

Changing the Commons:  
Understanding Institutional Change in Seven Pre-Industrial Communities,  
Northern Spain, 14<sup>th</sup>-19<sup>th</sup> centuries.

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Winter 2014

Incomplete Draft.

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**Abstract.** In this paper we bring together Elinor Ostrom's stress on the 'grammar of institutions' and Avner Greif and other's historical approach to the study of institutions in order to analyze patterns of institutional change in a set of seven pre-industrial communities in northern Spain between the 14<sup>th</sup> and the 19<sup>th</sup> centuries. Our focus lies in the process of institutional change within a collective action setting. For much of the pre-industrial era, rural communities in Spain preserved important self-governance features, with village councils and neighbors assemblies in charge of coordinating and regulating interdependences among individuals in every realm of their economic and social life – not the least in the collective exploitation of pastures and forests. By collecting and codifying the regulations these communities produced over the centuries, we have built a large dataset that allows a systematic comparison across them and over time. A preliminary analysis of the patterns of institutional change as reflected in the regulations is presented here.

## Introduction

In the last years commons have regained much of the reputation they seemed to have lost. The publication of Elinor Ostrom's *Governing the Commons* in 1990 was followed by an immense amount of research on common-property regimes both by scholars and practitioners.

Contrasting with the dismal predictions derived from standard collective action theory (Olson,

Hardin), it has now become clear that, when institutions get the incentives right, individuals are able to cooperate for their common benefit. Rather than confirming the existence of a helpless tragedy, much of the intellectual efforts of the last two decades have been therefore focused on validating the so-called ‘design principles’ originally proposed by Ostrom in 1990. In this sense, the overall appropriateness of Ostrom’s seminal insights has been confirmed and continues to articulate much of the work done in collective action nowadays (Ostrom 2005).

In purely methodological terms, Ostrom’s contribution and much of the work on institutions that followed represented a milestone within the social sciences. In contrast with the stress on very stylized theories and macro-approaches common among many economists and political scientists, Ostrom, firmly building upon anthropological and sociological research, based her original conclusions on a more or less systematic comparison between in-depth case studies from a number of common-property regimes. In her later work (Ostrom 2005) she eventually emphasized the need to pay a higher attention to empirical evidence in order to articulate a ‘*grammar of institutions*’ able to account for the observed institutional diversity.<sup>1</sup> A close attention to the empirical evidence, a comparative case-study approach and a reliance on sources other than those purely quantitative are therefore the visible hallmarks of Ostrom and her disciples’ tools when studying institutions.

Much of the discussion surrounding Ostrom’s contributions underlies new approaches in the realm of institutional studies.<sup>2</sup> In this sense, the work by Avner Greif (2006) takes good note of the observed deficiencies in the early wave of neo-institutionalism to sketch an alternative approach. Besides the strong emphasis on game theory, a case-study approach and a comparative perspective are also present in his analysis of the institutional foundations of the late medieval commercial expansion. Contrasting with Ostrom, however, Greif stresses the need of a historical dimension in order to fully understand the nature and the impact of institutions on the economic and social realms. Rather a ‘compression of history’ (cf. Gareth Austin), an ‘expansion of history’ is absolutely necessary if we want to fully understand what are institutions and how they came to be what we observe now. Building on these premises, Greif has almost unavoidably baptised his approach as ‘*historical and comparative institutional analysis*’.<sup>3</sup>

In this paper we bring together these two strands of the institutionalist literature in order to approach the study of institutional design and institutional change in a set of seven pre-industrial Spanish communities. On the one hand, we rely upon the stress on a case-study approach and the concept of the ‘*grammar of institutions*’ as formulated by Elinor Ostrom, particularly in her late work. On the other, and in line with Greif’s work, we explicitly adopt a

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<sup>1</sup> In this sense, the award of the 2009 Nobel Prize in Economics to Ostrom was received with mixed feelings by some of the more orthodox economists, who often expressed their qualms about her methodological approach. This short press piece written by the growth economist Sala-i-Martin is illustrative at this respect:

<http://salaimartin.com/randomthoughts/item/101-la-tragedia-de-los-bienes-comunales.html>.

<sup>2</sup> For a brief but very illustrative review of the main criticisms received by the more quantitative, theory-focused, macro approach to the study of institutions, see the recent posts by Dietz Vollrath in his blog: <https://growthecon.wordpress.com/2014/11/18/the-skeptics-guide-to-institutions-part-1/> (and the following ones)

<sup>3</sup> Exaggeratedly or not, Barry Weingast has written that Greif’s analysis represents “*the next generation in the study of institutions*”.

long-term historical perspective aimed at highlighting changes in institutions rather than to consider them in a purely static way.

Blending history and institutions unavoidably leads to the realm of institutional change – how certain rules are replaced by others over time and which are the main drivers of this process. The focus of this paper therefore lies in institutional change in a collective action setting. As a matter of fact, a lack of proper attention to long-term dynamics has been identified as an important limitation in traditional studies on institutions for collective action – as Ostrom herself acknowledged. In this sense, the first contribution of this paper joins the efforts of recent scholars to approach the study of the commons from a more long-term perspective. Our second contribution is, however, fundamentally methodological. Our analysis of institutional change relies upon a large dataset of formal regulations from a number of different pre-industrial communities in northern Spain. This dataset has been partly built following the guidelines provided by Ostrom in her later work, particularly the idea of a ‘*grammar of institutions*’. To the best of our knowledge, this is the first dataset to implement such a detailed, systematic analysis for a large number of historical regulations. As detailed in the data section, historical regulations have been de-composed into their smallest unit of analysis and subsequently codified according to a number of dimensions. This methodology greatly expands possibilities for comparison both across communities and over time.

The geographical and temporal scope of our research lies in pre-industrial northern Spain between the 14<sup>th</sup> and 19<sup>th</sup> centuries. We identified a number of seven self-governed communities within the boundaries of the old kingdom of Navarra, one of the main historical polities of present-day Spain. Until the administrative changes of the 19<sup>th</sup> century, when the powers of municipal and supra-municipal bodies were substantially modified in favor of political centralization, many rural communities in pre-industrial Spain preserved important self-governance features. Interdependences between individuals in all the realms of economic and social life were therefore coordinated and regulated by neighbors themselves, rather in a top-down fashion by authorities alien to the communities. This basic feature allows us to put the spotlight on a clear example of an institution for collective action. The widespread presence of resources exploited in a collective way within these communities (pastures and meadows, forests) accentuated even further the collective nature of these pre-industrial settlements and the necessity of cooperation among their neighbors.

In the following sections we first introduce the sources and data used to build our dataset on historical regulations. Thereafter we present a preliminary characterization of the patterns of institutional change followed by our seven communities to point at the similarities and differences observed between them.

### **Institutional Change and the Collective Action**

[...]

## Data and Sources

The analyses presented in the following section are based on original documentary evidence mostly collected in the Archivo Real y General de Navarra (Royal and General Archives of Navarra). From the late medieval period onwards, the rural communities analyzed started to write down the rules that governed the economic and social life of their inhabitants. For a long time, these communities had probably resorted to informal, not explicit customs in order to articulate the cooperation needed to cope with the common interdependence. However, from the 11<sup>th</sup>-12<sup>th</sup> centuries and as a part of a pan-European phenomenon probably related to the extension of literacy, the reception of the classical legal tradition, growing competition for natural resources and state-building processes, communities all over western Europe, both urban and rural, started to make explicit which were those rules. Although these rules were frequently aimed at solving particular conflicts within the communities, the immediate driver behind this formalization process seems to have been more related with the need of reasserting communities' self-governance in front of external powers. As a consequence of all this, and until the self-governance of these communities was severely limited, the production of documentary evidence was common during the whole pre-industrial period.

After identifying a set of rural communities which managed to preserve their self-governance during most of the pre-industrial era, documentary evidence about their regulations was gathered through archival work. The formalization of regulations, decided by the village councils (or supra-village assemblies in case of inter-commons such as Lokiz or Roncal) and usually undertaken by an official notary with subsequent approval by the higher authorities, seems to have been a frequent activity in all the communities analyzed. As a consequence of this and the disparate survival of archival records, it is difficult to claim that we are able to capture the whole path of institutional change followed by the communities over time. **Table 1** shows the years for which regulations are available in each community. As observed, out of the presumably high number of regulations produced, only a few of them are available. Despite this, our claim is that they are enough to obtain an idea of how the regulations were modified, where the main stress was put and how different communities could compare with each other in terms of their formal institutional design.

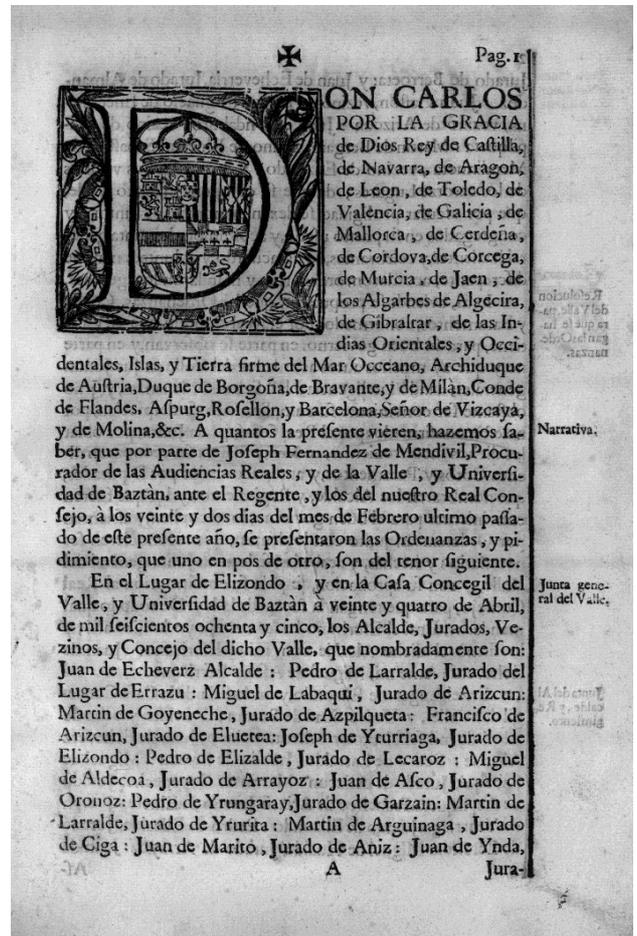
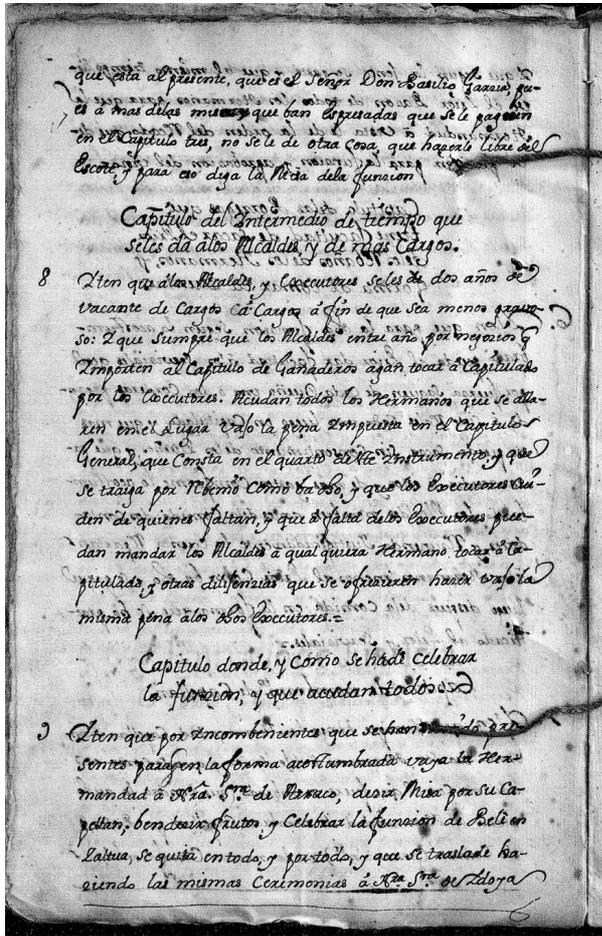
Most of the regulations gathered for this study look similar to the ones presented in **Figure 1**. In some cases, especially the earlier examples, regulations were just handwritten by the official notary in front of the village council or a few representatives. These documents, or subsequent copies made for administrative purposes in the royal administration, are similar to **Figure 1 (left)**, which shows part of the text of the regulations of the cattle farmers' guild of the village of Isaba, in the valley of Roncal during the first half of the eighteenth century. In some cases, printed copies, similar to the *ordenanzas* of the valley of Baztán in the year 1696 (in **Figure 1, right**), were also available.

**Table 1. Communities and years for which regulations are available.**

Community	Year
Ancin	1357
	1692
	1799
	1825
Murieta	1357
	1686
	1713
	1847
Sierra de Lokiz	1357
	1788
	1824
Iurre	1537
	1766
Etayo	1540
	1545
	1717
	1739
Valle de Roncal	1534
	1569
	1598
	1750
Olejua	1541
	1715
	1747

The regulations were not drafted according to a standard structure. However, their production by official notaries seems to have introduced some regularities in the way they were organized, making easier a comparison among them. In this sense, the *ordenanzas* usually start with an indication of the place and the date in which the meeting of the village council (or the supra-local assembly) took place, followed by a list of the attendees. Religious references as well as references to the higher authorities (i.e. the king of Navarra) were common in this preamble, which in many cases also contained some indications about the conflict or problems that the *ordenanzas* aimed to settle or solve. Beyond the rule content itself, these preambles usually provide clear insights on the underlying motivation of the regulations and, therefore, about which were the tensions driving institutional change in these communities. After the preamble, the rule content itself follows. Rather than in continuous writing, the rules are organized in different paragraphs, chapters or *capítulas*, with each paragraph usually dealing with a similar topic. The number of *capítulas* per *ordenanza* is obviously variable: some regulations are relatively long (e.g. Etayo in 1540 or Murieta in 1686) whereas other tend to be shorter (e.g. Ancín in 1799 or the valley of Roncal in 1598). In **Figure 1 (left)** it is possible to observe the organization of the text of the regulations in different paragraphs. *Capítulas* represent therefore the basic unit around which the text of each *ordenanza* is organized, and correspond to what we have called, for the purposes of our analysis, *original rule*. Each of these *capítulas*, despite dealing with a single topic, usually contain more than a single precept. If the interest of our analysis lies in the institutional structure of the communities and the set of incentives designed in order to organize cooperation, the basic locus of analysis should be then the smallest indecomposable unit ordering behavior (Ostrom 2005), rather than the *capítulas*, which simply represent a grouping of them according to the object of the regulation. For the purposes of our analysis,

we have therefore decomposed each of the *capitulas* or original rules into those smallest units, which we have called *individual rules*. Individual rules constitute then our basic unit of analysis.



**Figure 1. Left:** Text of the *ordenanzas* of the *ligallo de ganaderos* (cattle farmers’ guild) of Isaba, valle of Roncal, Navarra, first half of the 18<sup>th</sup> century. **Right:** Preamble of the *Ordenanzas, Cotos, y Paramentos* (regulations) of the valley of Baztan, Navarra, 1696.

A few examples of the relationship between *capitulas* (or original rules) and individual rules can be illustrative. The fourteenth paragraph of the regulations that the community of Etayo passed in June 1717 state that:

*‘All the neighbours of this said place are allowed to have, for grazing its term, as much work cattle they want, without limit to the number of work cattle.’*

*[‘Que todos los vecinos de este dicho lugar puedan tener para gozar sus términos todo el ganado de reja que cada uno quisiere sin que en el ganado de reja se ponga limite ni numero.’]*

For the purposes of our analysis, this text represents an original rule, since it is one of the paragraphs in which the original text of the *ordenanzas* is divided. In this original rule, however, only one individual rule (i.e the permission to put to graze within the district of Etayo as much as work cattle as the neighbours want) can be distinguished. In this case, the overlap between the original and the individual rule is complete, with a relationship one-to-one between them.

In June of 1598 the general assembly of the Valley of Roncal passed a set of *ordenanzas*, whose first paragraph indicated:

*'First of all, they established that the present and future guards of the villages of the valley shall be appointed as it is the custom; they are obliged to watch and take care of the cultivated fields, with the required care and diligence, and also of the grass of the grain fields; and they shall report to the field owner the damages made on his grain fields; on pain, on the contrary, of the payment of the damage made both inside and outside the grain fields, in money or in wheat according to the will of the damaged party, by All Saints' Day each year. And the officers, without permission from a judge, are not allowed to compel anyone to take an oath.'*

*['Primeramente, asentaron por coto y paramentos y ordenanza observadera, los dichos procuradores y diputados, que los guardas que al presente son y serán, en cada un año, de las villas del dicho valle, que seran nombrados por la orden y costumbre que se a tenido en las dichas villas asta aqui, sean tenidos y obligados de guardar y guarden los dichos sembrados, con el cuidado y diligencia que se requiere, y lo propio en la yerba del dicho panificado; y de dar cuenta, con pago del daño que se hiziere en los panes al dueño de la heredad cuyo fuere el pan, so pena que si asi no lo hizieren y no los guarden los dichos bayles, paguen el dicho daño quanto querra que sea hecho en los panificados como fuera dellos, en trigo o en dinero, a voluntad de la parte dañada, para el dia y fiesta de Todos Santos en cada un año o antes diez dias que quisieren. Y que los dichos bayles, sin autoridad de juez, no puedan compeler a juramento a nengun.']*

Again, this text represent a single original rule. Contrary to the previous example, however, here the relationship between the original rule and the individual rules is not one-to-one but one-to-four. In other words, within the text of this original rule, four different basic unit of analysis, each of them comprising a different precept and therefore different incentives, can be differentiated. Specifically, the four different individual rules are: (1) the obligation of appointing the guards according to the established custom, (2) the obligation of the guards to watch the grain and the grass fields, (3) the obligation of the guards to report to the field

owner the damages caused in his field and (4) the prohibition of taking an oath to anyone without the permission of a judge.

A final example is provided by the *ordenanzas* passed by the village council of Olejua in October 1542. The seventh paragraph or *capítulo* of these regulations indicates that:

*'It was also agreed in the said council that from now onwards no neighbour or dweller in the site of Olejua shall bring during the annual festivities any flock aside from the flocks of the said council except when the flock could follow the flocks of the said council, and that flock shall have its own guard, on pain of one tarja each time'*

*['Otrosí fue acordado en el dicho concejo que de aquí adelante ningún vecino ni habitante en el lugar de Olexoa en los días de fiesta de cada un año no puedan traer ningún ganado apartado de los ganados del dicho concejo, si no sea ganado que no pueda seguir a los ganados del dicho concejo, y que el tal ganado traiga su guarda, so pena de una tarja por cada vez.]*

In this case, a single original rule contains two different individual rules: (1) the prohibition of introducing separate individual flocks during the annual festivities and (2) a permission to introduce separate flocks during the festivities upon the fulfillment of certain conditions.

Once the disaggregation of all the original rules into their respective individual rules was carried out, we have available for our analysis 1,213 individual rules from our seven different communities. **Table 2** shows the number of original and individual rules for each pair community-year.

For the purposes of the analysis, all the identified individual rules have been codified according to a number of categories pre-defined in a codebook (available upon request). This process of codification partly relies on the insights of Elinor Ostrom, who provided some broad guidelines for institutional analysis in her later work. The codification of the individual rules is therefore aimed at identifying and making explicit the main 'building blocks' underlying an individual rule in order to facilitate comparisons across communities. Broadly speaking, the codification paid attention to two main aspects: the rules themselves and the sanctions attached to them. Since here we are not studying sanctioning, we leave the details about the way sanctions were codified out of this study. Our focus in this paper lies exclusively in the basic elements which characterize each individual rule. Beyond the general identification of the individual rule (community, dates), these underlying elements refer to the type of rule, the rule form, the type and main features of the resource the rule seeks to regulate (location, amount, unit, season, technology), the governance or management activity the rule refers to, and the recipient of the rule.

**Table 2. Number of Original and Individual Rules per Community and Year.**

Community	Year	# Original Rules	# Individual Rules	Ratio IR/OR
Ancin	1357	1	11	11
	1692	26	61	2,35
	1799	5	10	2
	1825	33	66	2
<b>Total Ancin</b>		<b>65</b>	<b>148</b>	
Murieta	1357	1	10	10,00
	1686	50	98	1,96
	1713	8	15	1,88
	1847	35	80	2,29
<b>Total Murieta</b>		<b>94</b>	<b>203</b>	
Sierra de Lokiz	1357	44	92	2,09
	1788	15	27	1,80
	1824	6	7	1,17
<b>Total Sierra de Lokiz</b>		<b>65</b>	<b>126</b>	
Iurre	1537	22	37	1,68
	1766	11	40	3,64
<b>Total Iurre</b>		<b>33</b>	<b>77</b>	
Etayo	1540	54	79	1,46
	1545	24	36	1,50
	1717	46	122	2,65
	1739	40	106	2,65
<b>Total Etayo</b>		<b>164</b>	<b>343</b>	
Valle de Roncal	1534	7	21	3,00
	1569	21	44	2,10
	1598	3	8	2,67
	1750	46	133	2,89
<b>Total Valle de Roncal</b>		<b>77</b>	<b>206</b>	
Olejua	1541	29	53	1,83
	1715	21	42	2,00
	1747	6	15	2,50
<b>Total Olejua</b>		<b>56</b>	<b>110</b>	
<b>TOTAL ALL</b>		<b>554</b>	<b>1213</b>	

More specifically, the five dimensions of institutional change analyzed in the following section (regulation level, deontic structure and coercive orientation, resource orientation, non-operational orientation and community involvement) build upon the information provided by specific categories. Rule category captures which is the main set of activities the rule refers to. It indicates whether an individual rule refers to access, use, management or governance activities. Rule form indicates whether an individual rule, in order to make explicit the incentive to behavior it contains, adopts the form of a permission, an obligation, a prohibition, an appointment, a rejection or a more general, partly residual form. Use General and Specific capture, with different degrees of detail, the resource the individual rule seeks to directly regulate (animals, vegetation, topsoil or subsoil resources, water, infrastructure, borders or housing). For the purposes of our analysis, only the individual rules whose rule category has been identified as use has been subsequently codified according to the Use General and Specific categories. Governance General and Specific capture the specific management or governance realm (administration, finance, maintenance, management, meetings and monitoring) to which an individual rule relates to. Only the individual rules whose rule

category is different from use has been codified according to these categories. Finally, Party Category and Subcategory identifies the main recipient of the individual rule (everyone, members, non members, officials, others), the group of individuals whose behavior the rule seeks to incentive or constrain.

Again, some examples can help to clarify these categories. In the case of the fourteenth *capítulo* of the *ordenanzas* passed in Etayo in June 1717 (see above), the individual rule identified has been codified as a permission (rule form) relative to use (rule category), animals in particular (use general), aimed at members (party category). In the case of the first paragraph of the regulations of Roncal from June 1598, the four individual rules present the following features: (1) obligation relative to governance, appointment of officials in particular, aimed at the officials of the community, (2) obligation relative to governance, inspections in particular, aimed at the officials, (3) obligation relative to governance, monitoring in particular, aimed at the officials, and (4) prohibition relative to governance, monitoring specifically, aimed at the officials. As indicated, the seventh chapter of the regulations of Olejua in October 1542 contains two individual rules, which have been codified according to the following structure: (1) a prohibition related to use, animals specifically, aimed at everyone (neighbours or members *strictu sensu* but also dwellers) and (2) a permission related to use, animals specifically, aimed at everyone.

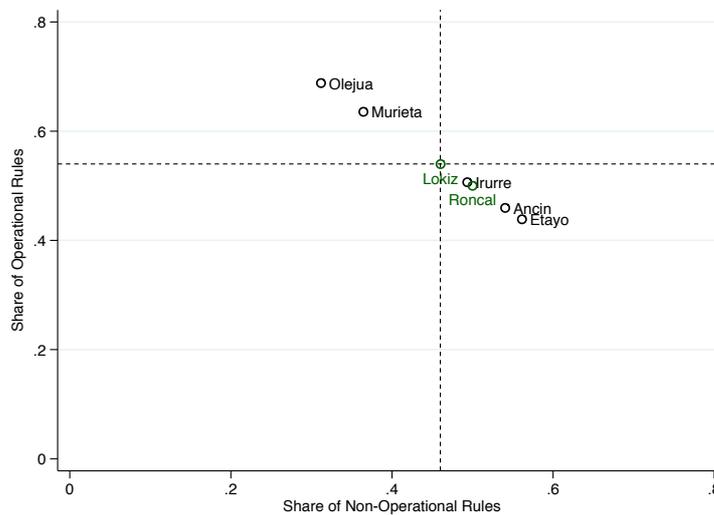
### **Preliminary Analysis**

The first dimension of institutional change that our data allow to analyze is the **regulation level**. The distinction between operational, collective-choice and constitutional rules has been clearly stated in Elinor Ostrom's work. Whereas operational rules are designed to provide *direct* incentives to the users regarding the exploitation of the resources, collective-choice and constitutional rules deal with the design of the managerial and governance arenas in which operational rules are designed, monitored and enforced. In this sense, the appointment of officials, the indication of their duties and wages, the procedures to follow during the community's meetings or sanctioning are not strictly related to the exploitation of the resources but they are essential to the satisfactory compliance of the operational rules. Collective-choice and constitutional rules can be then regarded as *indirectly* providing incentives to the exploitative activities of the community, and it is the contrast between direct and indirect incentives that our dimension of regulation level aims to capture. Admittedly, when paying attention to the regulation level, the classification of the *ordenanzas* in our dataset has not relied explicitly in Ostrom's categories but in the differentiation between access, use, management and governance rules. Although the match is not entirely perfect, the simple distinction between use (or operational) and non-use (or non-operational) rules does provide insights at this respect.

**Figure 1** displays where each of our communities locates in terms of regulation level (**Table 1** present disaggregate figures). A clear contrast seems to have existed between communities such as Murieta or Olejua, on the one hand, and Etayo, Ancin or Roncal, on the other. Admittedly, change in operational rules always represented at least half of all the rule changes identified. Given the nature of these communities and the importance that agricultural and

pastoralist activities had during pre-industrial times, permanent, close attention to the incentives of users remained always necessary to adjust the resource demand with the more uncertain, fragile supply. This said, the patterns of institutional change followed by certain communities seem to have been considerably different. Murieta and particularly Olejua seem to have been more concerned with getting the operational rules right (around 65 per cent of all their regulations relate to this), whereas attention to the managerial and governance levels was relatively lower (around 30 per cent). The opposite was probably the case in places such as Etayo and Ancin, where around half of the rules were concerned with the non-operational level. Irurre, for its part, was a more balanced case, somehow halfway between the patterns just observed: half of its rules had an operational nature and around 40 percent dealt with the non-operational level.

**Figure and Table 1. Regulation Level.**

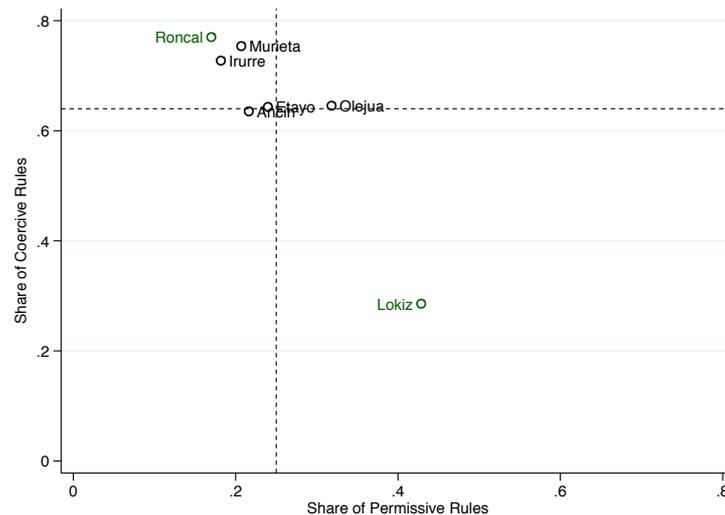


	Ancin	Murieta	Lokiz	Irurre	Etayo	Roncal	Olejua	Av.	Std.
<i>Use</i>	0,46	0,64	0,54	0,51	0,44	0,50	0,69	0,54	0,09
<b>Operational</b>	<b>0,46</b>	<b>0,64</b>	<b>0,54</b>	<b>0,51</b>	<b>0,44</b>	<b>0,50</b>	<b>0,69</b>	<b>0,54</b>	
<i>Access</i>	0,04	0,02	0,01	0,03	0,01	0,03	0,01	0,02	0,01
<i>Governance</i>	0,24	0,09	0,10	0,32	0,31	0,30	0,15	0,21	0,1
<i>Management</i>	0,25	0,24	0,09	0,06	0,25	0,15	0,12	0,16	0,07
<i>Other</i>	0,01	0,01	0,27	0,08		0,02	0,04	0,07	0,1
<b>Non Operational</b>	<b>0,54</b>	<b>0,36</b>	<b>0,46</b>	<b>0,49</b>	<b>0,56</b>	<b>0,50</b>	<b>0,31</b>	<b>0,46</b>	
<b>Total Rules</b>	148	203	126	77	342	206	109		

A second dimension has to do with the **deontic structure** of the rules. As Ostrom and other authors have stressed, the rules regulating behavior can embody different deontic elements. Whereas a specific rule can indicate an imperative behaviour regarding an action or an omission, others can show a permissive nature, leaving to individuals the ultimate choice regarding to follow a particular course of action or not. The first distinction regarding the

deontic structure of the rules is therefore a distinction between coercive (i.e. must, cannot) and permissive rules (i.e. can, to be allowed to). **Figure 2** displays where each of our seven communities is situated with respect to this dimension (the figures are presented in **Table 2**). In general, coercive rules seem to have been used much more often in order to regulate the community behavior: except in the particular case of Lokiz, coercive rules always represented above 60 percent of all the rule changes identified. Permissive rules, on the contrary, ranged usually ranged between 20-30 percent approximately. This said, whereas communities such as Ancin and Etayo seem to have been quite balanced in their distribution of rules, others such as Roncal, Murieta or Irurre paid relatively higher attention to coercive elements. Lokiz, for its part, seems to have been a rather specific case, with a relatively higher proportion of permissive rules at the expense of more coercive ones.

**Figure and Table 2. Deontic Orientation.**

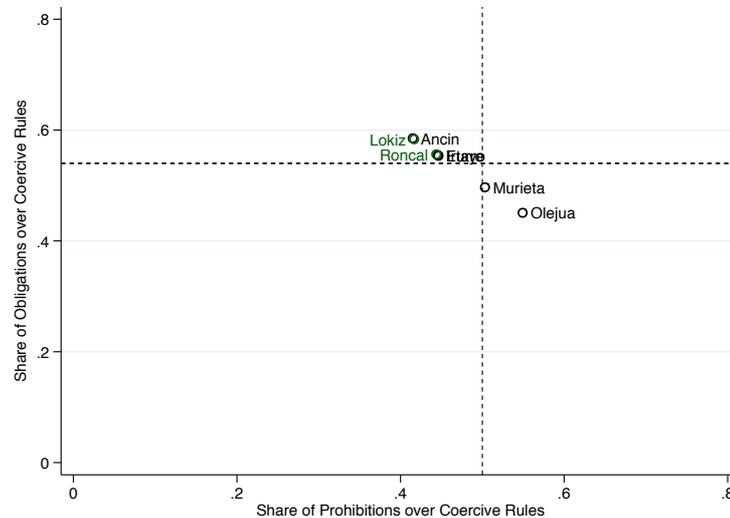


	Ancin	Murieta	Lokiz	Irurre	Etayo	Roncal	Olejua	Av.	Std.
<i>Obligation</i>	0,37	0,37	0,17	0,40	0,36	0,43	0,29	0,34	0,09
<i>Prohibition</i>	0,26	0,38	0,12	0,32	0,29	0,34	0,35	0,29	0,09
<b>Coercive</b>	<b>0,64</b>	<b>0,75</b>	<b>0,29</b>	<b>0,73</b>	<b>0,64</b>	<b>0,77</b>	<b>0,65</b>	<b>0,63</b>	
<i>Permission</i>	0,22	0,21	0,43	0,18	0,24	0,17	0,32	0,25	0,09
<b>Permissive</b>	<b>0,22</b>	<b>0,21</b>	<b>0,43</b>	<b>0,18</b>	<b>0,24</b>	<b>0,17</b>	<b>0,32</b>	<b>0,25</b>	
<i>Appointment</i>	0,09			0,01	0,05	0,00	0,01	0,03	0,04
<i>Rejection</i>		0,00			0,02			0,01	0,01
<i>General</i>	0,05	0,03	0,29	0,08	0,05	0,04	0,03	0,08	0,03
<b>Total</b>	148	203	126	77	342	206	109		

A further distinction within rules with a coercive nature can be made, differentiating between those rules framed as obligations (i.e. must) and those framed as prohibitions (i.e. cannot, must not). **Figure 3** presents the results. In general, the distribution of coercive rules between prohibitions and obligations was pretty balanced in the all the communities, with around half

each. Just Olejua and Murieta seems to have been a bit biased towards prohibitions in comparison with the other communities.

**Figure 3. Coercive Orientation.**



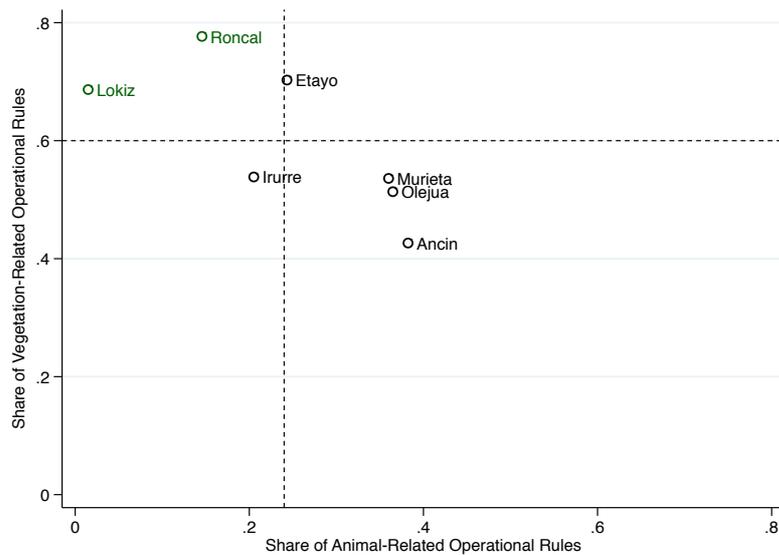
The third dimension of institutional change has to do with the **resource orientation**, with how much emphasis was put in which resources over time. Contrasting levels of attention to specific resources can be informative about the dissimilar significance that certain activities, and not others, could have had within the community or about which resources and activities were, as a consequence of a fragile supply or a relatively higher demand, source of conflict or stress over time. In pre-industrial communities such as the ones studied here, characterized by a mixed agricultural system where agriculture was supplemented with sheep (and more marginally goat and pig) farming, the interdependence between both activities was always a source of concern. Livestock farming was indispensable for agricultural production as a source of nutrients, with the latter largely contributing, in turn, to the feeding of the cattle. But spillovers between economic activities frequently had a less beneficial nature. Intentionally or not, cattle often trespassed cultivated fields, ruining the harvest or damaging the cultivated areas. This problem was probably more significant in those communities, such as Roncal, where cattle farming had a transhumant nature, with grazing alternating between summer and winter pastures. Even when users respected the closed season, they frequently put to graze more cattle than it was actually allowed, increasing the levels of environmental stress and giving rise to conflicts within the communities. Concerns for finding the right balance between these activities (fostering positive spillovers while mitigating negative ones) lay at the basis of much, probably most, of the regulatory effort of the communities over time.

That the main source of concern lay at the interaction between agriculture and livestock farming is evident from the data (see **Table 4**). On average, more than 80 percent of all the operational rules had as main objective the regulation of either vegetation (basically crops or grass) or animals (sheep and goats). Overall, the attention paid to other resources was scarce, pointing then to a clear source of concern and conflict within all the communities. This

generalized absence of attention to resources other than vegetation and animals makes even more evident the important role that specific resources must have had in certain communities. Notice, for example, the importance that land for cultivation seems to have had in Irurre, water supply or housing in Lokiz, fences in Ancin or overall infrastructure in Roncal. The indisputable fact is, however, that the balance between agriculture and livestock farming represented the main source of conflict and concern. This said, whereas changes relative to the protection of crops and grass lands usually always represented more than half of all the changes in operational rules, relative attention to livestock seems to have diverged between communities. **Figure 4** displays this trade-off. In communities such as Lokiz or Roncal regulation relative to animals is hardly found, with most of the changes focused on either crop (Roncal) or grassland (Lokiz). In Ancin, Olejua or Murieta, specific concern over animals (fundamentally sheep and goat livestock) is much more present, with around 40 per cent of changes related to this issue. Cases like Etayo or Irurre seem to have lay somewhere in between this two extremes, with their patterns of changes relatively in line with the average values.

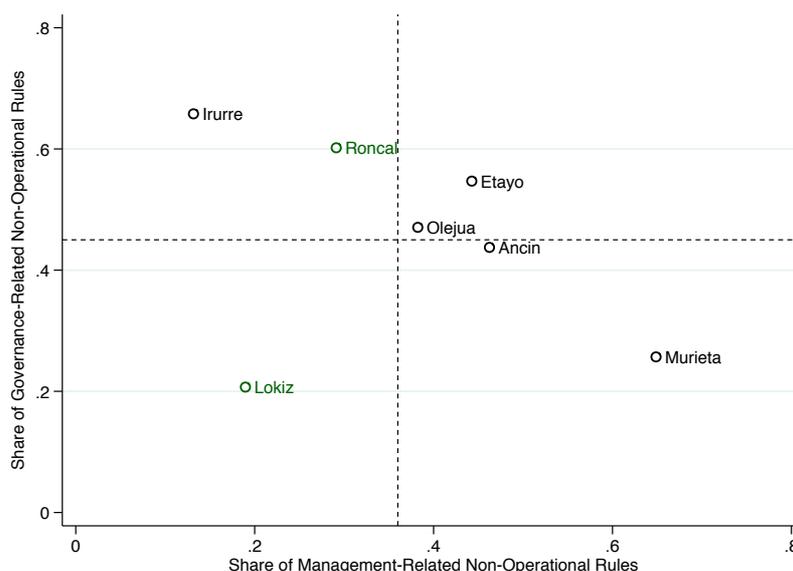
**Table and Figure 4. Resource Orientation.**

	Ancin	Murieta	Lokiz	Irurre	Etayo	Roncal	Olejua	Av.	Std.
<b>Vegetation</b>	<b>0,43</b>	<b>0,54</b>	<b>0,69</b>	<b>0,54</b>	<b>0,70</b>	<b>0,78</b>	<b>0,51</b>	<b>0,6</b>	<b>0,13</b>
<i>Crops and Stubble</i>	0,16	0,25		0,23	0,19	0,58	0,34	0,29	0,15
<i>Timber and Wood</i>	0,04	0,02	0,13	0,03	0,06	0,01		0,05	0,04
<i>Vineyards</i>	0,06	0,03		0,05	0,09	0,01	0,03	0,05	0,03
<i>Grass</i>	0,03	0,18	0,52	0,23	0,30	0,15	0,09	0,22	0,16
<i>Acorn</i>	0,13	0,05	0,03		0,03			0,06	0,05
<i>Other</i>				0,03	0,02		0,05	0,03	0,02
<b>Topsoil Resources</b>		<b>0,04</b>	<b>0,03</b>	<b>0,15</b>	<b>0,02</b>		<b>0,07</b>	<b>0,06</b>	<b>0,05</b>
<i>Land</i>		0,02		0,13	0,02		0,07	0,06	0,05
<i>Manure</i>		0,02	0,03					0,02	0,01
<b>Animals</b>	<b>0,38</b>	<b>0,36</b>	<b>0,01</b>	<b>0,21</b>	<b>0,24</b>	<b>0,15</b>	<b>0,36</b>	<b>0,24</b>	<b>0,14</b>
<i>Goats and Sheep</i>	0,22	0,18		0,10	0,14	0,06	0,15	0,14	0,06
<i>Cows</i>	0,03	0,02	0,01		0,05	0,02	0,04	0,03	0,01
<i>Pigs</i>	0,06	0,06		0,08	0,01		0,03	0,05	0,03
<i>Mules, Horses and Oxen</i>	0,03	0,03			0,03		0,01	0,02	0,01
<i>Other and Unspecified</i>	0,04	0,06		0,03	0,01	0,07	0,14	0,06	0,04
<b>Water</b>	<b>0,01</b>	<b>0,01</b>	<b>0,15</b>		<b>0,01</b>		<b>0,03</b>	<b>0,04</b>	<b>0,06</b>
<b>Housing</b>	<b>0,01</b>	<b>0,02</b>	<b>0,06</b>				<b>0,01</b>	<b>0,03</b>	<b>0,02</b>
<b>Borders</b>	<b>0,13</b>	<b>0,02</b>	<b>0,03</b>	<b>0,05</b>	<b>0,01</b>	<b>0,03</b>		<b>0,05</b>	<b>0,04</b>
<i>Right of Way</i>	0,01							0,01	
<i>Border Setting</i>	0,03		0,03	0,05	0,01	0,02		0,03	0,01
<i>Fences</i>	0,09	0,02				0,01		0,04	0,04
<b>Infrastructure</b>	<b>0,03</b>	<b>0,02</b>	<b>0,03</b>		<b>0,01</b>	<b>0,05</b>	<b>0,01</b>	<b>0,02</b>	<b>0,01</b>
<i>Roads</i>	0,03	0,02	0,03		0,01	0,03	0,01	0,02	0,01
<i>Other</i>					0,01	0,02		0,01	0,01
<b>Unspecified and Other</b>				<b>0,05</b>		<b>0,03</b>		<b>0,04</b>	<b>0,02</b>
<b>Total</b>	68	125	67	39	148	103	74		



Closer insights regarding the organization of the non-operational level are obtained by looking at how much attention communities put on either the day-to-day management or the governance arenas. Both aspects, management and governance, define the general framework in which the exploitation of the economic resources is carried out.. However, whereas management activities relate to the more daily tasks of monitoring, sanctioning and collective labor performed by both the members and the officials of the community, governance activities fall exclusively on the officials and are more related to the political arena in which operational rules are modified. Our fourth dimension of institutional change, **non-operational orientation**, captures this aspect (**Figure 5**, for the specific figures see **Table 1**). In contrast with the two previous dimensions, variation between communities seems to have been considerably higher at this respect. A community such as Iurre seems to have been much more concerned with the development and refinement of its governance regime, with around 30 per cent of all its rules devoted to changes in this realm and hardly any related to management. At the opposite end, Murieta paid higher attention to the regulation of management (around 25 per cent of all its rule changes) with less than 10 per cent related to governance. In certain communities such as Lokiz or even Olejua attention to both the management and the governance levels seems to have relatively scarce (around 10-15 per cent), probably pointing at a certain underdevelopment of the collective-choice and constitutional infrastructure. Others, however, put high attention at both levels, as it can be observed for Etayo and maybe also Ancin (around 25-30 per cent).

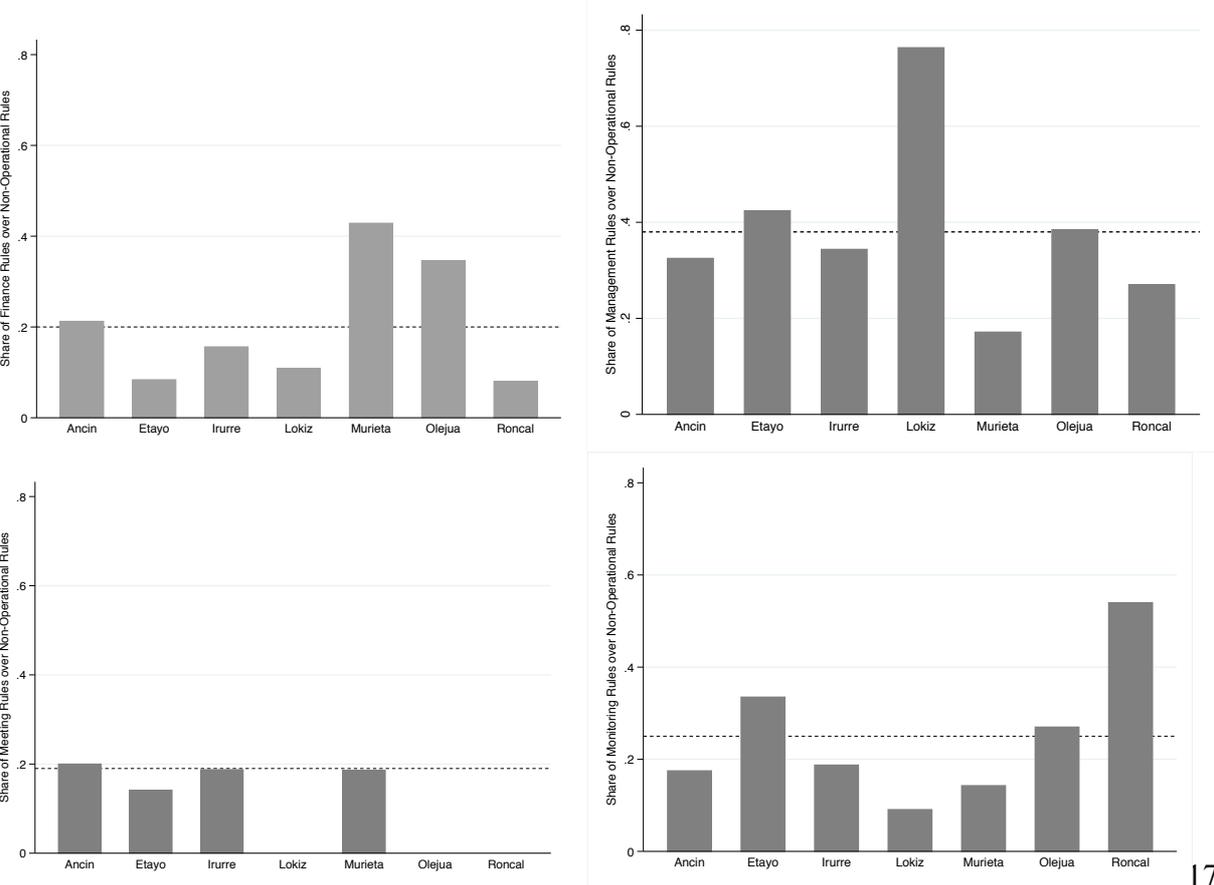
**Figure and Table 5. Non-Operational Orientation.**



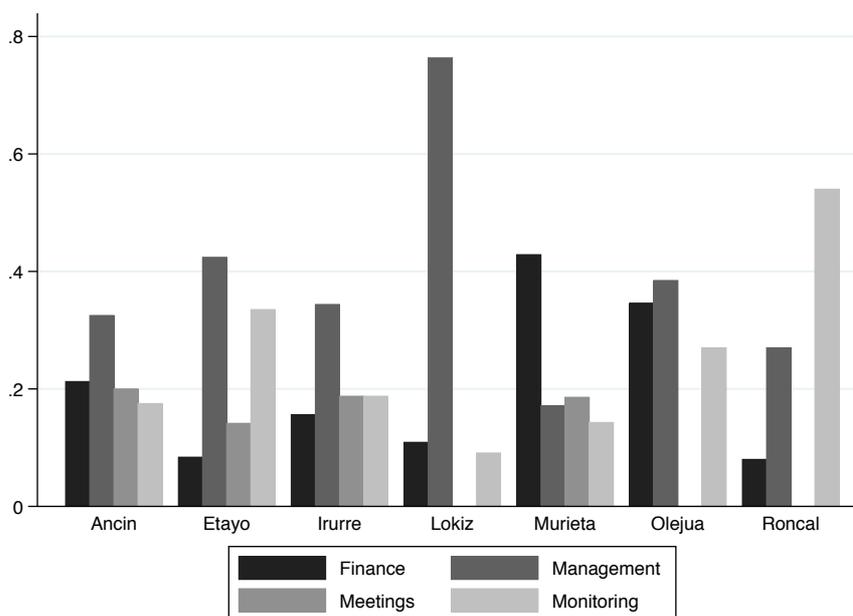
	Ancin	Murieta	Lokiz	Irurre	Etayo	Roncal	Olejua	Av.	Std.
<b>Access</b>	<b>0,08</b>	<b>0,04</b>		<b>0,09</b>	<b>0,01</b>	<b>0,09</b>	<b>0,04</b>	<b>0,06</b>	<b>0,03</b>
<i>Access Rights</i>	0,03	0,03		0,09	0,01	0,09	0,04	0,05	0,03
<i>Admission Fees</i>	0,06	0,01						0,04	0,03
<i>Other</i>		0,01						0,01	
<b>Administration</b>	<b>0,01</b>	<b>0,01</b>	<b>0,04</b>	<b>0,03</b>	<b>0,01</b>			<b>0,02</b>	<b>0,01</b>
<i>Registration Regulation</i>		0,01	0,02	0,03				0,02	0,01
<b>Finance</b>	<b>0,21</b>	<b>0,43</b>	<b>0,11</b>	<b>0,16</b>	<b>0,08</b>	<b>0,08</b>	<b>0,35</b>	<b>0,2</b>	<b>0,13</b>
<i>Governance Fees</i>			0,02	0,03		0,01		0,02	0,01
<i>User Fees</i>		0,04	0,02		0,01		0,08	0,04	0,03
<i>Payment of Debts</i>	0,01			0,09	0,02	0,02	0,12	0,05	0,05
<i>Taxes</i>		0,01			0,03		0,04	0,03	0,01
<i>Wage Officials</i>	0,18	0,31			0,01	0,04		0,13	0,14
<i>Other</i>	0,01	0,04		0,03	0,02	0,01	0,12	0,04	0,04
<b>Maintenance</b>		<b>0,01</b>						<b>0,01</b>	
<i>Procedures</i>	0,01							0,01	
<i>General</i>		0,01						0,01	
<b>Management System</b>	<b>0,33</b>	<b>0,17</b>	<b>0,76</b>	<b>0,34</b>	<b>0,42</b>	<b>0,27</b>	<b>0,38</b>	<b>0,38</b>	<b>0,19</b>
<i>Appointing Officials</i>	0,21	0,06	0,04	0,09	0,10	0,05	0,23	0,11	0,08
<i>Jurisdiction</i>	0,04	0,03	0,62	0,09	0,10	0,07		0,16	0,23
<i>Regulations and General Tasks</i>	0,08	0,09	0,09	0,16	0,21	0,09	0,12	0,12	0,05
<i>Other</i>					0,02	0,05		0,03	0,02
<b>Meetings and Convocation</b>	<b>0,20</b>	<b>0,19</b>		<b>0,19</b>	<b>0,14</b>			<b>0,19</b>	<b>0,03</b>
<i>Convocation</i>	0,08	0,07		0,03	0,08			0,06	0,02
<i>Procedures</i>	0,11	0,11		0,16	0,04			0,11	0,05
<i>Other</i>	0,01				0,02			0,02	0,01
<b>Monitoring</b>	<b>0,18</b>	<b>0,14</b>	<b>0,09</b>	<b>0,19</b>	<b>0,34</b>	<b>0,54</b>	<b>0,27</b>	<b>0,25</b>	<b>0,15</b>
<i>Inspections</i>	0,01		0,02	0,03	0,06	0,10		0,04	0,04
<i>Sanctioning</i>	0,11	0,07	0,07	0,13	0,24	0,20	0,04	0,12	0,07
<i>General</i>	0,05	0,07		0,03	0,02	0,18	0,23	0,1	0,09
<i>Other</i>					0,02	0,06		0,04	0,03
<b>Other</b>						<b>0,01</b>		<b>0,01</b>	
<b>Total</b>	<b>80</b>	<b>70</b>	<b>55</b>	<b>32</b>	<b>191</b>	<b>96</b>	<b>26</b>		

A closer look at the specific matters with which communities were concerned at the non-operational level reveals further differences between them (Table 5). In general, rule changes related to access, administration and maintenance seem to have been relatively scarce. In line with the few changes rules related to access (see above), only in Roncal and Irurre changes of rules related to access rights seem to have been an issue; the same is observed with admission fees in Ancin. Regulations strictly related to the management of the community (appointment of officials, jurisdiction over conflict, general tasks) usually represented an important share of all non-operational changes, followed by financial matters (payment of tax and debts, officials' wages, governance and use fees) and monitoring (specifications regarding the inspections and the sanctioning). Changes in regulations relative to the convocation of meetings and the procedures to follow during their celebration represent also a relatively important category, especially in places such as Murieta, Ancin and Irurre. But beyond these similarities, differences between the communities arise regarding the relative importance of these categories. Figures 6 and 7 show the relative weight of each of these four categories (per specific category and jointly respectively). When it comes to management, Lokiz and Murieta stand out, the former because of its relatively higher attention and the latter as a consequence of the low share of non-operational rules devoted to this aspect. Regarding financial matters, Murieta and Olejua seem to have paid relatively higher attention than the rest. In terms of monitoring Roncal displays higher relative weight whereas in Lokiz the situation is quite the contrary. Finally, regarding meetings, the absence of specification in Lokiz, Olejua and Roncal should be stressed.

**Figure 6. Main Non-Operational Areas.**

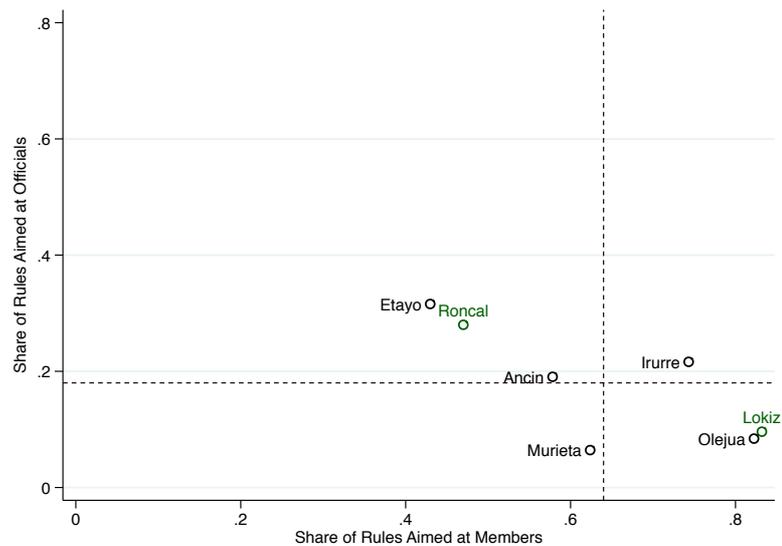


**Figure 7. Main Non-Operational Areas.**



Finally, our data also allow us to measure who were the main recipients of the rule changes identified. We can identify this dimension of institutional change as **community involvement**. As Ostrom has indicated, each of the obligations, prohibitions or permissions that constitute a rule is addressed at a specific party. The incentives partly embodied within a single rule are always directed at individual or groups of individuals whose behavior wants to be either fostered or inhibited. In our particular cases, for example, the prohibition of grazing in the crop or grasslands could be directed to any person, member of the community or not. In those cases in which access to the economic resources was more contested, with non-members trying to benefit from their exploitation at the expense of members, rules were probably more often aimed at non-members in comparison with other cases. However, evident limitations in the jurisdictional powers of the authorities of a given community made usually difficult to expand coercive powers beyond membership. The crucial distinction in terms of the rule recipients seems to have therefore lie within the community itself, with the distinction between officials and the rest of members. A higher number of rule changes aimed at officials is probably suggestive of both a well-developed non-operational level and the higher overall responsibility of the officials in the satisfactory performance of the community. By contrast, less attention to officials can be indicative of the existence of certain underdevelopment at the management and governance levels, with the subsequent need of a higher involvement of members themselves in order to secure sustainable economic exploitation.

**Figure 8 and Table 6. Community Involvement.**



	Ancin	Murieta	Lokiz	Iurre	Etayo	Roncal	Olejua	Roncal	Av.
<i>Everyone</i>	0,22	0,28	0,04	0,04	0,25	0,21	0,09	0,21	0,16
<i>Members</i>	0,58	0,62	0,83	0,74	0,43	0,47	0,82	0,47	0,64
<i>Non Members</i>	0,01	0,03	0,02	0,00	0,01	0,03	0,00	0,03	0,03
<i>Officials</i>	0,19	0,06	0,10	0,22	0,32	0,28	0,08	0,28	0,18
<i>Other</i>	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,01
<b>Total</b>	147	202	125	74	342	204	107	204	

**Figure 8** plots where the communities are located in terms of the so-called community involvement dimension as observed in their rule changes (figures are presented in **Table 6**). In general, rule changes aimed at members of the community never represented less than 40 percent of all the rule changes (with an average of 64), whereas those aimed at official never were beyond 30 percent (average 18). That the main source of concern, and the main responsibility in the performance of the community, regarding individual participation lay in the members themselves seems then clear. In the end, exploitative activities were performed by the members themselves and the limited number of officials in relation to them must have made necessary to place the regulatory stress directly on the behavior of members rather than on indirectly by providing incentives to the officials' behavior. This said, a clear contrast seems to have existed, however, between places such as Etayo or Roncal, on the one hand, and Lokiz and Olejua, on the other. In the former communities, attention to members seems to have relatively low but a higher attention was paid to the behavior of officials. In Lokiz or Olejua, the opposite seems to have been the case. Communities such as Irrure and Ancin seem to present more balanced features with Murieta displaying hardly any attention to official's behavior.

Overall, focusing on these five different dimensions allows to characterize the patterns of institutional change followed by the communities over time. **Table 7** summarizes the pattern of institutional change followed by the average community whereas **Table 8** shows where each community locates in terms of each dimension. The average community seems to have

been slightly more concerned with directly balancing the conflicts inherent to a mixed agricultural system while still paying attention to the indirect mechanisms supporting the compliance of the rules. In this sense, operational rules, directly related to the use of the resources, represent a slightly higher share over the total number of rules, although those related to non-operational issues follow closely. Changes in operational rules were clearly aimed at the protection of the vegetation resources, mostly cultivated fields and croplands but also grasslands. Livestock flocks not respecting the closed season or cattle excess during the open season, and the associated conflicts between cattle farmers and cultivators, were probably the most frequent problem these communities encountered. The tension between the daily requirements of exploitative activities and a more long-term focus on the design of the governance and management regimes seems to have been, however, always present in the path of institutional change followed by these communities, as the importance of non-operational rules suggests. The appointment of officials as well as the delimitation of their jurisdiction and tasks (particularly sanctioning) remained always a necessary condition to make credible the threat of discipline and the compliance of the operational rules by members themselves, and the constant regulation of these matters seem to bear witness of that. For their part, the procedures to follow during the meetings – a paradigmatic example of collective-choice rule – and financial matters seem also to have laid at the core of the community's concerns. The clear member-biased character of the regulations, with members being the most frequent recipients of the incentives embedded in the rules, should be seen as a natural counterpart of their operational nature. Given that a large part of the rules were concerned with the direct exploitation of resources and that this activity was usually carried out by the members themselves, finding this bias in the regulations should come therefore at no surprise. A similar conclusion can be reached with regard to the clear coercive element of the regulations.

When observing which were the differences between communities (**Table 8**), two relatively clear patterns seem to emerge. On the one hand, Ancin and Etayo seem to have enjoyed a relatively balanced pattern, with changes in their rules often falling halfway between the two extremes in each dimension. The main focus of attention in these communities seems to have laid in the change of those rules dealing with aspects different than the direct exploitation of the resources (i.e. non-operational level), which probably points to the importance attached to the refinement of the management and governance regimes as a solid foundation for the adequate compliance of purely operational rules. Within the non-operational level itself, both governance and management activities seems to have enjoyed a similar amount of attention (i.e. non-operational orientation). In line with these emphasis in the non-operational level, the distribution of responsibilities within the community probably relied quite importantly on the officials and authorities of the community (i.e. community involvement), a feature particularly observed in Etayo. In contrast with this, Olejua and Murieta seem to have paid a greater attention to the incentives directly dealing with the exploitation of the resources (operational rules) at the expense of the governance and management rules. This stress on the behavior of the users themselves is probably related to the slightly more coercive orientation exhibited by the rules there (see especially Murieta), with prohibitions (i.e. cannot, must not) playing a decisive role in influencing behavior. Importantly enough, this relative importance

of a coercive element in Olejua and Murieta is also indicative of the significance that sanctioning must have enjoyed there as a way of enforcing discipline. Contrasting with Ancin and Etayo, in Olejua and Murieta the involvement of members themselves in the satisfactory functioning of the community seems to have been relatively higher, a normal situation given the stress on rules directly related with the exploitation of resources. Lokiz and Roncal, the two inter-commons in our sample of communities, show also interesting features, basically pointing to the diversity that could have characterized this institutional arrangements. At first, given the supra-local nature of inter-commons and their role as mere coordination *fora*, one could expect to find more similarities between them. Our evidence seems to point, however, to the existence of important differences between them, particularly in terms of the attention given to the development of their management and governance regimes. Whereas Roncal seems to have stressed its non-operational dimension, especially regarding its governance aspects, in Lokiz the importance of use rules seems to have been relatively higher. This disparity between operational and non-operational levels seems to have translated, as it is the case in the smaller communities, into different patterns of community involvement, with the responsibility of members being higher in the case of Lokiz whereas attention to official's duties prevailed in Roncal. The only difference that seems to have clearly set Lokiz and Roncal apart from the rest of cases is the importance that regulation relative to vegetation seems to have had in the former. Whereas in the local communities direct attention to animals was frequent (this was especially the case in Ancin but also in places such as Olejua and Murieta), Lokiz's and Roncal's regulations were predominantly focused on the protection of the crop and grasslands. This seems to be explained by the fact that, since Lokiz and Roncal were not human settlements themselves (only the villages encompassed by their supra-local infrastructure were), they were not home to livestock flocks either and, therefore, direct jurisdiction over animals seems to have been relatively weak. Focusing on the protection of the crop and grasslands shared by all the communities within their respective realms was then the only alternative

**Table 7. Institutional Change in an Average Community**

	<b>Average Community</b>
<b>Regulation level</b>	Slightly Operational
<b>Deontic orientation</b>	Coercive
<b>Coercive Orientation</b>	Slightly Obligation-biased
<b>Resource orientation</b>	Vegetation-biased
<b>Non-operational orientation</b>	Slightly Governance-biased
<b>Community involvement</b>	Member-biased

**Table 6. Pattern of Institutional Change.**

	<b>Ancin</b>	<b>Etayo</b>	<b>Irurre</b>	<b>Olejua</b>	<b>Murieta</b>	<b>Lokiz</b>	<b>Roncal</b>	<b>Average Community</b>
<b>Regulation level</b>	Non-operational	Non-operational	Slightly Non-operational	Operational	Operational	Balanced	Slightly Non-operational	Slightly Operational
<b>Deontic orientation</b>	Balanced	Balanced	Slightly Coercive-based	Balanced	Slightly Coercive-based	Permission-based	Coercive-based	Coercive
<b>Coercive orientation</b>	Balanced	Balanced		Slightly Prohibition-based	Slightly Prohibition-based			Slightly Obligation-biased
<b>Resource orientation</b>	Animal-biased	Slightly Vegetation-biased	Balanced	Slightly Animal-biased	Slightly Animal-biased	Vegetation-biased	Vegetation-biased	Vegetation-biased
<b>Non-operational orientation</b>	Balanced	Balanced	Governance-based	Balanced	Management-based		Governance-based	Slightly Governance-biased
<b>Community involvement</b>	Balanced	Official-based	Slightly Member-based	Member-based	Slightly Member-based	Clearly Member-based	Official-based	Member-biased