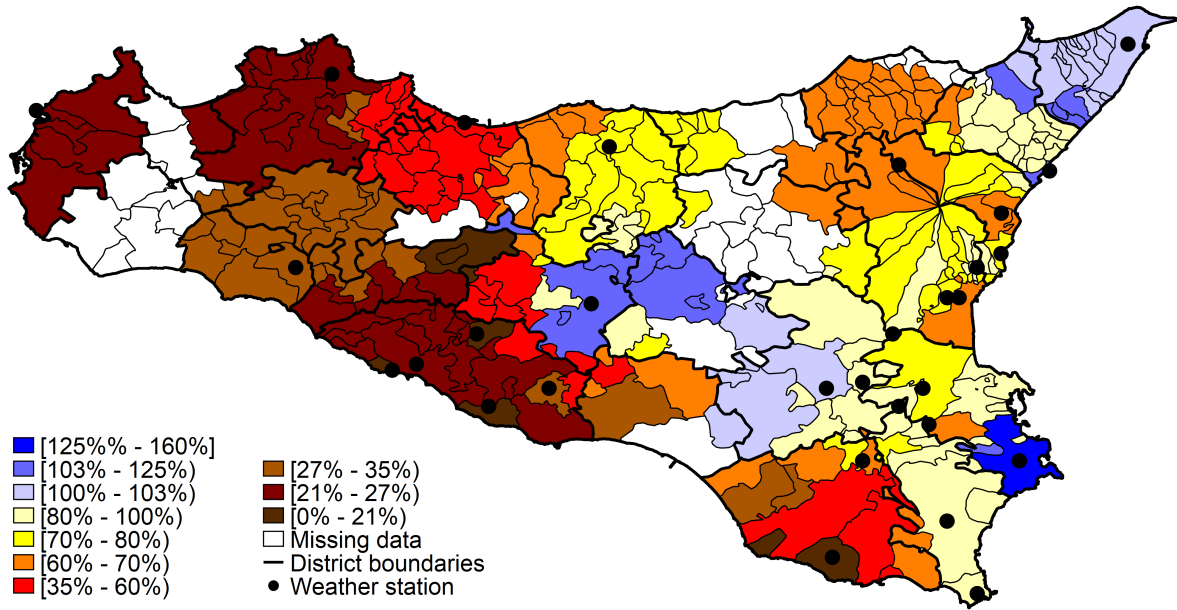
Figure 2: Drought intensity in spring 1893. Ratio of the rainfall in spring 1893 to long-run average spring rainfall.

crimes]. We have already seen that the Mafia does not always commit crimes, and that the crimes perpetrated by them are not exclusive of the Mafia. [...] For this reason we drew this map using our personal appraisal of the different density of the Mafia from town to town" (Cutrera, 1900, pp. 114–115). We create the variable $Mafia1900$ with values ranging from 0 (no Mafia), to 3 (major Mafia presence). In 1900 Sicily had 357 municipalities organized in 7 provinces. Cutrera identified 84 municipalities where there was no Mafia, 66 where there was little presence, 70 where the Mafia had significant presence, and 69 municipalities with a major presence of the Mafia (68 municipalities were left unclassified). 38% of the municipalities in the Palermo province, 44% of the municipalities in Trapani and 41% in Girgenti (the old name of Agrigento) had a major presence of the Mafia while only 29% in the Caltanissetta province, 15% in Catania and 7% in Messina had such high levels of Mafia presence. No municipality was classified as having a major Mafia presence in the Siracusa province. We believe that this is a reliable source for the Mafia intensity, and it is widely acknowledged in the historical literature. The geographic distribution of the Mafia intensity according to Cutrera (1900) is depicted in Figure 3.

To control for the presence of the Mafia before the Fasci movement, we use the information reported in the 1880-85 parliamentary inquest on the Italian agriculture (Damiani, 1885). Damiani requested information about the presence of the Mafia from local state officials in each of the 162 Sicilian judicial districts. We follow Buonanno et al. (2015) and classify all the municipalities in the judicial district according to the intensity of the Mafia. In Figure 4 we depict the resulting variable, $Mafia1885$.

As for our controls, we collected data about the agricultural use of land and rents at municipality level from Sicily's Bourbon Cadastre compiled by Mortillaro (1854). The agricultural use of land is based on the *riveli*, declarations made by the landowners to the Royal commission in 1815 and updated in the 1830s. This dataset is particularly relevant because it pertains to a period before Italian unification and the Mafia. From this source we obtain the average agricultural rent, and for municipalities with more than 3000 residents, urban rent per hectare. We also compute from the same source the total area of the municipality, the share of agricultural land, and the

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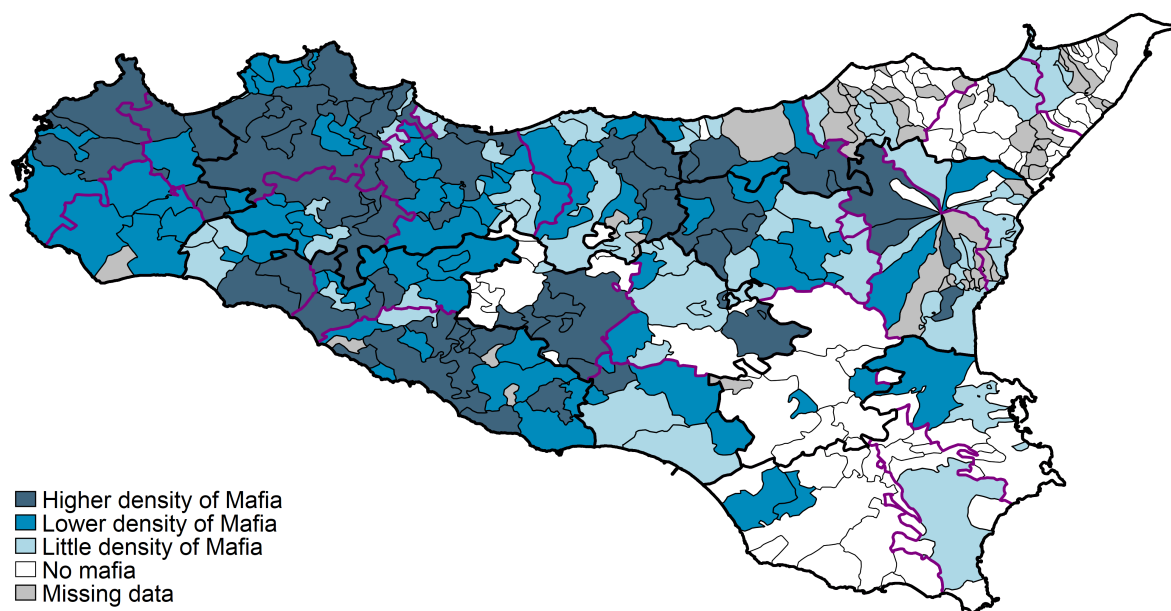
Figure 3: Mafia intensity in 1900 according to the Police inspector Cutrera. Source: Cutrera (1900).
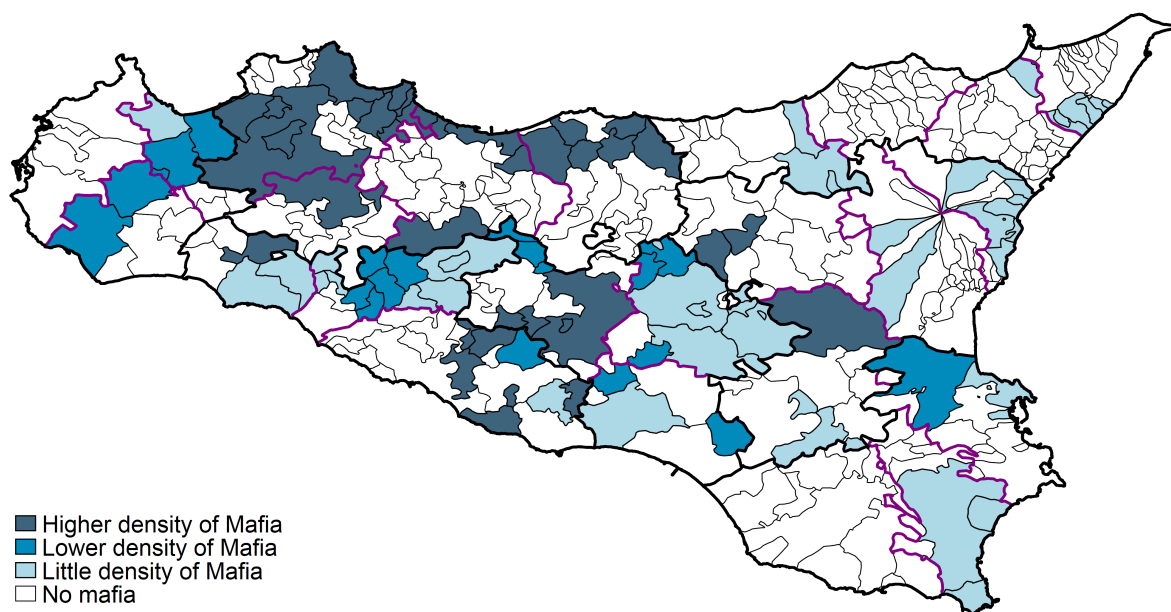
Figure 4: Spatial distribution of the Mafia presence according to its intensity as reported in Damiani (1885).

share of the total area devoted to cereal cultivation, citrus groves, vineyard, and olive groves.

From the first Italian census in 1861 we gathered information on total population as well as of the existence of agro-towns (rural centers) where peasants and farmers were concentrated. These towns are a peculiar characteristic of the Sicilian countryside, often linked to a concentrated landownership structure, which induced landless peasants to gather in rural town centers where they could get seasonal or other work in large estates specializing in cereals. The presence of such towns is thus both an indication of the pattern of landownership and, as emphasized by Hobsbawm (1971), a potential direct determinant of peasant organizations, since the presence of so many peasants agglomerated in agro-towns "gave them the opportunity to discuss grievances, formulate unified strategies and act collectively" (Kaplan, 1977, p. 5). We define agro-towns as municipalities that have a center with an agglomerated population of at least 4,000 residents and with more than 40% of the agricultural land devoted to cereal cultivation.

As highlighted in the historical background, another important determinant of the development of the Sicilian Mafia has been the presence of sulfur mines. We rely on data reported in Parodi (1873) for the average production of sulfur in each municipality between 1868 and 1870.

We use further geographical variables to control for the distance from the capital, Palermo, and from the closest port using the postal distance as reported by Lo Jacono (1856) which takes into account the availability of roads. A dummy variable for direct access to one of the postal roads is coded from the detailed maps compiled by Cary (1799) and digitized by Buonanno et al. (2015). Information on the maximum and average altitude and the altitude of the town center is obtained from the 1929 Agrarian Cadastre. Finally, the average temperature is from the website climate-data.org.

Data on political competition in 1865 and 1909 are obtained from the database provided by Corbetta and Piretti (2009). The parliamentary elections in 1865 and 1909 were held under a first-past-the-post system in 55 electoral districts in Sicily. For each municipality we compute the Herfindahl concentration index (or HHI as an abbreviation for Hirschman-Herfindahl index) by looking at the share of votes of each candidate. Using data from the same 1909 parliamentary elections we compute the share of votes of socialist candidates as well. We collected voting data for the lower chamber of the Italian parliament between 1948 and 1992 from the Election Historical Archive of the Interior Ministry website. These elections were held under a proportional system with a single national constituency and we compute the HHI from vote shares of all the parties in each municipality. As an alternative measure of the presence of socialist organizations, we also use data on peasant league membership reported in Lorenzoni (1910b).

We measure human capital, our main proxy for the overall level of economic development, using data on literacy and high school completion rate for the population above the age of six from the censuses for the years 1911, 1921, 1931, 1961, 1971 and 1981.[18]

As a proxy for the provision of public goods we constructed from primary sources average infant mortality rate for 1869-70 and 1908-9 for each municipality. Specifically, we counted the number of deaths of residents below the age of one from the death registries of each municipality for 1869, 1870, 1908 and 1909 (when one of the registries was not available, we used data from the subsequent year). We then collected data on the number of births for the corresponding years and computed the infant mortality rate as the average ratio of deaths below the age of one over the number of births for the years 1869 and 1870, and 1908 and 1909 by municipality of

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[18]High school data are not available for the period 1911-1931.

residence.[19] For infant mortality rates in 1969-1970 and 1982 we rely on data provided by ISTAT.[20] Information on the quantity of drinking water in 1885 is from Direzione Generale della Statistica (1886), and data on aqueducts in 1961, 1971 and 1981 are from the Population and Housing Censuses. As a proxy for local state capacity, we also look at the number of notaries per 1000 inhabitants at the municipality level, which are constructed from the data of the Finance Ministry on taxpayers for 1871 and 1924 (Ministero delle Finanze, 1872, 1924).

We computed a measure of per capita development expenditure (in logs) from the 1884, 1912, and 1957 municipality budgets. This measure aggregates all spending under the discretion of the local administration directed at economic development or improvement of local infrastructure, education, security and justice. We collected these data from official government publications (Direzione Generale della Statistica, 1887; Direzione Generale della Statistica e del Lavoro, 1914; Direzione Generale dell'Amministrazione Civile, 1958).

We finally estimate state presence before 1893 using two separate measures: the number of soldiers stationed in Sicily used for local policing divided by population and the efficiency of civil courts. We construct estimates for the first variable using data from the Parliamentary Commission of 1875, and in particular a map from the report of the commanding general (Carbone and Grispo, 1969).[21] The efficiency of civil courts in 1875 is measured as the share of civil and commercial cases receiving a final sentence within the year (Ministero di Grazia e Giustizia e dei Culti, 1877).

Tables 1 provides descriptive statistics for all of the variables described in this section.

4   The Origins of the 19th-Century Expansion of the Mafia

This section empirically investigates the effects of the drought of 1893 and the Peasant Fasci movement on the spread of the Sicilian Mafia. It provides evidence that the drought of 1893 had a major impact on the presence of Peasant Fasci and the spread of the Sicilian Mafia.

4.1   The Drought and Agricultural Production

We start by confirming that the drought of spring 1893 had a sizable negative impact on agricultural production. We use data from Direzione Generale dell'Agricoltura (1886-1896) to measure agricultural production for 20 crops in 24 districts in 1893. To control for potential differences in agricultural productivity across the districts, we divide production in 1893 by the average of the production of the crop in that district over the years 1885-1892

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[19]For four municipalities (Caltanissetta, Girgenti, Naro and Noto), the mortality data are available for one year only in the period 1869-70 and the mortality rate is computed accordingly. In two cases (Messina and Catania) the mortality rate for 1908-9 has been based on the data for 1908 only. The data for the number of births by municipality are from Ministero Agricoltura, Industria e Commercio (1872) and Somogyi (1979).

[20]The data for the years 1969-70 report the deaths by municipality of the event instead of municipality of residence. There is therefore a mismatch between the numerator (deaths by municipality) and the denominator (births by municipality of residence) which likely increases the mortality rate for municipalities with hospitals and health centers.

[21]There were 7200 soldiers (equivalent to 22.5 battalions) stationed in Sicily used for local policing at this time. The map provides information on where each battalion, company, platoon and squad was located, but we do not know the exact size of each unit. We subtract all soldiers in companies, platoons and squads from the total number of soldiers and then divide the remaining soldiers among the battalions. The number of soldiers in a municipality is then estimated as the sum of the sizes of battalions, companies, platoons and squad in that municipality. In this exercise, we use estimates of the number of soldiers per squad and platoon consistent with information in Encyclopaedia Britannica: 10 soldiers per squad and 30 soldiers per platoon. We show in the Appendix that our results are robust to alternative assumptions about the sizes of squads and platoons.

and 1894-1895. We combine this with our data on relative rainfall in the spring of 1893 to estimate the following relationship:

$$\text{relative production}_{c,d} = \kappa \cdot \text{relative rain}_d^{1893} + \eta \cdot \text{K}_c \cdot \text{relative rain}_d^{1893} + X'_{c,d}\beta^{\text{prod}} + \psi_c + \varepsilon_i^{\text{prod}}. \quad (1)$$

Here, relative rain_d^{1893} is relative rainfall in the district, capturing the (inverse of the) severity of the drought of 1893, while K_c is a measure of the relative importance of spring rainfall for crop c.[22]

The covariates include a full set of crop dummies (ψ_c), the main effects of various different rainfall measures, information on the crop's productivity in the district (1885-95) and its cultivated area in 1893, and province or district dummies in some specifications.

The results are reported in Table 2.[23] We start in columns 1 and 2 without the interaction terms, thus focusing on the main effect of relative rainfall in the spring of 1893. The results confirm that districts suffering worse drought conditions (lower relative rainfall) in the spring of 1893 had lower agricultural production. Rainfall in the winter of 1892 is also positive and significant in column 1, reflecting the fact that crops sown in late fall, mainly grains in Sicily, benefit from winter rainfall as well.[24]

The remaining columns of the table turn to our main focus, the interaction between relative rainfall in the spring of 1893 and K_c, represented by η in equation (1). The estimate of η in column 3 is 1.44 (standard error = 0.73) and implies that a more severe drought in the district leads to a bigger drop in output for a crop that is more dependent on spring rainfall such as wheat or barley (in specifications with interactions the main effects of the rainfall variables are evaluated at $\text{K}_c = 0$). The relationship becomes a little more precise in columns 4 and 5 when we control for crop-specific output and cultivation area, and add province fixed effects. Our preferred specification is reported in column 6 and includes a full set of district fixed effects (and thus drops the main effects of various rainfall measures). In this case, the coefficient estimate of η is 1.45 (standard error = 0.66). This implies that a district suffering a very severe drought, corresponding to the 25th percentile of the distribution of relative rainfall in spring 1893, experiences a 6% decline in the production of wine (with $\text{K}_c = 0.4$) and a 32% decline in the production of olive oil ($\text{K}_c = 0.7$), but a much larger decline for wheat ($\text{K}_c = 0.9$), of almost 85%.

Columns 7 and 8 report specifications that can be interpreted as falsification checks where we in addition include interactions between our measure of the importance of spring rainfall, K_c, and relative rainfall during other seasons. Consistent with our interpretation, we find that these interactions are smaller and insignificant, while the coefficient of the interaction with relative spring rainfall remains positive and significant at 10%.

Overall, this evidence verifies that there was a large decline in agricultural production in parts of Sicily most adversely affected by the drought of 1893 and that this was much more pronounced for crops such as wheat that depend most heavily on spring rainfall.

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[22]The K_c coefficient is defined by the Food and Agriculture Organization (FAO) as the ratio between the evapotranspiration (sum of evaporation from the land surface and transpiration from plants) of the crop in question relative to a reference crop assumed to have a uniform grass field. K_c varies during the different stages of crop growth, and we computed the spring K_c by averaging over the spring period using the crop water information provided by the FAO. See Brouwer and Heibloem (1986) and the FAO website (www.fao.org/land-water/databases-and-software/crop-information/en/) for further information.

[23]We report bootstrapped standard errors allowing for two-way clustering conditional on the district and the crop; details of the two-way bootstrapping procedure are described in the next subsection.

[24]See Palmieri (1883) and http://www.fao.org/land-water/databases-and-software/crop-information/wheat/en/.

4.2 First Stage

Our first stage is given by the following cross-sectional relationship linking the presence of the Peasant Fasci to the drought of 1893:

$$\text{Fasci}_i = \gamma^{\text{Fasci}} \cdot \text{relative rain}_i^{1893} + X_i' \beta^{\text{Fasci}} + \varepsilon_i^{\text{Fasci}}, \tag{2}$$

where Fasci_i denotes our dummy variable designating the presence of the Peasant Fasci in municipality i, relative rain$_i^{1893}$ is the relative rainfall in the spring of 1893, now for municipality i, X_i is a vector of covariates which are discussed in greater detail below, and $\varepsilon_i^{\text{Fasci}}$ is a random error term, capturing all omitted factors. Equation (2) will be our first stage when estimating the impact of the Peasant Fasci on the development of the Mafia.

Unless stated otherwise, we report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality (Cameron et al., 2008, 2011). These standard errors take into account the fact that rainfall in a municipality, as well as many of our other variables, might exhibit significant correlation with neighboring municipalities.[25] Moreover, as described in the previous section, and further discussed in our robustness checks, the fact that rainfall data for many municipalities are interpolated from neighboring weather stations creates additional correlation across observations; the two-way clustering is a simple method to remove this correlation. As we will see below, maximum likelihood estimation taking the exact structure of the error term resulting from interpolation leads to standard errors very that are similar to the two-way clustered errors, while other corrections for spatial correlation we explore below turn out to be less conservative.[26]

Estimates of equation (2) on our sample of 245 municipalities are reported in Table 3.[27] In column 1, Panel A we show the raw correlation between our Peasant Fasci variable and relative rainfall (without controlling for any covariates). The coefficient estimate is -1.00 and is significant at 1%.

Column 1, Panel B adds province fixed effects to this specification so that the comparison is between municipalities in the same province (as noted above, we have seven provinces in the data). The relationship is quite similar and has a somewhat smaller magnitude in the presence of province fixed effects; -0.76 (with a two-way clustered standard error of 0.21).

The remaining columns add successively more of the covariates we use throughout the paper — with and without province fixed effects in the two panels. In column 2, we include various determinants of the presence of the Peasant Fasci, which are: a dummy for the presence of a Peasant Fasci before spring 1893, a dummy for the municipality being a rural center ("agro-town"), the levels of rural rents and urban rents, the share of total cultivated land, and the share of land devoted to grains. These variables are expected to affect the presence of the Fasci, which were more likely to organize in places where grain production was important. The inclusion of these covariates has very little effect on the relationship between our drought variable and the presence of the Peasant

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[25]We use 30 weather stations across 24 districts. Nine out of 39 weather stations we have available do not have complete data for all three of the months of March, April and May 1893, which we use to construct our (relative) rainfall measure.

[26]For example, in Table A1 in the Appendix we report Conley's spatially-corrected standard errors as well as non-corrected (white noise) standard errors. Both are smaller than our two-way bootstrapped errors. Finally, in Table A2 we estimate equations (2) and (3) at the district level, which can be interpreted as a very conservative correction for district-level correlation of error; the results are similar in this case (though because we only have 23 districts and 30 covariates and province dummies, in this case we include different subsets of the covariates separately).

[27]As explained in Section 3, in our source for the Mafia presence in 1900 (Cutrera, 1900) 68 municipalities were left unclassified. Furthermore, 36 municipalities do not have an active weather station within a 30km radius in spring 1893 and their rainfall data are missing. These missing data reduce our sample from 333 municipalities to 245.

Fasci, and the estimates of γ^{Fasci} are now -0.94 and -0.81, without and with province fixed effects, respectively.

Column 3 in addition includes various determinants of the presence of the Mafia: sulfur production in 1868-70 (emphasized by Del Monte and Pennacchio (2012) and Buonanno et al. (2015)), citrus groves in 1830s (emphasized by Dimico et al. (2017)), olives and vineyards (discussed by Bandiera (2003)), and Damiani's measure of the strength of the Mafia in 1885. These variables also have very little effect on the coefficient estimates of interest, which now stand at -0.93 and -0.74 without or with province fixed effects. Column 4 adds a range of geographic controls, in particular, log population in 1861, log area of the municipality, maximum and average altitude and the elevation of the town center, distance to Palermo, distance to the closest port, access to postal roads, average temperature, average rainfall and variance of our (relative) rainfall measure (all of these computed over the period 1881-1941). The results are again similar.

Quantitatively, the coefficient estimate in column 4, Panel B, -0.72, implies that a very severe drought (corresponding to the 25th percentile of the rainfall distribution across municipalities in the 1893 drought) increases the likelihood that the Peasant Fasci is organized in a municipality by 35 percentage points (compared to a municipality at the 75th percentile of the distribution).

Figure 5 shows the residual plot corresponding to column 4, Panel B. In addition to depicting the negative relationship, it also shows that this relationship is not driven by any outliers.[28]
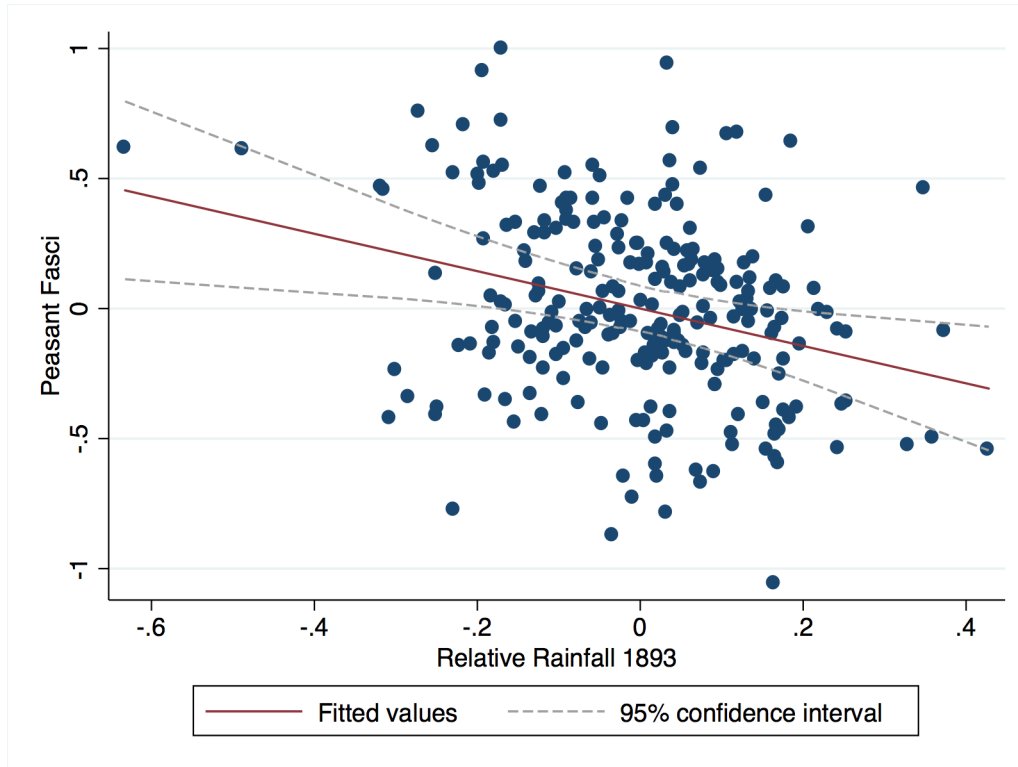
Figure 5: Residual plot of Relative Rainfall against Peasant Fasci from column 4 of Panel B in Table 3. The dashed curves represent the 95% confidence interval.

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[28]We also verified that outliers are not responsible for our results by estimating a robust regression that downweighs outliers following Li's (1985) procedure. This leads to a coefficient estimate that is very similar to our OLS estimate in column 4, -0.83, and is significant at less than 1%.

4.3 The Impact of Peasant Fasci on the Mafia

We now turn to the main focus of this section, the impact of the Peasant Fasci on the expansion of the Mafia. As explained in the Introduction and in Section 2, our hypothesis is that the Mafia spread to parts of Sicily where the Peasant Fasci was strong, because landowners and rural estate managers turned to the Mafia to combat and limit the influence of the Fasci. Econometrically, this hypothesis can be investigated by estimating the following simple cross-sectional relationship,

$$\text{Mafia}_i = \alpha^{\text{Mafia}} \cdot \text{Fasci}_i + X_i' \beta^{\text{Mafia}} + \varepsilon_i^{\text{Mafia}}, \tag{3}$$

where Mafia_i is the index of strength of the Mafia in municipality i from Cutrera (1900). Recall that this variable takes a value of 0, 1, 2 or 3, progressively indicating stronger Mafia presence in the municipality. The coefficient of interest is α^{Mafia}, which represents the effect of the Peasant Fasci on the Mafia.

Though equation (3) can be estimated by OLS, this is unlikely to lead to consistent estimates of the impact of the Peasant Fasci on the Mafia, since despite our detailed controls, areas where the peasant organizations took root might be particularly vulnerable to the Mafia, leading to an upward bias in α^{Mafia}. Conversely, if the Mafia is fighting against the peasant organizations (as we are hypothesizing), then factors that facilitate the expansion of the Mafia will make it more difficult for the Peasant Fasci to take root in the municipality, potentially leading to a downward bias in α^{Mafia}.

To partially overcome these problems, we use an instrumental-variables (IV) strategy where equation (2) is the first stage for the Peasant Fasci. This IV strategy is valid if the error term in (3), $\varepsilon_i^{\text{Mafia}}$, is orthogonal to the excluded instrument, relative rainfall$_i^{1893}$. We already motivated this exclusion restriction in the Introduction. Here we simply note that even though the drought of 1893 was very severe in many parts of Sicily, what made it more consequential was its juxtaposition with the rise of the nascent Fasci movement. We document below that other similar droughts before or after 1893 did not impact future Mafia or socio-economic outcomes. Our causal channel is thus confined to this specific historical juncture where the drought strengthened the Peasant Fasci and induced landowners to turn to the Mafia as a counterweight to peasant demands.

Table 4 provides two-stage least squares (2SLS) estimates of equation (3). This table has an identical structure to Table 3, except that we also report first-stage F statistics (for our excluded instrument, relative rainfall), and in Panels C and D we report in addition OLS estimates of the coefficient α^{Mafia} for comparison. In column 1, Panel A (where we do not include province fixed effects), we see a large and significant estimate of α^{Mafia}, 2.05 with the two-way clustered standard error of 0.39. In column 1 of Panel B (which also includes province fixed effects), we estimate a considerably smaller coefficient, 0.87, which is still statistically significant at 10%. The difference between these two estimates likely reflects the fact that comparing the presence of the Mafia across different provinces of Sicily is not as informative as within-province comparisons, in part because of the differential success of the Mafia across provinces. Motivated by this reasoning, in what follows we put more emphasis on the specifications that include province fixed effects. In columns 2-4, we again control for the same set of covariates as in Table 3. In Panel B, which includes province fixed effects, the estimates of α^{Mafia} are stable, ranging between 1.03 and 1.56, and are significant at 1%, though the first-stage F-statistic falls to 6.15 in column 4.

Quantitatively, our estimate from column 4, Panel B indicates that the presence of the Peasant Fasci in a municipality increases the Mafia index in that municipality by 1.5. To put this in perspective, recall that an increase in the Mafia index from 1 to 2 corresponds to a change from little presence of the Mafia in a municipality to

significant presence. This quantitative magnitude implies that as much as 38% of the strength of the Mafia in 1900 throughout Sicily may have been due to its deployment against the Peasant Fasci, thus suggesting that the episode we are focusing on may have played a pivotal role in the Mafia's dominant position on the island.[29]

Table 4 also shows that the OLS relationship between the Peasant Fasci and the Mafia is considerably weaker than the 2SLS relationship. We believe this reflects the fact that, as noted above, the Mafia made it difficult for the Fasci to organize in the first place. In Table A4 in the Appendix, we report the coefficients of the prior existence of the Mafia ($Mafia1885$) on the emergence of the Peasant Fasci. Consistent with this hypothesis, these coefficients are always negative and significant at 5%. Furthermore, we also estimate a positive impact of the presence of the Peasant Fasci on the Mafia in a simultaneous equation model where we allow the Mafia to impact whether the Peasant Fasci succeeded in organizing in the municipality. We continue to use relative spring rainfall in 1893 as instrument for the Fasci and utilize sulfur production in 1868-70 or $Mafia1885$ as of the excluded instrument for $Mafia1900$. The results reported in Table A5 confirm that while the presence of Peasant Fasci has a strong positive effect on the development of Mafia, the Mafia itself has a significant negative effect on the formation of Peasant Fasci.

4.4   The Drought and the Mafia

In our investigation of the effect of the Mafia on medium-term and long-term outcomes, we will bypass the causal channel working through the Peasant Fasci, and directly use our rainfall variable as a source of variation in the presence of the Mafia at the beginning of the 20th century. To prepare for these specifications, we now show the relationship between our drought variable and the Mafia directly, estimating the regression equation,[30]

$$\text{Mafia}_i = \gamma^{\text{Mafia}} \cdot \text{relative rainfall}_i^{1893} + X_i' \beta^{\text{Mafia}} + \varepsilon_i^{\text{Mafia}}. \tag{4}$$

Estimates of this equation are reported in Panels A and B of Table 5, which has an identical structure to Table 3, but also reports the F-statistic for our instrument. Though this F-statistic is small in the first column of Panel B, in columns 2-4, which report the main specifications we will use in our 2SLS estimates, they are between 8 and 11.

Unsurprisingly given the results in Table 4, we see a strong, stable and highly significant relationship in Table 5. Panel A is once again without province fixed effects and is included for completeness; as already noted, we put more emphasis on the estimates including province fixed effects, which are in Panel B. In Panel B, column 1, γ^{Mafia} is estimated as -0.66 (with a two-way clustered standard error of 0.33). As the same covariates as in Tables 3 and 4 are added, this coefficient increases to -1.12 in column 4, and is always significant at 1%.

4.5   Alternative Correction for Standard Errors

Though the two-way clustered standard errors are fairly conservative, they do not explicitly take into account the fact that measurement error in the rainfall from a weather station will affect the (relative) rainfall variable

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[29]This compares to the 10% explained by the pre-existing strength of the Mafia in 1885, 7% due to sulfur production, and 2% due to citrus groves (which do not appear to be a significant determinant of the Mafia in 1900). In all cases, the quantitative effects are computed by measuring the proportional decline in our Mafia measure in 1900 when the relevant determinant is set equal to zero.

[30]We should note that the exclusion restriction when we directly use equation (4) is slightly weaker than when we use (2) and (3). In the former case, we require that the drought has no direct impact on medium-term and long-term economic and political outcomes, while in the latter case, we would additionally require that any effect of the drought on the Mafia works entirely through the Peasant Fasci.

for several municipalities. In this subsection, we explicitly correct for this potential correlation by developing a maximum likelihood estimation strategy.

Let us denote the number of municipalities by n and the number of weather stations by $k < n$. Suppose that true rainfall is given by the k-dimensional vector R, but in practice, instead of observing this true rainfall vector, our measurement is subject to error, and we observe $\tilde{R} = R + \xi$, where ξ is a vector of weather station-level measurement error terms. As described in Section 3, we construct municipality-level rainfall (or relative rainfall) by using the $n \times k$ weights matrix, denoted here by W. This matrix specifies how rainfall in a municipality is related to rainfall measured at the various weather stations across Sicily. Thus our instrument at the municipality level is constructed as

$$\tilde{Z} = W\tilde{R} = Z + W\xi,$$

where $Z = WR$ is the true vector of (relative) rainfall across municipalities.

Thus, once again using vector notation, the reduced-form relationships of interest for us can be represented as

$$
\begin{aligned}
y &= X'\beta + \gamma\tilde{Z} + \tilde{\varepsilon} \\
&= X'\beta + \gamma Z + \varepsilon + \gamma W\xi,
\end{aligned}
\tag{5}
$$

where y is one of our left-hand side variables and X is a vector of covariates.

In this model, there are k random effects that need to be estimated. These random effects create additional correlation between the residuals of different municipalities, and if they are ignored, this could lead to standard errors that are underestimated.

To estimate (5), we assume that both ε and ξ are normally distributed (with variance-covariance matrices that allow for arbitrary heteroscedasticity, Σ and Λ). This enables us to specify the likelihood function explicitly and estimate the relevant parameters by maximum likelihood. Notice, in particular, that because the coefficient of interest, γ, is part of the error term, maximum likelihood estimation can lead to different estimates of this parameter than OLS (in practice, the estimates are very similar).

The log-likelihood function of this model is

$$L = -\frac{1}{2}\left[\ln(\det V) + (y - X'\beta - \gamma Z)'V^{-1}(y - X'\beta - \gamma Z) + n\ln(2\pi)\right],$$

where $V = \Sigma + W\Lambda W'\gamma^2$. Using this log-likelihood function, we estimate the relevant parameters by maximum likelihood, and then compute bootstrapped standard errors that allow for additional correlation within a district.

The results from this alternative estimation strategy with Mafia in 1900 as dependent variable are reported in Panel C and D of Table 5. We see throughout that the estimates of the relevant parameters are very similar to those reported in Panel A and B. More importantly, the standard errors are also very similar to ones that allow for two-way clustering conditional on district and the closest weather station. This congruence makes us more confident that our standard errors are not understated. In what follows, we focus on the two-way clustered standard errors in the text, but also show maximum likelihood estimates for our main outcome variables in the Appendix.

4.6 The Supply of the Mafia

Our results so far show that the "demand" for the Mafia coming from the desire of landowners and rural estate managers to combat the Peasant Fasci has played a major role in its spread the years following 1893. A natural question is whether the "supply" of the Mafia, determined by its existing location and strength, has also played a major role in its expansion during this critical period. We investigate this issue in Tables A6 and A7 in the Appendix and do not find any evidence that the supply of the Mafia has been important. In particular, interactions between relative rainfall in 1893 and measures of strength of the Mafia in neighboring municipalities and various proxies for the potential strength of the Mafia in the municipality — $Mafia1885$, the importance of sulfur production and the presence of citrus groves — are all far from significance. We interpret these results as suggesting that when the demand for its services was present, the Mafia found a way of getting a toehold in the municipality regardless of its prior organization there or in neighboring municipalities, partly thanks to the general lawlessness of the island and the availability of rural guards and local thugs who were willing to provide their services to the Mafia (see Lupo, 1996, p. 183; and Romano, 1966, p.175-177).

4.7 Robustness

Tables A8 and A9 in the Appendix investigate the robustness of the results reported so far to different specifications of the relative rain variable. For brevity, we focus on equations (2) and (4), and on the specification with province fixed effects.

In Table A8, we verify that it is (relative) rainfall in the spring of 1893 that matters. In column 1, we show that there is no similar relationship between (relative) rainfall in the spring of 1892 and Peasant Fasci or the Mafia in 1900. In column 2 we include spring rainfall in 1892 and 1893 together. For both Peasant Fasci and Mafia, it is the rainfall in 1893 that is statistically significant at 10% and 5% respectively. In column 3, we include (relative) rainfall in the spring 1893, fall 1892, winter 1893 and summer 1893, and we see that it is indeed the spring rainfall that is statistically significant, while rainfall in other seasons has no effect. This is reassuring because it confirms the results reported in Table 2 about the role of the spring 1893 drought on agricultural production.

In Table A9 we document that different measures of rainfall lead to very similar results. Recall that our relative rainfall variable measures the rainfall in the spring of 1893 relative to the average spring rainfall between 1881 and 1941 of the same municipality. In this table, we present similar results using the log of relative rainfall and relative rainfall capped at 1 (so that variation coming from some municipalities getting more rain in the spring of 1893 than their historical average does not feature in our variable). We also investigate whether the interpolation of rainfall from the weather stations, described in Section 3, could be responsible for our results. We do this by limiting the sample to municipalities where the interpolation uses at least two weather stations, where we use weather stations within 25 km of the municipality, or going in the opposite direction, where we only use weather stations within 35 km of the municipality. The results are very similar in all cases.

In Table A10, we show that the results are similar when we use the alternative interpolation method described in footnote 17. The results are similar, too, when we use a dummy for major presence of the Mafia in the municipality rather than our baseline measure which takes the value 0, 1, 2 or 3 (Panel A in Table A11).[31] As already noted, the

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[31]Panels B and C of Table A11 report the main results of the medium- and long-term consequences of the presence of the Mafia discussed in the next sections using the dummy for the Mafia presence rather than our baseline $Mafia1900$ variable.

results are again very similar when we collapse the data to the district level (Tables A2 and A3).

4.8 Falsification

Our empirical strategy presumes that weather conditions do not impact the spread of the Mafia, or any of our subsequent economic and political outcomes, absent the rise of the Peasant Fasci (which is unique to this critical period in Sicily's history). Any direct effect of rainfall on our outcomes of interest is therefore a major threat to our approach. In this subsection, we provide evidence using several falsification exercises that such effects are not present.

First, we show that weather conditions in 1893 are not related to pre-1893 variables. In Table 6, we report the relationship between (relative) rainfall in the spring of 1893 and 20 proxies for pre-existent social, economic and political characteristics. These are: the presence of Mafia in 1885 as provided by (Damiani, 1885) and described in Section 3; a dummy variable for malarial areas in a municipality; the ratio of vaccinated children over population; two measures of the health of the population based on the fraction of young men rejected for the draft because of poor health or because of insufficient height; the quantity of drinking water; the number of doctors per 1000 inhabitants in 1885 which are gathered from Direzione Generale della Statistica (1886); the infant mortality rate variable for the years 1869-70 described in Section 3; the per-capita development expenditure; the level of local indirect taxation over population and the ratio of indirect over direct taxation which are collected from Direzione Generale della Statistica (1887) for the year 1884; the diffusion of tenancy, sharecropping and own-farming in 1885 from Damiani (1885); and the following variables described in Section 3: the share of citrus groves in 1830s; the quantity of sulfur production in 1868-70; the Herfindahl index of the concentration of votes in the 1865 parliamentary elections; the number of notaries per 1000 inhabitants in 1871; the number of soldiers used for local policing divided by population; and the efficiency of civil courts in 1875. We focus on the specification from column 4 of Tables 3-5 with province fixed effects (the number of observations varies across columns due to data availability).

Overall, we find no systematic association between our rainfall measure and any of these 20 variables. Only two of these variables, Mafia in 1885 and the number of soldiers divided by population in 1875, have a relationship that is close to statistical significance (just about at 10%) with our rainfall measure. This overall pattern bolsters our interpretation that there was no systematic relationship between the severity of the drought of 1893 and pre-existing economic, social and political conditions of municipalities.

Our second falsification exercise checks whether relative rainfall before 1892 had a systematic effect on the emergence of the Peasant Fasci or the Mafia. This might be the case, for example, if weather conditions impacted the emergence of the Mafia through other channels (e.g., they may affect economic conditions, which could then translate into an impact on the Mafia). In Table 7, we look at the potential effects of relative (spring) rainfall between 1882 and 1891 on the Peasant Fasci (in Panel A) and on the Mafia (in Panel B). For reference, the first column presents the reduced forms with relative rainfall for 1893, corresponding to column 4, Panel B, from Tables 3 and 5. The results in the rest of the table and their contrast with column 1 are encouraging for our hypothesis. The coefficients on the other rainfall measures are typically much smaller than in column 1, and none has a correlation with the Peasant Fasci or the Mafia that is significant at 5%, and of the 20 coefficients only one is marginally significant at 10%.

Third, in the first two rows of Table A12 in the Appendix, we replicate this exercise by looking at the relationship between spring rainfall for the period 1900-1941 and our Peasant Fasci and Mafia variables in the three specifications in columns 2-4 of Tables 3-5.[32] We report the fraction of coefficient estimates that are statistically significant at 10%, separately for negative and positive estimates. As right-hand side variables, we use our baseline rainfall variable, log rainfall and capped rainfall (as used in Table A9). A spurious relationship between rainfall and the Mafia would lead to over-rejection in this table, meaning to numbers that are systematically above 0.05. The numbers are typically less than 0.05 and when they are not, as in the case of the Peasant Fasci, the sign is the opposite of the one in our first-stage regression. These results further increase our confidence in our exclusion restriction.

Finally, we report more extensive falsification exercises using contemporary variables when we turn to the effects of the Mafia on medium-term and long-term economic and political outcomes. All of these falsification exercises support the exclusion restriction as well.

4.9 The Role of Pre-Existing State Capacity

Our analysis in this paper focuses on within-Sicily variation. A complementary question is whether any factors made the rise of the Mafia more likely in Sicily than the rest of the country. In this subsection, we suggest that one such factor might have been the overall weakness of the state in Sicily, which made it possible for Peasant Fasci to organize and grow rapidly, and landowners and estate managers to turn to the Mafia to combat the Fasci. As already mentioned in Section 2.1, by the end of the 19th century Sicily was underdeveloped relative both to the rest of Italy and to the other southern regions formerly under Bourbon rule. This economic underdevelopment was accompanied by we comparative absence of state institutions and weak state capacity. Sicily's relative social and political conditions did not improve after unification. A few measures we have available corroborate this pattern. In 1892, draft evasion rate in Sicily was 7% compared to 5% in other southern regions; the percentage of homicides that remain unsolved was 15% compared to 8% in the rest of the South (Direzione Generale della Statistica, 1893). Moreover, the army, rather than the police, was in charge of local security and order (which was unique to Sicily).

Though we cannot use our empirical strategy for the whole of Italy (since we do not have data on organizations that would be the analogues of Peasant Fasci and Mafia in most of the rest of the country), we can provide suggestive evidence on the importance of pre-existing state capacity by investigating whether the effects of the drought and the presence of the Peasant Fasci on the rise of the Mafia are stronger in municipalities with weaker state capacity. In Table 8, we use the two measures of the capacity of the state described above, the number of soldiers used for local policing and efficiency of civil courts, and interact them with our dummy for the presence of Peasant Fasci (instrumented by relative rainfall) in Panel A and directly with relative rainfall in a reduced-form specification in Panel B.[33] The estimates using either measure support the interpretation that both the effect of the

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[32]We do not use rainfall between 1894 and 1900 in our falsification exercises, since further droughts during this window could have acted as an additional trigger for peasant organizations and thus the Mafia.

[33]We cannot use the third measure we referred to above, notaries relative to population in 1871, for this exercise because missing values for this variable mean that it has no overlap with municipalities with a Peasant Fasci in 1893.

For the two endogenous variables included in the models estimated in Table 8, Peasant Fasci and the interaction between Peasant Fasci and state capacity, we use relative rainfall in the spring of 1893 and the interaction between relative rainfall and the state capacity measure as excluded instruments.

First stages for the specifications in Panel A are reported in Table A13, while Table A14 in the Appendix reports similar results using alternative measures of army presence and civil courts efficiency.

presence of Peasant Fasci and the direct impact of the drought are more pronounced in municipalities with lower state capacity; the interaction effects are uniformly negative in Panel A (greater state capacity reduces the effect of Peasant Fasci on the Mafia) and positive in Panel B (greater state capacity means less pronounced effects from the drought), even if they are typically only significant in the specifications that include geographic controls (columns 2 and 4).

5 The Medium-Term Effects of the Mafia

Having established a plausible source of variation in the Mafia at the turn of the 20th century, we now investigate the effects of the Mafia on various economic outcomes in the early 20th century. We turn to longer-term outcomes in the next section.

5.1 Economic Outcomes

Throughout the rest of the paper, we estimate cross-sectional models of the form

$$y_i = \alpha^y \cdot \text{Mafia}_i + X'\beta^y + \varepsilon_i^y.$$

Our main specifications will be estimated by 2SLS using equation (4) as the first stage (with relative rainfall in the spring of 1893 as the excluded instrument). The first stages are essentially identical to those reported in Panel B of Table 5 (only missing two or three municipalities for some of the outcome variables). In addition to the 2SLS estimates reported in Panel A, we show OLS estimates in Panel B for comparison. In what follows, we focus on specifications with province fixed effects (especially since there are some notable differences in economic outcomes across provinces).[34]

In Table 9, we investigate the effect of the Mafia on human capital, proxied by literacy. As noted in Section 3, we have literacy data from the censuses of 1911, 1921 and 1931 (for the population above the age of six).

In columns 1-3 we report the results for literacy in 1911, which show no significant effect of the Mafia on this variable, with the exception of column 3 which is weakly significant. This is not surprising in view of the fact that literacy is a stock variable, and thus even if the Mafia influences human capital investments, this would be unlikely to exhibit itself in literacy in 1911.

In columns 4-6 we turn to literacy in 1921. For this variable, we see a statistically significant negative relationship in all three specifications. For example, in the specification including all controls in column 6, we have an estimate of -0.10. Columns 7-9 show similar, statistically significant estimates for literacy 1931.

Quantitatively, the effects are large. For example, increasing the Mafia in 1900 variable from 1 to 2 (corresponding to an increase from little presence of the Mafia to significant presence) will lead to about 10 percentage points decline in literacy in 1921 (about 20% of its mean).

It is noteworthy that the OLS estimates, reported in Panel B, are close to zero. We believe that this reflects the

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[34]As the F-statistic of the most demanding specification in Panel B of Table 5 is slightly lower than the usual benchmark suggested by Stock et al. (2002), in Table A15 in the Appendix we report the Anderson-Rubin weak-instrument robust 95% confidence intervals for all the medium-term and long-term outcome variables, which are quite similar to our 2SLS estimates. We also report in Tables A16 in the Appendix maximum likelihood estimates for all of the medium-term and long-term outcome variables discussed in the text.

selection of the Mafia to municipalities with better economic prospects. Though what would be relevant for the difference between the 2SLS and OLS is selection conditional on unobserved heterogeneity, we verify that there is a similar selection conditional on observables. Specifically, using the parameter estimates for all the covariates from column 4, we compute predicted values of the dependent variable (say literacy in 1921 or in 1931), denoted by $\hat{y}_i$. We then check the correlation between $\hat{y}_i$ and Mafia_i. A positive correlation indicates that at the beginning of the 20th century, the Mafia was more likely to be present in municipalities that had better economic prospects on the basis of observable covariates. In all cases we find a substantial positive correlation. For example, for literacy this correlation is 0.37 in 1911, 0.45 in 1921, and 0.11 in 1931. On the basis of this pattern, we interpret the absence of a relationship between Mafia and our various economic outcomes in the OLS as reflecting an upward bias due to this type of selection.

We also investigated whether the endogenous selection of the Mafia to richer municipalities could explain the difference between our OLS and IV estimates using the methodology developed by DiTraglia and García-Jimeno (2016). These authors provide a Bayesian approach for incorporating priors about measurement error affecting the key regressor (which is being instrumented in the IV estimation) and the bias of OLS estimates. In the context of a linear model, their method involves the specification of a parameter κ, measuring the signal-to-noise ratio in the endogenous regressor, and ρ_{T^*u}, capturing the correlation coefficient between the error term in the second-stage equation and this regressor (which is the source of bias in the OLS). Their fully Bayesian procedure then jointly estimates the possible range of correlation coefficient between the instrument and the second-stage error term, $\hat{\rho}_{uz}$ (which is the source of the bias in IV), and the implied value of the causal effect purged of this bias, $\hat{\beta}$. We implemented this procedure for our most demanding specification (e.g., columns 3, 6 and 9 in Tables 9), assuming a signal-to-noise ratio in the range $\kappa \in (0.5, 1]$ in the Mafia variable and a correlation coefficient between the regressor and the second-stage error term $\rho_{T^*u} \in [0.1, 0.9]$. This implies priors over that the extent of endogenous selection that start from a low level and go up all the way to a high level of correlation (for variables that are negatively associated with prosperity, we correspondingly use $[-0.1, -0.9]$). The results from this approach for all of our medium-term and long-term outcome variables are reported in Table A17 in the Appendix, and show that the patterns are consistent with our interpretation. In all cases (with the partial exception of infant mortality in 1982, one of our long-term outcome variables for which we do not find a significant effect of the Mafia), we cannot reject that the correlation between the instrument and the second-stage error term ρ_{uz} is equal to zero, and the estimates of the coefficients of interest purged from any bias of this form are always similar to our IV estimates.

5.2 Public Goods

We conjecture that a proximate reason for the negative effect of the Mafia on economic outcomes is that the Mafia reduces the capacity, and the incentives, of the local government to provide public goods and protect its citizens. Though we are not able to establish that this is the main proximate channel, we provide evidence that the Mafia has a strong negative impact on the provision of public goods in Table 10. We look at two measures of the local government performance: infant mortality in 1909 and per capita development expenditure in 1912 (in logs).

In columns 1-3, we estimate positive, and statistically and economically significant effects of the Mafia on infant mortality. Quantitatively, an increase in Mafia presence from 1 to 2 (little presence to significant presence of the Mafia) leads to about 5 percentage points increase in infant mortality (about 30% of its mean). In columns

4-6, we report the estimates of the effect of the Mafia on per capita development expenditure in 1912. The impact is negative and statistically significant, suggesting a considerable reduction in public spending directed to developmental outcomes in municipalities in which the Mafia was operating.[35] Finally, in columns 7-9 we look at the effect of the Mafia on a measure of state capacity, the number of notaries divided by population in 1924. We again find a negative effect, suggesting that where the Mafia was strong, the capacity of the state to provide services was lower.

On the basis of these results and our discussion in Section 2, we conclude that there is a negative association between the Mafia and public goods provision, and this might be partly working through lower capacity of the state to provide such public goods.

5.3 Mafia and Politics

While the results in the previous subsection suggest that part of the effects of the Mafia might be working through reduced provision of public goods and perhaps local state capacity, how the Mafia affects various social and economic outcomes is still an open question. In this subsection, we provide evidence on another channel of influence of the Mafia — its impact on politics. Our discussion in Section 2 suggests that the Mafia has often been involved in politics (see Buonanno et al., 2016; De Feo and De Luca, 2017). The Mafia might impact the political equilibrium in the municipality both by discouraging certain parties and candidates from campaigning or competing in elections and by influencing voters directly using threats and coercion (Alesina et al., 2018).

Motivated by this expectation, in columns 10-12 of Table 10 we look at the effects of the Mafia on the distribution of votes across candidates in the 1909 parliamentary elections. Specifically, we focus on the Herfindahl index of vote shares in that election. (We saw in Table 6 that the Mafia in 1900 is unrelated to the same variable measured in 1865). With all three specifications, we estimate a statistically significant and quantitatively sizable impact of the Mafia on political competition in 1909. For example, an increase from little presence of the Mafia to significant presence (from 1 to 2) is associated with a 30 percentage points increase in the Herfindahl index of vote shares in 1909 (about 38% of its mean). This very large impact suggests a substantial link between the presence of the Mafia and local politics, most likely because of the inability of certain political candidates to campaign in areas dominated by the Mafia as well as other forms of voter intimidation and fraud (see for example Salvemini, 1910; Hess, 1973; Schneider and Schneider, 1976; Alesina et al., 2018).

5.4 Additional Falsification Exercises

We further investigated whether rainfall could be systematically related to outcome variables through other channels. Our exercises here focus on a similar set of issues to our previous falsification checks, and in particular would show significant effects if rainfall shocks had a direct impact on various social and outcomes.[36]

Table A18 in the Appendix shows the relationship between relative rainfall (again in the spring) in the 10 years preceding the 1893 drought and our medium-term outcomes. We report the coefficients of (relative) spring rain in the most demanding specification for all variables considered so far, with each column testing the relationship

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[35]Interestingly, and perhaps surprisingly, while spending composition is affected by the Mafia, municipality total revenue and total spending are not.

[36]For instance, Maccini and Yang (2009) document substantial effects of early-life rainfall on subsequent health and education in Indonesia.

for each consecutive year starting with 1882. The results are reassuring. Out of 70 coefficients, only seven are statistically significant at 10% or less, and there is no clear pattern of systematic negative or positive correlation between relative rainfall and development outcomes.

Table A12, whose first two rows were discussed in the previous section, again directly investigates whether there is any relationship between current rainfall and various economic outcomes. It reports the fraction of co-efficient estimates that are statistically significant at 10% (separately for negative and positive estimates) when we look at the relationship between our outcome variables and rainfall in the years between 1900 and 1941. The results are encouraging and show very few numbers above 5% (and those that are have the opposite sign to the one implied by the reduced form of our main results, reported in the first column of Table A19 in the Appendix). These results further bolster our confidence in the exclusion restriction underlying our approach.[37]

The strategy in Table A12 is to look at rainfall in all years. This deals with the most salient concern about rainfall having a direct effect on economic or political variables. A variant of this concern is that only severe drought experiences would have such effects; if this were the case, by pooling all data between 1900 and 1941 we might be diluting the possibility of detecting a violation of our exclusion restriction. Reassuringly, we obtain similar results in Table A19 in the Appendix when we focus on "drought years" where average relative rainfall across municipalities was below average relative rainfall in 1893, 0.65. In particular, in this table only six out of 154 estimates are significant at 10% or less. Overall, we interpret these results as providing further support for our exclusion restriction that the effect of the 1893 rainfall is working through the organization of the Peasant Fasci and the spread of the Mafia which was a response to this.

5.5   Other Concerns

Another concern is that our economic outcomes may be partly confounded by an endogenous migration response to the drought, the rise of the Peasant Fasci and/or the strengthening of the Mafia. For example, if some of the most educated inhabitants leave a municipality because of these factors, this could affect both our literacy results and our other economic outcomes. We investigate this issue in Panel A of Table A20 in the Appendix by looking at the change in population between 1881 (before the Peasant Fasci and the spread of the Mafia in response) and 1901. We estimate very small and far from significant effects of (relative) rainfall in 1893 on the change in population during this time period. This suggests that there has not been a major migration response to the Mafia or to economic and social forces that led to its rise.

Another related concern may be that as well as (or instead of) the impact of the Mafia, we are capturing the lingering effects of the rise of socialist mass politics or of the ongoing conflict between the Mafia and socialist organizations. Panel B of Table A20 investigates this question by estimating the effects of the (relative) rainfall in the spring of 1893 on the membership of the Peasant Leagues in 1908 (relative to population) and the share of votes for the three socialist parties in the parliamentary elections in 1909. We find no significant relationship between the severity of the drought and the strength of these left-wing groups, which suggests that any direct effects of

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[37]A complementary approach, similar to the strategy used in Madestam et al. (2013), is to compare the coefficient of relative rainfall in 1893 to the coefficient distribution for relative rainfall in other (placebo) years. This exercise is reported in Figure A2 in the Appendix where we plot the cumulative distribution of coefficients from regressions of our outcome variables on relative spring rainfall in the years 1900-1941, and indicate where our coefficient estimates for relative rainfall in spring 1893 fall within this distribution. The figure shows that the coefficient for the 1893 is a large outlier for Peasant Fasci, Mafia 1900 and our main medium-term outcome variables.

socialist organization and their conflict with the Mafia are likely to have disappeared by the first decade of the 20th century.

6   Long-Term Outcomes

In this section, we investigate the effects of the Mafia on long-term outcomes, focusing on variables from the 1960s, 70s and 80s.

6.1   Persistence of the Mafia

The spread of the Mafia at the end of the 19th century can have long-term effects through two complementary channels. First, the differential presence of the Mafia at the turn-of-the-century could put different municipalities onto different trajectories for economic and political development, with important implications for late 20th-century outcomes. Second, the local presence of the Mafia could persist between 1900 and later decades, and the presence of the Mafia in the second half of the century may directly impact contemporary economic and political outcomes. Though we do not have a way of distinguishing between these two channels, we can check whether there is persistence of the Mafia in a municipality from 1900 to later parts of the century. We obtained information about Mafia presence in the 1980s from a report by the military police (*Carabinieri*) submitted in 1987 to a parliamentary committee (CG Carabinieri, 1987). The report analyzes the activities of organized crime in Italy and lists the main Mafia families, providing for each of them the name of the boss and the town that was their stronghold. We create a dummy variable for a municipality being a stronghold of a Mafia family using this information.

Table A21 in the Appendix provides mixed evidence for the second channel — there is a positive relationship between the Mafia in 1900 and the Mafia in 1987, but this is nowhere significant in the 2SLS specification (it is smaller but significant in the OLS shown in Panel B). This weak persistence might reflect the fact that the Mafia spread further in the intervening 87 years and the impact of fascist repression against the organization, which may have reshaped its subsequent distribution. In light of this pattern, we may expect any effects of the Mafia on long-term outcomes to be attenuated relative to its medium-term effects. The results we report next are consistent with this expectation, though we do find significant correlations between the exogenous variation in the Mafia in 1900 and some long-term outcomes (especially in the political realm), which we interpret as the persistent effects of early Mafia presence on current outcomes.

6.2   Economic Outcomes and Public Goods

We start with economic outcomes, which we again proxy with human capital variables. We look at both literacy and the fraction of the population with high school education (completion rate) in 1961, 1971 and 1981. Panel A and B in Table 11 show that Mafia in 1900 is negatively correlated with both of these variables in all specifications, though the significance of the estimates disappears after 1971 for literacy and in 1981 for high school education. Quantitatively, the effects continue to be substantial. For example, an increase in the Mafia index in 1900 from 1 to 2 reduces high school education by 33% of its mean in both 1961 and 1971.

The next three panels of Table 11 look at three measures of public goods provision we have available for this period, infant mortality, development expenditures and availability of aqueducts. The point estimates for all three

variables are negative in all specifications, but now the estimates for infant mortality and development expenditures are never significant, while aqueduct coverage is significant at 10% or less in all specifications in 1971 and in most specifications in 1961.

Overall, we interpret these results as suggesting some continuing adverse effects of the Mafia. Crucially, however, these effects are considerably weaker than in the first half of the century, most likely because the strength of the Mafia across Sicily has changed significantly since 1900 and some of the effects of the crime syndicate from the early 20th century appear to have attenuated since then.[38]

6.3   Mafia and Politics

We next turn to the effects of the Mafia on political competition in the longer-term. Panel F of Table 11 reports results for the Herfindahl index of party votes in parliamentary elections of 1963, 1972 and 1983.[39] The presence of the Mafia in 1900 is associated with a greater concentration of votes. These estimates are significant in all specifications for all the elections. Quantitatively, an increase in the Mafia index in 1900 from 1 to 2 is associated with a 6 percentage points increase in the Herfindahl index of concentration in 1972, for instance. These effects are therefore considerably smaller than the impact of the Mafia on medium-term political competition, which is consistent with the idea that these are the lingering but attenuated effects of the presence of the Mafia in 1900.

6.4   Falsification and Other Concerns

Table A22 in the Appendix shows the relationship between relative rainfall in the 10 years preceding the 1893 drought and our long-term outcome variables. (This is similar to the falsification exercises for medium-term outcomes reported in Table A18). We report the coefficients of (relative) spring rain in the most demanding specification for all long-term variables, with each column testing the relationship for the effect of rainfall for a separate year starting with 1882. The results are again reassuring. Out of 150 coefficients, only nine are statistically significant at 10% or less, and there is no clear pattern of systematic negative or positive correlation between relative rainfall and development outcomes. Recall also that Tables A12 and A19 already showed falsification exercises using (relative) rainfall in each year between 1900 and 1941, and for specific drought years for the long-term outcomes. These exercises confirmed the lack of any significant relationship between rainfall and contemporary or subsequent outcomes for any year other than the critical juncture created by the rise of the Peasant Fasci, 1893. Finally, in columns 4-6 of Table A20 we investigate the effects of the Mafia in 1900 on longer-term population changes, and show that migration cannot account for the long-term effects of the Mafia we are documenting.

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[38]An additional factor is that the provision of health care, education and several other public goods has become more centralized at the regional or the national level since World War II, reducing their cross-municipality variation within Sicily.

[39]For completeness, Figure A3 in the Appendix reports the estimates for all elections between 1946 and 1992. In all cases we see a positive effect of the Mafia on political concentration, though the effects before 1958 are not statistically significant. We conjecture that this is because in the years immediately following World War II the Mafia was weaker and its impact on politics may have also been more limited.

7 Conclusion

There is growing evidence that state weakness and the lack of state capacity are important roadblocks on public good provision and economic development (e.g., Gennaioli and Rainer, 2007; Besley and Persson, 2011; Bandyopadhyay and Green, 2012; Michalopoulos and Papaioannou, 2013; Acemoglu et al., 2015). One of the many factors holding back the development of local state capacity is the impact of various criminal organizations. None is perhaps as famous as the Sicilian Mafia, which has played an outsized role in the island's history since the middle of the 19th century. Though anecdotal evidence on how racketeering by the Mafia has impacted the provision of various local public goods is plentiful (e.g., Mosca, 1900; Salvemini, 1910; Pezzino, 1990; Tranfaglia, 2008; Sacco, 2010) and recent work has documented that the Mafia and other criminal organizations have often played an important role in local politics (e.g., Daniele and Geys, 2015; Buonanno et al., 2016; Di Cataldo and Mastrorocco, 2016; De Feo and De Luca, 2017), there is still only limited direct evidence of the Mafia's (or other criminal organizations') impact on local economic development.

In this paper, we proposed a theory of the spread of the Mafia at the end of the 19th century and exploited the source of variation generated by this theory to estimate its medium-term and long-term effects on economics and politics on the island. Though the origins of the Mafia are well studied and emphasize the turbulence created by the collapse of the Kingdom of Two Sicilies and Italian unification, the role of local elites turning to the Mafia in response to the rising socialist threat at the end of the 19th century has been largely overlooked. The first mass socialist movement in Italy, the Peasant Fasci, emerged in Sicily, in part because of the poverty and extremely harsh working conditions of the island's peasants. The Peasant Fasci movement received a huge boost because of an exceptional drought in 1893, which cut agricultural production by as much as 50% in some parts of Sicily. We start by documenting that this drought — and no other past or future weather event — has a strong predictive power for the location of the Peasant Fasci. We then estimate the causal effect of the rise of the Peasant Fasci on the spread of the Mafia circa 1900. Our results indicate that as much as 38% of the strength of the Mafia in 1900 may be related to its involvement in the suppression of the Peasant Fasci.

In the second part of the paper, we use the severity of the drought across Sicily as an instrument for the presence of the Mafia in 1900 and estimate its impact on local economic and political outcomes. We further substantiate the validity of this instrumental-variables strategy by showing that rainfall in other years has no predictive power for the Mafia or various economic and social outcomes — it was only the drought of 1893, in the critical juncture created by the rise of mass socialist politics, that triggered the rise of the Mafia and hence its medium-term and long-term effects on various economic and political outcomes.

Our empirical work shows fairly large negative effects of the Mafia in the next two decades, significantly reducing literacy, increasing infant mortality and curtailing provision of local public goods. We also find a sizable effect of the Mafia on local politics: in places where the Mafia took root, the distribution of votes in parliamentary elections is highly concentrated. This suggests that the Mafia, in part by preventing parties and politicians not allied with itself from campaigning or even appearing in the municipality, majorly reduced political competition. We conjecture that this might be one of the channels via which the Mafia impacts local economic development (see Besley et al. (2010) for empirical evidence from the United States consistent with such an effect of political competition).

We document some longer-term effects of the Mafiaspace as well, though these are weaker, in part because

there are significant changes in the local strength of the Mafia in the 20th century, associated with the rise and decline of fascism, and then the subsequent rise of the Christian Democratic Party, which has often collaborated with the Mafia in many parts of Sicily. Nevertheless, the impact of the Mafia in 1900 on local political concentration appears to be very persistent and robust.

We view our paper to be part of a growing literature on the economic and political consequences of local criminal activities.[40] Though our work is directly informative only about the role of the Sicilian Mafia, we conjecture that the mechanisms highlighted here are more broadly applicable. First, the work of the historian Benigno (2015) argues that the same factors have been important in Naples. Second, paramilitary organizations in several countries in Latin America, including the united self-defense forces (AUC) in Colombia, ORDEN groups in El Salvador and civilian self-defense patrols in Guatemala, appear to have received support from landowners to fight left-wing groups and movements, in part because of the weakness of the state (Acemoglu et al., 2013; Fergusson et al., 2013; Brockett, 2005). Third, paramilitaries appear to have been used to fight drug gangs in Brazil for similar reasons and interestingly with similar economic and social consequences.[41] Finally, Varese (2001) has argued that the demand from mine owners against worker strikes in Russia during the chaotic years following the collapse of the Soviet Union significantly strengthened the Russian Mafia.

Future work in this area investigating the exact mechanisms via which different criminal organizations influence the organization of local government, local corruption and local politics would be particularly informative. For instance, our strategy does not reveal whether the Mafia may have reduced local economic development because of local corruption, other effects of local criminal activity, or because of its impact on local political competition.

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[40]In addition to the references already mentioned in the Introduction, see Dal Bó et al. (2006); Dell (2015); Angrist and Kugler (2008); Chimeli and Soares (2017); Mejia and Restrepo (2013); Castillo et al. (2014); Murphy and Rossi (2017).

[41]See the report by Dom Phillips in *The Guardian*: https://www.theguardian.com/world/2018/jul/12/brazil-militia-paramilitary-wield-terror-seize-power-from-drug-gangs.

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TABLES

Table 1: Descriptive Statistics

Variable	Obs	Mean	SD	Min	Max	Variable	Obs	Mean	SD	Min	Max
Main variables:						*Economic, Public Goods and State Capacity variables:*					
Mafia 1900	273	1.43	1.15	0	3	Literacy rate 1911	333	0.37	0.10	0.11	0.73
Peasant Fasci	333	0.31	0.46	0	1	Literacy rate 1921	333	0.48	0.09	0.23	0.80
Relative Rainfall 1893	297	0.64	0.28	0.06	1.28	Literacy rate 1931	333	0.59	0.08	0.37	0.79
						Literacy rate 1961	333	0.83	0.04	0.69	0.93
Determinants of Fasci:						Literacy rate 1971	333	0.88	0.04	0.74	0.99
Peasant Fasci before March 1893	333	0 .02	0.12	0	1	Literacy rate 1981	333	0.93	0.03	0.81	0.99
Rural center in 1861	333	0.37	0.48	0	1	High school rate 1961	333	0.03	0.02	0.01	0.10
Rural rent per hectare in 1853	333	6.85	4.75	1.17	35.15	High school rate 1971	333	0.06	0.03	0.02	0.22
Urban rent per hectare in 1853	333	1.56	4.30	0	69.99	High school rate 1981	333	0.09	0.04	0.03	0.30
Grains (share in 1830s)	333	0.50	0.23	0.015	0.99	Infant mortality 1869-70	259	0.20	0.07	0.01	0.67
Share cultivated land in 1853	333	0.97	0.08	0.17	1	Infant mortality 1909-10	277	0.16	0.04	0.04	0.32
						Infant mortality 1969-70	333	0.03	0.02	0	0.11
Determinants of Mafia:						Infant mortality 1982	333	0.02	0.02	0	0.11
Sulfur production 1868-70	333	5.59	23.50	0	210	Drink water quantity in 1885	333	1.69	0.51	1	3
Citrus groves (share in 1830s)	333	0.01	0.02	0	0.16	Aqueduct coverage 1961	333	0.66	0.24	0.01	0.99
Mafia 1885	333	0.57	1.01	0	3	Aqueduct coverage 1971	330	0.77	0.12	0.11	1
Olives (share in 1830s)	333	0.04	0.06	0	0.46	Aqueduct coverage 1981	333	0.67	0.14	0.01	0.99
Vineyards (share in 1830s)	333	0.10	0.12	0	0.74	Development Expenditure 1884	333	0.82	0.85	-2.15	3.28
						Development Expenditure 1912	333	-1.58	2.46	-10.03	5.23
Geographic controls:						Development Expenditure 1957	333	0.20	0.93	-2.76	3.56
Population in 1861	333	8.37	0.95	5.88	12.19	Notaries per 1000 inhabitants in 1871	333	0.01	0.05	0	0.52
Area	333	8.194	1.25	4.41	11.19	Notaries per 1000 inhabitants in 1924	333	0.15	0.16	0	0.98
Altitude of the town center	333	411.40	276.60	3	1265	Soldiers per 1000 inhabitants in 1875	333	2.11	4.30	0	35.86
Maximum altitude	333	944.20	591.70	48.00	3274	Efficiency of Civil courts in 1875	333	0.40	0.13	0	0.72
Average altitude	333	392.10	274.90	10	1627						
Roads in 1799	333	0.51	0.50	0	1	*Political competition:*					
Distance from Palermo	333	109.02	58.91	0	229	HHI 1865	289	0.77	0.20	0.45	1
Distance from closest port	333	32.49	20.13	0	90	HHI 1909	317	0.78	0.22	0.34	1
Average temperature	333	15.93	1.54	11.00	18.45	HHI 1963	333	0.31	0.07	0.17	0.59
Long run average rainfall (1881-1941)	307	156.30	29.18	70.15	253.10	HHI 1972	333	0.31	0.07	0.18	0.65
Long run variance of relative rainfall	307	0.21	0.07	0.12	0.47	HHI 1983	333	0.30	0.07	0.16	0.57

Notes: The descriptive statistics include the number of observations (Obs), the average (Mean), the standard deviations (SD), the minimum (Min) and the maximum value (Max) for the entire sample of municipalities. See text for variable definitions and sources.

Table 2: The Impact of Relative Rainfall on Agriculture Production in 1893. District-Level Data

Dependent variable: Change in Crop Output per ha in 1893	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relative Spring Rainfall 1893 × Kc spring coefficient			1.44	1.44	1.46	1.45	1.71	1.71
			(0.73)	(0.70)	(0.69)	(0.66)	(1.00)	(0.95)
Relative Spring Rainfall 1893	0.40	0.42	-0.69	-0.67	-0.99		-1.18	
	(0.13)	(0.12)	(0.59)	(0.56)	(1.23)		(1.34)	
Relative Fall Rainfall 1892	-0.02	-0.02	-0.03	-0.02	-0.43		-1.12	
	(0.16)	(0.15)	(0.16)	(0.15)	(1.11)		(1.43)	
Relative Winter Rainfall 1892-3	0.31	0.28	0.31	0.28	0.17		0.30	
	(0.16)	(0.16)	(0.16)	(0.16)	(2.32)		(2.37)	
Relative Summer Rainfall 1893	-0.08	-0.02	-0.02	0.02	-0.05		-0.15	
	(0.05)	(0.31)	(0.28)	(0.46)	(0.12)		(0.32)	
Relative Fall Rainfall 1892 × Kc spring coefficient							0.91	0.92
							(1.17)	(1.14)
Relative Winter Rainfall 1892-3 × Kc spring coefficient							-0.18	-0.16
							(1.19)	(1.16)
Relative Summer Rainfall 1893 × Kc spring coefficient							-0.05	-0.08
							(0.49)	(0.47)
Crop fixed effect	✓	✓	✓	✓	✓	✓	✓	✓
Crop-district specific average output per ha 1885-95		✓		✓	✓	✓	✓	✓
Crop-district specific cultivated area in 1893		✓		✓	✓	✓	✓	✓
Province fixed effects					✓		✓	
District fixed effects						✓		✓
Observations	303	303	303	303	303	303	303	303
R-squared	0.19	0.21	0.20	0.22	0.25	0.27	0.25	0.28

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 on the production of several crops. The dependent variable is the change in output per hectare in 1893 with respect to the average for the years 1885-1895 (excluding 1893) for 20 crops at district level (24 districts). The crops are barley, beans, broad beans, chestnuts, corn, flax, hemp, hay (irrigated), hay (non irrigated), hemp, oat, olive oil, oranges, other citrus, other tubers (fodder), potatoes, rice, rye, wheat, wine. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The district-level relative rainfall is the average of municipality-level data. In column 1 we include relative rainfall in the spring of 1893, relative rainfall in the other seasons and crop specific fixed effects. In column 2 we add the crop-district specific average output per hectare and the area devoted to the specific crop in the districts in 1893 in logs as additional controls. In column 3 we replicate the specification of column 1 and add our variable of interest which is relative rainfall in the spring of 1893 multiplied by the crop-specific spring-rainfall coefficient (Kc). The latter is the evapotranspiration of the crop in question relative to a uniform grass field which is the reference crop. It varies during the different stages of crop growth and we computed the spring K_c by averaging over the spring period using the crop water information provided by the FAO. See Brouwer and Heibloem (1986) and the FAO website (www.fao.org/land-water/databases-and-software/crop-information/en/) for further information. The crops with high spring Kc are essentially grains: rice with Kc=1; rye, barley, wheat and oat with Kc=0.9. The crops with low spring Kc are wine (0.4), chestnuts (0.5), and citrus and olive oil (0.7). In column 4 we replicate the specification of column 2 including relative rainfall in the spring of 1893 multiplied by the crop-specific spring-rainfall coefficient (Kc). In column 5 we add province fixed effects. In column 6 we replicate the specification of column 5 including district fixed effects (and therefore drop the seasonal relative rainfalls which are constant across crops within district). In column 7 as a falsification test we include the interactions between the the crop-specific spring-rainfall coefficient (Kc) and the rainfall in all the other seasons. Finally, in column 8 we replicate the specification of column 7 with district fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district and the crop.

Table 3: The Impact of Relative Rainfall 1893 on Peasant Fasci

Dependent variable: Peasant Fasci	(1)	(2)	(3)	(4)
Panel A: without province fixed effects				
Relative Rainfall 1893	-1.00	-0.94	-0.93	-0.78
	(0.14)	(0.13)	(0.14)	(0.20)
R-squared	0.36	0.41	0.44	0.46
Panel B: with province fixed effects				
Relative Rainfall 1893	-0.76	-0.81	-0.74	-0.72
	(0.21)	(0.24)	(0.25)	(0.29)
R-squared	0.39	0.44	0.48	0.49
Determinants of Fasci		✓	✓	✓
Determinants of Mafia			✓	✓
Geographic controls				✓
Observations	245	245	245	245

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 on the emergence of Peasant Fasci organizations. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The dependent variable is a dummy indicating the presence in the municipality of a Peasant Fasci organization. Panel A does not include province fixed effects which are included in all the specifications of Panel B. The specifications in column 1 include only relative rainfall in 1893. The specifications in column 2 also include other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 4: The Impact of Peasant Fasci on Mafia

Dependent variable: Mafia 1900				
	(1)	(2)	(3)	(4)
Panel A: IV without province fixed effects				
Peasant Fasci	2.05	2.10	1.96	1.69
	(0.39)	(0.39)	(0.37)	(0.44)
First-stage F-statistic	53.99	52.57	43.26	15.43
Panel B: IV with province fixed effects				
Peasant Fasci	0.87	1.03	1.34	1.56
	(0.43)	(0.32)	(0.39)	(0.54)
First-stage F-statistic	13.14	11.84	8.77	6.15
Panel C: OLS without province fixed effects				
Peasant Fasci	0.99	0.87	0.91	0.47
	(0.28)	(0.31)	(0.26)	(0.18)
R-squared	0.17	0.24	0.37	0.55
Panel D: OLS with province fixed effects				
Peasant Fasci	0.27	0.19	0.38	0.36
	(0.25)	(0.26)	(0.18)	(0.18)
R-squared	0.44	0.49	0.55	0.58
Determinants of Fasci		✓	✓	✓
Determinants of Mafia			✓	✓
Geographic controls				✓
Observations	245	245	245	245

Notes: Estimates of the impact of the Peasant Fasci organizations on the presence of the Mafia in 1900. The dependent variable is an index that takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia according to Cutrera (1900). Panels A and B report the IV estimates where the Peasant Fasci variable is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in Table 2. Panel A does not include province fixed effects which are included in all the specifications of Panel B. Panels C and D report the OLS estimates of the impact of the Peasant Fasci on the Mafia presence in 1900. Panel C does not include province fixed effects which are included in all the specifications of Panel D. The specifications in column 1 include only relative rainfall in 1893. The specifications in column 2 also include other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 5: Relative Rainfall 1893 and Mafia

Dependent variable: Mafia 1900	(1)	(2)	(3)	(4)
Panel A: without province fixed effects				
Relative Rainfall 1893	-2.06	-1.98	-1.83	-1.32
	(0.40)	(0.37)	(0.34)	(0.34)
F-statistic	27.07	28.39	28.62	14.81
Panel B: with province fixed effects				
Relative Rainfall 1893	-0.66	-0.83	-0.99	-1.12
	(0.33)	(0.26)	(0.29)	(0.39)
F-statistic	4.08	10.30	11.51	8.48
Panel C: without province fixed effects (Maximum Likelihood)				
Relative Rainfall 1893	-1.94	-1.87	-1.64	-1.32
	(0.53)	(0.54)	(0.42)	(0.49)
F-statistic	13.40	11.99	15.24	7.26
Panel D: with province fixed effects (Maximum Likelihood)				
Relative Rainfall 1893	-0.66	-0.83	-1.01	-1.12
	(0.34)	(0.34)	(0.41)	(0.44)
F-statistic	3.77	5.96	6.07	6.48
Determinants of Fasci		✓	✓	✓
Determinants of Mafia			✓	✓
Geographic controls				✓
Observations	245	245	245	245

Notes: OLS (Panels A-B) and Maximum Likelihood (Panels C-D) estimates of the impact of relative rainfall in the spring of 1893 on the presence of the Mafia in 1900. Maximum Likelihood estimates take into account the correlation induced by the interpolation of rainfall data. The dependent variable is an index that takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia according to Cutrera (1900). Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. Panel A does not include province fixed effects which are included in all the specifications of Panel B. The specifications in column 1 include only relative rainfall in 1893 and a dummy indicating whether a Peasant Fasci was present before March 1893. The specifications in column 2 also include other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 6: Falsification Exercise: Relative Rainfall 1893 and Pre-1893 Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A:				Draft	Draft					
			Vaccinated	rejected for	rejected for	Water	Doctors	Infant	Development	Indirect tax
	Mafia in	Malaria in	over pop in	poor health in	too short in	quantity in	over pop in	mortality in	spending in	over pop in
Dependent variable:	1885	1885	1885	1885	1885	1885	1885	1869	1884	1884
Relative Rainfall 1893	0.57	0.33	0.02	-0.00	-0.03	-0.26	0.00	-0.03	-0.03	-1.30
	(0.34)	(0.31)	(0.05)	(0.03)	(0.02)	(0.25)	(0.00)	(0.05)	(0.55)	(1.37)
Observations	297	245	245	245	245	245	245	238	245	245

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel B:	Indirect over	Diffusion of	Diffusion of	Diffusion of	Citrus groves	Sulfur		Notaries	Soldiers over	Civil courts
	direct tax in	tenancy	sharecropping	own-farming	share in	production	HHI in	over pop	population in	efficiency in
Dependent variable:	1884	1885	1885	1885	1830s	1868	1865	1871	1875	1875
Relative Rainfall 1893	-2.96	0.12	0.23	-0.54	0.00	-0.00	0.13	0.03	3.30	0.05
	(3.83)	(0.26)	(0.33)	(2.12)	(0.00)	(0.00)	(0.13)	(0.03)	(1.85)	(0.10)
Observations	242	236	236	151	245	245	227	245	245	245
Full set of controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: OLS estimates of the relationship between relative rainfall in the spring of 1893 and pre-1893 variables. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. The dependent variables are the presence of Mafia in 1885 as provided by (Damiani, 1885) and described in Section 3. The dummy on the presence of malaria infested areas at municipality level, the ratio of vaccinated children over population, the ratios of draft-rejected men for poor health and height, the quantity of drinking water, and the number of doctors per 1000 inhabitants in 1885 are gathered from Direzione Generale della Statistica (1886). The infant mortality rate variable for the years 1869-70 is described in Section 3. The per capita development expenditure, the level of local indirect taxation over population and the ratio of indirect over direct taxation are collected from Direzione Generale della Statistica (1887) for the year 1884. The diffusion of tenancy, sharecropping and own-farming in 1885 is provided by Damiani (1885), while the share of citrus groves in 1830s, the quantity of sulfur production in 1868-70, the Herfindahl index of the concentration of votes in the 1865 parliamentary elections, the number of notaries per 1000 inhabitants in 1871, the number of soldiers used for local policing and the efficiency of civil courts in 1875 are all described in Section 3. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 7: Falsification Exercise: Relative Rainfall 1882-1891, Peasant Fasci and Mafia

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Reduced form	Falsification tests									
Panel A:											
Dependent variable: Peasant Fasci											
Relative Rainfall 18XX	-0.72	0.01	0.10	-0.21	0.23	0.14	-0.05	-0.74	0.09	-0.15	-0.16
	(0.29)	(0.31)	(0.22)	(0.25)	(0.34)	(0.33)	(0.20)	(0.43)	(0.20)	(0.28)	(0.33)
Panel B:											
Dependent variable: Mafia 1900											
Relative Rainfall 18XX	-1.12	-0.53	0.24	-0.08	0.30	0.52	-0.20	-0.89	0.23	0.08	0.61
	(0.39)	(0.75)	(0.74)	(0.81)	(0.72)	(0.63)	(0.43)	(0.66)	(0.62)	(0.50)	(0.59)
Year	1893	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891
Full set of controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	245	197	181	222	204	224	208	224	225	241	244

Notes: OLS estimates of the relationship between relative rainfall in the spring of the years between 1882 and 1891 and the Peasant Fasci or the Mafia in 1900. In column 1 we report the 1893 relationship for reference. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. The coefficients of the impact of relative rainfall on the Peasant Fasci are reported in panel A, while the coefficients of the effect on Mafia 1900 is in panel B. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 8: The role of state capacity on the emergence of Mafia in 1900

Dependent variable: Mafia 1900				
	(1)	(2)	(3)	(4)
	Measure of state capacity is soldiers over population		Measure of state capacity is civil courts efficiency	
Panel A. IV regressions.				
Peasant Fasci	1.61	1.89	2.71	2.99
	(0.52)	(0.61)	(0.81)	(1.21)
State capacity	0.06	0.06	0.78	0.93
	(0.04)	(0.02)	(0.54)	(0.77)
State capacity ×	-0.09	-0.10	-3.16	-3.39
Peasant Fasci	(0.08)	(0.05)	(1.20)	(1.73)
Panel B. Reduced form regressions.				
Relative Rainfall 1893	-1.26	-1.44	-1.93	-2.04
	(0.42)	(0.45)	(0.63)	(0.94)
State capacity	-0.03	-0.04	-1.41	-1.25
	(0.04)	(0.04)	(0.69)	(0.89)
State capacity ×	0.09	0.09	2.17	2.09
Relative Rainfall 1893	(0.08)	(0.05)	(1.19)	(1.56)
R-squared	0.57	0.60	0.56	0.59
Province FE	✓	✓	✓	✓
Determinants of Fasci and Mafia	✓	✓	✓	✓
Geographic controls		✓		✓
Observations	245	245	245	245

Notes: Estimates of the impact of weak state and its interaction with the presence of Peasant Fasci organizations on the emergence of the Mafia. The dependent variable is an index that takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia according to Cutrera (1900). In Panel A we report the IV estimates of the impact on Mafia in 1900 of Peasant Fasci, a measure of state capacity, and the interaction between Peasant Fasci and state capacity. For the two endogenous variables Peasant Fasci and the interaction between Peasant Fasci and state capacity we use relative rainfall in the spring of 1893 and the interaction between relative rainfall and the state capacity measure as excluded instruments. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. First stages are reported in Table A13 in the Appendix. In Panel B we report the reduced form estimation of the impact on Mafia in 1900 of relative rainfall in the spring of 1893, a measure of state capacity, and the interaction between relative rainfall and state capacity. In columns 1 and 2 we report the coefficients of the estimate where the measure of state capacity is the number of soldiers deployed for policing activities in 1875 in the Sicilian municipalities. In this estimate we assume that the number of soldiers per squad is 10 and the number of soldiers per platoon is 30. In columns 3 and 4 we report the coefficients of the estimate where the measure of state capacity is civil court efficiency measured as the ratio of final sentences over the total civil and commercial cases dealt with by local civil courts in 1875. The specifications in column 1 and 3 include province dummies, other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains), and various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). In columns 2 and 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 9: The Impact of Mafia on Human Capital

Dependent variable:	Literacy in 1911			Literacy in 1921			Literacy in 1931		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: IV results									
Mafia 1900	-0.07	-0.06	-0.09	-0.10	-0.09	-0.10	-0.07	-0.06	-0.08
	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.03)	(0.04)
Panel B: OLS results									
Mafia 1900	0.00	-0.00	-0.00	0.01	0.00	0.00	-0.00	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
R-squared	0.26	0.27	0.32	0.28	0.29	0.32	0.35	0.36	0.43
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Mafia		✓	✓		✓	✓		✓	✓
Geographic controls			✓			✓			✓
Observations	245	245	245	245	245	245	245	245	245

Notes: Estimates of the impact of Mafia on literacy rates in the years 1911, 1921, and 1931. The dependent variable is the literacy rate of the resident population older than 6 years of age and is computed used data at municipality level reported in the three censuses of 1911, 1921, and 1931. Panel A reports the IV estimates of the effect of Mafia 1900 on literacy rates, where Mafia 1900 is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in Panel B of Table 5. Panel B reports the OLS estimates of the impact of the Mafia in 1900 on the literacy rates. Columns 1-3 report the coefficient estimates of the effect of the Mafia on the literacy rate in 1911; columns 4-6 report the same estimates for literacy rate in 1921, while columns 7-9 report the estimates for literacy rate in 1931. The specifications in column 1, 4, and 7 include province dummies and other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in columns 2, 5, and 8 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in columns 3, 6, and 9 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 10: The Impact of Mafia on Public Goods and Politics

Dependent variable:	Infant mortality in 1909			Development Expenditure 1912			Notaries in 1924			HHI in 1909		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: IV results												
Mafia 1900	0.04	0.04	0.05	-2.40	-2.08	-1.45	-0.12	-0.11	-0.12	0.41	0.34	0.31
	(0.02)	(0.02)	(0.02)	(1.10)	(0.93)	(0.84)	(0.07)	(0.06)	(0.06)	(0.18)	(0.15)	(0.14)
Panel B: OLS results												
Mafia 1900	0.00	0.00	0.00	0.05	0.01	0.02	-0.02	-0.02	-0.02	0.03	0.04	0.03
	(0.00)	(0.00)	(0.00)	(0.15)	(0.15)	(0.14)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
R-squared	0.28	0.31	0.36	0.10	0.10	0.24	0.10	0.12	0.16	0.22	0.24	0.30
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Mafia		✓	✓		✓	✓		✓	✓		✓	✓
Geographic controls			✓			✓			✓			✓
Observations	243	243	243	245	245	245	245	245	245	242	242	242

Notes: Estimates of the impact of the Mafia on various public goods. Panel A reports the IV estimates of the effect of Mafia 1900 on various public goods, where Mafia 1900 is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in in Panel B of Table 5. Panel B reports the OLS estimates of the impact of the Mafia in 1900 on the different measures of state capacity. The dependent variable in columns 1-3 is infant mortality, computed for the years 1908 and 1909 as the average ratio of the of deaths below the age of one over the number of births for the years 1908 and 1909. The dependent variable in columns 4-6 is the per-capita development expenditure in logs of municipalities in 1912. The dependent variable in columns 7-9 is number of notaries per 1000 inhabitants in 1924. The dependent variable in columns 10-12 is the Herfindahl concentration index for 1909 elections. The specifications in column 1, 4, 7, and 10 include province dummies and other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in columns 2, 5, 8, and 11 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in columns 3, 6, 9, and 12 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table 11: The Long-Term Impact of Mafia on Human Capital, State Capacity and Politics

	1961			1971			1981		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: High school									
Mafia 1900	-0.02	-0.02	-0.01	-0.03	-0.02	-0.02	-0.04	-0.03	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Panel B: Literacy									
Mafia 1900	-0.04	-0.03	-0.04	-0.03	-0.02	-0.03	-0.02	-0.01	-0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
Panel C: Infant mortality									
Mafia 1900				0.00	0.00	0.00	-0.01	-0.01	-0.01
				(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Panel D: Development Expenditure									
Mafia 1900	-0.56	-0.50	-0.02						
	(0.40)	(0.34)	(0.36)						
Panel E: Aqueduct availability									
Mafia 1900	-0.13	-0.12	-0.17	-0.13	-0.10	-0.07	-0.14	-0.12	-0.09
	(0.10)	(0.08)	(0.09)	(0.07)	(0.06)	(0.04)	(0.08)	(0.08)	(0.08)
Panel F: HHI									
Mafia 1900	0.10	0.08	0.09	0.08	0.07	0.06	0.09	0.07	0.05
	(0.04)	(0.03)	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Mafia		✓	✓		✓	✓		✓	✓
Geographic controls			✓			✓			✓
Observations	245	245	245	245	245	245	245	245	245

Notes: IV estimates of the impact of the Mafia in 1900 on high school completion rate, literacy rates, state capacity measures and politics in the years 1961, 1971, and 1981. Mafia 1900 is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in in Panel B of Table 5. The dependent variable in Panel A is the share of the population older that 6 years of age with a high school degree computed using census data at municipality level. The dependent variable in Panel B is the literacy rate of the resident population older than 6 years of age computed using the same census data. The dependent variable in Panel C is the infant mortality rate computed as the ratio between the deaths below the age of one over the number of births in the same years using data provided by ISTAT at municipality level on deaths by age and sex and on population change. The dependent variable in Panel D is the per-capita development expenditure in logs of municipalities, which aggregates all spending for development or improvement of local infrastructure, education, security and justice (e.g. building or upgrading of roads and schools). The dependent variable in Panel E is the share of the households receiving drinking water from an aqueduct using census data at municipality level. The dependent variable in Panel F is the concentration index (HHI) computed at municipality level for parliamentary elections using the share of votes of each party. Columns 1-3 report the IV estimates of the impact of the Mafia in 1900 on high school and literacy rates in 1961 (1957 for development expenditure, and 1963 for HHI), while Columns 4-6 and 7-9 report the same estimations for the years 1971 (1969-70 for infant mortality, and 1972 for HHI) and 1981 (1982 for infant mortality, and 1983 for HHI) respectively. The specifications in column 1, 4 and 7 include province dummies and other determinants of the presence of the Peasant Fasci. The specifications in columns 2, 5 and 8 also include various determinants of the presence of the Mafia. Finally, in columns 3, 6 and 9 we include a range of geographic controls. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

ONLINE APPENDIX A

Figure A1: Change in agricultural production per hectare for 20 crops in 1893
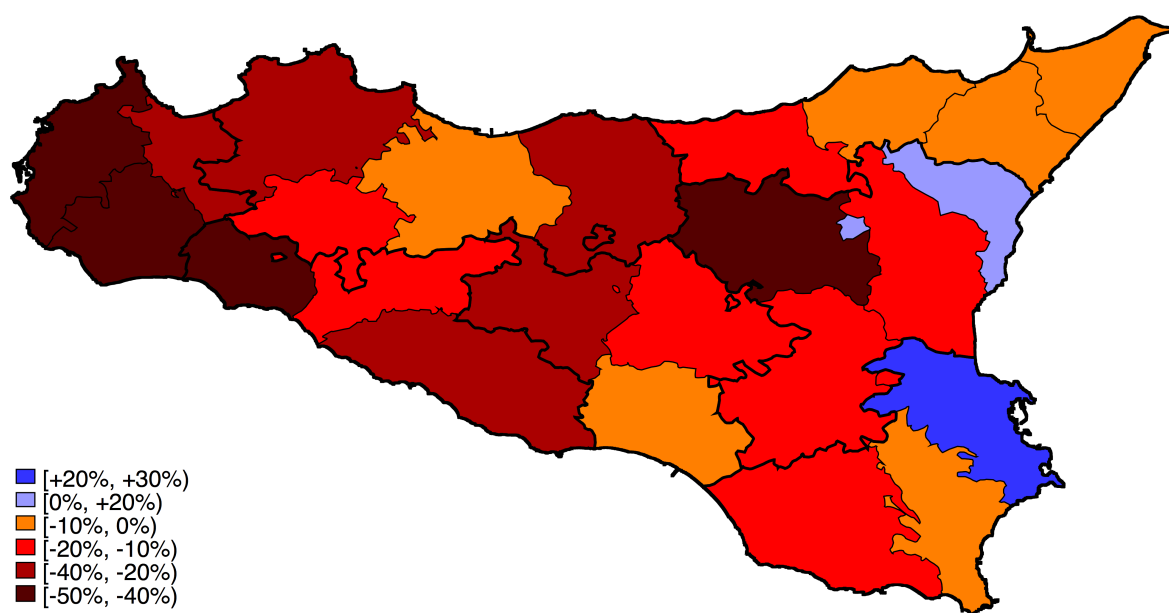
Notes: Average change in agricultural production per hectare for 20 crops in 1893 with respect to the average of the years 1885-1895 (excluding 1893) in each of the 24 districts. The average is computed by weighting the average production per hectare of the single crops by the size of the area devoted to each crop in every district. The crops are barley, beans, broad beans, chestnuts, corn, flax, hemp, hay (irrigated), hay (non irrigated), hemp, oat, olive oil, oranges, other citrus, other tubers (fodder), potatoes, rice, rye, wheat, wine.

Figure A2: Cumulative distributions of betas for Relative rainfall 1900-41
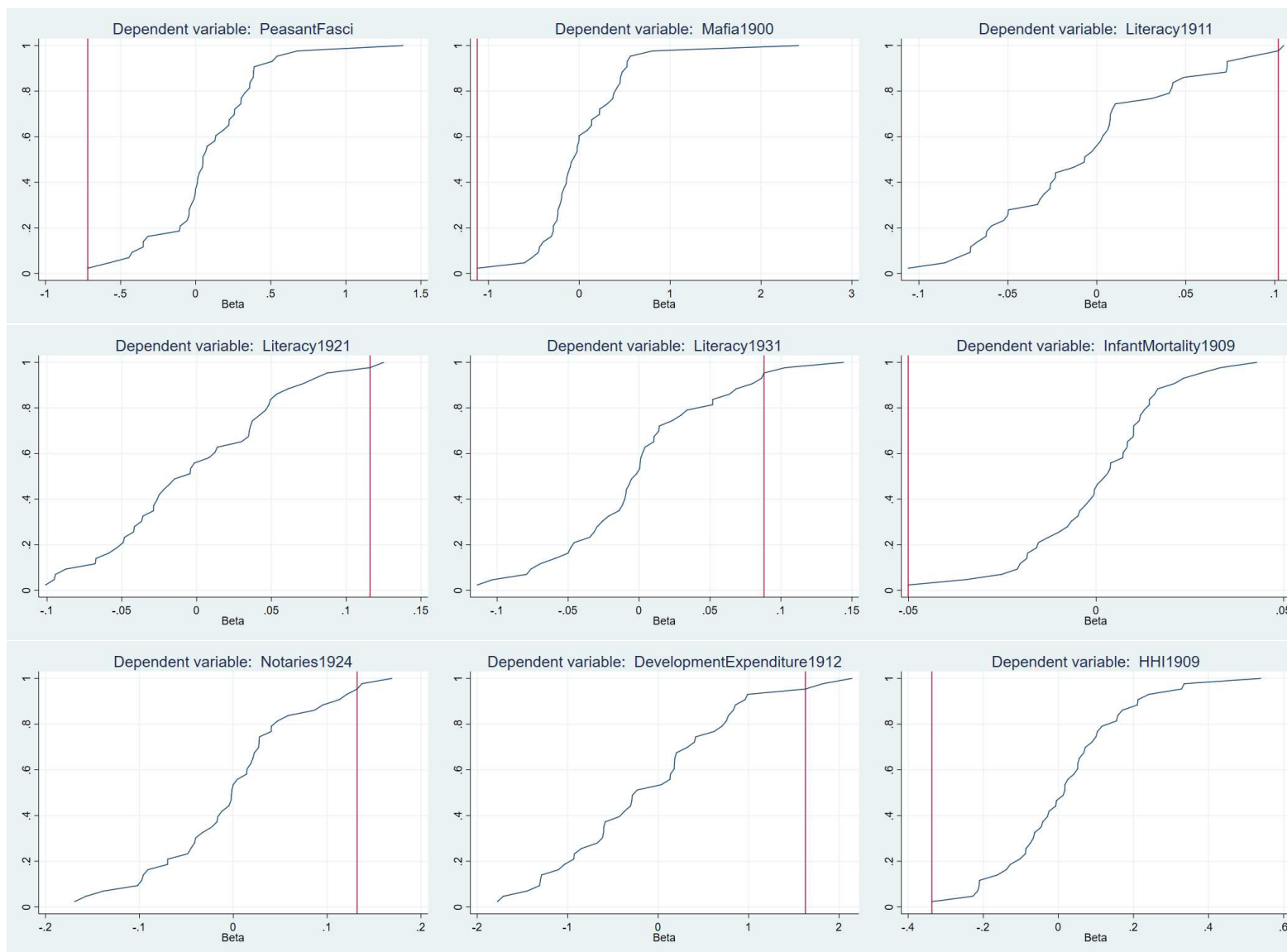
Notes: Red vertical lines identify coefficients of Relative rainfall in 1893

Figure A3: The impact of Mafia on HHI in national elections (90% CI)
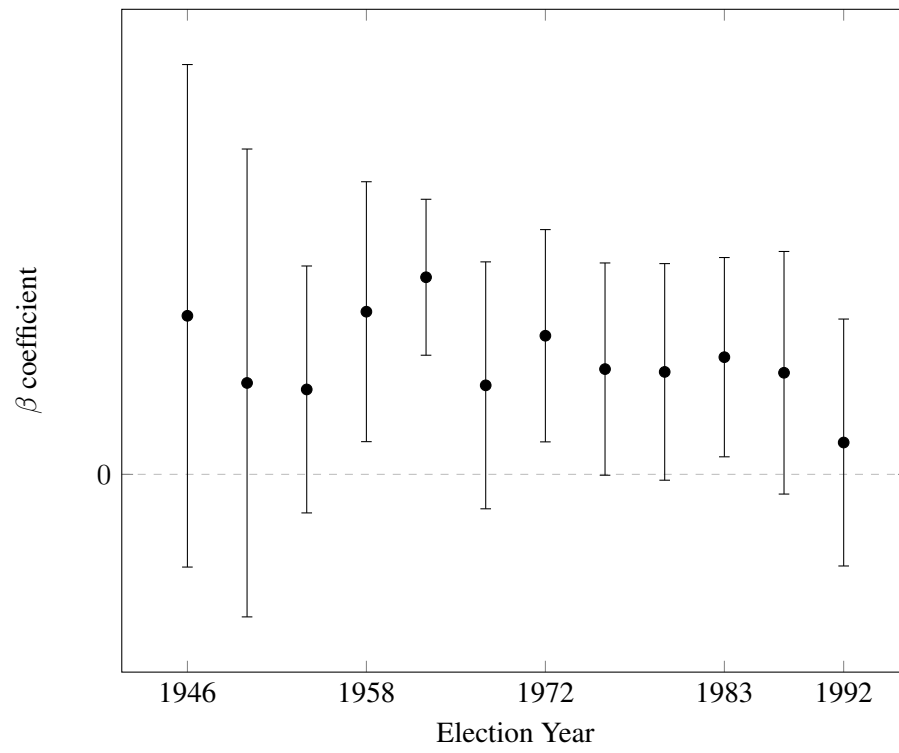
Table A1: Main Results. White Noise and Conley Standard Errors

Dependent variables:	(1)	(2)	(3)	Dependent variables:	(4)	(5)	(6)
Panel A: The Impact of 1893 Relative Rainfall on Mafia and Peasant Fasci (First Stage)							
Peasant Fasci	-0.81	-0.74	-0.72	Mafia 1900	-0.83	-0.99	-1.12
	(0.13)	(0.13)	(0.16)		(0.30)	(0.30)	(0.34)
	[0.16]	[0.16]	[0.17]		[0.26]	[0.28]	[0.26]
Panel B: The Impact of Peasant Fasci on Mafia (Second Stage)							
Mafia 1900	1.03	1.34	1.56				
	(0.39)	(0.43)	(0.52)				
	[0.36]	[0.45]	[0.53]				
Panel C: Medium- and Long-Term Impacts of Mafia (Second Stage)							
Literacy 1911	-0.07	-0.06	-0.09	Literacy 1921	-0.10	-0.09	-0.10
	(0.04)	(0.04)	(0.04)		(0.05)	(0.04)	(0.04)
	[0.04]	[0.03]	[0.04]		[0.04]	[0.04]	[0.05]
Literacy 1931	-0.07	-0.06	-0.08	Literacy 1961	-0.04	-0.03	-0.04
	(0.04)	(0.03)	(0.03)		(0.02)	(0.02)	(0.02)
	[0.03]	[0.03]	[0.04]		[0.02]	[0.01]	[0.02]
Literacy 1971	-0.03	-0.02	-0.03	Literacy 1981	-0.02	-0.01	-0.01
	(0.02)	(0.01)	(0.02)		(0.01)	(0.01)	(0.01)
	[0.01]	[0.01]	[0.01]		[0.01]	[0.01]	[0.01]
High school 1961	-0.02	-0.02	-0.01	High school 1971	-0.03	-0.02	-0.02
	(0.01)	(0.01)	(0.00)		(0.01)	(0.01)	(0.01)
	[0.01]	[0.01]	[0.00]		[0.01]	[0.01]	[0.01]
High school 1981	-0.04	-0.03	-0.02	Infant mortality 1909	0.04	0.04	0.05
	(0.02)	(0.01)	(0.01)		(0.02)	(0.02)	(0.02)
	[0.02]	[0.01]	[0.01]		[0 .02]	[0.02]	[0.02]]
Infant mortality 1969-70	0.00	0.00	0.00	Infant mortality 1982	-0.01	-0.01	-0.01
	(0.01)	(0.01)	(0.01)		(0.01)	(0.01)	(0.01)
	[0.01]	[0.01]	[0.01]		[0.01]	[0.00]	[0.01]
Development Expenditure 1912	-2.40	-2.08	-1.45	Development Expenditure 1957	-0.56	-0.50	-0.02
	(1.23)	(0.96)	(0.83)		(0.45)	(0.37)	(0.33)
	[0.85]	[0.61]	[0.59]		[0.43]	[0.33]	[0.21]
Notaries 1924	-0.12	-0.11	-0.12	Aqueduct coverage 1961	-0.13	-0.12	-0.17
	(0.07)	(0.06)	(0.06)		(0.09)	(0.08)	(0.08)
	[0.06]	[0.05]	[0.05]		[0.09]	[0.07]	[0.07]
Aqueduct coverage 1971	-0.13	-0.10	-0.07	Aqueduct coverage 1981	-0.14	-0.12	-0.09
	(0.07)	(0.05)	(0.04)		(0.07)	(0.06)	(0.05)
	[0.07]	[0.06]	[0.03]		[0.08]	[0.07]	[0.05]
HHI 1909	0.41	0.34	0.31	HHI 1963	0.10	0.08	0.09
	(0.16)	(0.12)	(0.11)		(0.04)	(0.03)	(0.03)
	[0.15]	[0.12]	[0.11]		[0.03]	[0.02]	[0.03]
HHI 1972	0.08	0.07	0.06	HHI 1983	0.09	0.07	0.05
	(0.04)	(0.03)	(0.03)		(0.04)	(0.03)	(0.02)
	[0.03]	[0.02]	[0.03]		[0.03]	[0.02]	[0.02]
Province FE	✓	✓	✓		✓	✓	✓
Determinants of Fasci	✓	✓	✓		✓	✓	✓
Determinants of Mafia		✓	✓			✓	✓
Geographic controls			✓				✓

Notes: OLS and 2SLS estimates of the main results of the paper reporting white noise standard errors (in round brackets) and spatially-corrected standard errors computed following Conley's procedure (in square brackets) with a cutoff of 0.4 degree for latitude and 0.75 degree for longitude, which represent roughly half of the height and width of the Sicilian island. Panel A reports the coefficients of relative rainfall in the spring of 1893 in our two first stage regressions (as in Tables 3 and 5); Panel B reports the coefficient of Peasant Fasci in the second stage (Table 4); Panel C reports the coefficients of Mafia 1900 in the second stage for all medium- and long-term economic outcomes, public goods, and politics. The dependent variables are listed on the left of the Table. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The specifications in columns 1 and 4 include province dummies and other determinants of the presence of the Peasant Fasci. The specifications in columns 2 and 5 also include various determinants of the presence of the Mafia. Finally, in columns 3 and 6 we add a range of geographic controls.

Table A2: The Impact of Relative Rainfall 1893 on Peasant Fasci: District level analysis

Dependent variable: Peasant Fasci				
	(1)	(2)	(3)	(4)
Panel A: without province fixed effects				
Relative Rainfall 1893	-1.04	-0.85	-0.90	-0.97
	(0.13)	(0.16)	(0.16)	(0.38)
R-squared	0.69	0.90	0.95	0.84
Panel B: with province fixed effects				
Relative Rainfall 1893	-0.96	-0.53	-0.49	-1.36
	(0.24)	(0.25)	(0.37)	(0.31)
R-squared	0.81	0.95	0.97	0.97
Determinants of Fasci		✓	✓	
Determinants of Mafia			✓	
Geographic controls				✓
Observations	23	23	23	23

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 on the emergence of Peasant Fasci organizations, district level analysis. All the variables have been averaged at district level from the municipality level data. Panel A does not include province fixed effects which are included in all the specifications of Panel B. The specifications in column 1 includes only relative rainfall in the spring of 1893. The specifications in column 2 also include other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we add to relative rainfall in the spring of 1893 a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). The small number of observations does not allow to control at the same time for the three sets of controls, as we do in the rest of the paper. We report robust standard errors.

Table A3: Relative Rainfall 1893 and Mafia: District level analysis

Dependent variable: Mafia 1900				
	(1)	(2)	(3)	(4)
Panel A: without province fixed effects				
Relative Rainfall 1893	-2.15	-1.72	-1.68	-1.50
	(0.40)	(0.54)	(0.52)	(0.80)
R-squared	0.47	0.62	0.85	0.86
Panel B: with province fixed effects				
Relative Rainfall 1893	-0.88	-0.30	-0.16	-2.35
	(0.57)	(0.99)	(1.48)	(1.11)
R-squared	0.75	0.83	0.96	0.94
Determinants of Fasci			✓	✓
Determinants of Mafia				✓
Geographic controls				✓
Observations	23	23	23	23

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 on the presence of the Mafia in 1900, district level analysis. All the variables have been averaged at district level from the municipality level data. Panel A does not include province fixed effects which are included in all the specifications of Panel B. The specifications in column 1 includes only relative rainfall in the spring of 1893. The specifications in column 2 also include other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we add to relative rainfall in the spring of 1893 a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). The small number of observations does not allow to control at the same time for the three sets of controls, as we do in the rest of the paper. We report robust standard errors.

Table A4: Peasant Fasci and Mafia in 1885

Dependent variable: Peasant Fasci				
	(1)	(2)	(3)	(4)
Mafia 1885	-0.05	-0.06	-0.05	-0.05
	(0.02)	(0.02)	(0.02)	(0.03)
Province FE	✓	✓	✓	✓
Determinants of Fasci		✓	✓	✓
Determinants of Mafia			✓	✓
Geographic controls				✓
R-squared	0.32	0.36	0.41	0.44
Observations	245	245	245	245

Notes: OLS estimates of the impact of the Mafia presence in 1885 on the emergence of Peasant Fasci organizations. Mafia presence is derived from Damiani (1885) and, as in Buonanno et al. (2015), takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia. The dependent variable is a dummy indicating the presence in the municipality of a Peasant Fasci organization. The specification in column 1 includes only Mafia strength in 1885 and province fixed effects. The specification in column 2 also includes other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specification in column 3 also add various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A5: Simultaneous equations system to analyze the effect of Mafia presence on Peasant Fasci and of Peasant Fasci on Mafia.

	Panel A: Dependent variable: Mafia1900							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Peasants' Fasci	1.06	1.20	1.34	1.56	0.99	1.17	1.34	1.56
	(0.42)	(0.37)	(0.39)	(0.54)	(0.41)	(0.32)	(0.39)	(0.54)
Sulfur production in 1868-70	0.01	0.01	0.01	0.01				
	(0.00)	(0.00)	(0.00)	(0.00)				
Mafia1885					0.22	0.22	0.19	0.21
					(0.08)	(0.08)	(0.08)	(0.09)

	Panel B: Dependent variable: Peasants fasci							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mafia1900	-0.39	-0.43	-0.46	-0.47	-0.24	-0.27	-0.25	-0.25
	(0.20)	(0.20)	(0.21)	(0.20)	(0.08)	(0.10)	(0.12)	(0.15)
Relative Spring Rainfall 1893	-1.02	-1.18	-1.19	-1.25	-0.92	-1.04	-0.98	-1.00
	(0.28)	(0.31)	(0.33)	(0.37)	(0.22)	(0.23)	(0.25)	(0.31)
Determinants of Fasci		✓	✓	✓		✓	✓	✓
Determinants of Mafia			✓	✓			✓	✓
Geographic controls				✓				✓
Province FE	✓	✓	✓	✓	✓	✓	✓	✓
Observations	245	245	245	245	245	245	245	245

Notes: Three-stage least square estimation of a system of simultaneous equations to analyze the effect of Mafia presence on Peasant Fasci and of Peasant Fasci on Mafia. We use relative rainfall in the spring of 1893 as excluded instrument for Peasant Fasci while the excluded instrument for Mafia 1900 is sulfur production in 1868-70 in the specifications of columns 1-4 and Mafia 1885 in the specifications of columns 5-8. In Panel A we report the coefficient estimates for the equation with Mafia 1900 as dependent variable, while in panel B we report the coefficient estimates for the equation with Peasant Fasci as dependent variable. In Columns 1 and 5 we include only the province fixed effects as additional controls to the endogenous regressors and the relative excluded instruments. The specification in columns 2 and 6 also includes other determinants of the presence of the Peasant Fasci. The specification in columns 3 and 7 adds the other determinants of the presence of the Mafia. Finally, in columns 4 and 8 we include a range of geographic controls. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A6: Mafia supply. Mafia presence in the neighborhood in 1885 on Peasant Fasci and Mafia1900.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent variable: Peasant Fasci									
Relative Rainfall 1893	-0.71	-0.66	-0.55	-0.66	-0.62	-0.47	-0.76	-0.71	-0.64
	(0.22)	(0.23)	(0.29)	(0.23)	(0.24)	(0.30)	(0.23)	(0.23)	(0.29)
Mafia in 1885	-0.06	-0.06	-0.05	-0.06	-0.06	-0.05	-0.05	-0.05	-0.04
	(0.07)	(0.07)	(0.08)	(0.06)	(0.07)	(0.07)	(0.06)	(0.07)	(0.07)
Mafia in 1885 × Relative Rainfall 1893	0.03	0.05	0.03	0.04	0.05	0.03	0.02	0.03	0.01
	(0.11)	(0.11)	(0.13)	(0.11)	(0.11)	(0.13)	(0.10)	(0.10)	(0.12)
neighboring Mafia in 1885 (average)	0.04	0.07	0.11						
	(0.12)	(0.12)	(0.12)						
neighboring Mafia in 1885 (average) × Relative Rainfall 1893	-0.16	-0.18	-0.25						
	(0.20)	(0.22)	(0.21)						
neighboring Mafia in 1885 (max)				0.04	0.05	0.08			
				(0.07)	(0.07)	(0.07)			
neighboring Mafia in 1885 (max) × Relative Rainfall 1893				-0.10	-0.10	-0.15			
				(0.11)	(0.13)	(0.12)			
neighboring Mafia in 1885 (max dummy)							0.05	0.08	0.12
							(0.21)	(0.21)	(0.21)
neighboring Mafia in 1885 (max dummy) × Relative Rainfall 1893							-0.12	-0.08	-0.16
							(0.35)	(0.46)	(0.44)
	243	243	243	243	243	243	245	245	245
Panel B: Dependent variable: Mafia in 1900									
Relative Rainfall 1893	-0.79	-0.93	-1.29	-0.90	-0.98	-1.39	-0.96	-1.03	-1.31
	(0.38)	(0.40)	(0.56)	(0.44)	(0.44)	(0.59)	(0.31)	(0.30)	(0.41)
Mafia in 1885	0.12	0.11	0.05	0.14	0.10	0.04	0.14	0.11	0.03
	(0.15)	(0.18)	(0.17)	(0.14)	(0.17)	(0.16)	(0.14)	(0.17)	(0.16)
Mafia in 1885 × Relative Rainfall 1893	0.07	0.06	0.21	0.03	0.06	0.21	0.03	0.05	0.23
	(0.21)	(0.24)	(0.23)	(0.19)	(0.22)	(0.21)	(0.19)	(0.21)	(0.21)
neighboring Mafia in 1885 (average)	0.11	0.03	-0.05						
	(0.21)	(0.20)	(0.23)						
neighboring Mafia in 1885 (average) × Relative Rainfall 1893	-0.25	-0.17	0.02						
	(0.46)	(0.41)	(0.52)						
neighboring Mafia in 1885 (max)				0.04	0.03	-0.03			
				(0.09)	(0.11)	(0.12)			
neighboring Mafia in 1885 (max) × Relative Rainfall 1893				-0.02	-0.03	0.06			
				(0.20)	(0.21)	(0.24)			
neighboring Mafia in 1885 (max dummy)							0.15	0.10	0.07
							(0.35)	(0.33)	(0.33)
neighboring Mafia in 1885 (max dummy) × Relative Rainfall 1893							0.31	0.25	0.22
							(0.54)	(0.50)	(0.49)
Observations	243	243	243	243	243	243	245	245	245
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Mafia			✓	✓		✓	✓		✓	✓
Geographic controls				✓			✓			✓

Notes: OLS estimates of the impact of the presence of Mafia in 1885 in the municipality and in its neighborhood on the emergence of Peasant Fasci in 1893-4 and on the presence of the Mafia in 1900. In this table we report the estimates of the baseline equations (2) and (3) including the pre-existing presence of Mafia in the municipality and in the neighborhood in 1885 and their interaction with relative rainfall in the spring of 1893. Mafia presence in 1885 is derived from Damiani (1885) and, as in Buonanno et al. (2015), takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia. In columns 1-3 the Mafia presence in the neighborhood is measured as the average level in the neighboring municipalities, while in column 4-6 it is measured by the maximum level in the neighboring municipalities, while in columns 7-9 it is a dummy that takes on value 1 if there is at least one neighboring municipality with highest density of the Mafia. Panel A reports the coefficient estimates when the dependent variable is Peasant Fasci, while Panel B reports the coefficient estimates when Mafia in 1900 is the dependent variable. The specification in columns 1, 4, and 7 also include relative rainfall in the spring of 1893, province fixed effects and other determinants of the presence of the Peasant Fasci. The specification in columns 2, 5, and 8 adds various determinants of the presence of the Mafia. Finally, in columns 3, 6 and 9 we include a range of geographic controls. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A7: Mafia Supply. Analysis of the effect of the presence of some determinants of Mafia on Peasant Fasci and Mafia1900

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Dependent variable: Peasant Fasci									
Relative Rainfall 1893	-0.83	-0.80	-0.78	-0.88	-0.80	-0.78	-0.38	-0.21	-0.18
	(0.25)	(0.24)	(0.30)	(0.22)	(0.24)	(0.27)	(0.17)	(0.19)	(0.19)
Sulfur Production 1868-70	-0.01	-0.01	-0.01						
	(0.02)	(0.02)	(0.02)						
Sulfur Production 1868-70 $\times$	0.01	0.01	0.00						
Relative Rainfall 1893	(0.09)	(0.09)	(0.09)						
Citrus groves (share in 1830s)				-6.92	-5.80	-6.53			
				(17.08)	(17.55)	(17.42)			
Citrus groves (share in 1830s) $\times$				10.76	10.78	12.77			
Relative Rainfall 1893				(22.93)	(24.05)	(24.39)			
Relative Rainfall 1893 in the neighborhood							-0.57	-0.70	-0.76
							(0.28)	(0.31)	(0.38)
Observations	245	245	245	245	245	245	243	243	243
Panel B: Dependent variable: Mafia in 1900									
Relative Rainfall 1893	-0.90	-0.97	-1.11	-0.72	-0.88	-1.06	-0.73	-1.08	-1.12
	(0.26)	(0.27)	(0.39)	(0.25)	(0.31)	(0.40)	(0.16)	(0.47)	(0.55)
Sulfur Production 1868-70	0.01	0.01	0.01						
	(0.03)	(0.02)	(0.03)						
Sulfur Production 1868-70 $\times$	-0.00	-0.00	-0.00						
Relative Rainfall 1893	(0.13)	(0.07)	(0.09)						
Citrus groves (share in 1830s)				14.53	13.43	10.72			
				(51.01)	(40.37)	(42.21)			
Citrus groves (share in 1830s) $\times$				-21.05	-17.21	-13.14			
Relative Rainfall 1893				(65.97)	(58.23)	(62.44)			
Relative Rainfall 1893 in the neighborhood							-0.13	0.12	0.01
							(0.46)	(0.60)	(0.52)
Observations	245	245	245	245	245	245	243	243	243
Province FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓	✓	✓	✓
Determinants of Mafia		✓	✓		✓	✓		✓	✓
Geographic controls			✓			✓			✓

Notes: OLS estimates of the impact of the presence of Mafia in 1885 in the municipality and in its neighborhood on the emergence of Peasant Fasci in 1893-4 and on the presence of the Mafia in 1900. In this table we report the estimates of the baseline equations (2) and (3) including the interaction with relative rainfall in the spring of 1893 of some Mafia determinants in the municipality. In columns 1-3 we include the interaction of sulfur production with relative rainfall in spring 1893, while in column 4-6 we include the interaction of citrus groves instead. Finally in columns 7-9 we include the average level of rainfall in the neighborhood. Panel A reports the coefficient estimates when the dependent variable is Peasant Fasci, while Panel B reports the coefficient estimates when Mafia in 1900 is the dependent variable. The specification in columns 1, 4, and 7 also include relative rainfall in the spring of 1893, province fixed effects and other determinants of the presence of the Peasant Fasci. The specification in columns 2, 5, and 8 adds various determinants of the presence of the Mafia. Finally, in columns 3, 6 and 9 we include a range of geographic controls. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A8: Robustness Tests on Relative Rainfall

	(1)	(2)	(3)
Panel A: Dependent variable: Peasant Fasci			
Relative Spring Rainfall 1892	-0.33	-0.21	
	(0.17)	(0.16)	
Relative Spring Rainfall 1893		-0.53	-0.70
		(0.29)	(0.36)
Relative Winter Rainfall 1892-3			0.04
			(0.25)
Relative Summer Rainfall 1893			0.00
			(0.07)
Relative Fall Rainfall 1892			0.08
			(0.27)
R-squared	0.44	0.46	0.53
Panel B: Dependent variable: Mafia 1900			
Relative Spring Rainfall 1892	-0.156	0.023	
	(0.404)	(0.488)	
Relative Spring Rainfall 1893		-1.12	-1.27
		(0.55)	(0.43)
Relative Winter Rainfall 1892-3			-0.78
			(0.82)
Relative Summer Rainfall 1893			-0.01
			(0.17)
Relative Fall Rainfall 1892			0.04
			(0.54)
R-squared	0.60	0.61	0.67
Full set of controls	✓	✓	✓
Observations	205	205	208

Notes: Estimates of the impact of relative rainfall in several seasons of 1892 and 1893 on the Peasant Fasci and the Mafia in 1900. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. Panel A reports the estimates for Peasant Fasci while Panel B reports the estimated for the Mafia. All specifications include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. The specifications in column 1 control for relative rainfall in the spring of 1892. The specifications in column 2 also include relative rainfall in the spring of 1893. The specifications in column 3 also include relative rainfall in the fall of 1892, the winter of 1892-3, and the summer of 1893. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A9: Alternative Measures for Relative Rainfall 1893

	(1)	(2)	(3)	(4)	(5)
Panel A:					
Dependent variable: Peasant Fasci					
Relative Rainfall 1893	-0.36	-0.78	-0.57	-0.63	-0.71
	(0.14)	(0.31)	(0.30)	(0.33)	(0.32)
R-squared	0.50	0.50	0.52	0.51	0.49
Panel B:					
Dependent variable: Mafia 1900					
Relative Rainfall 1893	-0.46	-1.16	-1.43	-0.94	-1.11
	(0.22)	(0.41)	(0.47)	(0.48)	(0.37)
R-squared	0.59	0.59	0.69	0.59	0.59
Measure of Relative Rainfall 1893:					
Log of relative rainfall	✓				
Relative rainfall capped at 1		✓			
Interpolation using:					
Minimum two stations			✓		
Stations within 25 km				✓	
Stations within 35 km					✓
Full set of controls	✓	✓	✓	✓	✓
Observations	245	245	155	216	245

Notes: Estimates of the impact of alternative measures of relative rainfall in the spring of 1893 on the Peasant Fasci and the Mafia in 1900. In panel A we report the estimates of the effects on the Peasant Fasci while in panel B the effect on the Mafia. All specifications include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. The specifications in column 1 include the natural logarithm of relative rainfall measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The specifications in column 2 include instead the relative rainfall interpolated as above, but capped at 1. The specifications in column 3 include the relative rainfall for the municipalities where at least two weather stations where used to compute the interpolated measure of relative rainfall within the 30km cutoff. The specifications in column 4 include the relative rainfall interpolated at municipality level using the inverse of the distances as weights with a cutoff of 25km. Finally, the specifications in column 5 include the relative rainfall interpolated at municipality level using the inverse of the distances as weights with a cutoff of 35km. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A10: Alternative interpolation method

	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Panel A: Peasant Fasci and the Mafia

Dependent Variable	Peasant Fasci			Mafia1900			
Alternative interpolation for	-0.76	-0.70				-1.24	-1.06
Relative Rainfall 1893	(0.19)	(0.28)				(0.35)	(0.40)
Peasant Fasci				1.63	1.51		
				(0.47)	(0.56)		
F-statistic	15.45	6.144				12.30	7.122
IV				✓	✓		
province FE		✓			✓		✓
Full set of controls	✓	✓		✓	✓	✓	✓

Panel B: Medium Term Outcomes

Dependent variable:	Literacy in 1911	Literacy in 1921	Literacy in 1931	Infant Mortality in 1909	Notaries in 1924	Development Expenditure in 1912	HHI in 1909
Mafia 1900	-0.10	-0.12	-0.08	0.05	-0.13	-1.60	0.35
	(0.05)	(0.05)	(0.04)	(0.02)	(0.06)	(0.93)	(0.15)
IV	✓	✓	✓	✓	✓	✓	✓
Full set of controls	✓	✓	✓	✓	✓	✓	✓

Panel C: Long Term Outcome

Dependent variable:	High School	Literacy	Infant Mortality	Aqueduct Availability	Development Expenditure	HHI	
a) 1961: Mafia 1900	-0.01	-0.04		-0.17	-0.05	0.10	
	(0.01)	(0.02)		(0.10)	(0.37)	(0.02)	
b) 1971: Mafia 1900	-0.02	-0.03	0.00	-0.07		0.07	
	(0.01)	(0.02)	(0.01)	(0.04)		(0.03)	
c) 1981: Mafia 1900	-0.02	-0.01	-0.09	-0.01		0.06	
	(0.02)	(0.01)	(0.08)	(0.01)		(0.03)	
IV	✓	✓	✓	✓	✓	✓	
Full set of controls	✓	✓	✓	✓	✓	✓	

Notes: This table provides a summary of the main results of the paper when the relative rainfall in the spring of 1893 is measured using an alternative interpolation. In particular we first interpolate the absolute level of the rainfall in the spring of 1893 at station level, then the average spring rainfall at station level and finally take the ratio of the two interpolated measures at municipality level. The interpolation is performed using the inverse of the distances as weights with a cutoff of 30km. Panel A reports the coefficients of the most demanding specification of the OLS and IV regressions of Tables 3-5. Panel B reports the coefficients of the most demanding specifications of the IV regressions of Tables 9 and 10. Panel C reports the coefficient of the most demanding specifications of the IV regressions in Table 11.

Table A11: Mafia dummy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Peasant Fasci and the Mafia							
Dependent Variable			Mafia1900				
Relative Rainfall 1893			-0.37	-0.49			
			(0.12)	(0.17)			
Peasant Fasci	0.48	0.69					
	(0.16)	(0.24)					
F-statistic			9.21	8.38			
IV	✓	✓					
province FE		✓		✓			

Panel B: Medium Term Outcomes							
Dependent variable:	Literacy in 1911	Literacy in 1921	Literacy in 1931	Infant Mortality in 1909	Notaries in 1924	Development Expenditure in 1912	HHI in 1909
Mafia 1900	-0.21	-0.23	-0.18	0.11	-0.27	-3.30	0.71
	(0.11)	(0.12)	(0.09)	(0.05)	(0.14)	(1.91)	(0.33)
IV	✓	✓	✓	✓	✓	✓	✓
Full set of controls	✓	✓	✓	✓	✓	✓	✓

Panel C: Long Term Outcome						
Dependent variable:	High School	Literacy	Infant Mortality	Aqueduct Availability	Development Expenditure	HHI
a) 1961: Mafia 1900	-0.02	-0.09		-0.39	-0.05	0.21
	(0.01)	(0.05)		(0.21)	(0.81)	(0.05)
b) 1971: Mafia 1900	-0.04	-0.06	0.00	-0.16		0.15
	(0.02)	(0.03)	(0.03)	(0.10)		(0.07)
c) 1981: Mafia 1900	-0.04	-0.03	-0.20	-0.02		0.12
	(0.04)	(0.03)	(0.17)	(0.02)		(0.06)
IV	✓	✓	✓	✓	✓	✓
Full set of controls	✓	✓	✓	✓	✓	✓

Notes: This table provides a summary of the main results of the paper when we use a dummy for Mafia in 1900 which takes up value one when Mafia in 1900 has the highest density according to Cutrera (1900), and zero otherwise. Panel A reports the coefficients of the most demanding specification of the OLS and IV regressions of Tables 4 and 5. Panel B reports the coefficients of the most demanding specifications of the IV regressions of Tables 9 and 10. Panel C reports the coefficient of the most demanding specifications of the IV regressions in Table 11.

Table A12: Falsification Exercise: Relative Rainfall 1900-41

Drought variable: Relative Rainfall 19XX:	Original		Logged		Capped	
Share of coefficients significant at 10%	+	-	+	-	+	-
Dependent variables:						
Mafia 1900	0.02	0.02	0.02	0.01	0.03	0.02
Peasant Fasci	0.12	0.04	0.11	0.04	0.12	0.04
Literacy 1911	0	0.02	0.01	0.08	0.01	0.08
Literacy 1921	0	0.06	0.01	0.10	0	0.09
Literacy 1931	0.02	0.06	0.02	0.10	0.04	0.06
Literacy 1961	0.01	0.07	0.01	0.08	0.01	0.07
Literacy 1971	0.02	0.05	0.01	0.06	0.02	0.03
Literacy 1981	0	0	0.01	0.01	0	0.02
High school 1961	0.03	0.06	0.02	0.13	0.02	0.10
High school 1971	0.02	0.10	0.02	0.11	0.02	0.08
High school 1981	0.04	0.07	0.01	0.07	0.02	0.06
Infant mortality 1909	0.02	0	0.04	0.01	0.05	0.02
Infant mortality 1969-70	0.05	0.02	0.06	0	0.02	0.03
Infant mortality 1982	0.02	0.02	0.01	0.05	0.02	0.02
Development Expenditure 1912	0.03	0.06	0.01	0.04	0.02	0.01
Development Expenditure 1957	0.02	0.03	0	0.02	0	0.02
Aqueduct coverage 1961	0.04	0.02	0.04	0.02	0.05	0.02
Aqueduct coverage 1971	0.03	0.05	0.04	0.03	0.02	0.05
Aqueduct coverage 1981	0.04	0.02	0.05	0.02	0.06	0.01
Notaries 1924	0.04	0.14	0	0.12	0.05	0.06
HHI 1909	0.06	0.06	0.06	0.06	0.06	0.02
HHI 1963	0.02	0.02	0.06	0.03	0.02	0.02
HHI 1972	0.02	0.05	0.01	0.05	0.02	0.06
HHI 1983	0	0.02	0	0.2	0.02	0.02

Notes: Relationship between relative rainfall in the spring of the years 1900-1941, the Peasant Fasci, the Mafia in 1900, economic outcomes, and state capacity measures. We report the share of positive and negative coefficients for relative rainfall which are significant at 10% in the three specifications in columns 2-4 of Tables 3-5 including provincial fixed effects. As in the main specifications, we consider bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality. In the first and second columns we report the share of positive and negative coefficients for the baseline rainfall variable which are significant at 10%. In the third and forth columns we report the share of positive and negative coefficients for the log relative rainfall (as used in column 1 of Table A8) which are significant at 10%. Finally in columns 5 and 6 we report the share of positive and negative coefficients for the capped rainfall variable (as used in column 2 of Table A8) which are significant at 10%.

Table A13: The role of state capacity on the emergence of Mafia in 1900: first stage regressions

	(1)	(2)	(4)	(5)
	Measure of state capacity is soldiers over population		Measure of state capacity is civil courts efficiency	
Panel A. Dependent Variable: Peasant Fasci.				
Relative Rainfall 1893	-0.75	-0.70	-0.36	-0.27
	(0.23)	(0.28)	(0.44)	(0.51)
State capacity	0.00	0.00	0.70	0.79
	(0.01)	(0.01)	(0.65)	(0.71)
State capacity ×	0.00	-0.01	-0.88	-1.03
Relative Rainfall 1893	(0.02)	(0.02)	(0.83)	(0.90)
F-test on excluded instruments:	5.33	3.10	4.84	3.78
R-squared	0.48	0.49	0.49	0.50
Panel B. Dependent Variable: State capacity × Peasant Fasci.				
Relative Rainfall 1893	0.65	1.15	0.31	0.36
	(0.84)	(1.13)	(0.18)	(0.21)
State capacity	0.99	1.01	1.29	1.34
	(0.29)	(0.29)	(0.31)	(0.34)
State capacity ×	-0.98	-1.05	-1.44	-1.53
Relative Rainfall 1893	(0.38)	(0.38)	(0.38)	(0.42)
F-test on excluded instruments:	4.09	4.30	8.86	8.48
R-squared	0.62	0.65	0.51	0.53
Province FE	✓	✓	✓	✓
Determinants of Fasci and Mafia	✓	✓	✓	✓
Geographic controls		✓		✓
Observations	245	245	245	245

Notes: First stages of the estimations reported in Table 8. In panel A we report the coefficients of the excluded instruments in estimates for the endogenous variable Peasant Fasci, while in panel B we report the same coefficients for the endogenous variable Peasant Fasci interacted with a measure of state capacity. The excluded instruments are relative rainfall in the spring of 1893 and the interaction between relative rainfall and the measure of state capacity. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. In columns 1-3 we report the coefficients of the estimate where the measure of state capacity is the number of soldiers deployed for policing activities in 1875 in the Sicilian municipalities. In this estimate we assume that the number of soldiers per squad is 10 and the number of soldiers per platoon is 30. In columns 4-6 we report the coefficients of the estimate where the measure of state capacity is civil court efficiency measured as the ratio of final sentences over the total civil and commercial cases dealt with by local civil courts in 1875. The specifications in column 1 and 4 include province dummies and other determinants of the presence of the Peasant Fasci. The specifications in columns 2 and 5 also include various determinants of the presence of the Mafia. Finally, in columns 3 and 6 we include a range of geographic controls. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A14: The role of state capacity - 2SLS estimates using alternative measures of state capacity.

Dependent variable: Mafia 1900						
	(1)	(2)	(3)	(4)	(5)	(6)
	Measure of state capacity is soldiers over population				Measure of state capacity is civil courts efficiency	
Peasant Fasci	1.87	1.86	1.90	1.89	3.08	3.25
	(0.60)	(0.60)	(0.62)	(0.61)	(1.22)	(1.32)
State capacity	0.06	0.06	0.06	0.06	1.10	0.84
	(0.02)	(0.02)	(0.02)	(0.02)	(0.80)	(0.73)
State capacity $\times$ Peasant Fasci	-0.10	-0.09	-0.10	-0.11	-3.70	-4.11
	(0.05)	(0.05)	(0.05)	(0.05)	(1.77)	(1.95)
R-squared	0.60	0.60	0.60	0.60	0.60	0.60
Soldiers per squad	7	10	15	10		
Soldiers per platoon	30	20	30	40		
Civil sentences over total cases					✓	
Civil sentences ($< 1,000$ liras) over total cases						✓
Full set of controls	✓	✓	✓	✓	✓	✓
Observations	245	245	245	245	245	245

Notes: Estimate of the impact of weak state and its interaction with the presence of Peasant Fasci organizations on the emergence of the Mafia. The dependent variable is an index that takes a value of 0, 1, 2, or 3, progressively indicating the strength of the Mafia in a municipality with 0 denoting no presence of Mafia organizations and 3 highest density of the Mafia according to Cutrera (1900). We report the IV estimates of the impact on Mafia in 1900 of Peasant Fasci, a measure of state capacity, and the interaction between Peasant Fasci and state capacity. For the two endogenous variables Peasant Fasci and the interaction between Peasant Fasci and state capacity we use relative rainfall in the spring of 1893 and the interaction between relative rainfall and the state capacity measure as excluded instruments. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. In columns 1-4 we report the coefficients of the estimate where the measure of state capacity is the number of soldiers deployed for policing activities in 1875 in the Sicilian municipalities. In this estimate we assume different numbers of soldiers per squad and per platoon:7 and 30 respectively in the estimates in column 1, 10 and 20 respectively in column 2, 15 and 30 in column 3, and 10 and 40 in column 4. In columns 5 and 6 we report the coefficients of the estimate where the measure of state capacity is civil court efficiency. The alternative measures used in this table are: the ratio of civil sentences over civil cases in column 5 and the ratio of sentences over cases worth less than 1000 Lire. All the specification include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A15: AR Weak Instrument Robust CIs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Medium Term Outcomes							
Dependent variable:	Literacy in 1911	Literacy in 1921	Literacy in 1931	Infant Mortality in 1909	Notaries in 1924	Development Expenditure in 1912	HHI in 1909
Mafia 1900	-0.09	-0.10	-0.08	0.05	-0.12	-1.45	0.31
	[-0.31, -0.03]	[-0.39, -0.03]	[-0.27, -0.03]	[0.01, 0.15]	[-0.27, -0.05]	[-4.50, -0.36]	[0.11, 0.80]
Full set of controls	✓	✓	✓	✓	✓	✓	✓

	High School	Literacy	Infant Mortality	Aqueduct Availability	Development Expenditure	HHI	
Panel B: Long Term Outcome							
Dependent variable:							
a) 1961: Mafia 1900	-0.01	-0.04		-0.17	-0.02	0.09	
	[-0.05, -0.00]	[-0.12, -0.01]		[-0.52, -0.05]	[-0.22, 0.22]	[0.05, 0.27]	
b) 1971: Mafia 1900	-0.02	-0.03	0.00	-0.07		0.06	
	[-0.07, -0.00]	[-0.09, -0.01]	[-0.02, 0.02]	[-0.15, 0.02]		[0.03, 0.18]	
c) 1981: Mafia 1900	-0.02	-0.01	-0.01	-0.09		0.05	
	[-0.08, -0.00]	[-0.05, 0.00]	[-0.02, 0.01]	[-0.29, 0.01]		[0.02, 0.14]	
Full set of controls	✓	✓	✓	✓	✓	✓	

Notes: Summary of the main results of the paper with the Anderson-Rubin weak-instrument robust 95% confidence intervals reported in the squared brackets. Panel A reports the estimates of the effect of the Mafia on the different medium term dependent variables, where Mafia 1900 is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. Panel B reports the estimates of the effect of Mafia 1900 on the different long term dependent variables for 1961 (a), 1971 (b), and 1981 (c), respectively. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects.

Table A16: The Impact of Mafia on Medium- and Long-Term Outcomes. Maximum Likelihood Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Medium Term Outcomes							
Dependent variable:	Literacy in 1911	Literacy in 1921	Literacy in 1931	Infant Mortality in 1909	Development Expenditure in 1912	Notaries in 1924	HHI in 1909
Mafia 1900	-0.09	-0.10	-0.07	0.04	-1.45	-0.12	0.36
	(0.04)	(0.03)	(0.03)	(0.01)	(0.75)	(0.07)	(0.12)
Panel B: Long Term Outcome							
Dependent variable:	High School	Literacy		Infant Mortality	Development Expenditure	Aqueduct Availability	HHI
a) 1961: Mafia 1900	-0.01	-0.04			-0.02	-0.17	0.09
	(0.01)	(0.02)			(0.21)	(0.07)	(0.04)
b) 1971: Mafia 1900	-0.02	-0.03		0.00		-0.04	0.06
	(0.01)	(0.01)		(0.01)		(0.05)	(0.03)
c) 1981: Mafia 1900	-0.02	-0.01		-0.01		-0.09	0.05
	(0.01)	(0.01)		(0.01)		(0.06)	(0.03)
IV	✓	✓	✓	✓	✓	✓	✓
Full set of controls	✓	✓	✓	✓	✓	✓	✓

Notes: Maximum likelihood estimates of the impact of the Mafia on medium- and long-term economic outcomes, state capacity, and politics. Panel A reports the estimates of the effect of Mafia 1900 on the different medium term dependent variables, where Mafia 1900 is instrumented by relative rainfall in 1893. Relative rainfall is measured as the relative spring rainfall measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in Table 5. Panel B reports the estimates of the effect of Mafia 1900 on the different long term dependent variables for 1961 (a), 1971 (b), and 1981 (c), respectively. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A17: Testing the selection effect in OLS and IV.

Dependent variables:	OLS	IV	$\hat{\rho}_{uz}$	$\hat{\beta}$
Literacy 1911	0.00	-0.09	0.03	-0.08
	(0.01)	(0.04)	[-0.16, 0.20]	[-0.19, 0.00]
Literacy 1921	0.00	-0.10	0.07	-0.06
	(0.01)	(0.05)	[-0.12, 0.24]	[-0.17, 0.00]
Literacy 1931	0.00	-0.08	0.04	-0.06
	(0.01)	(0.03)	[-0.14, 0.21]	[-0.15,-0.01]
Infant mortality 1909	0.00	0.05	-0.03	0.04
	(0.00)	(0.02)	[-0.21, 0.16]	[0.01, 0.08]
Development Expenditure 1912	0.02	-1.45	-0.01	-1.58
	(0.15)	(0.77)	[-0.19, 0.15]	[-4.08,-0.04]
Notaries in 1924	-0.02	-0.12	-0.03	-0.14
	(0.01)	(0.05)	[-0.20, 0.13]	[-0.33, -0.03]
HHI 1909	0.03	0.31	0.08	0.22
	(0.01)	(0.12)	[-0.07, 0.25]	[0.06, 0.47]
Literacy 1961	0.00	-0.04	0.04	-0.03
	(0.00)	(0.02)	[-0.15, 0.21]	[-0.08, 0.00]
Literacy 1971	0.00	-0.03	0.02	-0.02
	(0.00)	(0.01)	[-0.16, 0.19]	[-0.07, 0.00]
Literacy 1981	0.00	-0.01	-0.01	-0.01
	(0.00)	(0.01)	[-0.19, 0.15]	[-0.04, 0.00]
High school 1961	0.00	-0.01	0.01	-0.01
	(0.00)	(0.00)	[-0.17, 0.18]	[-0.02, 0.00]
High school 1971	0.00	-0.02	0.05	-0.01
	(0.00)	(0.01)	[-0.14, 0.22]	[-0.03, 0.00]
High school 1981	0.00	-0.02	-0.03	-0.02
	(0.00)	(0.01)	[-0.20, 0.13]	[-0.05, 0.00]
Infant mortality 1969-70	0.00	0.00	0.11	0.01
	(0.00)	(0.01)	[-0.04, 0.26]	[0.00, 0.04]
Infant mortality 1982	0.00	-0.01	0.19	0.01
	(0.00)	(0.01)	[0.05, 0.32]	[0.00, 0.03]
Development Expenditure 1957	0.05	-0.02	-0.11	-0.69
	(0.08)	(0.30)	[-0.26, 0.03]	[-1.88, 0.02]
Aqueduct coverage 1961	0.00	-0.17	0.01	-0.15
	(0.02)	(0.07)	[-0.17, 0.18]	[-0.40, 0.00]
Aqueduct coverage 1971	0.01	-0.07	-0.04	-0.09
	(0.01)	(0.04)	[-0.20, 0.13]	[-0.24, 0.00]
Aqueduct coverage 1981	0.01	-0.09	0.00	-0.08
	(0.01)	(0.05)	[-0.17, 0.16]	[-0.24, 0.01]
HHI 1963	0.01	0.09	-0.08	0.06
	(0.00)	(0.04)	[-0.26, 0.12]	[0.01, 0.14]
HHI 1972	0.00	0.06	-0.01	0.06
	(0.00)	(0.03)	[-0.18, 0.17]	[0.01, 0.14]
HHI 1983	0.01	0.05	0.01	0.06
	(0.00)	(0.03)	[-0.15, 0.19]	[0.01, 0.13]

Notes: This table reports the fully Bayesian estimates using the methodology developed by DiTraglia and García-Jimeno (2016) to investigate the difference between OLS and IV estimates of the effect of the Mafia on economic outcomes, public goods and politics reported in Tables 9, 10, and 11. The first two columns report our OLS and IV estimates from the specification including the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. For all outcomes, we assume that the signal-to-noise ratio in the regressor is in the range $\kappa \in (0.5, 1]$, while the correlation coefficient between the error term in the second-stage equation in the regressor, ρ_{T^*u} is in the interval $[0.1, 0.9]$ or $[-0.1, -0.9]$ depending on whether the outcome in question is negatively or positively correlated with economic development. The third column reports the estimate of the correlation between the error term in the second-stage equation and the endogenous regressor, $\hat{\rho}_{ux}$, while the fourth column gives the Bayesian estimate for our coefficient of interest, $\hat{\beta}$. See Section 5.1 and DiTraglia and García-Jimeno (2016) for details.

Table A18: Falsification Exercise: Relative Rainfall 1882-1891 and Medium-Term Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Reduced form	Falsification tests									
Literacy 1911	0.10	-0.04	-0.04	0.00	0.16	0.04	0.04	0.04	-0.05	-0.08	-0.04
	(0.05)	(0.08)	(0.11)	(0.10)	(0.06)	(0.07)	(0.06)	(0.12)	(0.08)	(0.04)	(0.07)
Literacy 1921	0.12	-0.07	-0.04	-0.03	0.03	0.01	0.05	0.03	-0.05	-0.03	-0.02
	(0.06)	(0.06)	(0.10)	(0.09)	(0.08)	(0.07)	(0.05)	(0.11)	(0.06)	(0.04)	(0.07)
Literacy 1931	0.09	0.01	-0.04	-0.03	0.10	0.02	0.05	-0.02	-0.05	-0.08	-0.08
	(0.04)	(0.07)	(0.06)	(0.08)	(0.06)	(0.05)	(0.05)	(0.08)	(0.06)	(0.04)	(0.06)
Development Expenditure 1912	1.63	-1.75	-0.02	-1.11	-0.99	-0.05	0.44	-1.01	-0.19	0.06	0.84
	(0.94)	(1.22)	(1.49)	(0.97)	(1.40)	(1.13)	(0.90)	(1.66)	(1.06)	(0.82)	(1.35)
Infant mortality 1909	-0.05	0.04	0.01	0.01	0.00	-0.01	-0.00	-0.00	0.02	0.01	-0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)	(0.03)
Notaries in 1924	0.13	-0.06	-0.04	-0.03	0.03	-0.02	-0.08	-0.06	-0.01	-0.07	-0.07
	(0.07)	(0.08)	(0.08)	(0.07)	(0.08)	(0.09)	(0.03)	(0.09)	(0.07)	(0.06)	(0.11)
HHI 1909	-0.34	0.07	0.08	-0.00	0.14	0.41	-0.03	-0.23	0.07	0.03	0.06
	(0.15)	(0.14)	(0.14)	(0.19)	(0.26)	(0.15)	(0.11)	(0.22)	(0.13)	(0.16)	(0.22)
Year	1893	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891
Full set of controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: OLS estimates of the relationship between relative rainfall in the spring of the years between 1882 and 1891 and medium-term economic outcomes, state capacity measures, and political competition. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. In column 1 we report the relationship in 1893 for reference. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A19: Reduced form with Relative Rainfall for 1893 and later drought years

Coefficient of Relative Rainfall	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Reduced form			Falsification tests				
Dependent variables:								
Literacy 1911	0.10	-0.11	0.07	0.00	-0.06	-0.01	-0.06	-0.03
	(0.05)	(0.12)	(0.10)	(0.09)	(0.06)	(0.08)	(0.08)	(0.05)
Literacy 1921	0.12	-0.09	0.12	0.05	-0.09	-0.03	-0.10	0.01
	(0.06)	(0.11)	(0.08)	(0.09)	(0.08)	(0.10)	(0.08)	(0.05)
Literacy 1931	0.09	-0.08	0.10	0.09	-0.10	-0.01	-0.05	-0.00
	(0.04)	(0.08)	(0.10)	(0.08)	(0.07)	(0.09)	(0.05)	(0.07)
Literacy 1961	0.04	0.00	0.07	0.05	-0.03	0.01	-0.02	0.01
	(0.02)	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.03)	(0.03)
Literacy 1971	0.03	0.02	0.06	0.04	-0.03	0.02	-0.01	0.02
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.02)
Literacy 1981	0.01	0.03	0.05	0.03	-0.01	0.02	-0.01	0.01
	(0.01)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
High school 1961	0.01	-0.00	-0.00	0.02	-0.00	0.00	0.00	-0.01
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
High school 1971	0.02	-0.01	-0.00	0.03	-0.01	0.02	0.00	-0.00
	(0.01)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
High school 1981	0.02	0.01	-0.00	0.04	-0.02	0.02	-0.00	0.00
	(0.02)	(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Infant mortality 1909	-0.05	0.04	-0.02	-0.02	-0.00	0.01	0.02	0.01
	(0.02)	(0.06)	(0.03)	(0.04)	(0.02)	(0.03)	(0.02)	(0.03)
Infant mortality 1969-70	-0.00	-0.00	-0.00	-0.01	0.00	0.02	0.01	0.00
	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.01)
Infant mortality 1982	0.01	-0.01	0.01	0.01	0.00	0.00	0.01	-0.01
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Development Expenditure 1912	1.63	-1.78	-0.67	0.99	0.32	-1.31	2.14	0.75
	(0.94)	(1.70)	(2.36)	(1.64)	(1.14)	(2.14)	(1.22)	(1.46)
Development Expenditure 1957	0.02	0.74	0.06	-0.03	0.08	-0.09	-0.19	-0.39
	(0.40)	(0.98)	(1.04)	(0.97)	(0.43)	(0.67)	(0.56)	(0.59)
Aqueduct coverage 1961	0.19	-0.15	-0.17	0.04	-0.11	-0.07	-0.07	-0.14
	(0.10)	(0.25)	(0.17)	(0.19)	(0.11)	(0.13)	(0.15)	(0.15)
Aqueduct coverage 1971	0.08	-0.08	-0.04	-0.06	0.01	0.04	-0.16	0.00
	(0.05)	(0.11)	(0.09)	(0.09)	(0.06)	(0.10)	(0.08)	(0.06)
Aqueduct coverage 1981	0.10	-0.23	0.10	-0.03	0.03	0.15	-0.18	0.05
	(0.08)	(0.17)	(0.12)	(0.13)	(0.07)	(0.10)	(0.11)	(0.09)
Notaries in 1924	0.13	-0.16	0.11	0.17	0.03	-0.02	-0.10	0.02
	(0.07)	(0.17)	(0.14)	(0.16)	(0.06)	(0.11)	(0.08)	(0.09)
HHI 1909	-0.34	0.33	-0.21	0.33	-0.05	0.54	0.02	-0.09
	(0.15)	(0.22)	(0.39)	(0.28)	(0.18)	(0.26)	(0.16)	(0.17)
HHI 1963	-0.10	0.21	0.03	0.02	-0.05	0.04	-0.01	-0.02
	(0.02)	(0.06)	(0.05)	(0.07)	(0.03)	(0.07)	(0.04)	(0.04)
HHI 1972	-0.07	0.15	0.04	0.01	-0.07	-0.04	0.01	-0.04
	(0.03)	(0.08)	(0.05)	(0.07)	(0.03)	(0.07)	(0.04)	(0.04)
HHI 1983	-0.06	0.01	0.00	0.01	-0.04	0.01	-0.04	-0.02
	(0.03)	(0.06)	(0.04)	(0.04)	(0.03)	(0.07)	(0.04)	(0.05)
Year	1893	1906	1913	1914	1920	1922	1924	1927
Full set of controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 and later drought years (1909, 1913, 1914, 1920, 1922, 1924, 1927) on medium- and long-term economic outcomes, public goods, and politics. The dependent variables are listed on the left of the Table. We report only the coefficients of relative rainfall in the various years. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The specification used for all the years include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A20: Migration and Persistence of Socialist Support

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
Dependent variable:	Δ population 1881-1901			Δ population 1881-1971		
Relative Rainfall 1893	0.01	-0.00	-0.07	0.13	0.11	-0.03
	(0.07)	(0.09)	(0.09)	(0.26)	(0.26)	(0.27)
R-squared	0.19	0.26	0.38	0.21	0.21	0.47
Panel B: Socialist Support						
Dependent variable:	Peasant Leagues in 1908			Socialist votes in 1909		
Relative Rainfall 1893	0.00	0.00	-0.00	0.29	0.30	0.22
	(0.01)	(0.01)	(0.02)	(0.19)	(0.18)	(0.22)
R-squared	0.12	0.13	0.20	0.20	0.22	0.31
Province FE	✓	✓	✓	✓	✓	✓
Determinants of Fasci	✓	✓	✓	✓	✓	✓
Determinants of Mafia		✓	✓		✓	✓
Geographic controls			✓			✓
Observations	245	245	245	245	245	245

Notes: OLS estimates of the impact of relative rainfall in the spring of 1893 on medium- and long-term migration, and on the medium-term persistence of Peasant organizations and socialist parties. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. In panel A we report the impact on migration. The dependent variable in columns 1-3 is the change in population between 1881 and 1901 computed using census data. The dependent variable in columns 4-6 is the change in population between 1881 and 1971 again computed using census data. In panel B we report the impact on the persistence of Peasant and socialist organizations. The dependent variable in columns 1-3 is membership rate of the Peasants' leagues in 1908. It is computed using the number of members of Peasant leagues reported in Lorenzoni (1910b) divided by the population in the previous census of 1901. The dependent variable in columns 4-6 is the vote share for candidates belonging to the Socialist party in the parliamentary elections in 1909. The specifications in column 1 and 4 include province dummies and other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 2 and 5 also include various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in columns 3 and 6 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A21: The Persistence of Mafia

Dependent variable: Mafia 1987				
	(1)	(2)	(3)	(4)
Panel A: IV results				
Mafia 1900	0.37	0.33	0.28	0.25
	(0.41)	(0.29)	(0.24)	(0.22)
Panel B: OLS results				
Mafia 1900	0.11	0.08	0.08	0.09
	(0.04)	(0.04)	(0.04)	(0.04)
R-squared	0.32	0.37	0.37	0.46
Province FE	✓	✓	✓	✓
Determinants of Fasci		✓	✓	✓
Determinants of Mafia			✓	✓
Geographic controls				✓
Observations	245	245	245	245

Notes: Estimates of the persistence of the Mafia from 1900 to 1987. The dependent variable is a dummy that takes on value 1 for the municipality which is considered a stronghold of the Mafia in a 1987 report by the military police (*Carabinieri*). Panel A reports the IV estimates of the persistence of Mafia presence in 1900 on the 1987 measure, where Mafia 1900 is instrumented by relative rainfall in the spring of 1893. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. The first stage is therefore reported in in Panel B of Table 5. Panel B reports the OLS estimates of the persistence of Mafia presence in 1900 on the 1987 measure. The specifications in column 1 include only Mafia 1900 and province fixed effects. The specifications in column 2 include also other determinants of the presence of the Peasant Fasci (a dummy indicating whether a Peasant Fasci was present before March 1893, a dummy for the municipality being an agro-town, the levels of rural rents and urban rents in 1853, the share of total cultivated land, and the share of land devoted to grains). The specifications in column 3 adds various determinants of the presence of the Mafia (sulfur production in 1868-70, the share of land devoted to citrus groves, vineyards and olive trees, and a measure of the presence of the Mafia in 1885). Finally, in column 4 we include a range of geographic controls (log population in 1861, log area of the municipality, elevation of the town center, maximum altitude, average altitude, distance to Palermo, distance to the closest port, the access to a postal road, average temperature, average rainfall and variance of relative rainfall). We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.

Table A22: Falsification Exercise: Relative Rainfall 1882-1891 and Long-Term Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Reduced form	Falsification tests									
Literacy 1961	0.04	-0.02	-0.02	-0.02	0.04	0.03	0.02	-0.04	-0.02	-0.04	-0.01
	(0.02)	(0.03)	(0.05)	(0.05)	(0.04)	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.03)
Literacy 1971	0.03	-0.01	-0.01	-0.02	0.04	0.03	0.01	-0.03	-0.03	-0.02	-0.01
	(0.02)	(0.02)	(0.04)	(0.03)	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Literacy 1981	0.01	-0.02	-0.00	-0.02	0.02	0.01	-0.00	-0.04	-0.01	-0.01	-0.01
	(0.01)	(0.02)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.03)	(0.02)	(0.01)	(0.01)
High school 1961	0.01	-0.00	0.00	0.00	0.01	0.02	0.01	-0.00	-0.01	-0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
High school 1971	0.02	-0.01	-0.00	-0.00	0.02	0.03	0.02	0.00	-0.02	-0.01	-0.00
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)
High school 1981	0.02	-0.01	-0.00	-0.00	0.02	0.05	0.02	-0.02	-0.02	-0.01	-0.01
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)
Infant mortality 1969-70	-0.00	0.00	-0.01	-0.01	0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Infant mortality 1982	0.01	-0.02	-0.00	-0.00	0.00	0.00	0.00	0.01	-0.00	-0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Development Expenditure 1957	0.02	-0.16	-0.35	0.18	0.37	-0.17	-0.44	-0.86	0.27	-0.38	-0.26
	(0.40)	(0.59)	(0.57)	(0.70)	(0.58)	(0.49)	(0.40)	(0.62)	(0.51)	(0.40)	(0.60)
Aqueduct coverage 1961	0.19	0.10	-0.12	0.04	0.01	-0.08	0.08	0.21	0.03	-0.06	-0.01
	(0.10)	(0.15)	(0.18)	(0.15)	(0.16)	(0.16)	(0.07)	(0.13)	(0.10)	(0.11)	(0.15)
Aqueduct coverage 1971	0.08	-0.02	0.03	0.01	0.06	-0.02	0.01	0.08	-0.03	-0.07	-0.07
	(0.05)	(0.06)	(0.07)	(0.08)	(0.08)	(0.06)	(0.06)	(0.08)	(0.06)	(0.05)	(0.09)
Aqueduct coverage 1981	0.10	-0.08	-0.01	-0.04	0.01	-0.04	-0.00	0.06	0.01	-0.12	-0.10
	(0.08)	(0.10)	(0.10)	(0.10)	(0.14)	(0.09)	(0.09)	(0.16)	(0.08)	(0.06)	(0.09)
HHI 1963	-0.10	0.04	-0.01	-0.01	0.02	0.01	-0.02	-0.07	0.02	0.02	-0.00
	(0.02)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.02)	(0.06)	(0.04)	(0.03)	(0.05)
HHI 1972	-0.07	0.03	-0.02	0.01	0.00	-0.02	0.00	-0.07	-0.01	0.04	-0.01
	(0.03)	(0.04)	(0.06)	(0.05)	(0.05)	(0.04)	(0.03)	(0.05)	(0.03)	(0.03)	(0.06)
HHI 1983	-0.06	0.01	0.02	0.02	0.00	-0.01	-0.01	-0.02	0.01	0.01	-0.05
	(0.03)	(0.05)	(0.05)	(0.04)	(0.05)	(0.04)	(0.02)	(0.05)	(0.03)	(0.03)	(0.05)
year	1893	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891
Full set of controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: OLS estimates of the relationship between relative rainfall in the spring of the years between 1882 and 1891 and long-term economic outcomes, public goods, and politics. The first column shows the results for the year 1893 for reference. Relative rainfall is measured at weather station level and interpolated at municipality level using the inverse of the distances as weights with a cutoff of 30km. All the specifications in the present table include the full set of controls (Determinants of Fasci, Determinants of Mafia, and Geographic controls) and province fixed effects. We report bootstrapped standard errors allowing for two-way clustering conditional on the district in which the municipality is located and the closest weather station to the municipality.