Set Apart: Feudalism, Family Structure, and the Origins of Low Social Capital *

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Abstract

Abstract This paper shows how hierarchical and extractive institutions can persistently hinder the accumulation of local social capital by shaping family formation patterns. Focusing on feudal institutions in Sicily – one of Europe's longest-lasting feudal societies – and using a novel municipality-level dataset, we document that areas historically governed as fiefdoms exhibited substantially lower levels of social capital. Historical evidence traces this pattern to the family structure fostered by feudal production relations, which favored the prevalence of small nuclear (SNu) families, while making cooperation and inter-family solidarity inefficient and unfavorable. Consistent with this argument, we find that feudal municipalities display significantly smaller and fewer co-resident families. The presence of these families is, in turn, associated with lower levels of social capital. These findings highlight how a family structure typically associated with cooperative outcomes (i.e., nuclear families) can have a negative long-lasting impact on social capital accumulation, if embedded in hierarchical and extractive institutional environments.

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1 Introduction

It is increasingly recognized that the stock of social capital inherited by a community – encompassing networks, norms of reciprocity, and interpersonal trust – plays a crucial role in explaining contemporary differences in development.[1] Yet, many societies remain trapped in persistently low levels of social capital. Previous research has shown that such patterns can often be traced back to long-gone institutions (Tabellini, 2010; Guiso, Sapienza, and Zingales, 2016; Rustagi, 2024). However, little is known about which institutions *undermine* social capital accumulation, and through which *mechanism* this happens.

This paper investigates these questions by studying the role of feudalism[2] in the context of Sicily, one of Europe's most extractive and longest-lasting institutional system, and by emphasizing the role of family structure as the key mechanism explaining the relationship between feudal institutions and social capital.

Since the Norman conquest in the 11th century, many Sicilian municipalities were governed through feudal arrangements in which landlords managed the local political and judicial authority as well as the agricultural production of their fiefdoms (e.g., Matthew, 1992; Musi, 2012). For centuries, feudal institutions shaped power relations, labor market structures, and social organizations. Importantly, they also shaped family formation patterns, promoting the prevalence of small nuclear (SNu thereafter) families that lacked economic and social incentives to cooperate. By contrast, municipalities outside the feudal system – e.g., those included in the royal demesnes – enjoyed a greater degree of autonomy and, at the same time, displayed larger and more socially integrated families (Fazio, 1997, 2004).

To conduct the empirical analysis, we assembled, from historical archives and secondary sources, a novel dataset on the universe of historically feudal and nonfeudal municipalities and on different indicators of social capital. Our main proxies for social capital come from the first census of *opere pie* (literally pious societies) in 1861. These lay charitable organizations represented a spontaneous form of collective solidarity, being a sort of noprofit organizations *ante litteram* (Bouwsma, 1978; Cappelli, 2017).[3] We use both the number of opere pie with exclusively charity purpose and the share of charity expenditure across all organizations as measures of local social capital.

We find that municipalities historically governed as fiefdoms had roughly 60% fewer charitable organizations and devoted about 15% lower share of expenditures to charity purposes. Next, we provide evidence on the mechanism. Historical sources suggest that feudal governance had two main conse-

[1] See Durante, Mastrorocco, Minale, and Snyder (2024) for a review of this literature.

[2] We use the term 'feudalism' to refer to the hierarchical institutional system in place in Sicily from the 11th to the 19th century. See Section 2.1 for a discussion on the definition of feudalism.

[3] The data was collected at the time of Italian unification, making unlikely that subsequent national policies confound the results.

quences. First, it fostered the prevalence of small nuclear families (e.g., Silverman, 1968; Benigno, 1985, 1989; Fazio, 1997, 2004). Second, it discouraged inter-family solidarity and cooperation (e.g., Fazio, 2004; Carlestål, 2005).

In particular, fiefdoms' inhabitants lived in single-family houses leased by the landlord, and cultivated small and fragmented plots throughout the year while working as seasonal day laborers in the growing season. Under these conditions, the marginal returns from an additional family member during the growing season rarely outweighed the year-round cost of supporting them, and the small houses and plots further limited the possibility of extended co-residence. Together, these economic and physical constraints favored the predominance of SNu families.

Yet, these families were embedded in an institutional framework that made cooperation and solidarity economically and socially unlikely: they directly competed for employment in a monopsonistic labor market (Martinelli, 2014) and had limited economic incentives for joint cultivation or cooperative agricultural investments. Meanwhile, landlords exercised private jurisdiction within their domains and provided a minimal safety net – single-family housing, access to small plots, and seasonal jobs – in exchange for loyalty and compliance. This form of 'feudal paternalism' likely reduced the need to collectively provide local public goods.[4]

Consistent with the historical narrative, we show two pieces of empirical evidence. First, feudal municipalities exhibited: i) smaller family size; ii) fewer co-resident families (as proxy for nuclearity). In a nutshell, feudal municipalities saw a greater prevalence of SNu families. Second, we find that the presence of SNu families is associated with lower social capital. This evidence supports the argument that nuclear families, if embedded into a hierarchical and extractive institutional setting, did not generate social capital: they undermined it.

When interpreting the above findings, one concern could be that the distribution of fiefdoms is associated to other factors also related to social capital. To mitigate this concern, we first account for a series of geographic and economic factors (including distance to Palermo, access to coast, roads, and irrigation, urban and rural wealth, population density) at the municipality level. Next, by adding province fixed effects, we control for unobserved characteristics at the province-level.

To further limit the scope for omitted-variables bias, we employ a neighbor-pair fixed-effects estimator that compares adjacent feudal and nonfeudal municipalities. This design exploits local variation in feudal governance while holding constant unobservables shared by neighboring areas. The results remain highly stable. We also conduct a formal sensitivity analysis to quantify how strong any remaining unobserved confounders would need to be in order to overturn our estimates: the required bias is

[4]In the context of post-Civil War Southern U.S., Alston and Ferrie (1999) show that a system of 'paternalism' was also in place: black and poor white people – prompted by insecure property rights – demanded protection, which was offered by landowners in exchange for 'good and faithful' labor.

implausibly large.

A second concern is that feudal lords may have strategically selected locations with initially lower social capital. Historical narrative about pre-feudal (i.e., pre-Norman) Sicily suggests that, when the Arabs conquered Sicily they introduced a water-management system (based on Persian qanāts) which, to be built and maintained, required collective labor and coordination. Therefore, former Arab-controlled areas of Sicily might have developed comparatively higher pre-feudal social capital – raising concerns on whether Normans, two centuries later, avoided these places when allocating fiefs. We show that this was not the case: former Arab-controlled zones were no less likely to become fiefdoms. This alleviates the concern that selection into feudalism drives our results.

Literature review This paper contributes to different strands of research. First, it advances the literature on the institutional origins of social capital (Banfield, 1958; Putnam, 1993; Tabellini, 2010; Guiso et al., 2016; Cappelli, 2017; Mariella, 2022; Alfani, Borghi, and Masciandaro, 2023; Rustagi, 2024). Existing studies emphasize how self-governing, participatory, and inclusive institutions foster generalized trust and cooperative behaviors in the long-run. Instead, we examine how hierarchical and extractive institutions – such as feudal governance – can *actively* hinder the accumulation of social capital. Feudalism was not merely the absence of self-government (and, thus, it was not the 'other side of the medal'), but a distinct institutional equilibrium based on vertical ties of dependence from the landlords.[5] Moreover, to the best of our knowledge, we are the first to highlight family formation patterns as the *key* mechanism linking feudal institutions to lower levels of social capital. We argue that the emergence of SNu families, in a particularly hierarchical and extractive institutional setting, made cooperation and mutual solidarity both inefficient and unlikely.

Second, this paper contributes to the literature on the interaction between institutions, family systems, and social organizations. Scholars have linked the rise of nuclear families in medieval Northern Europe to the development of corporative institutions – such as chartered towns, guilds, and universities – that both supported cooperation and complemented nuclear household structures (Greif, 2006; Greif and Tabellini, 2010; Schulz, 2022; Greif, Mokyr, and Tabellini, 2025). Similarly, studies on modern Western countries have shown that family structure is closely related to extra-familial cooperation.[6] However, recent work cautions against viewing nuclear families as universally beneficial, emphasizing instead that the impact of family structures might depend on the surrounding institutional framework. Drawing on demographic studies covering 39 European countries, Dennison and Ogilvie

[5]Banerjee and Iyer (2005) document persistent effects of landlord-based institutions in British India, showing lower post-independence public goods provision in former landlord areas. While not focused on social capital, their results highlight the long-run consequences of extractive land institutions on economic development.

[6]Extended family ties often substitute for generalized trust and civic participation, whereas more nuclear family structures tend to facilitate cooperation beyond the family (Fukuyama, 1995; Alesina and Giuliano, 2010, 2011; Moscona, Nunn, and Robinson, 2017; Enke, 2019; Kravtsova, Oshchepkov, and Welzel, 2025).

(2014) classify societies based on kinship complexity and marriage patterns, and document substantial heterogeneity within each kinship regime: predominantly nuclear-family systems coexisted with both high (e.g., England) and low (e.g., southern Italy) levels of economic development, while regions with more complex kinship arrangements also experienced sustained growth (e.g., northern Italy).[7] To the best of our knowledge, this paper is the first to provide micro-level evidence that small and nuclear families can *emerge* and *negatively impact* social capital accumulation under a highly hierarchical and extractive institutional setting.

Third, we contribute to the huge literature on institutional persistence (see Nunn (2014) and Voth (2021) for a review of the literature). We provide evidence that abolished institutions can leave enduring impact on collective behaviors by shaping the micro-foundations of social life – namely the family.

The rest of this paper is organized as follows. Section 2 discusses the characteristics of Sicilian feudalism and presents the historical and institutional background. Section 3 describes the data. Section 4 presents the empirical strategy and the main results: (1) historical feudal governance is negatively associated with social capital accumulation, and (2) the prevalence of SNu families represents a key mechanism explaining this relationship. Section 5 discusses the limitations of the analysis and provides further interpretation of the results. Finally, Section 6 concludes.

2 Historical and Institutional Framework

2.1 Definition of Feudalism in Sicily

A rich historiography suggests that the term 'feudalism' was coined by modern scholars to identify and impose coherence on a variety of medieval and early modern institutions across Europe (e.g., Brown, 1974; Reynolds, 1994; Barthélemy, 2009; Reynolds, 2012). Given the heterogeneous characteristics of feudal institutions across space, in this section, we briefly clarify the key features of feudalism in our context.

Feudal institutions emerged in Europe, starting from the IX century and proved remarkably resilient, evolving over the centuries to accommodate the growing royal bureaucracies and the consolidation of territorial monarchies. Southern European monarchies – notably Spain and southern Italy – constructed hybrid systems of governance in which royal and feudal authority were closely intertwined. Monarchs delegated judicial and fiscal authority to local elites who acted simultaneously as royal officers and landowners (e.g., Matthew, 1992; Epstein, 2000; Musi, 2012; Blaydes and Chaney,

[7] Relatedly, Chen, Fisman, Lan, Wang, and Ye (2024), focusing on Chinese clans, find that extended kinship communities suffered less the loss of livestock associated with 1955-56 collectivization, but experienced higher mortality during the 1959-61 Great Famine. They anecdotally suggest that kinship heterogeneous responses to negative shocks might depend on their interaction with the broader institutional environment.

2013; Cancila and Musi, 2015). This arrangement produced what Musi (2012) describes as the 'land-holding–jurisdiction nexus,' a defining feature of Mediterranean forms of feudalism. In this context, feudalism was less about military vassalage (as in Northern Europe) and more about governance, taxation, and rent-extraction within an institutionalized hierarchy of power.

Based on these features, we consider feudalism as a set of both political and economic relationships. The latter was based on land-property, with peasants bound to landlords by tenancy and labor services. In other words, it was a form of decentralized governance, in which landlords managed their fiefs politically, as a jurisdiction, and economically, as a personal source of income (Brenner, 1982; Matthew, 1992; Epstein, 2000; Musi, 2012; Blaydes and Chaney, 2013; Cancila and Musi, 2015). Under this definition, *Sicily* stands as an archetypal case of Mediterranean feudalism: it was one of Europe's most extractive and pervasive institutional system, as well as one of the longest-lasting.

2.2 The Sicilian Feudal System: Origins, Consolidation, and Abolition

After the collapse of the Roman Empire, Sicily remained under Byzantine rule until the Arab conquest in the ninth century. The Arab domination (827–1061) transformed the island's economy and agrarian structure. New irrigation systems based on Persian *qanāt*, the introduction of new crops (e.g., citrus, cotton, and sugarcane), and the growth of urban markets fostered both the agricultural and commercial expansion of Arabs across the central Mediterranean (Amari, 1854; Maurici, 1995; Metcalfe, 2009; Tramontana, 2014).

Between 1061 and 1071, the Normans conquered Sicily and introduced a new system of 'feudal' institutions. Indeed, faced with the need to consolidate control as the conquest advanced, Norman leaders granted fiefs to their followers – mostly relatives and companions from Normandy – as rewards for their military service and as a way to secure their loyalty (Loud, 2000). As a result, Sicily resembled a mosaic of landlords and their estates, each endowed with judicial responsibilities and fiscal privileges (Matthew, 1992). The Norman monarchy, on the other hand, retained direct authority over some towns and exercised penal jurisdiction across the entire island (Loud, 2000; Cancila, 2013). The towns under royal jurisdiction (the so-called *Città Demaniali* or *Universitates*) maintained some form of autonomy – though far less than the northern Italian *Comuni* – with their own laws, customs, and toll franchises (Romano, 1992; Epstein, 1992). We refer to them as nonfeudal municipalities.

The death without heirs of Emperor Frederick II (1198–1250) created a political vacuum that culminated in the 1282 uprising known as the Sicilian Vespers, which brought the island under the Aragonese crown and, later, under Spanish rule. During this period, feudal institutions became increasingly entrenched. King Frederick III of Aragon (1296–1337) granted, for the first time, both civil and penal jurisdiction to some of his leading landlords in exchange for political support, thereby consolidating local baronial authority (Hamel, 2014). The Spanish sovereigns rarely resided on the

island and delegated its administration to viceroys and local feudal lords, reinforcing their control over land, justice, and taxation (Mack Smith, 1983).

From the late sixteenth century, to meet rising population pressures and European grain demand, the Spanish government promoted an internal 'feudalization' of Sicily by selling royal lands and granting *licentiae populandi* to noblemen. These licenses authorized the foundation of new feudal villages, often giving to landlords the authority to exercise both civil and penal jurisdiction within their fiefs (Davies, 1983; Benigno, 1986).

In 1713, the Treaty of Utrecht assigned Sicily to the House of Savoy, before it was retaken by the Spanish Bourbons in 1734 and later united with Kingdom of Naples under a single crown. The Bourbons abolished feudalism on the mainland but maintained it in Sicily as a cost-effective mechanism of local governance and social control (Mack Smith, 1965). Feudalism in Sicily was formally abolished only in 1812, when the Parliament – under British influence during the Napoleonic Wars – adopted a liberal constitution. Yet, the reform left landed power largely intact. The baronial elite adapted to the new order by transforming itself into a landed bourgeoisie that preserved its economic dominance and social prestige (Mack Smith, 1983). The institutional feudal equilibrium forged centuries earlier thus remained substantially unchanged until Italian unification in 1860.

2.3 Governance and Economic Organization under Feudalism

The Norman and the Spanish dominations of Sicily rested on a feudal system that combined delegated political authority with an extractive agrarian economy.

Within this framework, feudal lords had the right to exercise civil jurisdiction within their domains, while the crown retained control over penal justice and ultimate authority over appeals. Over time, however, many landlords secured the right to also administer penal justice, effectively transforming their fiefs into self-sufficient political units (Cancila, 2013). Acting simultaneously as landlords and royal officers, they collected taxes, enforced order, and dispensed local justice on behalf of the monarchy (Musi, 2012). In the words of Matthew (1992, p. 143), "the important requirement was that barons, as lords, had jurisdiction and not merely a holding of land with military obligations."

Each fiefdom typically consisted of an inhabited center surrounded by extensive landed estates. Land constituted the primary source of income for feudal lords and was largely devoted to extensive grain cultivation (Mack Smith, 1983). Because grain farming required intensive labor only during short periods of the year – namely sowing and harvesting – it generated a structural demand for seasonal labor in a context without serfdom. To secure a readily available workforce, landlords usually built and leased single-family houses to peasants and granted them short-term concessions on small, scattered plots within their estates. These plots were deliberately too small to sustain a family, compelling peasants to work as day laborers on the baronial fields during peak seasons (Benigno, 1985, 1986).

Together, these economic and physical constraints favored the predominance of small nuclear (SNu) families, as the most suitable family structure.

The feudal organization of agricultural production entrenched a system of vertical dependency and discouraged investments on both sides: peasants held insecure, short-term concessions, while landlords prioritized rents over land improvements (Balsamo and Vaughan, 1808; Mack Smith, 1965). The resulting society was rigidly stratified and socially fragmented. Peasants cultivated small, scattered plots and supplemented their income as seasonal day-laborers, which placed them in competition within a monopsonistic labor market rather than encouraging cooperative work. Temporary and dispersed land concessions further weakened incentives for collective cultivation or long-term joint investment. At the same time, landlords functioned as royal officers, administering justice and ensuring minimal subsistence for the inhabitants of their fiefs. Together, these conditions made *socially-isolated* SNu families the core productive and social unit of fiefdoms (Benigno, 1989; Fazio, 2004). As Carlestål (2005, p. 14) notes, Sicilian peasants "suffered the absence of the security an extended family may give to its single members and preoccupied themselves exclusively with the material short-run advantage for the nuclear family." In this way, the Sicilian – and more broadly Mediterranean – form of feudalism fostered *vertical* dependence on landlords while undermining *horizontal* inter-family solidarity.

3 Data and Descriptive Statistics

Our analysis is conducted at the municipality level – encompassing both feudal and nonfeudal municipalities – and relies on the territorial organization of Sicily prior to the Italian unification in 1860. The resulting dataset includes 328 municipalities.[8] Appendix Section B provides details and sources for all variables, and Table A.1 reports the corresponding summary statistics.

3.1 Identifying the Fiefdoms

In the empirical analysis, we exploit within-region variation in historical governance by comparing municipalities that were subject to feudal authority with those that were not. Nonfeudal municipalities comprise those under royal jurisdiction (known as *Città Demaniali* or *Universitates*), along with a small number of territories administered by abbeys or by self-governing immigrant communities (e.g., the municipality of Piana degli Albanesi).

Since, to the best of our knowledge, a comprehensive catalogue of Sicilian fiefdoms does not exist, we consulted and digitized several historical sources to track the political evolution of each

[8]The Bourbon Cadastre consulted by Mortillaro (1854) lists 348 municipalities in 1853. Because reliable historical information is not available for all of them, we restrict our sample to 328. In addition, some control variables used in later specifications are not consistently reported across space, which reduces the final sample in the full-controls specification to 315 municipalities.

municipality in the sample. Our primary source was the book "*I Fasti di Sicilia*" (Castelli, 1820), which offers a detailed description of the political institutions existing in the Kingdom of Sicily. Since the author was himself a feudal lords, the source rests on his direct access to contemporary administrative records and personal knowledge. To validate this source, we checked other historical collections, such as the "*Historical Atlas of Sicily*" (Touring Club Italiano, 2005), the "*Dizionario Storico-Araldico della Sicilia*" (Palizzolo, 1871), and a report on the *licentiae populandi* compiled by the State Archive of Palermo (Porrello and Fazio, 2021). Lastly, for towns not mentioned in these sources, we consulted the historical section of official city websites.

Combining these information, we construct a dummy equal to one if the municipality belonged to a fiefdom at any time between the Norman conquest of Sicily and the formal abolition of the feudal system in 1812. Panel (a) of Figure 1 shows the geographical distribution of nonfeudal and feudal municipalities.

3.2 Measures of Social Capital

Social capital refers to the networks, norms of reciprocity, and interpersonal trust that facilitate cooperation and enable communities to achieve mutually beneficial outcomes (Coleman, 1988; Putnam, 1993; Ostrom and Ahn, 2003). Although these elements cannot be directly observed in historical contexts, we can observe collective behaviors that presuppose their existence. Putnam (1993, p. 148), for instance, identifies social capital in "associationism and collective solidarity." Following this approach, we use, as our main proxy of social capital, data on *opere pie* (literally 'pious societies') existing in Sicily in 1861. We digitized this information from the first census of opere pie, compiled by the newly formed Italian government (Direzione Centrale di Statistica, 1873). As Sicily became part of Italy in 1860, our data is unlikely to capture the immediate impact of post-unification national policies.

The opere pie were social organizations that emerged as "spontaneous and local confraternities of laymen for the purposes of performing charitable exercises and pious works together" (Bouwsma, 1978, p. 1134). Establishing such organizations required generalized trust, reciprocity, and cooperative norms. Although sometimes motivated by religious sentiment, opere pie constituted the main form of private charity in pre-unification Italy, operating with substantial local autonomy and functioning in practice as civic institutions (Servalli, 2013; Cappelli, 2017). As noted in the introduction to the census (Direzione Centrale di Statistica, 1873, p. 5), the local distribution of opere pie reveal "not so much the needs, but rather the charitable sentiments prevalent in the population."

Functioning of opere pie Opere pie were typically founded by local inhabitants who endowed them with land, capital, or other assets, as acts of charity and civic responsibility. Even after their foundation, resources came from private endowments, bequests, and donations, rather than from public funds. Governance was similarly communal. Opere pie were managed by small boards of lay

administrators drawn from the same locality. In other words, norms of cooperation and reciprocity were required for these associations to emerge, function, and endure (Servalli, 2013; Cappelli, 2017).

Opere pie had a very local reach, with the population participating both as contributor and beneficiary. The activities of opere pie were very diverse and included: management of shelters, orphanages, and asylums for widows and the disabled; distribution of food, clothing, and subsidies to the poor; provision of dowries for impoverished girls; and extensions of grain loans or credit to peasants in distress.

In sum, opere pie were founded voluntarily by the local population, and managed jointly by their members. Their creation and operation required sustained norms of trust, reciprocity, and cooperation, namely an underlying stock of social capital.

Variables construction & statistics The census of opere pie lists all active organizations in each municipality as of 1861, reporting their main purpose, date of foundation, and average expenditures. Organizations are classified in four categories, based on their main purpose: exclusively charitable, charitable and religious, exclusively religious, or lending.

To better identify the aspects of opere pie that plausibly reflect norms of generalized trust, reciprocity, and collective solidarity – that is, those most closely related to social capital – we adopt a strict definition of our outcome variables. Specifically, we consider: (i) the number of *exclusively charitable* opere pie (per 1,000 inhabitants), and (ii) the share of *charity expenditure* over total expenditures across all types of opere pie (excluding lending).[9,10]

Regarding the first measure, although all types of opere pie needed some form of social capital to exist and operate, their purpose could reflect motives other than reciprocity norms and solidarity. For example, opere pie having charitable-and-religious or exclusively religious purposes might be prevalent in places with higher religiosity, while opere pie having lending purposes in places with higher financial needs. To limit such potential confounding, we restrict attention to charitable only opere pie. And because the creation of any opera pia required a minimum stock of social capital, this indicator captures an 'extensive-margin' dimension. The second measure, instead, reflects an 'intensive-margin' dimension: because each organization could decide whether and how much to allocate to charitable activities, this measure reflects the priority assigned to collective solidarity, conditional on available resources.[11]

This choice is confirmed by the patterns observed in Figure 2. The left panel reports the average number of opere pie (per 1,000 inhabitants), by purpose, separately for feudal and nonfeudal municipalities. Historically nonfeudal municipalities hosted substantially more opere pie, especially charitable

[9]We exclude lending opere pie because the market value of loans was recorded among the charity expenditures (but not among total expenses) and it is unlikely that this type of expenditure has a charity goal.

[10]From now on we refer to this indicator simply as share of charity expenditure.

[11]By normalizing charity expenditures by total expenditures, we account for differences in resource availability, thereby reducing concerns that the measure merely reflects local need or economic conditions.

ones: on average, they had one charitable opera pia per 2,000 inhabitants, compared to one per 3,000 inhabitants in feudal municipalities.[12] The right panel displays the average share of expenditures, by purpose, across all opere pie at the municipal level. Nonfeudal towns devoted on average about 40% of total expenditures to charity, compared to roughly 25% in feudal municipalities (while the difference is not so striking for other types of expenditures). Panel (b) of Figure 1 maps the distribution of charitable opere pie across Sicilian municipalities in 1861, while panel (c) portrays the distribution of share of charity expenditure.

The catalogue also reports the foundation year for most opere pie, allowing us to reconstruct the accumulation of social capital observed in 1861 over time. The left panel of Figure A.1 in the Appendix illustrates the cumulative number of charitable opere pie in feudal vs. nonfeudal towns, founded between 1250 and 1850 (and still active in 1861). Both types of municipalities experience an increase in the number of opere pie, but the growth is markedly steeper in nonfeudal towns. The right panel plots the difference (with 95% confidence intervals) in the average number of charitable opere pie between feudal and nonfeudal municipalities every 50 years – controlling for province-specific linear time trends. This difference increases around the 1400s, coinciding with the Spanish domination of Sicily, it widens over time, stabilizing only in the seventeenth century. This descriptive evidence suggests that, for centuries, feudal towns accumulated lower social capital, that persisted even when feudalism was finally abolished.

3.3 Control Variables

In our empirical analysis, we include a series of baseline and economic controls that could be associated with both the establishment and persistence of feudal governance, as well as with the accumulation of social capital.

Baseline controls. We begin by including a set of geographical and environmental characteristics. First, we control for elevation, which may have facilitated defense for feudal villages but simultaneously limited agricultural productivity and trade opportunities. To capture the influence and reach of central institutions – and the tendency of some feudal lords to reside in the capital – we include distance from Palermo. Furthermore, because most Sicilian agricultural goods (produced primarily in fiefdoms) were traded across the island, we also control for direct access to postal roads and proximity to the coast. These variables are drawn from Acemoglu, De Feo, and De Luca (2020).

Following Buggle (2020) and Naghavi and Shaeyan (2024), agricultural societies where joint irrigation is necessary tend to develop more collectivistic norms. To account for this, we include a dummy

[12] Figure 2 also shows that lending opere pie were relatively more common in feudal towns. Although this may seem counterintuitive, lending opere pie included *Monti di Pietà* and *Monti frumentari*, which offered credit (the former) or grain (the latter) at advantageous conditions to people in difficulty. Monti frumentari were particularly widespread in wheat-growing area – predominantly feudal – where they effectively substituted for commercial banks.

variable equal to one if a municipality had access to a permanent source of irrigation (e.g., a river). This variable is digitized from the "*Dizionario Geografico del Regno di Sicilia*" (Sacco, 1799). Similarly, in predominantly agrarian economies, climatic volatility can shape inter-group trust as individuals cope with uncertainty by developing stronger ties of solidarity with each others (Buggle and Durante, 2021). To proxy for climatic variability, we therefore include the standard deviation of average temperature and precipitation during the growing season (spring and summer) between 1500 and 1800, obtained from the European Seasonal Temperature and Precipitation Reconstructions (Luterbacher, Dietrich, Xoplaki, Grosjean, and Wanner, 2004; Pauling, Luterbacher, Casty, and Wanner, 2006).[13]

Lastly, since malaria was widespread across Sicily and influenced agricultural organization, labor contracts, and settlement patterns (Buonanno, Esposito, and Gulino, 2020; Mariella, 2022), we include the share of municipal territory infested by malaria. These data are from Mariella (2022).

Economic controls. Agriculture was the dominant economic sector throughout Sicily, with fiefdoms mostly specializing in extensive grain cultivation. Accordingly, we control for the share of municipal land devoted to agriculture, as well as the share allocated to grains, vineyards, citrus, and olive groves. Then, to account for differences in local wealth and economic conditions, we include the average urban and rural rents per hectare. Data come from the Sicily's Bourbon Cadastre, compiled by Mortillaro (1854), based on the *Riveli* – people' wealth declarations to the Royal Commission in 1815, updated in the 1830s – and distinguish between agricultural and urban sources of wealth. We also include a dummy for the presence of a sulfur mine (Buonanno, Durante, Prarolo, and Vanin, 2015), since sulfur extraction represented the most profitable non-agricultural activity in 19th century Sicily.

Finally, we include population density (computed over land not devoted to agriculture) to capture potential demographic and economic differences across municipalities.

4 Empirical Analysis

4.1 Feudalism and the Accumulation of Local Social Capital

We begin by examining the relationship between historical feudal institutions and the accumulation of local social capital. Figure A.2 plots the kernel density of our two main proxies – the number of charitable opere pie (per 1,000 inhabitants) and the share of charity expenditure across all opere pie – separately for feudal and nonfeudal municipalities. In both cases, the distribution for nonfeudal municipalities is shifted to the right, suggesting systematically higher levels of charitable activities.[14]

[13] Data are available at the cell level. Each ESTPR grid cell covers 0.5° (approximately 56 km at the equator). For municipalities spanning multiple cells, we assign a weighted average based on land area.

[14] The distribution of charitable opere pie is right-skewed, consistent with a log-normal shape. Accordingly, this variable is log-transformed in all baseline regressions.

To explore this relationship more systematically, we estimate equations of the form:

$$y_{ip} = \beta \cdot F_{ip} + \gamma' \mathbf{X}_{ip} + \alpha_p + \varepsilon_{ip}, \tag{1}$$

where y_{ip} is a proxy for social capital[15] in municipality i and province p, F_{ip} equals one if the municipality was historically governed as a fiefdom, $\mathbf{X}_{ip}$ includes a set of municipal controls, and α_p denotes province fixed effects. Standard errors are clustered at the feudal-family level, since a single feudal lineage often ruled multiple municipalities.

4.1.1 Main Results

Table 1 reports the OLS estimates of equation (1).

Our baseline specification (column 1) shows that municipalities historically ruled as fiefdoms have 66.3% fewer opere pie relative to nonfeudal municipalities, corresponding to roughly three fewer charitable organizations per 10,000 inhabitants. Because founding a new pious society required an underlying stock of generalized trust and reciprocity norms – namely of social capital – this extensive-margin result indicates that feudal governance significantly undermined the local propensity to create charitable organizations.

Then, we consider the share of charity expenditure, thereby capturing somehow an intensive margin dimension (column 5). Municipalities historically ruled as fiefdoms devote 16.4 p.p. less of their total resources to charitable activities – equivalent to about a 42% reduction relative to nonfeudal towns. This suggests that even where opere pie existed, their willingness to mobilize resources for charitable activities was substantially lower in formerly feudal places.

To assess the magnitude of the effects, Table 1 also reports standardized coefficients. Historical exposure to feudalism is associated with a 0.675 standard deviation reduction in the (log) number of charitable opere pie (per 1,000 inhabitants) and a 0.602 standard deviation reduction in the share of charity expenditure.[16]

4.1.2 Identification Strategy and Threats

Because feudal governance was not randomly assigned across Sicilian municipalities, one may worry that other geographic or economic factors jointly shaped the local presence of feudal institutions and social capital. To mitigate this concern, our identification strategy progressively conditions on a rich set of geographic and economic controls, and province-level unobservables.

[15] Recall that one of our proxies for social capital – the number of charitable opere pie – is a count variable, which often amounts to zero organizations. Thus, we use $\log(y_{ip} + 0.1)$ as dependent variable in this case. In section 4.2.1, we test the robustness of our results using alternative methods to deal with the large presence of zeros.

[16] Standardized coefficients are computed by expressing the dependent variable in standard deviations while maintaining the independent variables in their original units.

Table 1 shows how our coefficient of interest evolves as additional controls are introduced. We first account for geographic fundamentals – including elevation, distance from Palermo, access to the coast and historical postal roads, irrigation availability, climatic volatility, and malaria prevalence (columns 2 and 6). The estimated effect of feudal governance remains negative, large, and highly significant.

We then add economic controls capturing differences in agricultural specialization, land use, local wealth, and population density (columns 3 and 7). These variables absorb variation related to local productivity, income, and settlement structure that might otherwise be confounded with the legacy of feudalism. Results again remain stable.

Finally, including province fixed effects (columns 4 and 8) ensures that the effect is not driven by persistent province-level differences, for instance in market development and access, or administrative structures. The estimates remain virtually unchanged, indicating that the relationship between feudalism and social capital is robust to a wide array of potential confounders.[17]

Nonetheless, concerns remain that local unobservables or reverse causality may drive the results. To mitigate these concerns, we perform a set of empirical exercises and we: (i) examine additional factors – beyond feudalism – that could plausibly influence the accumulation of social capital; (ii) assess the scope for omitted-variable bias and implement a neighbor-pair fixed-effects estimator; (iii) conduct a placebo test; and (iv) investigate whether feudal lords strategically targeted areas with pre-existing differences in social capital.

Additional confounders One could worry that alternative factors – orthogonal to historical feudal governance – could lead to our results. Here, we discuss the role of few relevant confounders.

First, because roughly one-third of fiefdoms were established in the seventeenth century as 'foundation villages' – newly created feudal settlements populated by attracting residents from nearby towns – one could worry about selective migration. If the decision to move was correlated with pre-existing social capital – for example, if individuals with weaker cooperative norms were more likely to relocate – our estimates would be biased upward. To assess this possibility, Table A.4 in the Appendix replicates our baseline results excluding foundation villages. The coefficients remain virtually unchanged, reinforcing the idea that it was the institutional features of feudal governance, rather than migrants' pre-existing characteristics, that shaped social capital dynamics.

Second, recent studies shows that major earthquakes can foster the development of social capital (both in the short run (Bai and Li, 2021) and over the long run (Buonanno, Plevani, and Puca, 2023)) as communities respond to destruction by strengthening cooperative ties. Given that Sicily is among the most seismically active regions of Italy, one may wonder whether such events could explain away our findings. A particularly catastrophic episode was the 1693 earthquake in the southeast (*Val di*

[17] Appendix Tables A.2 and A.3 report coefficients for all controls.

Noto), which reached intensity XI (Extreme) on the Mercalli–Cancani–Sieberg scale and hit dozens of towns (Guidoboni, Ferrari, Mariotti, Comastri, Tarabusi, Sgatoni, and Valensise, 2018). Using the Catalogue of Strong Italian Earthquakes (Guidoboni et al., 2018), we identify municipalities that were severely impacted by the earthquake (intensity $\geq$ X) and re-estimate our baseline model excluding them. As reported in Table A.5 in the Appendix, the coefficient on feudalism remains negative and strongly significant, indicating that our results are not driven by seismic shocks.

Omitted-variables bias Now, we assess the role of omitted variables. First, to account for unobservables varying at finer geographical level than provinces, we draw on the historical process through which feudal governance was introduced. When the Normans conquered Sicily, fiefs were granted as rewards to relatives and military companions, in order to secure their loyalty rather than according to a precise knowledge of the local economic conditions (Loud, 2000; Matthew, 1992). As a result, also neighboring municipalities might end up under different political regimes. We exploit this feature by implementing a neighbor-pair fixed-effects estimator (following Acemoglu, Garcìa-Jimeno, and Robinson, 2012; Buonanno et al., 2015, 2023), which combines elements of matching and regression discontinuity. We restrict the sample to feudal municipalities bordering at least a nonfeudal one and include neighbor-pair fixed effects, thereby holding constant all unobservables shared across adjacent municipalities – such as terrain, micro-climate, and access to local markets – and isolating variation in historical governance within very small geographic units. Table 2 shows that the resulting estimates remain negative and significant, only slightly smaller than the baseline, suggesting that local unobservables are unlikely to explain away the results.

We next quantify the potential influence of remaining local-level unobservables through a sensitivity analysis of our main estimates, reported in Table 3. Following Oster (2019), we compute the degree of selection on unobservables (δ) that would be required to eliminate our estimated effects, assuming – as standard in the literature – that adding unobservables would increase the model's R^2 by 30%. In all specifications, δ > 1, which is generally interpreted as evidence that unobserved confounders would need to be implausibly strong to overturn the results. In addition, we also compute the breakdown points proposed by Diegert, Masten, and Poirier (2025), which measure the largest amount of selection on unobservables, as a percentage of selection on observables, needed to revert the sign of the estimates (thereby ranging between 0 and 1). We consider two extreme assumptions about the correlation between unobservables and observables: maximal correlation (c = 1) and no correlation (c = 0). The corresponding values range from 0.38 to 0.48 in the most restrictive case and from 0.41 to 0.54 in the less restrictive case, indicating that even under pessimistic assumptions, selection on unobservables would be insufficient to erase our findings.

Taken together, these checks should reduce concerns about omitted-variable bias.

Placebo test Next, to examine whether our estimates could arise by chance, we implement a

placebo permutation test. We reproduce the distribution of feudal experiences across Sicily by randomly re-assigning the different types of governance to municipalities and then we estimate equation (1). We replicate this procedure 5,000 times. Figure 3 plots the k-density of the placebo point estimates for feudal governance and a vertical line indicating our true coefficients. The test suggests that our results are not due to chance, because the true estimated coefficients for feudal institutions (which were statistically significant in the baseline model) lay on the extreme left tail of the distributions.

Reverse causality A remaining concern is that feudal lords may have strategically targeted areas with already low levels of social capital. If so, we would overestimate the true effect of feudal governance. To evaluate this possibility, we turn to historical and archaeological evidence from the pre-Norman (i.e., pre-feudal) period.

Before the introduction of the feudal system, the Arab invasion of Sicily (827–902 CE) divided the island into Arab- and Byzantine-controlled territories. Arabs introduced new crops and, crucially, advanced hydraulic technologies derived from Persian *qanāt* (e.g., Amari, 1854; Maurici, 1995; Metcalfe, 2009; Tramontana, 2014). Qanāts were underground canals designed to intercept shallow springs and channel water by gravity to shafts or storing caves. These systems were particularly suited to the hydrogeology of western Sicily, and archaeological research confirms their presence throughout the island.[18] Although dating individual qanāts remains difficult, ceramic evidence, construction techniques, and medieval geographers consistently point to their use between the ninth and eleventh centuries (Maurici, 1995; Cessari and Gigliarelli, 2000).

Because constructing and maintaining a qanāt required collective labor and coordination, scholars argue that such hydraulic systems may have fostered norms of mutual trust and reciprocity that extended well beyond water management (Abbasi, 2024; Naghavi and Shaeyan, 2024). In many documented cases, the qanāts operated not merely as an irrigation device but as a social institution; sociologists even describe a distinct 'qanāt culture,' characterized by solidarity and cooperative behaviors rooted in the communal effort required to build and maintain these systems (Khaneiki, 2020). Recent evidences from Iran document that villages with functioning qanāts display higher social capital today (Abbasi, 2024; Naghavi and Shaeyan, 2024). Under this view, former Arab-controlled areas of Sicily might have developed comparatively higher pre-feudal social capital – raising concerns if Normans later avoided these places when allocating fiefs.[19]

[18] In particular, recent archaeological studies have found evidence of Arab qanāts in Palermo and its hinterland (Todaro, 2009; Todaro, Barbera, Castrorao Barba, and Bazan, 2020; Castrorao Barba, 2025) and in the provinces of Messina (Cannella, Manitta, Nicita, Orifici, Vraca, Pollina, Sapienza, and Trecarichi, 2017; D'Amico, Colica, Galone, Foti, and Capizzi, 2022), Trapani (Cessari, Gigliarelli, and Buccellato, 1997; Civantos, Corselli, and García, 2023) and Syracuse (Magno, 2014).

[19] Importantly, our specification controls directly for irrigation availability, thus absorbing the environmental determinants that shaped the location of such hydraulic systems.

We address this concern in two steps. First, historically, this interpretation would require that Norman elites both possessed reliable information about local social capital and enjoyed sufficient freedom and incentives to allocate territories accordingly. As discussed above, existing historiography offers limited support for such selective behavior, which appears to have been constrained by military necessities and the availability of lands.

Second, we empirically test this hypothesis. Ideally, this would require systematic municipality-level data on qānats location; however, current archaeological knowledge is fragmentary, spatially uneven, and based on case-studies rather than on island-wide census (Boccuti, Ferrari, Pingue, and Luzio, 2022). In light of these data limitations, we digitize a map compiled by Ahmad (1977) on the territorial division of Sicily between Arabs and Byzantines (reported in Figure A.3 in the Appendix), and we adopt an intention-to-treat approach classifying all initially Arab-controlled municipalities as potentially exposed to Arab hydraulic systems. Table 4 shows that historical Arab domination is uncorrelated with the later probability of becoming a fiefdom, also when including controls and fixed effects. This absence of correlation is informative: pre-feudal differences in local social capital do not appear to have meaningfully shaped the geography of feudal governance.

Taken together, these exercises – rich controls and province fixed effects, robustness to additional confounders, neighbor-pair comparison, sensitivity analysis, permutation test, and historical/empirical evidence against reverse causality – substantially strengthen the interpretation of our results. While we remain appropriately cautious, the cumulative evidence points to a robust and plausibly causal relationship between exposure to feudal governance and the underdevelopment of social capital within Sicily. We refer to Section 5 for a conclusive discussion of our strategies and results.

4.2 Robustness Checks

In this section, we perform a series of robustness checks (described in details in Appendix A) to support the internal validity of our findings.

4.2.1 Specification Robustness

Let us start with a series of exercises to ensure that the results are not driven by our modeling choices.

First, we address the concern that the effect might be disproportionately influenced by small municipalities. Table A.6 reports weighted regressions using 1861 population as weight; the estimates remain highly significant and slightly smaller in magnitude to our baseline. Second, Table A.7 uses alternative model specifications to deal with the large number of zeros in the number of charitable opere pie at municipal-level. The results are robust when (i) using a dummy equal to one for the presence of at least one organization (columns 1–2), (ii) applying an inverse hyperbolic sine (IHS) transformation to the dependent variable (columns 3–4), and (iii) estimating a zero-inflated Poisson

model (ZIP)[20] (columns 5–6). Third, Figure A.4 reports the estimated coefficients and 90% confidence intervals under a variety of standard-error corrections. Across all specifications, the sign, magnitude, and significance of the results remain stable. Finally, we use an alternative proxy for historical social capital: the (log) number of mutual aid societies (per 1,000 people) in 1880. These associations developed after Italian unification, following the Rattazzi Law, and represented "the first embryo of an associative process" in late-nineteenth-century Italy (Trigilia, 1981). Table A.8 shows that our main findings also hold when using this alternative measure.[21]

4.2.2 Outcome Variable: Social Capital vs. Religiosity

Another concern is that our measures of social capital may instead be capturing variation in local religiosity. We already mitigate this concern by narrowing our outcomes' definition to opere pie with *exclusively* charitable purpose or to the share of *exclusively* charity expenditure. Nonetheless, some of these institutions may have been partly motivated by religious sentiment. To address this possibility more directly, we complement the analysis with additional empirical exercises.

We begin by testing whether feudal governance is systematically associated with local religiosity. We use as proxy for historical religiosity, the municipal number of churches (per 1,000 inhabitants) in 1799, reported in the *Dizionario Geografico del Regno di Sicilia* (Sacco, 1799). Table 5 shows no systematic difference in religiosity between former feudal and nonfeudal places (columns 1-2).

Next, we explore whether religiosity is correlated with our main proxies for social capital – the number of charitable opere pie and the share of charity expenditure. In both cases, the correlation is negligible and not statistically significant (columns 3–4 and 5–6 of Table 5).

Finally, one might argue that the number of opere pie devoted exclusively to religious purposes, or the share of expenditures allocated to religious activities, could themselves serve as proxies for religiosity. In Table A.9 in the Appendix, we therefore use these variables as outcomes, replicating equation (1). The results indicate that the number of religious opere pie is significantly lower in municipalities that historically belonged to a fiefdom, whereas the share of religious expenditures does not differ significantly across governance types. To reconcile these results, remember that the establishment of *any* form of opera pia required a *minimum* level of mutual trust and collective solidarity. In other words, the very existence of such organizations presupposed some degree of social capital, regardless of the purpose. Reassuringly, the fact that the share of religious expenditures does not systematically differ across municipalities suggests that both under feudal and nonfeudal governance comparable resources

[20] To interpret coefficients as elasticities, the ZIP specification uses the number of opere pie per 1,000 inhabitants in levels.

[21] We do not use mutual aid societies as our primary outcome because they emerged in the 1880s (Putnam, 1993), contemporaneously with the rise of the Sicilian Mafia and under the newly formed Italian state, which introduces additional institutional and political confounders.

are allocated to religious purposes.

Taken together, these findings support the interpretation that feudal areas were not less religious but rather lacked the minimum level of social capital needed to establish and sustain charitable organizations.

4.3 Mechanism: From Feudalism to Socially Isolated SNu Families

So far, we have documented a strong negative relationship between exposure to historical feudal governance and the accumulation of social capital. The next question is: Through which channel did it happen? We argue that a key channel runs through shaping family formation patterns.

As mentioned in Section 2 and better documented in the next few paragraphs, the feudal institutional arrangements: i) favored the prevalence of *small*, self-contained families composed of a couple and their children that established an independent household upon marriage (*'nuclear'*)[22] – SNu families; ii) discouraged solidarity and cooperation across these families, through both economic conditions and a 'paternalistic' system in which landlords provided justice and basic subsistence, thereby reducing the need and opportunities for horizontal solidarity. These SNu families were, thus, *vertically dependent* on landlords but *horizontally isolated* from each other, thereby limiting social capital development.

4.3.1 Measures of Family Structure

To test this historical argument and examine how feudal institutions shaped family formation patterns – and, in turn, the accumulation of social capital – we digitize data from the 1861 Population Census and we derive three indicators capturing distinct but related dimensions of family organization: (i) the average family size, (ii) the average number of families co-residing within the same house, and (iii) a synthetic index (SNu Index) that aggregates these two components and highlights the small *and* nuclear dimension of families.

The first indicator proxies the demographic scale of the family unit, which may have responded to the economic and spatial constraints imposed by feudal regime (e.g., temporary tenancy on small plots of land and single-family houses, seasonal wage labor etc.). The second indicator captures the extent to which families shared the same living space and were, therefore, organized according to extended-family principles rather than as independent, nuclear units. Finally, to summarize these dimensions in a single metric, we construct the SNu index as follow: we standardize both family size and the number of co-resident families, reverse their sign so that higher values correspond to more pronounced small/nuclear characteristics, and compute their average (we then standardize this combined score for

[22]Following the typology proposed by Laslett and Wall (1972), nuclear families are defined as a married couple (or widow/widower) and their unmarried children, whereas extended families involve the co-residence of multiple family units.

ease of interpretation). The resulting indicator takes larger values in municipalities where families were relatively smaller and more nuclear. Table A.1 in the Appendix provides summary statistics for the full sample.[23] On average, families were composed by roughly four members and 1.2 families lived in the same house – an initial suggestion of the predominance of SNu family structures.

A potential concern is that indicators derived from the 1861 population census may not fully capture family patterns throughout the entire feudal period. Yet the available historical evidence – based on earlier fiscal and demographic sources (most notably the *Riveli*) – points to substantial continuity.[24] As Benigno (1989) notes,"from a variety of sources the evidence appears unequivocal; in most of Sicily the nuclear family household predominated, not only in the nineteenth century but also during the early modern period." This suggests that the 1861 data provide a credible snapshot of long-standing family formation patterns.

4.3.2 Feudalism Shaped Family Structure

We now study the link between feudal institutions, the diffusion of SNu families, and social capital accumulation in the context of Sicily.[25]

A rich historiography has documented that the organization of agricultural production under feudalism prompted the emergence of SNu families (e.g., Silverman, 1968; Benigno, 1985, 1989; Fazio, 1997, 2004).[26] Peasants typically combined seasonal wage labor on landlords' estates with subsistence farming on small, dispersed plots for the rest of the time. In this setting, the marginal wage income earned from an additional working family member rarely offset the cost of maintaining that person throughout the rest of the year, thereby limiting the dimension of families. At the same time, the small houses and plots that peasants leased from landlords physically constrained the possibility of households' co-residence, typical of extended-family structure (Silverman, 1968; Benigno, 1989). In the words of Fazio (2004, p. 268):

> "The nuclear family was best suited to coping with a situation characterized by precarious short-term labor contracts and by plots of land that were scattered far from each other

[23] We exclude the municipality of Spaccaforno from the sample because the census reports a number of families that exceeds its recorded population – a clear reporting error, given both corroborating alternative sources on population and the municipal demographic trends.

[24] Case studies regard Taormina (Abbasi, 2024), Paceco (Benigno, 1985), Militello in Val di Catania (Scalisi, 2000), San Margherita di Belice (Pomara Saverino, 2012), Noto (Benigno, 1992), Nicolosi, Terranova di Sicilia, Agira, and Giardini Naxos (Ligresti, 2002).

[25] This is in line with a growing body of research investigating how institutions can shape family formation patterns. For instance, the Catholic Church's restrictions on cousin marriage and polygamy have been found to contribute to dismantle extended kinship across Medieval Western Europe (Schulz, Bahrami-Rad, Beauchamp, and Henrich, 2019; Henrich, 2020; Greif et al., 2025).

[26] By contrast, in Eastern Europe, alternative feudal arrangements encouraged extended families, who retained livestock and could collectively meet labor obligations such as the *corvée*s (Benigno, 1985).

across the large estates and that had to be worked by people who were both day-laborers and smallholders."

Figure 4 provides descriptive evidence consistent with this interpretation. The figure compares the distribution of our three indicators of family structure across feudal and nonfeudal municipalities. Panel (a) shows that the distribution of family size in feudal municipalities lies systematically below that of nonfeudal ones, suggesting that families in feudal areas tended to be smaller. Panel (b) indicates that, in feudal municipalities, the number of co-resident families is tightly concentrated around one, with most houses hosting a single family – a typical characteristic of nuclear-family structures. By contrast, nonfeudal municipalities exhibit a noticeably heavier upper tail, reflecting a greater incidence of houses shared by multiple families. Finally, Panel (c) reports the SNu Index, which combines these two dimensions into a single standardized measure. The distribution for feudal municipalities is predominantly positive, consistent with a stronger presence of small, nuclear families. Conversely, the distribution for nonfeudal municipalities is skewed toward negative values, indicating a lower prevalence of SNu family structures.

Next, Table 6 examines this relationship within a regression framework. First, we use the average family size in 1861 as the dependent variable. Municipalities historically governed as fiefdoms exhibit significantly smaller families than those without a feudal past (column 1). The result is robust to the inclusion of geographical and socio-economic controls, as well as province fixed effects (column 2). Then, we turn to the number of co-resident families as a proxy for the organization of households along nuclear versus extended-family lines. Here too, feudal municipalities show significantly lower values, suggesting that houses were less likely to contain multiple family units (columns 3-4). Finally, we use the SNu Index as outcome: the coefficient on feudal governance is positive and significant across specifications, indicating that in feudal municipalities small, nuclear families prevailed (columns 5-6).

Taken together, these findings align with the descriptive evidence and point to a clear pattern: feudal institutions contributed to the predominance of smaller, more nuclear family structures.

4.3.3 When Nuclear Families Undermine Social Capital

Much of the existing literature on nuclear families focuses either on modern bureaucratic states or on the corporative institutions of medieval Northern Europe. In modern democracies, nuclear families – without the obligations of an extended clan – are more likely to seek community in civic associations, neighborhood networks, or political participation (e.g., Alesina and Giuliano, 2010, 2011; Moscona et al., 2017). Similarly, in medieval Northern Europe, the rise of nuclear families created the demand for corporations (such as guilds, confraternities, and other self-governing associations) that facilitated public good provision (e.g., Greif, 2006; Greif and Tabellini, 2010; Schulz, 2022; Greif et al., 2025). In both settings, nuclear families supported – and were supported by – broader institutions conducive

to cooperation and collective solidarity.

However, similar family structures can arise under very different institutional environments. As Dennison and Ogilvie (2014) emphasize,"it was not inevitable that a framework favoring nuclear families should consist of institutions that also benefited the economy, such as well-functioning markets or impartial legal systems, instead of those with more ambiguous effects such as serfdom, religious bodies, or absolutist states." The Sicilian case illustrates this point particularly well. Drawing on evidence from local testaments, Fazio (1997) documents that the families of day laborers – who largely resided in feudal territories – were indeed nuclear, yet displayed neither patterns of economic reciprocity nor relational forms of mutual solidarity. The Sicilian SNu families were embedded in a hierarchical and extractive institutional setting in which cooperative behavior was not only unnecessary but could even be counterproductive (Fazio, 2004; Carlestål, 2005).

Several factors contributed to this dynamic. Peasants typically worked as seasonal day laborers and cultivated scattered plots of land too small to support their families. Rather than incentivizing extended family labor, these arrangements increased competition among households for employment and access to land in a monopsonistic labor market (Martinelli, 2014). Moreover, these temporary and scattered land concessions made cooperative cultivation and joint investments physically unfeasible and economically inefficient.[27] In the words of Silverman (1968, p. 14):

> "Because of the fragmentation of economic activity there is no basis for stable cooperative associations between households. Each small family group makes its own way by combining and improvising a variety of different sources of sustenance."

At the same time, landlords exercised private jurisdiction within their domains and provided a minimal safety net in the form of basic housing, access to small plots of land, and seasonal employment. In return, they demanded loyalty and compliance. This form of 'feudal paternalism' could have substituted for, and effectively crowded out, the demand for collective provision of local public goods that we observe in free-city states on Northern Europe.[28] The result was a society of SNu families that were vertically dependent on landlords but horizontally fragmented, with little scope for cooperative behaviors.

Table 7 provides empirical evidence consistent with this interpretation. Panel A uses as dependent variable the (log) n. of charitable opere pie (per 1,000 people) in 1861, while Panel B considers the share of charity expenditure. Across all specifications, the prevalence of SNu families is negatively and significantly associated with the levels of social capital.

[27] Additionally, the inconstancy of work relations and consequent social class tensions also discouraged any form of cooperation between peasants and landowners (Mariella, 2022).

[28] Similarly to what Alston and Ferrie (1999) suggest regarding post-Civil War Southern U.S.: black and poor white people demanded protection which was offered by 'paternalistic' landowners in exchange for loyalty and labor.

Specifically, Panel A shows that an increase in average family size is associated with an increase in the number of charitable opere pie (column 1). The effect remains positive (but insignificant) after controlling for baseline and economic controls, and province fixed effects (column 2). Similarly, municipalities with a higher number of co-resident families exhibit significantly more charitable organizations (columns 3-4). Lastly, the prevalence of SNu families – as captured by our standardized index – is negatively and significantly associated with social capital accumulation.

Panel B presents analogous results when using the share of charity expenditure as the outcome variable. All indicators show a correlation with social capital: smaller and more nuclear families significantly reduce the fraction of resources devoted to collective solidarity, with coefficients remaining stable after including baseline and economic controls, and province fixed-effect.

These findings reveal that the SNu families that predominated under feudal institutions were socially isolated and less capable of sustaining cooperation and solidarity. This discussion provides novel evidence on the interaction between family structure and social capital accumulation. We show that 'family nuclearity' is not intrinsically positively associated with social capital. It rather depends on the surrounding institutional framework. Within hierarchical and extractive feudal institutions, nuclear families did not generate social capital: they undermined it.

5 Discussion and Limitations

The empirical analysis, combined with extensive historical evidence, reveals two clear patterns: (1) historical feudal governance is negatively associated with social capital accumulation, and (2) the prevalence of SNu families, embedded into an extractive institutional framework, represents a key mechanism explaining this relationship.

Our identification strategy relies on a series of empirical exercises: we control for a rich set of municipal characteristics and province fixed effects; we discuss the role of additional confounding factors; we include neighbor-pair fixed effects; we carry out a sensitivity analysis estimating how strong unobserved confounders would need to be to explain away our results; we perform a placebo test to rule out spurious correlation; and we address the issue of reverse causality both historically and empirically. Although we cannot fully rule out non-random allocation of feudal governance, our results hold across all these exercises, suggesting that feudalism likely played a strong role in hampering social capital accumulation.

Throughout the paper, we argue that feudalism exerted a deep and long-lasting influence on Sicilian society. Particularly, it shaped *family formation patterns* toward smaller and more nuclear families. In this interpretation, SNu families, a by-product of extractive institutions, rested on vertical ties of dependence from the landlord rather than on horizontal ties of solidarity among themselves.

However, a growing literature has emphasized the role of medieval marriage regulations introduced

by the Catholic Church in weakening extended kinship in favor of nuclear families, and communitarian values in favor of universalistic values (Schulz et al., 2019; Henrich, 2020; Schulz, 2022; Greif et al., 2025). While this argument offers important insights into long-run European development, it is unlikely to fully account for the spatial variation of family structure within Sicily. During our period of analysis, Sicily was overwhelmingly Catholic,[29] but one could still argue that the *intensity* of exposure to Catholic marriage regulations may itself have differed within the region. We try to investigate this alternative explanation empirically. First, Table A.10 in the Appendix shows that church density does not predict our indicators of family structure (columns 1, 3, and 5). Second, we assess whether our estimates of the effect of feudalism on family structure are sensitive to controlling for church density. Including this variable as an additional control leaves the magnitude and statistical significance of the feudal governance coefficients virtually unchanged (columns 2, 4, and 6 of Table A.10).[30] While church density is an imperfect proxy for the enforcement or salience of Catholic marriage norms, the absence of both direct effects on family structure indicators and indirect effects on our main estimates makes it unlikely that variation in the exposure to Catholic marriage regulation drives our results.

Overall, these considerations reinforce our interpretation that the origins of low social capital in Sicily lie in the institutional environment of feudalism, which shaped family structures and constrained inter-family cooperation and solidarity.

Persistence to present day After the abolition of feudalism, other factors could have affected social capital development, as for instance the rise of the Sicilian Mafia. Mafia emerged in the last two decades of the 19th century, in a context of weak state capacity following the abolition of feudal institutions (Hure, 1982; Mack Smith, 1983).[31] Using a contemporaneous measure of social capital – the number of nonprofit organizations in 2011 – Table A.11 in the Appendix shows that historical feudal governance continues to strongly predict lower levels of social capital today. Importantly, when controlling for Mafia presence around 1900, the magnitude and significance of the feudalism coefficients remain virtually unchanged, while Mafia itself does not predict current social capital. These results reinforce the conclusion that feudal institutions left a profound and long-lasting influence on social capital accumulation in Sicily – consistently with the emphasis of historians and sociologists on the

[29] Although the Norman Kingdom of Sicily formally adhered to Catholicism while allowing Muslims and Jews to profess their faith, under the Spanish crown religious uniformity was enforced more strictly, culminating in the 1492 edict that mandated conversion or expulsion of non-Catholics.

[30] Additionally, we had already shown that feudal and nonfeudal municipalities do not differ systematically in church density, suggesting no strong correlation between feudal governance and intensity of local religiosity (see Table 5).

[31] The economics literature has identified different triggering factors for the rise of the Mafia, such as landownership concentration (Bandiera, 2003), the role of export-oriented citrus production (Dimico, Isopi, and Olsson, 2017), the importance of the sulphur mines – whose output was highly demanded by the most industrialized countries during the Second Industrial Revolution – (Buonanno et al., 2015), the emergence of the socialist threat represented by the Peasant Fasci Organization (Acemoglu et al., 2020), and the enforcement of mandatory conscription after the Italian unification (Marciante, 2025).

deeper roots of Sicilian underdevelopment to be traced back to the feudal past (Franchetti and Sonnino, 1877; Mack Smith, 1983; Putnam, 1993).

External validity While our empirical analysis focuses exclusively on Sicily, the findings may have broader relevance. Sicily is widely considered a prototypical case of Mediterranean feudalism, sharing key institutional characteristics with other regions such as southern Italy and Spain. A defining characteristic of these systems was the 'landholding–jurisdiction nexus,' in which landlords simultaneously exercised political and judicial authority while managing large land estates (Musi, 2012). Consistent with this institutional similarity, historical case studies document demographic patterns resembling those found in Sicily: nuclear families predominated in early modern Calabria (Caridi, 2009), Puglia (Da Molin, 1990), Abruzzo (Cozzetto, 1986), southern Spain (Martìnez, 1987; Rowland, 1988), and southern Portugal (Nunes, 1986). Thus, we cautiously suggest that the patterns we found in Sicily are likely to be observed in similar institutional contexts.

6 Conclusions

Large differences in social capital exist both across and within countries, and they are often the legacy of early (long-gone) institutions. In this paper, we investigate *whether* and *how* historical feudal institutions undermine the accumulation of local social capital.

Focusing on Sicily, we show that municipalities historically governed as fiefdoms developed significantly lower levels of social capital, proxied by the density of charitable opere pie and the share of charity expenditure across all organizations.

We argue that feudal landlords, by enforcing a highly extractive agrarian system based on small, temporary tenancy and seasonal labor, promoted the prevalence of small nuclear families. Embedded in a institutional context where (i) economic incentives for cooperation and solidarity were limited, and (ii) landlords exercised some sort of 'paternalistic' authority by dispensing justice and minimal safety net, these SNu families had no reasons to engage in cooperative behaviors. Consistent with this mechanism, feudal municipalities historically exhibited smaller and fewer co-resident families, and more SNu families overall, and these dimensions are strongly correlated with our measures of social capital.

This paper aligns with recent research suggesting that the broad influence of family structures on various socio-economic outcomes strongly depend on the surrounding context (Dennison and Ogilvie, 2014, 2016; Chen et al., 2024). A nuclear-family society flourishes when conducive and complementary institutions (markets, courts, civic associations) are in place, whereas, in the absence of such institutions, purely nuclear households may remain socially isolated and limit the development of social capital.

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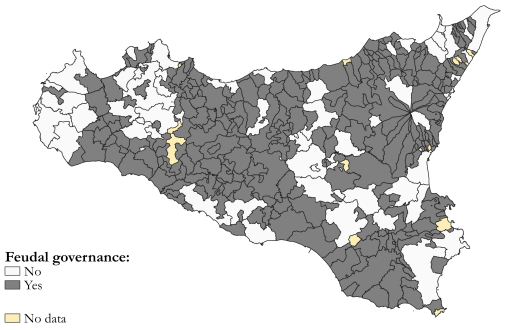
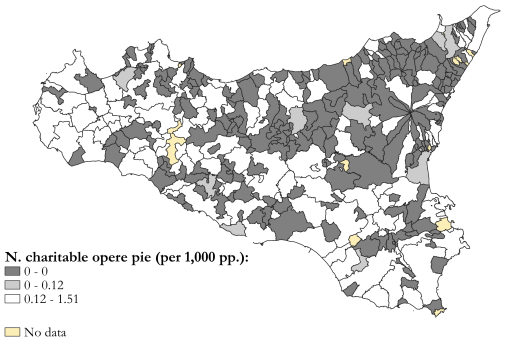
FIGURES

Figure 1: Spatial Distribution of Feudal Governance and Historical Social Capital

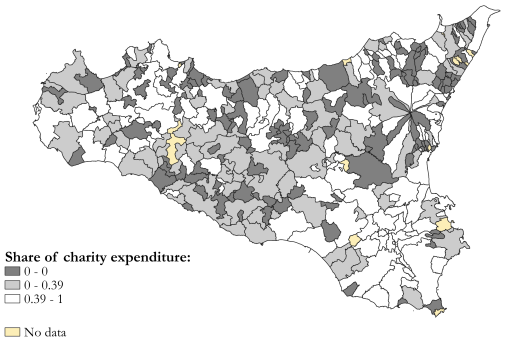
(a) Feudal governance



(b) Charitable opere pie pc 1861

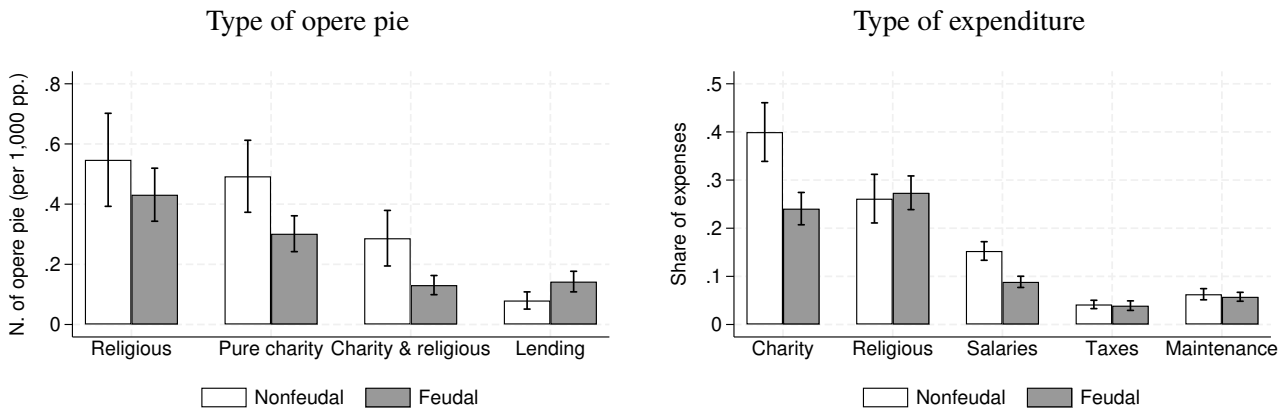


(c) Share of charity expenditure 1861



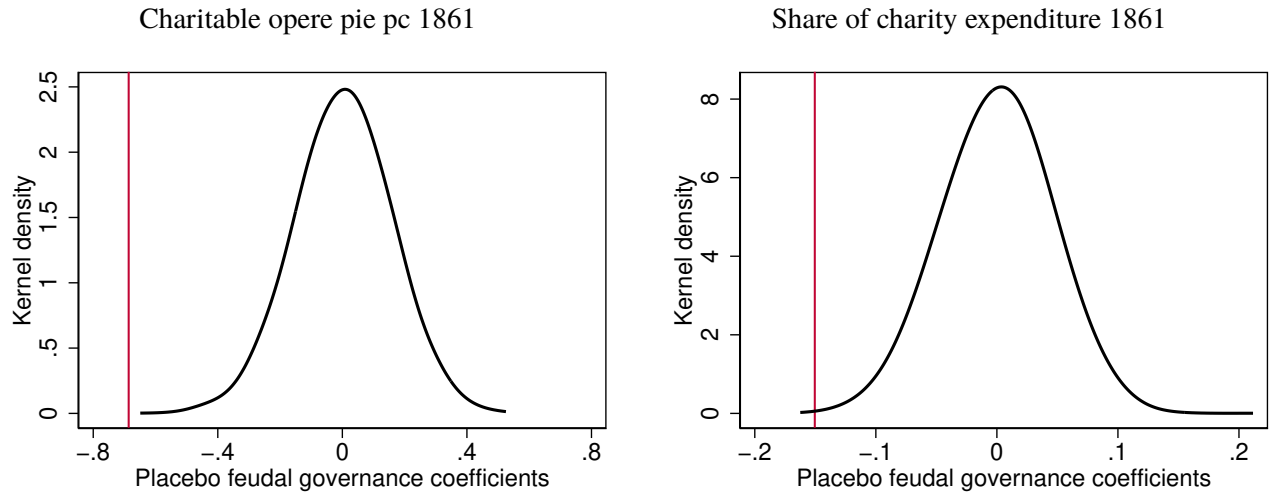
Notes: The top panel shows the spatial distribution of the feudal governance. The bottom panels show the spatial distribution our proxies of historical social capital, and are obtained using terciles.

Figure 2: Descriptive Statistics on Opere Pie and Their Expenses, by Purpose



Notes: The left panel shows the mean and 95% confidence interval of the n. of opere pie (per 1,000 inhabitants) in feudal e nonfeudal municipalities, by purpose. The right panel shows the mean and 95% confidence interval of the share of expenditure in feudal e nonfeudal municipalities, by purpose.

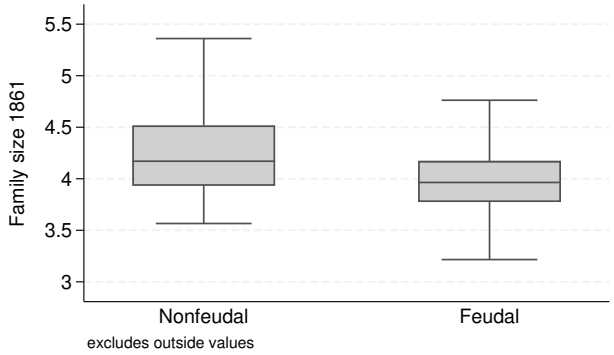
Figure 3: Placebo Permutation Test



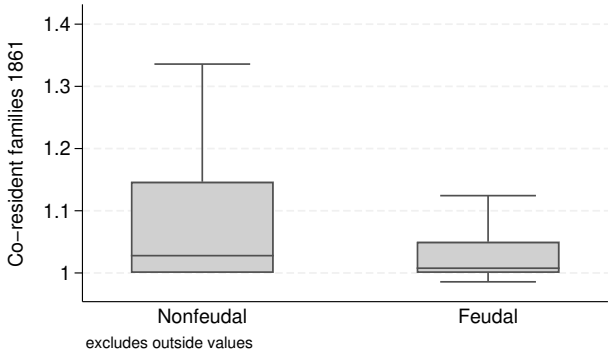
Notes: The figure plots the probability density functions of the estimated coefficients from the placebo permutation test, iterated 5,000 times. The vertical lines indicate the true point estimates as reported in column 4 and 8 of Table 1.

Figure 4: Distribution of Family Structure Indicators, by Feudal Governance

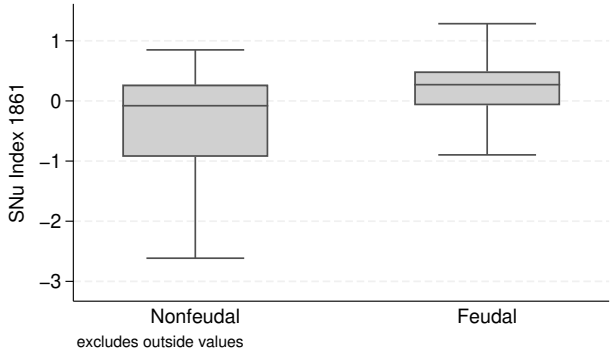
(a) Family size 1861



(b) Co-resident families 1861



(c) SNu Index 1861



Notes: The panels show box plots of our measures of family structure separately for feudal e nonfeudal municipalities (excluding outliers).

TABLES

Table 1: Feudal Institutions Hampered Social Capital Accumulation

Dependent Variable:	Charitable opere pie pc 1861				Share of charity expenditure 1861			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Feudal governance	-0.663***	-0.665***	-0.735***	-0.686***	-0.164***	-0.146***	-0.158***	-0.150***
	(0.128)	(0.131)	(0.139)	(0.142)	(0.033)	(0.035)	(0.034)	(0.035)
Baseline controls		✓	✓	✓		✓	✓	✓
Economic controls			✓	✓			✓	✓
Province FE				✓				✓
R^2	0.06	0.15	0.17	0.21	0.05	0.08	0.13	0.18
Observations	328	315	315	315	328	315	315	315
	Standardized beta coefficients							
Feudal governance	-0.675	-0.674	-0.745	-0.695	-0.602	-0.538	-0.581	-0.553

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 2: Neighbor-Pair Fixed Effect Estimates

Dependent Variable:	Charitable opere pie pc 1861				Share of charity expenditure 1861			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Feudal governance	-0.597***	-0.593***	-0.606***	-0.634***	-0.185***	-0.185***	-0.146***	-0.144***
	(0.160)	(0.123)	(0.131)	(0.143)	(0.042)	(0.031)	(0.034)	(0.035)
Neighbour-pair FE		✓	✓	✓		✓	✓	✓
Baseline controls			✓	✓			✓	✓
Economic controls				✓				✓
R^2	0.11	0.57	0.63	0.64	0.13	0.59	0.69	0.70
Observations	509	509	486	486	518	518	486	486

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 3: Sensitivity Analysis for Selection on Unobservables

Dependent Variable:	Charitable opere pie pc 1861		Share of charity expenditure 1861	
	(1)	(2)	(3)	(4)
Feudal governance	-0.735***	-0.686***	-0.158***	-0.150***
	(0.139)	(0.142)	(0.034)	(0.035)
Baseline controls	✓	✓	✓	✓
Economic controls	✓	✓	✓	✓
Province FE		✓		✓
R^2	0.175	0.207	0.126	0.177
Observations	315	315	315	315
Oster δ (R^2_{max} = 1.3*R^2)	6.673	2.921	4.828	1.767
DMP breaking point ($\bar{c} = 1$, $\bar{r}_Y = \infty$)	0.477	0.461	0.384	0.379
DMP breaking point ($\bar{c} = 0$, $\bar{r}_Y = \infty$)	0.542	0.519	0.416	0.410

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 4: Arab-Controlled Territories and Selection into Feudalism

Dependent Variable:	Feudal governance				
					Probit
	(1)	(2)	(3)	(4)	(5)
Arab-ruled territory	-0.093	-0.059	-0.047	-0.035	-0.245
	(0.064)	(0.065)	(0.068)	(0.067)	(0.292)
Baseline controls		✓	✓	✓	✓
Economic controls			✓	✓	✓
Province FE				✓	✓
R^2	0.01	0.11	0.18	0.19	
Observations	328	315	315	315	315

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 5: Feudal Institutions, Religiosity and Historical Social Capital

Dependent Variable:	Churches pc 1799		Charitable opere pie pc 1861		Share of charity expenditure 1861	
	(1)	(2)	(3)	(4)	(5)	(6)
Feudal governance	0.180	-0.102				
	(0.196)	(0.180)				
Churches pc 1799			-0.042	0.090	-0.008	0.021
			(0.058)	(0.073)	(0.017)	(0.017)
Baseline controls		✓		✓		✓
Economic controls		✓		✓		✓
Province FE		✓		✓		✓
R^2	0.01	0.31	0.00	0.16	0.00	0.15
Observations	314	309	314	309	314	309

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 6: Feudal Institutions Shaped Family Structure

Dependent Variable:	Family size 1861		Co-resident families 1861		SNu Index 1861	
	(1)	(2)	(3)	(4)	(5)	(6)
Feudal governance	-0.074***	-0.057**	-0.111***	-0.054**	0.945***	0.550***
	(0.021)	(0.023)	(0.038)	(0.023)	(0.242)	(0.162)
Baseline controls		✓		✓		✓
Economic controls		✓		✓		✓
Province FE		✓		✓		✓
R^2	0.04	0.15	0.08	0.37	0.12	0.38
Observations	327	314	327	314	327	314

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.

Table 7: SNu Family Structure and Low Historical Social Capital

Dependent Variable:	Charitable opere pie pc 1861					
	(1)	(2)	(3)	(4)	(5)	(6)
Family size 1861	0.600*	0.315				
	(0.351)	(0.402)				
Co-resident families 1861			0.752**	1.259**		
			(0.326)	(0.568)		
SNu Index 1861					-0.118***	-0.137**
					(0.042)	(0.064)
Baseline controls		✓		✓		✓
Economic controls		✓		✓		✓
Province FE		✓		✓		✓
R^2	0.01	0.17	0.01	0.19	0.01	0.18
Observations	327	314	327	314	327	314
Dependent Variable:	Share of charity expenditure 1861					
	(1)	(2)	(3)	(4)	(5)	(6)
Family size 1861	0.238***	0.148				
	(0.088)	(0.098)				
Co-resident families 1861			0.316***	0.334**		
			(0.106)	(0.154)		
SNu Index 1861					-0.048***	-0.043***
					(0.012)	(0.016)
Baseline controls		✓		✓		✓
Economic controls		✓		✓		✓
Province FE		✓		✓		✓
R^2	0.01	0.15	0.03	0.17	0.03	0.17
Observations	327	314	327	314	327	314

Notes: Baseline controls include the (log) elevation, the (log) distance from Palermo, a dummy for being located on the coast, a dummy for having access to a postal road, a dummy for having access to irrigation, the standard deviation of average temperatures and precipitations during spring and summer between 1500 and 1800 (at grid-cell level), and the share of municipal land infested by malaria. Economic controls include the share of land devoted to agriculture, the share of land devoted to grains, to vineyard, to citrus, and to olive groves, a dummy for the presence of a sulfur mine, the rural and urban rent per hectar, and the population density. Standard errors (clustered at the fiefdom level) in parentheses.