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ABSTRACT

Gender Discrimination in Property Rights¹

Starting from the medieval period, women in the Italian Alps experienced a progressive erosion in property rights over the commons. We collected documents about the evolution of inheritance regulations on collective land issued by hundreds of peasant communities over a period of six centuries (13th-19th). Based on this original dataset, we provide a long-term perspective of decentralized institutional change in which gender-biased inheritance systems emerged as a defensive measure to preserve the wealth of community insiders. This institutional change had implications also for the protection from economic shocks, for population growth, and for marriage strategies.

JEL Classification: J16, N53, Q20

Keywords: land rights, endogamy, migrations, common property

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1. Introduction

In many societies women are discriminated against in economic and in social life. Besides cultural reasons, discriminatory practices and beliefs may also be rooted in economic grounds, where gender roles developed as a consequence of specific production technologies (e.g., Engels, 1884). We contribute to the economic explanations of gender discrimination by focusing on the discrimination in property rights. In particular, we study the structure of property rights on the common pastures and forests of hundreds of small peasant communities in the Italian Alps from the late medieval to the early contemporary period (i.e., 13th-19th century). What emerged from a systematic analysis of the original documents is a clear trend of erosion in women's rights. While in the XIII century women enjoyed extended or little compressed rights on the land of the community, with the advent of the modern period at the end of the XV century their rights became gradually weaker. By the end of the XVIII century the process in these alpine communities was already complete: inheritance of the collective properties was nearly everywhere patrilineal.

We argue that the patrilineal system was preferred to the egalitarian one because it better protected the community resources from outside immigration. This institutional change raised three general issues. First, a patrilineal system limited the possibility to relocate to another community in case of a local economic shock. The possibility to easily move across communities in the region could effectively function as an insurance scheme against shocks that asymmetrically hit the communities. Second, gender-biased inheritance systems closed the communities to marriages with outsiders and this had a negative impact on the genetic heritage because of increased endogamy levels. Communities, therefore, faced a trade-off between the protection of common resources and a healthy genetic pool. Third, the independent decisions at the community level brought about gender-biased inheritance systems. This outcome was evolutionarily stable. Left alone under decentralized decision-making, communities engaged in a progressive closure to outsiders. Once the process was completed, the communities remained locked into a situation of women's discrimination; only a centralized political regime could change this course of action.

The ecological balance of a community can be compromised when the commons are overexploited (McNetting, 1981). Such overexploitation is known as "the tragedy of the commons" (Hardin, 1968). The communities from the alpine region of Trentino developed formal protective measures to limit the overexploitation of the common land in the form of community statutes (Casari, 2007). These statutes regulated access to the commons by both community insiders and outsiders, which could appropriate resources in a variety of ways. The most immediate form of appropriation of outsiders was trespassing, which was avoided by establishing property rights on the community land through the demarcation of land borders, the establishment of legal rights, and the hiring of guards to patrol the land. Once the resource was no longer open-access, opportunistic behavior over the commons could still occur in other ways. Outsiders could move in, settle down in the community and claim the use of common land and resources. To prevent all residents from accessing the commons, insiders entitled only the original members of the community with a special legal status, called membership right, which granted the full belonging to the community in terms of rights and duties. These types of regulations and entitlements were widespread in many areas of Europe (Ostrom, 1990, De Moor, 2008 and 2009, Alfani, 2011).

However, by marrying a member of the community outsiders could still gain access to the commons, and their descendants. This would effectively and permanently increase the size of the group. Hence, here is where the inheritance system intervened. Under an egalitarian inheritance system, in which both men and women enjoyed membership rights, outsiders from poor communities could enter a rich community by marrying an insider. This had distributional consequences on the rich community as it contributed to depleting the per-capita amount of community resources. On the contrary, a patrilineal inheritance system discouraged outsider men to marry insider women, in this way keeping under control the net migration in the community.²

This research presents three qualifying aspects. First, it considers institutional changes over a very long time span, which may otherwise have gone unnoticed, and that enables us to capture important drives in human history.³ Second, this investigation is not a single-case study but a large set of cases consisting of hundreds of communities in the alpine region of Trentino. Each community could autonomously regulate inheritance. This provided a unique setting because communities could adopt a variety of inheritance rules. One can exploit systematic variations across communities to infer the drives of institutional change. Third, we observe that gender discrimination in property rights became more severe with the approach of the modern period; this provides the opportunity to study economic factors behind the process of women's rights erosion.

The structure of the paper is the following. Section 2 introduces the study and the property rights structure in Trentino. Section 3 presents the data sources and the institutional evidence. Section 4 puts forward our interpretation of the evidence. The empirical evidence is presented in section 5, which includes a static and a duration econometric model illustrating the institutional change. Section 6 discusses some related issues. Finally, section 7 puts forth our conclusions.

2. Property rights in Trentino from 1200 to 1800

2.1 The historical setting

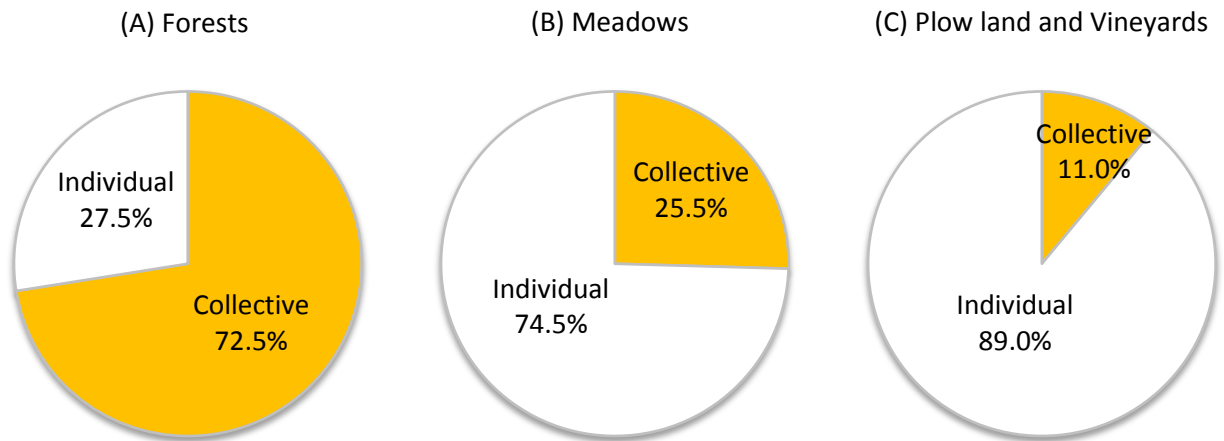
Trentino is a mountainous region in Northern Italy with a few hundred very small villages scattered over an area of about 6,200 square kilometers. According to the 1810 census, the median village population was 394. Figure 1 shows the shares in terms of surfaces of the land ownership according to land type in a selected sample of villages. Collective land was largely predominant in the forests and grazing lands. On the contrary, plow land and vineyards were mainly individual property, although some arable land could also be under a commons regime. Finally, about 25% of meadows were collective. Forests were a precious source of firewood, timber, craft furniture, and underbrush material used as bedding for animals. Meadows and pastures were necessary for cattle grazing and consequently

² Inheritance systems play an important role in determining group size because they shape the incentives for migrations and fertility. We focus on migration because it can modify group size more quickly than changes in fertility rates. Thus, migration flows can trigger defensive measures and consequently institutional change at the community level.

³ Similarly, Botticini and Siow (2003) provide a long-run perspective based on systematic data collection on dowry practices in Medieval and Early Renaissance Tuscany.

for the production of dairy products. The commons were not open access resources, to wit, available for everyone to use. Instead, they were collective property of a well-defined group of individuals living in the same village or group of villages with legal entitlement to use the resources. Consider that less than 10% of the entire region was cultivable. See also Casari (2007) for a general description.

Figure 1. Land ownership by land type (surface)



Source: 1780 cadastral registers.

Notes: data about a sub-sample comprising 32 villages (about 10% of the total). The land type (A) also includes grazing land and alps; (B) comprises meadows of one and double sawing at low altitudes; (C) also includes orchards and vegetable gardens. The 1780 cadastral register offers the first systematic land survey in this region and reports detailed data on both the rent and the surface of the various types of land. In addition, it contains data on land ownership, by village and land type.

The Prince-Bishops of Trento ruled over the region for almost eight centuries: from 1027 until 1796. From the XIII century, the communities of Trentino gradually started to codify a set of rules for the management of their resources in formal documents, called charters (*carte di regola*). Charters were official deeds engrossed by a notary in the presence of external witnesses, and subsequently confirmed by the Prince, who granted self-government on the commons and other local economic affairs, and certified that the charter was compatible with the existing laws. Such documents regulated (i) the right to establish appropriation rules of the collective resources, (ii) the right to hold community assemblies and appoint a governor (*regolano*) and other community officials, (iii) the right to locally enforce the appropriation rules by levying cash fines, and (iv) the protection of community resources from external encroachment. Charters defined the geographical entities, which, for clarity purposes, we call “communities” whereas, we shall call “villages” the geographical units of cadastral registers. A charter with a special status was the statute of Trento, the capital town, which provided for supplemental discipline on issues that were missing in other community charters.

Self-government could take place over different territorial levels. Overall, we considered 264 communities that adopted a charter, which were organized in one of the following four ways: a) 31 “supra-communities,” which grouped and regulated a few connected villages, of which at least one had,

at the same time, a local charter;⁴ *b*) 97 “connected communities,” which, at the same time, had their own local charter and were within a supra-community; *c*) 131 “standalone communities,” which had their own charter and were unconnected to any supra-community; *d*) 5 “special communities,” commonly called *vicinie*, consisting of a few families within a village or families belonging to different villages jointly exploiting some portions of forests and pastures. Charters of special communities could be in force side by side in the same village(s) with charters of community types *a*), *b*), and *c*).

The community of Civezzano was the first to write a charter in 1202. The charter system collapsed because of an exogenous political event at the very beginning of 19th century. Napoleon invaded the region in 1796, the charter regime was definitively abolished in 1807.⁵ The most ancient charters did not provide a systematic discipline of all aspects of community life and management of the common resources. Occasionally, community rules were updated by means of new chapters within an existing charter, or by enacting an entirely new charter. The charters appear as pragmatic instruments adopted by uneducated peasants revolving around actual litigation cases. They reflected specific responses to external challenges or contingent problems, which can be noticed in the sequence of isolated tweaks to the rules produced in some communities, often listed as additions to a pre-existing charter. Thus, we argue that charters summarized in writing the way a community resolved critical controversies arisen in the past. If an issue was not present in a charter, most likely it had not been a controversial matter in the community. We will rely on this general interpretation rule also when discussing inheritance systems.

2.2 Rights to access collective resources

Access to the collective resources and participation in the community life could take place at different levels and this section provides a taxonomy. The focus in this paper will be on the membership right (*vicinia*), which defined the most complete belonging to a community. We refer to those with membership rights as community members (*vicini*) or insiders. The family was the unit of reference for membership rights. If husband and wife were both community members, they were entitled to the same benefits and duties as if only one spouse was a member.⁶ If at least one living individual of the family was a community member, then the benefits from the commons were extended to all relatives living under the same hearthstone (*fuoco*). The head of the family, who was usually – although not necessarily – the rights-holder, was the person with the rights to participate in and vote at community meetings. People without membership rights were outsiders, a category that includes also those with the simple right to reside in the community, or with some right to appropriate the commons. To a certain extent,

⁴ For a detailed analysis of supra-communities see Tagliapietra (2013). There also existed statutes, different from charters, that encompassed many villages and regulated especially criminal justice (e.g., *Val di Sole e Non* and *Valle delle Giudicarie*).

⁵ In 1802 the Paris Treaty abolished the bishop principality of Trento. The Austrian government in 1805 forbade the gatherings of the community members in the assemblies, and in 1807 the Bavarian government, which in the meanwhile took power in Trentino through the Peace of Pressburg (1805), abolished the *Carte di Regola* and subjected Trentino towns and villages to the central government (Rizzoli, 1903).

⁶ A similar definition of membership rights was common in Japan, see McKean (1992).

all definitions in this section are conventional, and we introduce them to better interpret the content of the charters.⁷ See also Casari and Lisciandra (2011) for additional details.

The *membership right* gave full access to all benefits and duties. An insider enjoyed four categories of rights: (i) residence rights – the right to live in the community and thus have a stable domicile; (ii) full appropriation rights – the right to access and exploit the common resources of the community; (iii) participation and voting rights in community assemblies, in particular, rights to participate and speak at community assemblies, to appoint community officers, and to vote on decisions concerning management and alienation of collective resources, inheritance systems, acquisition of residence, appropriation, and membership rights; finally, (iv) inheritance rights, and more specifically the right to transmit the membership to offspring according to regulations.⁸

Sometimes, outsiders could live in the community with limited or no rights to access the commons. The most common entitlements were the appropriation right and the residence right. The *appropriation right* entailed residing in the community and granted some or all of the following entitlements: grazing, mowing grass, cutting timber, collecting firewood and litter, hunting and fishing, and transforming forests or pastures into arable land. Holders of appropriation rights could enjoy the right for at most their lifetime but could not pass it on to descendants through inheritance. Conversely, the simple *residence right* did not *per se* entitle the right-holder to use the collective resources. In order to acquire the residence right, outsiders often had to formally introduce themselves to the community and give assurance about their integrity and economic welfare. Typically, residence rights were granted to artisans, shopkeepers, and servants. Fines and restrictions for trespassing collective lands or using collective resources without authorization applied also to those with residence rights. Finally, rule violations could cause the loss of that right.

2.3 How to acquire the membership right

There were three ways to acquire the membership right: by purchase, by inheritance from partners, and by inheritance from parents.

Purchase. The membership right could be purchased from the community. It could not be purchased from an individual insider because a single member of the community could not transfer or alienate his or her individual membership right. The community assembly had to grant its formal consent in order to accept new members with a vote requiring a quorum ranging from a simple majority of half of the participants up to unanimity. Generally, prospective members had also to fulfill a few requirements

⁷ The aim of this study is neither to provide a legal classification of rights nor to map in detail all cases. On the contrary, we aim at analyzing the documents through a parsimonious taxonomy, which reflects economic property rights, that is those rights that an individual can actually exploit no matter what the formal or legal definitions are.

⁸ Membership in the medieval Trentino communities presents similarities to citizenship in contemporary national states, yet there are at least three noteworthy differences. First, it was more pervasive in terms of rights as well as duties. Fundamental duty was a continuous residence within the community. Moreover, members had to collaborate to build and maintain roads, huts, kilns, and wood coal sites. Refusal to fulfill such duties could bring about the loss of membership. Second, the rights-holder was the head of the family, the unique legal representative of the family in front of the community, although rights and duties extended to the whole family. The family was a single entity, and all families shared equal rights of access to the commons regardless of their size. Third, membership acquisition followed a different discipline with respect to modern citizenship.

such as *i*) having a good reputation, *ii*) paying the community treasury a certain amount of money, and *iii*) having held stable residence in the community for a certain period of time. The membership right gave equal rights and duties to newcomers as to pre-existing members. In Trentino, we detected 54 out of 274 communities that allowed membership purchase.⁹ This provision was mainly mentioned in the community charters but it was also documented in contracts of membership purchase.

Inheritance from partner. In case of marriage between an insider and an outsider, the insider spouse kept his or her status through marriage and could sometimes pass it on to their children, as we will see below. As a consequence of the marriage, the outsider spouse could receive – depending on the community – the membership right, the appropriation right, or no right at all. Whereas, in case of marriage between two insiders, membership rights could not be cumulated since the unit of reference was the family. One spouse's membership right, typically the wife's, remained dormant while she was married and became active only with widowhood.

Inheritance from parents. The membership right became manifest when the heir left the parents to form a new family, or alternatively, at the rights-holder's death. We have identified four basic inheritance systems for collective resources from parents: egalitarian, soft-patrilineal, patrilineal, and primogeniture. These inheritance systems encompass all the systems encountered in the Trentino charters. *Egalitarian*: all sons and all daughters of insiders inherited the membership rights. *Soft-Patrilineal*: all sons of insiders inherited membership rights whereas daughters did not, unless daughters had no brothers. In the latter case, one daughter or all daughters could inherit membership. If only one daughter inherited the membership, she was usually designated by the father or by the relatives; alternatively the charters usually gave the rights to the first-born or the last-born. *Patrilineal*: all sons of insiders inherited the membership rights whereas daughters did not, even if they had no brothers. *Primogeniture*: only one child of an insider family inherited the membership rights. Ordinarily the heir was a son chosen by the father's last will or, if lacking, by the closest relatives. If there was no son, or the son was not considered suitable and fit, one (and only one) daughter could inherit the membership (along with the private assets) conditionally to marrying a man, who could be an outsider.¹⁰

3. Institutional evidence

The evidence combines data from various sources: charters, cadastral registers, and population census. We identified a total of 480 community charters, of which 306 were available for reading. We also

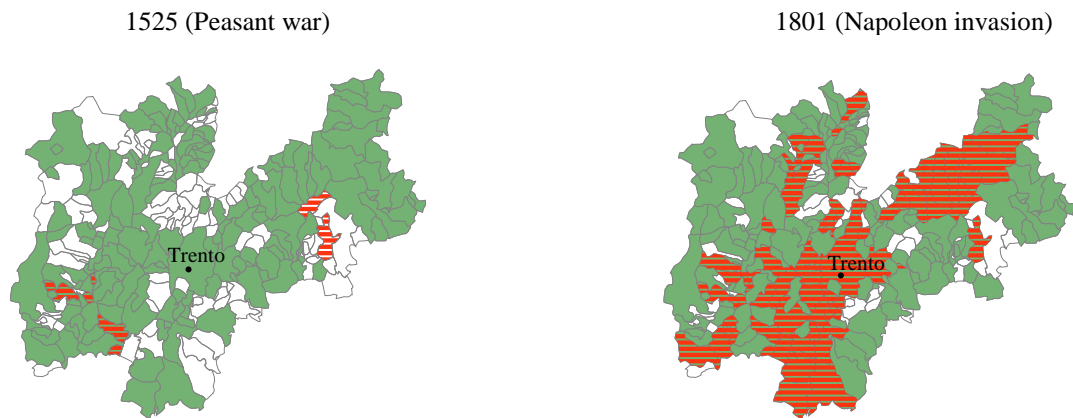
⁹ There were further 10 communities with other relevant documents for the investigation but no information about a charter.

¹⁰ Depending on the specific regulation of the community, the appropriation rights could also be acquired in three ways: by purchase, by inheritance from a spouse, by inheritance from a parent. An individual could not sell the appropriation right but the community could grant it. The rationale of the transmission by inheritance of appropriation right was to compensate offspring or spouses who were not entitled to receive the membership right, and hence it constituted a sort of welfare system that allowed these persons to access the common resources when orphans or widows. Only insiders could transmit by inheritance the appropriation right. The orphans of insider parents could acquire the appropriation right when the membership right was denied. This was especially the case for daughters within a patrilineal system. Their appropriation right remained dormant until the death of the insider member of the family. Women who inherited appropriation rights from their parents could preserve or lose them after marriage. In general, appropriation rights ceased when entitled women married outsiders and could be preserved if they married insiders. The possible loss for widows of appropriation rights could be a very high price to be paid, thereby affecting marriage or remarriage decisions.

collected relevant information about charters modifications and other specific documents containing regulations of inheritance systems of the commons, which enabled us to build a database of 879 observations. This evidence was organized around 366 villages as coded in the 1897 cadastral registers.

Figure 2 shows a map of the region with the villages that adopted a charter and some regulation of the inheritance systems of the commons in two different years of the time interval under scrutiny, 1525 and 1801. 1525 saw the revolt that involved peasants in Germany and also in Trentino, whereas 1801 was the date of the last record of the charter regime, which was immediately subsequent to the Napoleon’s invasion of few years earlier. There was a steady increase in charter adoption during the first four centuries with a peak in the second half of the XVI century. For Italy, this latter period was characterized by food scarcity and fears of losing social and economic status, which triggered institutional changes also in the governance of towns, as the ruling oligarchies attempted to protect their status (Alfani, 2011, 2013). In 1525, immediately before the peak, the villages that had a charter already covered an area equal to 64% of the region. Conversely, it is noteworthy that in 1525 hardly any village had formally introduced inheritance regulations over their commons within their charters or other relevant documents. In 1801, at the end of the time interval, the villages with a charter covered 84% of the Trentino surface. By 1801 many communities had enacted their second or even third charter. Inheritance regulations became more frequent with the expansion of charters adoption, but notwithstanding that, villages with a formalization of inheritance rules covered only 25% of the region.

Figure 2. Mapping charters and inheritance regulations in Trentino



Notes: Areas with solid color identify the presence of a charter while areas with striped color identify the presence of inheritance regulations on the commons. Areas in white had neither a charter or inheritance regulations. A geographical unit in the map is colored when most of its surface satisfies the condition of having a charter and/or inheritance regulations by the dates of 1525 and 1801. Charters define the geographical entities that we call “communities.” We then mapped communities into the geographical units, the “villages”, of the 1897 cadastral registers. The current cadastral registers, which are the ones shown in this figure, display a coarser partition than the 1897 register.

Three main findings about inheritance systems on the commons in Trentino emerge from the documental evidence in our possession. First, inheritance systems for the transmission of membership rights on the commons changed over time. Second, almost all changes eroded women’s rights to inherit

collective resources. Third, the majority of the charters did not regulate inheritance of membership rights on collective resources.

During the six centuries under scrutiny, the patterns of inheritance changed substantially. Table 1 considers the area covered by villages that adopted a charter and divides the area according to the type of inheritance system explicitly mentioned in the documents that we were able to encode. The selected dates in Table 1 divided the time span considered into four intervals of similar length: 1348 marks the European-wide plague; 1525 corresponds to the peasant war; 1630 denotes a period of declining population in Northern Italy and of crisis related to epidemic diseases; 1801 is the end of the period. At any one point in time three or four different inheritance systems in the region coexisted, since the institutional choice was made in a decentralized fashion at the community level. The erosion of women’s rights is visible from the shift from egalitarian to soft-patrilineal systems between 1525 and 1630, and from another shift toward a patrilineal system by 1801. A process of gradual convergence to a unique system can be observed, and in particular a clear later dominance of the patrilineal system, which acted as an attractor. Initially, in 1348, the patrilineal system covered 24% of encoded charters with a known system, by 1801 it had risen to 97%. Thus, the evolution of inheritance rules is essentially unidirectional, going from equal membership rights for men and women toward increasing gender discrimination.¹¹

Table 1. Inheritance systems on the Trentino commons (surfaces)

<i>Type of system</i>	<i>Year</i>			
	<i>1348</i>	<i>1525</i>	<i>1630</i>	<i>1801</i>
<i>(surface in hectares)</i>	<i>Black death</i>	<i>Peasant war</i>	<i>Italian crisis</i>	<i>Napoleon invasion</i>
Egalitarian inheritance	43,845	43,845	0	0
Soft-Patrilineal inheritance	6,420	6,420	54,305	2,449
Patrilineal inheritance	16,643	21,472	68,592	151,306
Primogeniture inheritance	2,623	2,623	2,623	2,623
Area with inheritance rules (A)	69,531	74,360	125,520	156,378
(A) in % of area with a charter in 1801	13.2%	14.1%	23.8%	29.7%

Source: Elaboration on our charters database and on the 1897 cadastral register.

Notes: The surfaces are in hectares and cover the villages with the type of inheritance system in force during a specific year considering the extension of the villages according to the 1897 cadastral register. In 1801 the total area of villages in Trentino that had adopted a charter amounted to 527,281 hectares; we considered only charters whose text was available.

As illustrative cases, consider the reform of the inheritance system that took place in 1583 in the supra-community of Fiemme. The Governor of the community explains to the Prince the motivation by stating:

“Up to now in our Fiemme Community we followed the rule that when outsiders married women who were members of our Community, they inherited membership rights and used the commons and the woods as much as any other member who was born in the Community. Since, lately, many outsiders are marrying women of the Fiemme community with the sole purpose of acquiring membership rights [...] our Community has consensually

¹¹ A similar pattern of erosion of women’s general property rights on the commons was observed by Alfani (2011) in other parts of Northern Italy.

convened that from now on women members of our Community shall not have nor inherit membership rights should they marry an outsider.”¹²

Hence, the inheritance system switched from egalitarian to soft-patrilineal.

The community of Fondo, for its part, switched from a soft-patrilineal to a patrilineal system in 1777 by restricting women’s right to access the commons. Those women who in a soft-patrilineal system enjoyed the membership right lost it in favor of the appropriation right, hence losing the possibility to transmit access to the commons through inheritance:

“For the future we do not want to obey the ancient custom with regard to community members who have no son but only one or more daughters;” [*according to the new rule, the youngest daughter of an insider could use the commons*] “only during her lifetime, and when she dies, the right to use the commons shall be extinguished; and her heirs shall be foreigners in the same way as if they had never been community members...”¹³

After listing all documental instances of inheritance regulations, we traced the evolution of inheritance systems village by village over six centuries. Overall, 80 Trentino villages (out of 290 with accessible charters) mentioned inheritance rules in their charter or other related documents. A chart flow of institutional changes between 1202 and 1801 is in Figure 3, which provides a bird’s-eye view of all recorded changes. Figure 3 depicts a story of relentless weakening of women’s inheritance rights on the commons. According to our data, in the late medieval period women enjoyed the highest levels of equality in property rights on the common property resources. From that period on, there was a steady process of convergence towards a patrilineal system, without backtracking. At the end of the period, 75 villages had a patrilineal system, 3 a soft-patrilineal system, 2 a primogeniture system and none had an egalitarian system. By the time Napoleon invaded Trentino and forcefully removed the charter regime, the process of erosion of women’s rights on the commons was already complete.

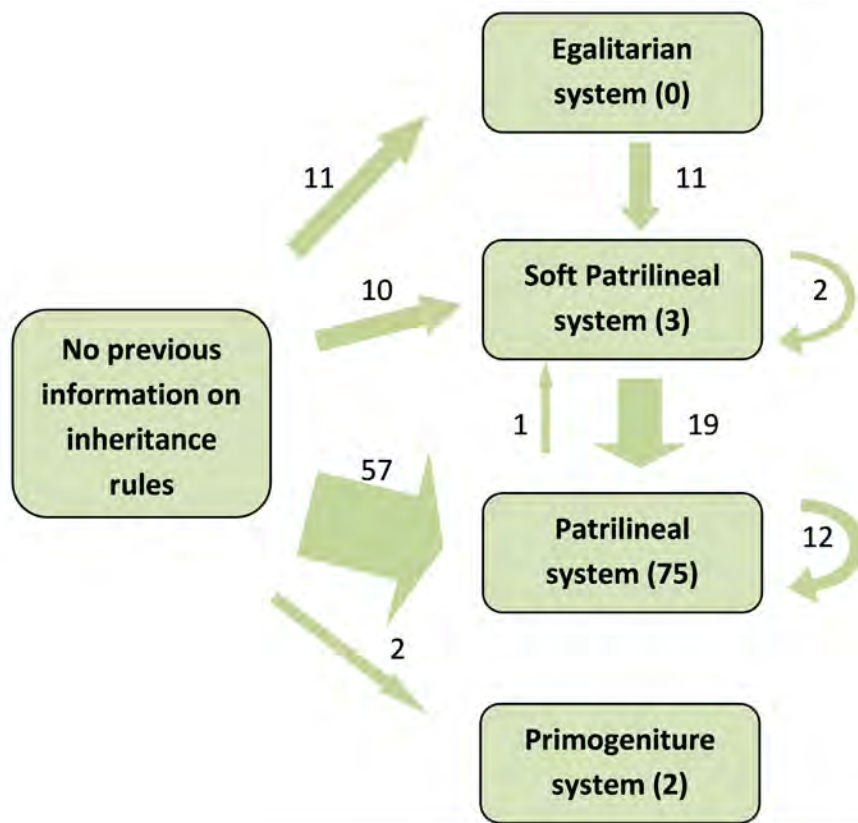
We identified only one exception to the general tendency to restrict the inheritance of membership rights for women, and that is in one of the villages of the supra-community of Comun Comunale. In 1544 Comun Comunale adopted a patrilineal system and kept it that way until the end of the charter regime. In 1786 the small village of Piazza adopted its own integrative charter, in addition to the “supra-charter” of Comun Comunale, thereby introducing a soft-patrilineal system. Most likely, Piazza did not intend to apply this system on the commons of Comun Comunale, but only to Piazza’s commons.

¹² “*Essendo che in la Comunità nostra de Fiemme fori qua se ha osservato, che maritandose le done vicine della Comunità in forestieri hereditarono la vicinanza et godevano in Comuni et Boschi tanto quanto che un altro vicino nativo della valle. .. Et perchè da uno tempo in qua molti foresteri se maridano in done de Fiemme solamente per haver detta Vicinanza [...][la comunità] ha deliberato et determinato de Comun Consenso [...] che da qui in poi per l’avenir tutto le done vicine della valle maritandose in foresteri che non siano vicini della valle non debano haver ne hereditar alcuna vicinanza.*” (Original Manuscript, AST-Archivio Storico di Trento, lat. sect. capsula XII, n.69 and n.72). This provision was also reported in the 1613 charter of Fiemme, chapter 117 (Sartori-Montecroce, 2002).

¹³ Fondo 1777: “*...non vogliamo più per l’avenir osservare l’antica osservanza con quelli vicini che non hanno eredi maschi ma sollo hano più ò una figliola, ... per quelle che venirà al mondo, e che saranno della vicinanza più non si ha da usare come per il passato ma la figlia più giovine che farà tale eredita del vicinato da suo padre si concede bensì che questa figlia più giovine erediti il vicinato ma solo per la sua vita durante e non d’avantaggio valle a dire morto che sarà questa sarà estinto la vicinanza, e li eredi della medema saranno forastieri come se mai fosseron stati vicini, questo servire debba per quelle figlie che veniranno al mondo doppo il presente tempo...*” (Inama, 1931, p. 24).

A separate mention is in order for the primogeniture system, which remained an isolated cluster in the flow chart in Figure 3. This system was prevalent in the nearby German speaking villages of South-Tyrol (outside the bishopric of Trentino) and in the two villages of Stramentizzo and Trodena, which were on the linguistic border between the German and Romance speaking territories. These two villages did not modify their inheritance system, and, interestingly, no other Trentino village ever adopted a primogeniture system (Cole and Wolf, 1974).¹⁴

Figure 3. Changes in inheritance regulations over six centuries (villages)



Source: Elaborations on authors' database of charters and other documents.

Notes: Period 1202-1801. One observation consists of one village according to the geographical unit employed in the 1897 cadastral register. Any modification to the type of inheritance system appears in the arrows connecting the four "system" boxes on the right. Curly arrows record restatement and clarifications of membership rights that took place within the same type of inheritance system. One village restricted the soft patrilineal system from all daughters to one daughter only (Cavedine 1764). Some villages belonging to supra-communities restated the rules either of the patrilineal system (Cimone 1768, Isera 1656, Marano 1796, Villa Lagarina 1759) or the soft-patrilineal system (Castello di Fiemme 1605) in their village charter. Other communities restated their previous regulations (Nago-Torbole 1628, Costa Savina 1739 and 1792, Vigalzano 1739 and 1792, Vervò 1757). Two villages with a patrilineal system specified the rules in more detail (Pieve Tesino 1628, Aldeno 1662). Curly arrows also include modifications to appropriation rights (Mezzolombardo 1777, Aldeno 1753).

¹⁴ For an overview of inheritance systems in Europe about private assets see Head-König, A.-L. and Pozsgai (2012)

The third main finding is that more than 70% of the villages did not explicitly formalize their inheritance system on the commons. As shown in Table 1, the area without inheritance regulations decreased substantially between 1348 and 1801, but still most charters did not ever mention inheritance rules. What was the system in place in those villages? The evidence about inheritance systems on the commons in the XIII century is scant. However, based on four leads, here we argue that in the late medieval Trentino the egalitarian system on the commons was likely to be widely followed although not formalized. The first lead comes from the 1425 Statute of Trento. Recall that this Statute applied to the whole Bishopric for those aspects that were not regulated in the local charters. The 1425 Statute disciplined the inheritance of private assets but not that of collective properties. It stated that, in the absence of a dowry for the daughters, both sons and daughters inherited the private assets of the parents, although the daughters inherited a lower share. On the subject, the older Statute of 1307 devoted little attention. Secondly, the institutional history of Fiemme, a supra-community that has existed as an entity since 1111,¹⁵ reports an explicit description of the egalitarian inheritance system applied to its commons, which was in place until 1583. In that year, as mentioned above, inheritance regulations became soft-patrilineal. Thirdly, the inheritance systems for private and collective properties in the same Fiemme community were identical before 1583.¹⁶ Fourthly, the oldest documental description of the egalitarian system is not a charter but a 1583 letter of the community governor to the Prince-Bishop. This suggests that many other communities may have followed it as a custom and this was why it was not explicitly written in the charters. Only thirty years later, the 1613 community charter of Fiemme included the transcript of a portion of the letter of the Governor reported above.

To put this documental evidence into a broader context, it should be recalled that charters did not usually regulate all aspects of community life in a systematic way but only encoded problematic aspects, especially those that in the past had generated controversies within the community. The Fiemme Governor's letter is a vivid illustration of a practice of that kind: when the frequency of marriages between local women and foreign men was low, or did not cause conflicts within the community, there was little pressure to encode the inheritance rule into the charters. Another illustration of how charters encoded regulations comes from the explicit norms about the purchase of membership rights by outsiders. One can expect that those communities with immigration pressure were more likely to regulate both membership purchase and membership inheritance. In fact, among the villages that mention membership purchase (79 out of 289), about 68% also had inheritance regulations at some point. Whereas, among the villages with no mention of membership purchase (210), only 12% had inheritance regulations. One way to read this regularity is that field controversies were what generated formal regulations.

To draw a conclusion, one can put together the non-systematic codification of inheritance systems on the commons, especially in the early period, as well as the pragmatic spirit of the community charters. If all marriages were between insiders it was practically irrelevant for a community to be under an

¹⁵ The Gebardini Pacts, signed on July 14th, 1111 between the Bishop of Trento Gebardo and the representatives of the Community of Fiemme, gave judicial and tax autonomy to the Community (see Sartori-Montecroce 2002).

¹⁶ From the 1613 charter, chapter 114 (*Le consuetudini di Fiemme - Libro II del civil*), in Sartori-Montecroce (*ibid.*) p. 278.

egalitarian or a patrilineal inheritance system. A marriage between an insider and an outsider had different consequences under the two inheritance systems only if the outsider was the husband and the new family wanted to live in the community of the wife. When no such cases occurred, because there was no immigration pressure toward the community, then the two systems were observationally equivalent. The charter would be changed only when the attempts to immigrate through marriage were frequent or controversial.

4. Inheritance systems and community size

We argue that gender discrimination in inheritance regulations emerged as an attempt to limit the size of the community and to protect insiders' wealth. Inheritance regulations in a community could impact its population level through at least two channels, one that altered migration patterns across communities and another that modified incentives for endogenous growth. In the dynamics of community size, migration was a short-run factor while endogenous growth was a long-run factor.

Migrations alone could increase or decrease the size of single communities also in a scenario of stable population at regional level. Assuming that everyone marries, if the spouses are from different communities they can decide to settle down in the community of the husband or in the community of the wife. If private assets are mobile, the family will want to settle in the community that is "richer" in terms of collective resources. Because of this incentive, the young generation of a rich community could attract spouses from poorer communities who want to move in to benefit from access to richer commons. Consider a situation where every family has two children. Under an egalitarian inheritance system, if every member of the young generation marries an outsider, the number of families in a community may double. Hence, the per-capita collective wealth in a rich community may halve within the time period of a generation, whereas the poorer communities observe an increase. One has also to consider that cross-community marriages may present some benefits from a collective point of view: small communities – as the ones in Trentino – run into severe risks of consanguinity if all marriages are between insiders, cross-community marriages reduce this risk. Conversely, a patrilineal inheritance system can effectively prevent net immigration via marriage, which would maintain the same level of per-capita collective wealth. This system does not forbid marriages with outsiders, but it ensures that the number of families in the next generation will remain the same. In particular, women who marry men who are outsiders will move to their husbands' communities since the new family has no access to the commons of the wife's original community. Hence, under a patrilineal inheritance system on the commons, the community will maintain its size and some genetic mixing will still be possible: for every man marrying an outside woman, one woman of that man's community will have to move out (Casari and Lisciandra, 2014). The same outcome can be achieved through a primogeniture system.¹⁷

To sum up, if all communities in the region have an egalitarian inheritance system, then the inequality in per-capita collective wealth will decline and reach minimal levels. In contrast to that, if all communities have a patrilineal inheritance system, the inequality in per-capita collective wealth will persist. In case both systems co-exist in the region, what matters is the type of system adopted by the

¹⁷ It is easy to show that the outcome under a soft-patrilineal inheritance system is in-between those of an egalitarian and a patrilineal system.

communities better endowed in terms of per-capita collective wealth. In order to avoid reductions in their share of collective resources, insiders of rich communities tend to adopt gender-biased inheritance systems. Contrariwise, the choice about inheritance rules of insiders of poor communities is irrelevant: migratory patterns would be unaffected by their type of inheritance system, whether it is formalized or not. This can explain why we observed many communities without written inheritance regulations (Table 1). A formal model of migratory pressure along these lines is presented in Casari and Lisciandra (2014).

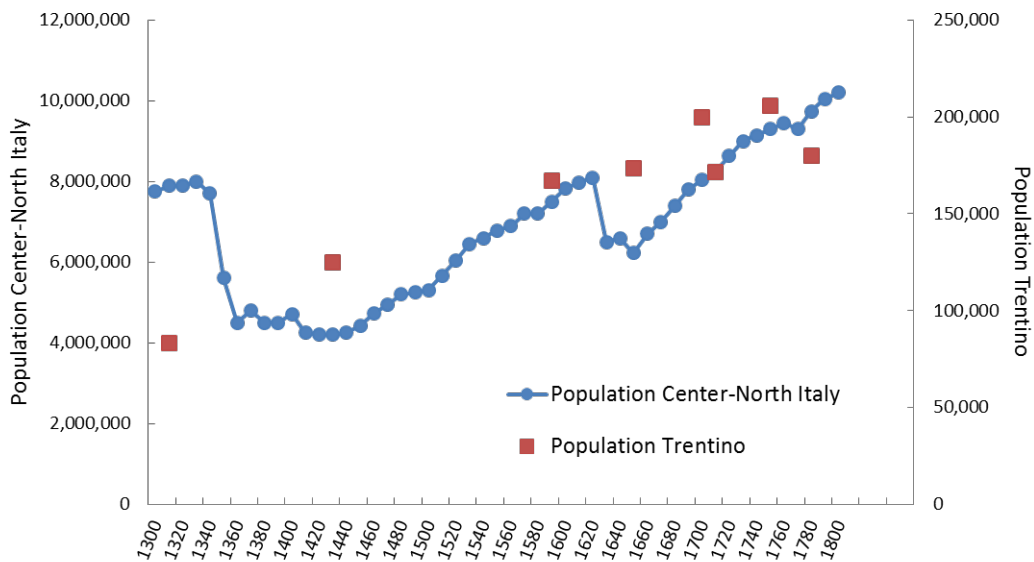
The choice of inheritance system on the commons can make a difference also in terms of fertility rates, and, consequently, on endogenous population growth. This phenomenon has been known at least since Hardin (1968) and it relates to the tragedy of the commons with regard to population control. Parents' decision about the number of kids is private but – when the kids have also access to collective resources – it becomes a matter of public concern. When the subsistence of a family lies exclusively on its own private resources, the family bears the full costs of having an additional child. Instead, if the family relies also on the collective land, the incentives to have children are higher because of the externality of appropriating collective resources. A portion of the cost of the additional child falls on the community at large, whose resources are subject to the typical mechanism of the tragedy of the commons. In an egalitarian inheritance system “everyone born has an equal right to the commons” and this would “lock the world into a tragic course of action” (Hardin, 1968). The solution to the tragedy about population control is a change in the inheritance system. The adoption of a primogeniture system on the commons fully removes the “tragedy” because additional children after the first one do not impose negative externalities on the community commons. A patrilineal system provides a partial solution because it lessens individual incentives to have additional children with respect to the egalitarian system as, in the long-run, only about half of the children, the boys, can count on the community commons. The patrilineal system attenuates, but does not solve, the tragedy about population control because for every additional child there is still some probability that the cost will be shifted to the community at large.

As previously argued, inheritance regulations had an impact on the dynamics of community size. In comparison with a patrilineal system, an egalitarian system increased incentives for both fertility and immigration. On the one hand, in Trentino the incentive for fertility was exacerbated by the presence of low-populated communities with large shares of commons. On the other hand, the existence of large inequalities among villages in per-capita collective wealth and the increment of population in the region triggered internal migrations. Although both fertility and migration push communities toward a change in the inheritance rules in order to protect their collective resource from depletion, we claim that the main drive for the institutional change in inheritance rules was the attempt to reduce migratory pressure occurring through marriage, because migration operates an adjustment in community size more quickly than endogenous population growth. Insiders may have been less averse to an increase in population from newborn than from outside migration. Hence, the remaining of the section discusses migrations.

Migration mainly occurs because individuals from poor communities may want to move into a rich community. Therefore, a high inequality in per-capita collective wealth across communities gives rise to this course. Unfortunately, we lack systematic data about migratory flows, size, and wealth at the community level over the six centuries, but we have been able to construct an inequality index for thirty-two villages using 1780 cadastral data and 1810 population census data.¹⁸ The resulting Gini index in per-capita *collective* wealth shows a high level of inequality across villages (0.61, N=32). The corresponding index in per-capita *total* wealth denotes a lower level of inequality (0.27, N=32). The difference in the two indices denotes how commons were more unequally distributed than individual properties. This suggests that communities with a higher commons endowment may have acted to prevent the leveling-off in commons wealth among the communities in the region.

The reason for the persisting inequality across villages in the value of per-capita collective wealth, we believe, was the occurrence of a series of shocks on population and wealth in the form of fires, landslides, flooding, famines, and plagues. These shocks were likely to hit villages in an asymmetric fashion. As a consequence, perfect equality was unlikely even in a society that universally adopted an egalitarian system. The frequency and magnitude of the asymmetric shocks were likely to dominate the speed of population adjustments.¹⁹

Figure 4. Population estimates in the Centre-North of Italy and Trentino



¹⁸ This sample from the 1780 register corresponds to 37 villages in the 1897 cadastral register (10% of all villages).

¹⁹ After centuries under an egalitarian inheritance system, one may expect that both migrations and endogenous population growth should have brought about a situation of near equality. Direct support for this view requires evidence that we cannot provide on the inequality levels at the time when communities started to restrict women’s inheritance rights. However, as documented in the previous section, restrictions occurred over time without a clear-cut switch. Furthermore, if migrations and endogenous population growth had indeed generated convergence in per-capita collective wealth by, say, the end of XVI century, one needs to explain what produced the inequality observed two centuries later. Consider that long-run convergence in per-capita collective wealth should have occurred also after women’s inheritance rights started to be restricted, assuming that fertility were positively related to per-capita wealth.

Source: Malanima (2002) for the Centre-North of Italy. Cole and Wolf (1974) for Trentino in years 1312, 1427, 1650, 1754. Further Trentino estimates: Debiasi (1953) in 1700; Franceschini (2009) in 1594, 1704; Chiocchetti and Chiusole (1965) in 1780.

Notes: The Centre-North of Italy includes Piedmont, Val d’Aosta, Nice, Monaco, Lombardy, Veneto, Trentino-Alto Adige, Friuli, Istria, Liguria, Emilia-Romagna, Tuscany, Umbria, and Marche. Fiebiger (1959) estimates that Trentino made up 34.7% of the entire Tyrol population in 1754. We applied this fraction to the estimates of Tyrol population in Wopfner (1954) for antecedent dates. The Trentino population estimates in Franceschini (*ibid.*) refer to the 1573-1615 and 1685-1723 time intervals, for which we considered the median years 1594 and 1704, respectively.

Migratory pressure will be even stronger when regional population increases. The available evidence refers to population estimates for the Centre-North of Italy and for Trentino (Figure 4). Overall, the population in Centre-North Italy grew from 1300 to 1800 by 32%, whereas in Trentino from 1312 to 1754-1780 by 131%. More precisely, population estimates for Trentino come from a variety of sources and are of 83,373 units in 1312 and 167,000 units in 1594, 206,000 in 1754, and 180,000 in 1780.²⁰ Although we have only scattered estimates of Trentino population, the patterns for Centre-North Italy and Trentino appear similar. In particular, from the more systematic data of the entire Centre-North of Italy, one can identify some focal dates that marked a change in the direction of population growth and levels, such as the Black Death of 1348 and the Italian crisis of 1630.

These population patterns can explain the institutional changes that are observed in inheritance regulations. The frequency of inheritance regulations on the commons in community documents increases in periods of population growth. More specifically, Table 2 illustrates the number of first mentions or changes in inheritance regulations broken down by periods of regional population increase and decrease. This evidence appears to point to the role of demographic pressure in the institutional change. A more systematic analysis will be provided in the following section.

Table 2. Population trends and inheritance regulations (documents)

Time Interval	Population trend	Number of documents reporting inheritance regulations (A)	Number of encoded charters (B)	(A)/(B)
1200-1347	Increase	2	14	14.3%
1348-1430	Decrease	1	22	4.5%
1431-1600	Increase	16	135	11.9%
1601-1630	Increase (above 1348 level)	8	21	38.1%
1631-1650	Decrease	3	12	25.0%
1651-1700	Increase	6	18	33.3%
1701-1800	Increase (above 1630 level)	24	78	30.8%

Source: Elaboration on authors’ database of charters and related archival documents. Population trends are from Malanima (2002) and refer to Centre-North Italy.

Notes: (A) includes all documents mentioning both first formalization and subsequent restrictions or restatements of inheritance regulations. The number of documents (A) and the number of encoded charters (B) here reported exclude those documents mentioning the inheritance systems but having an antecedent charter – in previous time intervals – existing but unavailable. These documents refer to the following communities: Croviana, Giovo and Faedo, Matarello, Varignano, Vervò, Vezzano and Padergnone. For example, Croviana mentions the inheritance system in the 1727 charter, however the previous charter was written in 1427 but it is unavailable. This is to avoid that we count charters mentioning the inheritance system that could have previous charters also mentioning the inheritance system and that actually introduced the inheritance regulation. Further, the number of encoded charters includes both first and subsequent charters.

²⁰ According to Malanima (2002) the population in the Centre-North Italy in 1620 was 8,100,000, whereas in 1800 was 10,120,000. The 131% increase in Trentino population considers the average between the estimates of 1754 and 1780.

In sum, we observe two factors triggering internal migrations: inequalities in the values of per-capita collective wealth and regional population growth. Both factors induced communities to adjust their inheritance systems on the commons in order to restrict the influx of outsiders and to protect collective resources. In particular, wealth inequalities help to explain why some communities adopted inheritance regulations whereas others did not, while the regional population growth had more to do with the timing of institutional change.

5. Empirical evidence

This section presents a regression analysis about the factors influencing the introduction of inheritance regulations in each village. The empirical analysis is here employed to verify coherence of the data with our initial conjecture. It includes two models of inheritance regulations adoption, a static model and a duration model. The static model presents factors that influenced the decision of a village to introduce inheritance regulations at any point in time before 1800 (*inheritance*). The duration model performs a survival analysis aiming to explain – during the entire period under scrutiny – which factors influenced the occurrence of the first formalization of inheritance systems (*event*). One village is the unit of observation and corresponds to a geographic entity in the 1897 cadastral register. Out of the 366 villages in the cadastral register, the dataset considers the 289 villages that had adopted a charter by the year 1800.²¹ Those villages had at least one encoded charter in our database.

Static model

The static model explains the village adoption of an inheritance regulation at any one time before 1800 (Tables 3 and 4). Proxies are built for the size of the village, its remoteness and wealth. The proxy for village size is the village population taken from the 1810 census (*pop1810*).²² Proxies for village remoteness are the walking distance in km (*dis_tn*) and the altitude difference (*diffalt_tn*) from Trento, the regional capital, which has a central position in the region (Figure 2). The two proxies are weakly correlated ($\rho=0.38$).

Proxies for wealth include the per-capita value of collective land (*pc_common_value*) and the per-capita value of total village land (*pc_total_value*). The total value of *all* the land in the village (*total_value*) is the sum over the surface of each land type in the village multiplied by its per-hectare value. We employed the 1897 cadastral data to estimate the surfaces by land type of each village and the 1780 cadastral data to estimate the average per-hectare value *in the region* by land type.²³ We employ the variable *total_value* as a proxy of relative wealth across villages. Notice that, by

²¹ Trento, the capital town, was dropped from the original 290 villages dataset because of its peculiar role of seat of government.

²² The census data are in Andreatta and Pace (1981). As in Casari (2007), when break-downs at the village level is not available, we use as shares the proportions from 1897 data (Consiglio provinciale d'agricoltura pel Tirolo, 1903).

²³ The 1897 data cover all villages in the region while the 1780 data covers only about 10% of villages. The 1897 register includes the surface for each type of land by village but neither rent nor ownership records. Since the land classifications in the 1780 and 1897 registers were slightly different (e.g., what is called grazing land in one dataset may be classified as meadows in the other), we carried out an analysis on surfaces to identify the best way to match the two sources. We then used the 1780 land rents to compute the relative value of each type of land. Forests, grazing land, and alps pooled together served as numeraire. Vineyards, for instance, were worth per hectare about 5.5 times the numeraire.

construction, it does not capture the value of good land management at the village level because the per-hectare value does not derive from village-specific estimates but from the average value in the region of each type of land. The value of collective land in a village (*common_value*) required information about the shares of collective ownership by land type, which was taken from the 1780 cadastral registers. Finally, the variables *total_value* and *common_value* were divided by the village population (*pop1810*) to obtain the variables *pc_total_value* and *pc_common_value*.²⁴

An additional wealth variable provides the value of collective land divided by the value of individual land per village (*ratio_value*). In the empirical model, this ratio can capture the presence of production complementarities between collective and individual land. Consider that collective land consisted of mostly forest, alps, and pastures at high altitudes while individual land was mostly made up of cropland and meadows at low altitudes. Cattle grazing, for instance, is more productive if meadows at low altitude are used during wintertime and grazing land and alps at high altitude are used during summertime. Each village needed both types of land for efficient agricultural production. Across villages there is a high correlation between collective land and individual land ($\rho=0.97$ in terms of surface and $\rho=0.78$ in terms of value). The variables *ratio_value* and *pc_common_value* are also correlated ($\rho=0.79$). Table 3 below summarizes the statistics of all the variables mentioned above.

Table 3. Summary statistics

	Mean	Std. Dev.	Min	Max
<i>Dependent variables</i>				
inheritance	.277	.448	0	1
inheritance or membership purchase	.398	.490	0	1
<i>Independent variables</i>				
pop1810	633.26	719.38	52	7069
dis_tn	48.67	28.92	2.90	129
diffalt_tn	483.41	289.39	-121	1385
pc_common_value	2.47	1.96	.08	19.45
pc_total_value	7.42	3.56	.80	31.11
ratio_value	.48	.27	.092	1.67

Source: Dataset constructed by the authors.

Notes: The number of observations is 289. Trento has not been included because it is the capital town. “Inheritance or membership purchase” is a dependent variable coded as 1 if a village either had inheritance regulation or gave outsiders the possibility to purchase membership or both, and as 0 if otherwise.

Among the regressors there are proxies for village remoteness (*dis_tn* and *diffalt_tn*) and wealth (*pc_common_value*, *pc_total_value*, and *ratio_value*). Since villages that adopted formal inheritance regulations could have different population dynamics to villages that did not adopt any regulation, it is

²⁴ The estimate of land value by type could differ between individual and collective land. For each type of land we estimated land values separately by ownership according to the 1780 rents. In particular, $pc_common_value = Total\ value\ of\ collective\ land / village\ population$. $Total\ value\ of\ collective\ land = \sum_{by\ land\ type} (1780\ value\ of\ land\ type) \times (1780\ ownership\ share\ of\ land\ type) \times (1897\ surface\ of\ land\ type) = 7.72 \times 0.255 \times (meadows) + 0.725 \times (grazing\ land + alps + forest) + 8.93 \times 0.137 \times (plow\ land) + 22.92 \times 0.015 \times (fruit\ and\ garden) + 5.56 \times 0.003 \times (vineyard)$. Total value of private land = $10.19 \times (1 - 0.255) \times (meadows) + 0.91 \times (1 - 0.725) \times (grazing\ land + alps + forest) + 10.51 \times (1 - 0.137) \times (plow\ land) + 24.59 \times (1 - 0.015) \times (fruit\ and\ garden) + 13.12 \times (1 - 0.003) \times (vineyard)$.

likely that there are issues of endogeneity of the village size variable (*pop1810*). As a consequence, the variables *pc_common_value* and *pc_total_value* could suffer from the same problem. For this reason the model estimation employs an instrumental variable probit. Given the small set of variables available, we use as instruments *common_value* and *total_value* respectively for their corresponding per-capita variables.²⁵

Table 4. Regulations about inheritance on the commons by 1800 (static model)

<i>Dependent variable</i> (1= regulation, 0=otherwise)	Inheritance regulation	Inheritance regulation	Inheritance or membership purchase regulation	Inheritance or membership purchase regulation
	(1)	(2)	(3)	(4)
dis_tn	-0.0112 (0.0067)*	-0.0091 (0.0063)	-0.0162 (0.0067)**	-0.0116 (0.0063)*
diffalt_tn	-0.0020 (0.0005)***	-0.0011 (0.0005)**	-0.0020 (0.0004)***	-0.0010 (0.0004)**
pc_common_value	0.2564 (0.1230)**		0.2597 (0.1211)**	
pc_total_value		0.3324 (0.0455)***		0.3475 (0.0360)***
ratio_value		-2.5567 (0.5812)***		-2.7303 (0.5527)***
Constant	-0.3107 (0.3103)	-1.3245 (0.3453)***	0.5627 (0.3069)*	-0.8710 (0.3764)**
<i>Wald test of exogeneity (Prob>χ^2)</i>	0.0125	0.0022	0.0044	0.0002
<i>log likelihood</i>	-637.8	-821.4	-666.7	-847.9
<i>Number of observations</i>	289	289	289	289

Source: Database constructed by the authors.

Notes: Instrumental variable probits. Dependent variables: *inheritance regulation*, *inheritance or membership purchase regulation*. To control for geographical fixed effects, 12 area dummies are included among regressors; they are not reported in the table. Trento, the capital town, has not been included. The figures in parenthesis are standard deviations. * denotes significance at a 10 percent level, ** at a 5 percent level, and *** at a 1 percent level.

The static model shows four specifications (Table 4). Two specifications include *pc_common_value* as wealth proxy, while two specifications include *pc_total_value*. They appear in different specification because they are highly correlated ($\rho=0.90$) and hence can be used as alternatives. In all specifications a Wald test confirms the presence of endogeneity in the structural equation and, consequently, the correctness of the adoption of the instrumental variable technique.²⁶ In particular, specification (1) uses as regressors two proxies of remoteness and the per-capita proxy for common land. The per-capita value of collective land significantly and positively influenced the introduction of formal inheritance

²⁵ The instruments satisfy the correct requirements. The correlations between *pc_common_value* and its instrument is 0.50, and between *pc_total_value* and its instrument is 0.26. The correlations do not appear strong, especially the second. However, we performed weakness tests on the instruments by considering the robustness of the F-statistics in the first-stage of the two-stage least-squares linear probability models. The instruments appear robust: *common_value* at 1% and *total_value* at 5%.

²⁶ A rejection of the null hypothesis of exogeneity means that the error terms in the structural equation and the reduced-form equation for the endogenous variable are correlated. Thus, instrumenting the endogenous variable was correct.

rules. This supports the interpretation that villages more endowed in per-capita collective wealth were induced to formalize inheritance regulations in order to protect their wealth. In addition, more remote villages in terms of altitude were significantly less likely to formalize inheritance rules (*diffalt_tn*). These results are coherent with the interpretations that geographically accessible villages formalized inheritance systems more often than remote ones because they were more subject to migration that threatened their commons. Furthermore, due to their less productive land, high mountain villages could have been less attractive to foreigners, and therefore raised barriers against them less frequently.

In specification (2) the per-capita value of total village land (*pc_total_value*) removes issues about incorrect estimates of ownership shares. An additional regressor, the value ratio between collective vs. individual land (*ratio_value*), captures complementarities in production between different types of land independently of village size. The higher the per-capita value of total land the more likely it was that the village had inheritance regulations. Moreover, a higher ratio is associated with a lower frequency of inheritance regulations: villages relatively more endowed with collective than individual land, did not feel threatened by newcomers.

As a robustness check, specifications (3) and (4) replicate the static model using an alternative dependent variable. Because of archival issues or destroyed documents, it is possible that we missed documents that regulated inheritance. For this reason we also considered the villages that regulated membership purchase. The introduction of a regulation on the purchase of membership rights points toward a pressure coming from people who wanted to move into the village. Regulation on membership purchase could be seen as another instrument to regulate migratory pressures. Depending on the village, the quorum required for accepting outsiders through membership purchase was between a simple majority and unanimity of insiders. This alternative variable takes value 1 if the village either regulated inheritance or gave outsiders the possibility to purchase membership or both, and 0 if otherwise. Both the inheritance and membership regulations were proxies of the village closure against migratory pressures. Specifications (3) and (4) confirm all results emerging from specifications (1) and (2).

Duration model

A duration analysis model can exploit both whether and when a village formalized inheritance regulations. The timing of inheritance regulations varied considerably across villages (Figure 2). A discrete version of a duration model is used to obtain the estimates presented in Table 5. This estimation technique is widely used in medicine, where it is called survival analysis. It relies on an event or transition, which in our case is the time of adoption of written inheritance regulations on the commons in a given village. The dataset for the duration model is based on the same 289 villages as in the static model with observations at five-year time intervals between the years 1200 and 1800. As long as there is no transition the dependent variable is set to zero, if the event occurs the dependent variable is set to 1, and the village is then deleted from the subsequent time intervals of the data set. The duration model estimates the probability that the event occurs in the time interval between t and $t+5$,

conditional on the village not having experienced the event at or before time t (*risk set*).²⁷ The equation employed to estimate the duration model is the following probit equation:

$$\Phi^{-1}[P(t)] = a(t) + b_1X_1 + b_2X_2(t) + u(t) \quad (1)$$

wherein Φ is the standard normal cumulative distribution function, $P(t)$ is the hazard rate consisting of the ratio between the number of events occurred in time t (i.e., formalization of inheritance regulation on the commons) and the number of “surviving” villages in time t (*risk set*);²⁸ $a(t)$ is the time trend; X_1 is the vector of time-invariant variables; X_2 is the vector of time-variant variables; $u(t)$ is the *i.i.d.* error term such that $E[u(t)]=0$ and $\text{Var}[u(t)]=\sigma^2$.

The time-variant regressors $a(t)$ includes dummies to control for important historical events in the area such as the Black Death (1350-1400), the Peasant War (1525-1535), the Council of Trento (1545-1565), and the Italian Crisis of the first-half of the seventeenth century (1600-1650). The time-invariant regressors are the walking distance from Trento (*dis_tn*), the difference in altitude with Trento (*diffalt_tn*), and the ratio between the value of collective and individual land (*ratio_value*) as in the static model. There are other five time-variant regressors. The village size estimate at time t (*poptime_cn*), which is built by taking the 1810 village population and scaling it using the ratio between the Centre-North Italy population at time t and in the year 1800.²⁹ The per-capita value of total village land (*pc_total_value*) and the per-capita value of the commons (*pc_common_value*) are built by taking the corresponding static model variables and dividing them by *poptime_cn*. The direction of population change in the Centre-North of Italy (*poptrend*) is a binary variable that takes value 0 when regional population decreased and 1 when it increased over the time intervals presented in Table 2. Finally, the model includes a variable about contagion (*f_centerin*), which consists of the fraction of villages around the same reference center that have already adopted inheritance regulations at time t .³⁰ Notice that the population variable and the per-capita variables are no longer endogenous as in the static model and are now included. This is the peculiarity of the duration models since, once the event (i.e., adoption of regulation) has occurred, the village is dropped from the dataset for the remaining time intervals.

The results from the duration model presented in Table 5 are in line with those of the static model. In specifications (1) and (2) the dependent variable is the adoption of inheritance regulations in a given 5-year time interval. Remoteness and wealth proxies have the correct sign. While remoteness in terms of altitude is significant, wealth proxies are non-significant. We have reasons to believe that the lack of

²⁷ This approach is *not* a panel data analysis. Following a survival analysis, the dependent variable is constructed around the year of the change: each village enters the dataset with a different number of “observations”. This model does not allow for the inclusion of village fixed effects.

²⁸ Put differently, $P(t)$ is the probability that a village adopts a regulation of the inheritance system on the commons at time t .

²⁹ For the population of Centre-North Italy see Malanima (2002). However, the data in Malanima do not cover the XIII century. The population data available for Italy in Belletini (1987) have been used to rescale villages population in 1300 backward to 1200. The population proxy *poptime_cn* assumes an identical population growth rate in all villages.

³⁰ The 17 reference centers are: Borgo, Canale S. Bovo, Canazei, Cavalese, Cles, Condino, Fondo, Levico, Malè, Mezzolombardo, Pergine, Pinè, Riva del Garda, Rovereto, Stenico, Tione, Trento.

significance of the wealth proxies could originate from their inaccuracies. We have neither cadastral data nor regular population census for each time interval along the six centuries considered. During such long horizon villages could have sold, purchased, individualized collective properties, or changed community boundaries through mergers and fissions.

Table 5. Regulations about inheritance on the commons (duration model)

<i>Dependent variable:</i> <i>event=1 if adopted regulation in the</i> <i>time period, =0 if not yet adopted</i>	Inheritance regulation	Inheritance regulation	Inheritance or membership purchase regulation	Inheritance or membership purchase regulation
	(1)	(2)	(3)	(4)
<i>poptime_cn</i>	0.0001 (0.0001)**	0.0002 (0.0001)**	0.0001 (0.0001)**	0.0002 (0.0001)***
<i>poptrend</i>	0.3108 (0.1432)**	0.3052 (0.1432)**	0.3684 (0.1263)***	0.3648 (0.1264)***
<i>dis_tn</i>	-0.0024 (0.0031)	-0.0013 (0.0032)	-0.0041 (0.0030)	-0.0031 (0.0030)
<i>diffalt_tn</i>	-0.0006 (0.0002)**	-0.0006 (0.0002)**	-0.0006 (0.0002)***	-0.0006 (0.0002)***
<i>pc_common_value</i>	-0.0015 (0.0277)		-0.0103 (0.0248)	
<i>pc_total_value</i>		0.0207 (0.0155)		0.0190 (0.0131)
<i>ratio_value</i>		-0.3487 (0.2500)		-0.3938 (0.2150)*
<i>f_centerin</i>	0.7256 (0.2741)***	0.7348 (0.2757)***	0.7673 (0.2023)***	0.7808 (0.2032)***
<i>crisis1630</i>	0.4444 (0.1244)***	0.4430 (0.1247)***	0.4047 (0.1066)***	0.4063 (0.1067)***
<i>tnccouncil</i>	0.7486 (0.1049)***	0.7497 (0.1051)***	0.6113 (0.0979)***	0.6121 (0.0981)***
<i>peasantwar</i>	-0.1510 (0.3231)	-0.1377 (0.3190)	0.0468 (0.2077)	0.0506 (0.2073)
Constant	-3.1616 (0.2004)***	-3.2281 (0.2172)***	-2.8963 (0.1693)***	-2.9439 (0.1821)***
<i>Pseudo-R2</i>	0.1312	0.1335	0.0944	0.0969
<i>log likelihood</i>	-485.0	-483.7	-683.8	-681.9
<i>Number of observations</i>	31,618	31,618	30,122	30,122

Source: Database constructed by the authors.

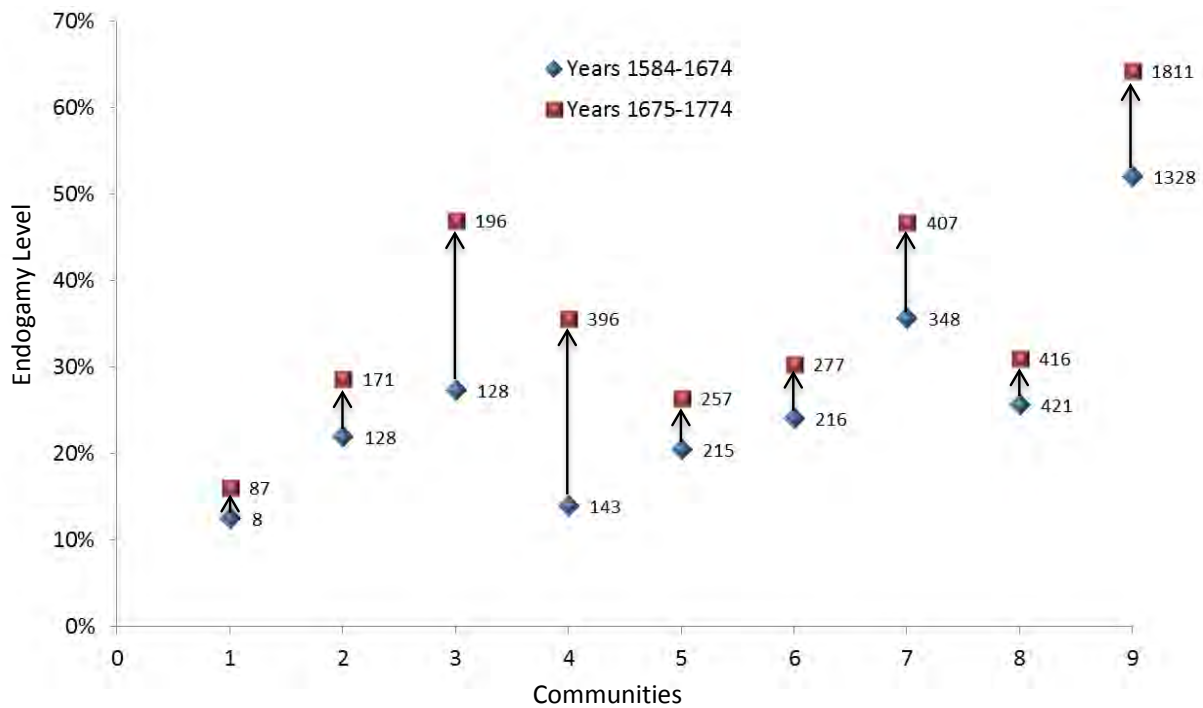
Notes: Survival analysis model based on a probit function (see main text). To control for geographical fixed effects, 12 area dummies are included among regressors; they are not reported in the table. The Black Death dummy is omitted because it is a structural zero: during that period no village changed its inheritance system or membership purchase regulations. All villages are in the dataset at the starting date. Trento, the capital town, has not been included. The figures in parenthesis are standard deviations. * denotes significance at a 10 percent level, ** at a 5 percent level, and *** at a 1 percent level.

There are three additional findings coming from the time-variant regressors in specifications (1) and (2). First, in periods of regional population growth (*poptrend*), villages were significantly more likely to adopt inheritance regulations, which is consistent with our view of regional population growth as a trigger for institutional change. Second, inheritance regulations spread by contagion. The more widespread the adoption of inheritance regulations in nearby villages had been, the significantly more likely was the village itself to adopt a regulation (*f_centerin*). Contagion from neighbors could come as

a cultural imitation or as a defensive measure. We favor the latter interpretation because the contagion proxy is defined locally: restrictions in the inheritance systems of nearby villages shifted the migratory pressure onto other close villages. In response, those villages could then decide to formalize or restrict inheritance rules to fence off the increased migration, which they may have not done otherwise.³¹ Third, larger villages in terms of population were significantly more likely to adopt inheritance regulations (*poptime_cn*). This finding builds on Casari (2007), which shows that the largest villages were more likely to adopt a charter, and also to have more ancient charters. The existing correlation between group size and inheritance regulations is not the consequence of a selection bias because villages that did not adopt a charter were excluded from the regressions.

Also for the duration model we performed a robustness check using an alternative dependent variable. Specifications (3) and (4) in Table 5 explain the adoption of inheritance or membership purchase regulations or both. This robustness check confirms and reinforces all the results emerging from specifications (1) and (2).

Figure 5. Closure of communities: two centuries of endogamy in marriage



Source: Motta (1978) from parish registers.

Notes: 8 parishes nearby the Fersina Valley ordered from the smallest to the largest, plus the entire valley (Obs. 9); the number of total marriages in the period is noted next to each marker. Endogamy is measured as the frequency of marriages among spouses that were living in the same parish. The total sum of marriages across the 8 parishes is higher than the number of marriages in the Fersina Valley; the reason may lie in classifying part of the parishes as being outside the Fersina Valley.

³¹ Casari (2007) found that a similar local contagion variable did not explain the adoption of community statutes but a regional contagion variable did.

6. Discussion

This section touches upon three issues related to inheritance regulations: (1) the implications for marriage strategies and genetic health, (2) the viability of a matrilineal system as an alternative way to close the community, and (3) the consequences of the exogenous removal of the charters regime by Napoleon at the beginning of the XIX century. These issues will be developed in the same order.

(1) The wave of adoptions of inheritance systems that restricted women's rights generated a progressive social closure of the communities, which reflected also on marriage patterns and, consequently, on societal genetic disorders.³² In the early modern period, one can observe a general trend of increasing endogamy in marriage at the community level within the Trentino communities. This statement is based on data from marriage registers of 17 parishes across a time span that varied among parishes and covers selected years between 1584 and 1800. Very small communities with high endogamy rates can exhibit more frequent genetic disorders. We consider a measure of inbreeding, i.e. the frequency of matrimonial dispensations for consanguinity, and a measure of endogamy, i.e. the frequency of marriages between spouses living in the same parish. The Fassa Valley showed an increasing trend in both measures during the entire 18th century. The two measures were positively correlated when considering 10-year intervals ($\rho=0.41$, $N=10$). We will use the frequency of marriages between spouses coming from the same parish as a proxy for risk of genetic disorders. Consider the case of the parishes in the Fersina Valley, for which one can compare the average endogamy levels in years 1584-1674 vs. years 1675-1774 (Figure 5). When controlling for parish size, we estimated a 7 percentage-point increase in the average level of endogamy before and after 1675.³³ This evidence points toward a progressive closure of the Trentino communities, which became more inward-looking when choosing marriage partners.³⁴ The restrictions in the right to inherit the commons were a likely cause of the high level of endogamy. This link is neatly documented for the village of Nonantola, which is in the north of Italy outside Trentino (Alfani and Munno, 2012). In 1584, the village changed to a patrilineal system: from that year on, women belonging to the original families who married a foreigner lost all their rights on the commons. The average endogamy rate within this group of original families changed from about 25% in 1574-80 to 45% in 1587-99. This shows a clear impact of the institutional change on marriage strategies.³⁵

³² The genetic effects of inbreeding in Italy are documented in Cavalli-Sforza *et al.* (2004). See Disertori *et al.* (2013) for a genetic study in Trentino on a recessive gene induced by genetic homogeneity, which causes serious cardiovascular pathology.

³³ For statistical reasons, in a large parish in terms of number of marriages there was a higher frequency of spouses who were both living in the same parish, which is our available measure of endogamy level in the Fersina valley. A tobit regression on the endogamy level [0,1] uses as independent variables the number of marriages in years 1584-1674 and 1675-1774, and a dummy variable for the 1584-1674 period. Thus, the total number of observations is 18 when considering both the 8 villages and the entire valley. The coefficient of the dummy is significant at the 5% level. When removing the observations of the valley ($N=16$), the coefficient is significant at the 10% level.

³⁴ The other endogamy data are from Cogolo, Borgo Valsugana, Predazzo, Levico, Pergine, Rovereto, Moena, Forno. There exist evidence of high endogamy in communities outside Trentino who moved from an egalitarian toward a patrilineal system, see Alfani and Munno (2012).

³⁵ Alfani and Munno (2012) compares last names of spouses with the list of families with membership rights (so called *Bocca Viva*). Nonantola was larger than most Trentino villages: in 1672 it had 3,253 inhabitants.

(2) Unlike gender-biased inheritance systems, egalitarian systems encourage population growth, especially in attractive communities. In Trentino, the institutional change shifted the society toward a patrilineal system for property rights on the common resources. An alternative path could have been a shift toward a matrilineal system, where men lost their rights. According to the interpretation in section 4, a matrilineal system would have accomplished the same results as a patrilineal system.

Patrilineal inheritance systems on collective resources have been the most widespread systems around the world. There exist, however, ethno-linguistic groups with matrilineal inheritance on common property land or customary land. We briefly describe three cases: central and southern Malawi, Sumatra, and the Garos ethnic group in North-Eastern India.

In the modern Malawi there are currently matrilineal societies, in particular the Chewa group, where the husband moves to the wife's village, and widowers or divorced men are expected to return to their natal village and lose the appropriation rights to the customary land in their wife's village. However, the family's key decision-maker concerning farm management still remains the husband (Hansen *et al.* 2005, Takane 2008).

In Sumatra the lineage land, particularly that for paddy fields, has traditionally been owned collectively by a group of akin members, and this group usually consisted of a grandmother, her husband, children, and grandchildren. This land is customarily bequeathed from mothers to daughters according to the decision of the lineage head, who is normally the maternal uncle. The share tenancy also follows that rule. Women are the guardians of lineage land and can oppose the transfer of land to non-family members. Men typically cultivate their wives' lands or, if unmarried, they work as farm laborers or emigrate to other areas to accumulate savings or establish a trade. However, as in the Malawi case, it is primarily husbands who make farm management decisions, even though they have no customary land rights (Quisumbing and Otsuka 2001, Quisumbing *et al.* 2001).

The old Garos' inheritance system is the most biased towards women among traditional societies. Until the turn of the XIX century, they practiced matrilineal inheritance. Commons' use rights were tied to residence and men were supposed to move to their wife's village. Men could not inherit property under any circumstance, and self-acquired property of men belonged to the closest female ascendant or descendant or, if married, to their wives. This female-biased system could also be explained by the fact that women played a major role in crop production and the gathering of forest produce.³⁶ However,

³⁶ Similarly, Fleck and Hanssen (2009) found that the inheritance system on private land in the ancient Sparta mirrored work specialization. Sparta based its agricultural production on occupied land by means of captive labor force, thus men could specialize in military activities rather than in agricultural activities. It was desirable then to employ women on the management of land. However, women could fill this role more efficiently only if they were given appropriate incentives in terms of property rights, in other words they had the right to receive by inheritance and to bequeath the land. Thus, women enjoyed important inheritance rights during the Spartan regime. However, once occupied lands were lost and women's fertility rate diminished because of their increased opportunity costs while working, women's rights began to be restricted.

although customary rules vested women with significant rights on land, the managerial control and the jural authority over land was vested in men (Agarwal 1994).³⁷

(3) The removal of the charters regime by Napoleon at the beginning of the XIX century brings about two considerations. First, unlike in modern states, within the charters regime each community had the right to locally establish and discretionally change inheritance rules on collective resources. This decentralized decision process might have locked the alpine communities in a patrilineal system. Consider for instance a community that decided on a possible transition from a patrilineal to an egalitarian inheritance system to improve the genetic health of the community. In some situations this change could have taken place if all other communities had been characterized by an egalitarian system but not if they were under a patrilineal system. The reason is that the costs in terms of per-capita collective wealth could have been much higher in the latter case. Hence, decentralized decisions on inheritance could have made it very difficult to switch from a patrilineal system to an egalitarian one. Second, this decentralized decision system was later replaced by a centralized government that did not allow local variations in inheritance rules. In Trentino, the Napoleon invasion of 1796 brought the charters experience to an abrupt end. It is difficult to assess whether this change improved the welfare of the region as a whole. In principle, it is possible that the centralized adoption of an inheritance system would be globally optimal. Besides the argument of genetic health, a universal egalitarian system could work as an insurance scheme against shocks hitting communities asymmetrically. In a long-run perspective, risk-averse individuals would prefer to live in a society without heavy costs of moving to other villages in case of exogenous shocks. However, as we have documented, with decisions decentralized at the community level an egalitarian inheritance system is likely to be evolutionarily unstable.

7. Conclusions

Over a period of six centuries, women in the Italian Alps gradually lost their property rights on the commons. This finding comes from a systematic study of inheritance systems on the commons in about three hundred villages between the 13th and 19th century. Thus, in the late medieval period women in the Alps had substantially more rights on collective properties than in the modern period.

We argue that this erosion in women's rights emerged as a protective measure to preserve the per-capita endowment of collective properties within a community. There exist economic factors behind this institutional change. Egalitarian inheritance systems on the commons were evolutionarily unstable because they allowed immigration from outside through marriage, which threatened the community common resources. Members of richer communities could react to preserve their share of commons by introducing a gender-biased inheritance system. A patrilineal system contributed to keep community size stable by limiting net migration through marriage. This interpretation relies on three key elements: the narrative in the original documents, the theoretical analysis of the economic incentives of

³⁷ Very few communities have adopted matrilineal inheritance systems. Sometimes the word matrilineal has been used with a different meaning, for instance in the case of the so-called uterine matrilineal systems in Western Ghana in which land is allocated to males and transferred intergenerationally to males; however this occurs through the members of the matriclan and women have access to land only through their husbands or fathers (Lastarria-Cornhiel 1997, Quisumbing *et al.* 2001, La Ferrara 2007).

inheritance systems, the quantitative models based on hundreds of villages. We report that the empirical evidence is coherent with our interpretation of the drivers of institutional change.

Discriminating women in property rights had deep impacts on the openness and endogamy levels of communities. For a given pattern of inheritance systems in the region, one can infer a level, direction, and type of migrations across communities. If all communities adopted an egalitarian system, one could expect a high level of internal migrations, going from the poor toward the rich communities in terms of per-capita collective wealth, and involving both men and women. If all communities adopted a patrilineal system, one could expect a low level of internal migrations, spread evenly across all communities, and involving mostly women. Over the long-term, introducing a gender-biased inheritance system to close the community to immigration generated a trade-off between preserving the per-capita collective wealth and undermining the variety in the community genetic pool. We observed a subset of Trentino communities and found that the level of endogamy in marriage steadily increased over the centuries, which may have weakened their genetic health.

At the regional level, this institutional change spread by contagion. Left alone under decentralized decision-making, communities engaged in a progressive closure towards outsiders. This process was characterized by path-dependency: the earlier decisions of some communities to change the inheritance system in favor of men effectively set the direction for the subsequent adjustments in other communities, leading the whole region toward a patrilineal system. If a community had switched to a matrilineal system in the middle of the process, that would not have been enough to steer the whole region toward a matrilineal system.

Once the process was completed, the communities were locked into a situation of women's discrimination and unable to move the region back to an egalitarian inheritance system. The lock-in effect springs from the decentralized decision-making over inheritance systems. In fact, a shift from a patrilineal to an egalitarian system could not have taken place through unilateral changes. Consider, as a thought experiment, an overnight decentralized change to an egalitarian system by all communities. This would not generate a new stable situation. On the contrary, it would trigger a decentralized process of adjustment toward a gender-biased system, either back to the patrilineal system or toward a matrilineal system. One way to restore gender equality would be to have a central state implementing a uniform egalitarian system on the whole region. After the Napoleonic invasion, a centralized state replaced the traditional political regime. Communities lost their autonomy of decision over the management of the commons and the local definition of property rights.

There are at least three open questions. One question is why the Trentino communities selected a patrilineal over a matrilineal inheritance system on the commons. A matrilineal system would have delivered the same consequences in terms of protection of community wealth. The communities may have preferred a patrilineal system because of social, cultural, or further economic reasons to be investigated. Another question is why communities did not adopt a primogeniture system, which would have further controlled population growth. A final question is about the role of a central state in ensuring gender equality in property rights. We leave these questions for future investigation.

In conclusion, the inheritance system on *common resources* turned out to be a cornerstone of a social and economic structure because of its consequences on migration patterns, genetic mixing, regional economic inequalities, population growth, and gender discrimination. The very long-term perspective of this study has allowed to capture the underground deep forces that shaped human societies over the centuries.

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