

**An Inquiry into the role of personal wealth in the pastoralist - agropastoralist
conflict resolution in *Yerer and Daketa Valleys, Eastern Ethiopia***

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Abstract

Capitalizing on the mobility of livestock is one of the major ways in which pastoralists have managed ecological uncertainties and risks, as it enables them the opportunistic use of the resources. However, agricultural encroachment onto rangelands by nearby agro-pastoralists has led to a shortage in grazing area and threatened the mobility of the pastoralists. As this process leads to a significant disruption and weakening of the risk-management systems of pastoralists, they seek for various institutional arrangements with agropastoralists to enable them access to common grazing land.

Based on an exploratory survey and data derived from interview of 146 households in eastern Ethiopia, this paper uses an adaptation of the sequential rationality game theoretical model and institutional analysis to discrete choice models. The analytical framework, in its entirety, presents a simple model of household and community level decision-making, in which they are concerned about their welfare along many different dimensions.

Choice of institutional arrangement, namely no opinion, reciprocal, sharing milk and the right to use milk, is modelled using multinomial logit discrete choice procedure. The model chi-squared statistic is significant at the 1% level of probability. For all arrangements, there are three to five observable characteristics of household that provide statistically significant predictive power for practicing a given arrangement. The paper argues resource scarcity may enhance the bargaining position of asset-poor members of an agro-pastoral society and urges the wealthier agropastoralists to comply with a non-violent resolution of competing claims towards a resource sharing arrangement.

1. Introduction

In the 1990s, Thomas Malthus' (1798) demographic theory had a powerful reawakening. According to Malthus, war is one of the 'positive constraints' through which people and resources are brought back into balance after a period of population growth. Similarly, Robert Kaplan argued in his influential essay "The Coming Anarchy" (1994) that violence and war in African countries such as Liberia, Somalia and Rwanda were clear evidence of Africa's gathering environmental crisis. Culture clash, resource competition and environmental breakdown would provoke a rash of small, localized and essentially uncontrollable armed conflicts. Many of these were to be anarchic disputes, i.e. apolitical events indistinguishable from banditry and crime. At the heart of this "New Barbarism" hypothesis (Richards 1996) is the idea that young people in Africa are driven to violence by population pressure and ecological collapse.

In this Malthusian line of thinking, there is an influential research tradition which understands resource scarcity and environmental degradation as a source and trigger of social conflict and war (e.g. Bächler et al. 1996; Homer-Dixon 1994, 1999). Homer-Dixon (1994) has developed a theoretical framework of environmental scarcity, which distinguishes *supply-induced* scarcity (resource degradation), *demand-induced* scarcity (population growth) and *structural* scarcity (inequitable distribution of resources). Environmental scarcity caused by one or an interplay of these factors is assumed to have serious socio-economic consequences, which in turn trigger domestic violent conflict. These three categories are also reflected in the study of Braun et al. (1999) on *Famine in Africa*. The latter distinguish resource poverty - climate shocks (equivalent to supply-induced), population pressure (demand-induced) and the broad category of policy, institutional and organizational failures (structural scarcity) as explanatory variables for the persistence of famine in Africa.

The Malthusian trap is often considered to drive environmentally-induced violence and resource conflicts in Africa's Sahel zone, in particular when resource competition occurs between different "cultures" (pastoralists, agro-pastoralists and sedentary farmers) and ethnic clans (e.g. some contributions in Mohammed Salih et al. 2001). In addition, the literature on common-pool resource (CPR) theory has emphasized that with the advent of high population pressure, increased market penetration and weakening traditional leadership, many traditional access and management regimes to common grazing land in Africa seemingly need better

adapted regimes to cope with increased pressure on a finite natural resource base (Bromley and Cernea 1989; North 1994; Lawry 1990). These scholars largely pursue the study of access regimes under efficiency and productivity considerations looking at which access regimes (private, common property etc.) were best for sustainable resource management (Place and Hazell 1993, Ngaido 1995; Swallow and Bromley 1995). However, even robust access regimes may come under challenge in periods of environmental shocks, such as drought and famine years.

Arguably, whether resource scarcity and environmental stress lead to political violence depends on the institutions and governance structures regulating access to resources and social welfare in a specific society and the role of the state, the elites, national inequality and political exclusion, hence the functioning or failing of a state (Auty 2001; Azam 2001; Carment 2003; Hermann 2002; Le Billon 2001; Mazrui 1995; Wimmer 1997). In addition, we need to understand the *local*-level institutional arrangements, which govern resource use in violence-prone areas (Collinson 2003; Korf 2004, 2005). In particular in ‘territories without a state’, in spaces, where the state has not the capacity to institute its realm of power, local and regional institutions of resource governance may become even more relevant. Hence, we have to study the potential dynamics of the Malthusian trap as being embedded in the institutional context of a particular place and society.

Our research on resource sharing arrangements between agro-pastoralist and pastoralist groups in Yerer and Daketa valleys located in the Ethiopian Somali region at the Horn of Africa brought up an empirical puzzle in contradiction to the Malthusian notion: even in an area which is considered to be prone to inter-clan violence, contraband trade and political instability at the border region between Ethiopia and Somalia, agropastoralists in Yerer and Daketa valleys do find peaceful arrangements with outsider pastoralists for sharing grazing land in times of drought, i.e. when the resources are particularly scarce. Our research therefore centered around the question how these peaceful institutions could emerge in a potentially violent environment.

In this paper, we trace socio-economic characteristics of agro-pastoralist households in Yerer and Daketa valleys, which determine a household’s decision to engage in sharing arrangements with outsider pastoralist groups, which demand access to their pasture and water resources in times of drought, i.e. a nature-induced shock. For a limited period of time, during the peak environmental stress of a drought phase, the pastoralists’ demands would place further

stress on the already scarce pasture resources of agro-pastoralist communities. In particular, we want to understand the intra-group dynamics among agro-pastoralists of these resource sharing arrangements: which types of households are most likely to enter into resource sharing agreements and what type of arrangement these are likely to be. Our findings suggest that resource scarcity may offer opportunities for asset-poor households to gain from sharing agreements and to enhance, though on a limited scale, their household capabilities. This provides incentives for finding co-operative solutions in times of scarcity.

2. Endowments, Entitlements and Capabilities

It is important to specify the nature of property rights and the processes through which actors gain access to and can derive benefits from resources. Amartya Sen first developed the entitlement concept to explain the emergence of famines in India. His concern was to explain how individuals or households derive entitlements to food. Environmental entitlement scholars have expanded the concept to focus on the dynamics and institutions of resource governance (Leach et al. 1999). First, we have to specify what types of rights to resources are at stake. Devereux (1996) stresses the importance of clarifying units of analysis (individual, household, community, etc.). He develops a hierarchy of claims or property rights over a resource or commodity, ranging from influence (weakest), access, control, and ownership (strongest). Control refers to the right of determining use and exclusion. Access refers to possibilities of use. And influence is only a limited say over access and control. In this logic, ownership includes all influence, access and control rights.

Crucial in entitlement analysis is the conceptual distinction between *endowment* as ownership, control or access to the resource and *entitlement*, which is the ownership etc. of the *benefits* and *utilities* derived from a resource (Devereux 1996; Gasper 1993). The question is who ultimately gets the effective command over making actual economic use of a resource and its products, which determines the economic relevance of user rights (Eggertsson 1996: 7). The entitlements derived from endowments in turn enhance people's capabilities, i.e. what people can do with their entitlements (Leach et al. 1999). These entitlements are influenced by the interplay of institutions (e.g. customary rules, division of labor, power). Local institutions can either promote or hinder the mobilization of some endowments (e.g. social capital) that are necessary to make effective use of others (e.g. natural capital). We understand institutions as emerging sites

of social interaction, negotiation and contestation, comprising heterogeneous actors having diverse goals. Given the ecological constraints and the variation of resource users over space and time, institutional arrangements for resource governance may be ad hoc, ambiguous and overlapping.

Sen's entitlement approach (Sen 1981) conceptualised how individuals or households derive endowments and entitlements under a *given* legal framework. This rights-based approaches does not take sufficient account of structural and relational mechanisms of gaining access to resources (Fine 1997; Watts 1991; Watts and Bohle 1993), and neglects the *politics* of resource governance, which determine not only the rights to derive benefits, but the actual ability to benefit from things (Ribot and Peluso 2003). This ability is negotiated in the local political and social field. It is therefore necessary to examine the layer of "property practices" in relation to specific items of property as well as to actions and processes in which all the rules and practices surrounding property are contested, reproduced and, possibly, transformed (Hann 2000: 8). Entitlements, then, are the outcome of negotiations among actors, involving power relations and debates over meaning (Gore 1993; Watts 1991).

In this paper, we are particularly interested in the transition from endowments to entitlements to common grazing lands and how agents transform these into capabilities and functionings. Our focus is on the analysis of resource sharing arrangements between agro-pastoralists and outsider pastoralists over entitlements to grazing land in times of resource scarcity. We study one case located in the politically unstable Somali Region in eastern Ethiopia.

3. Contested Pasture Resources in the Yerer and Daketa Valleys

Capitalizing on the mobility of livestock is one of the major ways in which pastoralists have managed ecological uncertainties and risks (Bassett 1986; Scoones 1994). Various studies are showing that mobile production systems in arid and semi-arid lands of Africa appear to be economically more efficient than sedentary systems (Scoones 1993, 1994). Since the productivity of the ecosystem in arid- and semi-arid areas is spatially and temporally variable and to a large degree unpredictable, mobility enables the opportunistic use of the resources (Niamir-Fuller 2000). Scarcity has a dynamic dimension as well: we need to distinguish gradual deteriorating trends and sudden shocks, mostly drought-induced disaster. Such shocks often accelerate the gradual declining trend, but these two types need to be distinguished, because the

resource users develop different coping and adaptive strategies to respond to these different types of environmentally induced challenges to their livelihoods.

Millions of poor people in Ethiopia living in semi-arid agropastoral and pastoral areas and have suffered extreme marginalization and food insecurity because of reduced access to pastureland, and in some places steadily extending croplands (Manger and Ahmed 2000). The lack of institutional support for the pastoralists has further excluded their participation in decision making. In the new political and socio-economic context of post-Socialist Ethiopia, research focusing on the management of community-based natural resources is emerging (Birhanu, et al. 2002, 2003; McCarthy et al. 2002). The findings of Birhanu et al. (2002), for example, confirm that collective action for grazing land management is widespread in the highlands of northern Ethiopia and both formal and informal property right institutions govern the use and allocation of croplands, forestlands, and grazing lands. Other studies show the increasing scope for inter-clan violence in pastoralist areas (e.g. Kassa 2001).

3.1. Background of the Study Area

Our study area, the Yerer and Daketa valleys, is located in eastern Ethiopia at the transition zone from the highlands to the semi-arid lowlands. The territories are situated in the Somali Regional State of Ethiopia, which borders Somaliland. These areas are spaces without firm government control; contraband trade is ongoing through the vast desert planes towards Somaliland. These areas are considered as politically unstable, prone to clan violence, banditry and crime. The state views the pastoralist groups moving in the outer spaces of the semi-arid lowlands and crossing the fuzzy boundaries between Ethiopia and Somaliland with suspicion, because of contraband trade, their pride, their willingness to defend their territories with arms and the difficulty to control the movement of these clans who largely belong to Somali tribes with kinship bonds to Somaliland.

From an agro-ecological perspective, the area can be classified into two zones namely, *woina dega* (mid altitude) and *kola* (lowland). The valleys are characterized by sparse and irregular rainfall, and are highly drought-prone. Both the Dakata and the Yerer rivers are seasonal. They dry on the surface around the end of October. The valley bottom is fertile and suited for the production of many lowland agricultural products during favourable rain seasons. During the rainy season, there is a lush growth of grass and shrubs supporting thousands of

livestock and wildlife. Even after a long time the rainy season is over, the grass continues to grow on the seasonally swampy places. In many parts of the valley, however, cactus weeds present a dangerous competition to the grazing grassland and contribute to degradation of pasture resources.

The inhabitants of the Yerer and Daketa valleys used to follow a traditional transhumant pattern of pastoralism with regular movement to and away from the valley. Livestock are watered at the shallow wells and seasonal streams during the wet season and deep hand-dug wells during dry seasons. They are grazed on the densely bushed hillside during the wet season, but allowed to browse along the riverside and on croplands during the dry season. The possession of a large number of livestock has remained the ambition of agro-pastoralists in the area. Even in the years of good harvests, households tend to sell the surplus and buy cattle or goat in return. Households tend to grow crops when the rainfall conditions permit, in particular sorghum, maize and groundnuts. Various types of water sources are used in the study area, including hand dug wells, digging stream beds, ponds, hand pump and reservoirs. The deep hand-dug wells, locally known as *ella*, are of particular importance in shaping social organizations in Daketa valley where surface water is relatively scarce and are used during dry seasons to supply water both for people and livestock.

3.2. Local Institutions and Access Regimes to Pasture Resources

Agropastoralists in Daketa and Yerer valleys are largely governed by the customary land tenure system where land nominally belongs to the state but the council of the peasant association, in collaboration with concerned government offices, allocates cultivation rights to individual households, while pasture land remains under the management and control of the community. The seasonal movement has changed gradually and crop cultivation in the fertile valley bottom has evolved and crop-livestock interaction increased. In the last fifty years, land tenure and land use systems were transformed from largely pastoralists exploiting communal rangelands to settled agro-pastoralists utilizing privately owned croplands and communally owned grazing lands (Tilahun et al. 1996). Some individual households gained more exclusive use right by investing their labour into the development or maintenance of water points. As a result, one can observe a mix of private, common, and state property and sometimes open access resources as mediated by a complex body of rules established by local groups-rules established over time.

The definition of these rules, their supervision and adjustment depend on local organizations acting under the authority of traditional institutions. In terms of social status, the village leader (*aba genda*) is the most powerful personality in the community. These traditional leaders become more influential as the state has only weak enforcement power in these outskirts of the state's territories.

Much of the benefits derived from the Valleys' natural resource base are exploited by agro-pastoral communities which represent various clans or sub-tribes including *Girie-Babile*, *Malingur*, *Hawiya*, *Abiskul*, *Werehume*, *Rer-Worfa*, *Ugas Koshin*, *Rer Isahak* and *Mekabil*. During the dry season, the agro-pastoralists live almost entirely on sorghum and maize. During the wet season, milk is the main food, except on feast days, not much meat is consumed. The valleys are largely used for grazing by the Oromo and the Somali lowlanders. Occasionally, in time of severe drought and grass shortage, the Issas also bring their herds of cattle and graze. The highland residents may also come from the plateau surrounding the valley; they usually have settled communities and at one time or another have tried to grow sorghum and corn further down the valley but abandoned these fields because of forest birds and wild animals. Besides grazing, these people also derive economic benefit from the valley by selling on the roadside fuelwood and charcoal to people travelling between Harar and Jijiga towns. Because of occasional violent armed clashes in the past between clans or sub-tribal groupings, each group or community is supposed to graze at a given space of the valley at a certain season of the year. It is not uncommon to see in one place armed herdsmen among their livestock; and when one group tries to encroach on the territorial confines of another, fighting may break out resulting in the loss of life and the abduction of the enemy's livestock. The prolonged dry seasons of the 1980s and 1990s observed a mass movement of the pastoralists of the Somali Regional State towards the Yerer and Daketa valleys which are normally agropastoralist territories. In most instances the pastoralists return to their transhumance system, very few have been able to settle by converting into agro-pastoralists.

Even though the incumbent agro-pastoral communities have long considered the Yerer and Daketa valleys as theirs, other pastoral groups from semi-arid areas of the Somali Regional State also access the common grazing lands, particularly during drought years. The growing number of migrant pastoralists and their large number of cattle exercise an increasing pressure upon grazing land, particularly during times when it is ecologically fragile. The variability of

boundaries between grazing and cultivated lands always required the mediation of traditional institutions in granting access to different users. In drought periods, community leaders of pastoralist communities seeking refuge in the more fertile lands of Yerer and Daketa Valley enter into negotiations with community leaders of the agro-pastoralist communities with customary endowments to pasture resources.

This negotiation process between pastoralists and agro-pastoralists comes in two stages. In drought years, pastoralist community leaders will first negotiate conditions for sharing pasture resources in the more fertile Yerer and Daketa valley with community leaders of the agro-pastoralists. When a general agreement on the level of the community leaders is found, pastoralist households will move towards the territories of the agro-pastoralists and seek sharing agreements with specific agro-pastoralist households in exchange of receiving entitlements to the grazing resources. In this sense, endowments (access rights) of agro-pastoralist community members are traded against direct benefits from pastoralist's entitlements to grazing land gained through these agreements. Poorer community members may be negatively affected in the process because land encroachment prevents them from directly accessing common resources, and precludes them from extracting wood for charcoal making and fuel wood for sale. Therefore, they tend to engage in negotiations with wealthier pastoralist from nearby semi-arid areas to facilitate mobility and encroachment. The payoffs of such negotiations are very important starting points for asset building. These community members are, therefore, more likely to contract with outsiders in order to support their families as well as foster capabilities.

The types of household-to-household sharing arrangement will also have repercussions on the prior negotiations on community leader level, because agro-pastoralist leaders need to account of the interests of their community members. Our household survey (Section 4 and 5) therefore focuses on the incentives of agro-pastoralist *households* to engage in sharing agreements with pastoralist *households*.

4. Methodology

4.1. Survey Design and Data Collection

The data collection was divided in two phases. The first phase aimed at identifying major issues in the management of grazing land and other resources in the study area through literature review, examination of secondary data, and informal exploratory surveys. Informal surveys were particularly useful because reliable prior studies on collective action and property rights were not available or incomplete or out of date. The second stage comprised a comprehensive household survey to analyse household's decisions to engage in specific institutional arrangements for sharing grazing resources.

In the extensive survey, all the five peasant associations, i.e., three in Daketa valley and 2 in Yerer valley, were covered and semi-structured group interview with community representatives was conducted. This was supplemented by information acquired from key informants. Selection of appropriate communities for intensive household survey was based on the intermediate results of the extensive survey. One criterion was to ensure representation of communities with contrasting characteristics in terms of wealth. The sample size considered the complexity of the issue and accuracy and coverage of data necessary for the statistical analysis to be used. During the extensive survey we learned that the three peasant associations located in Daketa valley have a total member of 2315 households, whereas the two peasant associations located in Yerer valley have a total member of 1928 households. A total of 150 households (80 households from Daketa valley and 70 households from Yerer valley) were covered during the intensive survey, but only 146 responses were complete to be used for further analysis. The households were selected randomly proportionate to size from a complete list of members of the peasant associations. A structured questionnaire was designed and pre-tested before executing the intensive household survey. Data collected include family composition, inventory of assets, history of acquisition of assets, current production and non-labour input use, property rights, history of institutional arrangement with pastoralist, among others.

4.2. Framework for Econometric Analysis

This research paper attempts to scrutinize major socio-economic and demographic characteristics of sample households that influence the households' choice of institutional arrangements to

facilitate mobility of pastoralists for the use of common grazing lands for mutual benefit. We assume that agropastoralist households will accommodate pastoralists on their common grazing land only if the private benefits from accommodating the pastoralists exceed the costs they are supposed to incur, i.e. the net benefit (NB) is positive. Among the various private benefits are gains from sharing calves, using milk, drought power, and potential improvements in asset endowment. In addition, accommodation may provide additional utility obtained from non-market benefits resulting from reciprocal arrangements. On the other hand, accommodation costs include not only part or all of the social cost of alienation from the wealthier agropastoralists, but also the negotiation and transaction time needed to learn about the incoming pastoralists.

The net benefits (NB_j) derived from the j -th alternative institutional arrangement can be decomposed into a systematic and random component. That is, net benefit is the sum of observable and unobservable components,

$$NB_{ij}(\text{choice } j \text{ for household } i) = V_{ij} + \varepsilon_{ij}$$

The net benefit level NB_{ij} , which is household i 's net benefit from choosing alternative j , is determined by the systematic component of net benefit of V_{ij} and random components, ε_{ij} , which is assumed to be independently and identically distributed (Greene, 2003). The random component represents the unknown components of the households' net benefit function, which can also be represented by a linear function of a vector of attributes which characterize the i -th household, X_i : i.e.,

$$(1) \quad NB_j = X_i\beta_j + \varepsilon_j \quad \text{Where } \varepsilon_j \sim N(0, \sigma^2) \text{ and } j = 0, 1, \dots, J.$$

Where β_j represents parameters to be estimated and ε_j the disturbance term. The disturbance terms are assumed to be independently and identically distributed.

The agropastoralist i chooses institutional arrangement j , if:

$$(2) \quad NB_{ij} > NB_{ik}, \quad \text{for all } k \neq j.$$

where NB_{ij} is the net benefit to the i -th household of alternative j , and NB_{ik} is the net benefit of alternative k to i -th household. If each institutional arrangement is considered as a possible net benefit maximization decision by the agropastoralist, the decision maker is expected to choose that alternative which will maximize the present value of net benefit. Therefore, given a finite set of alternatives to select among, the decision of the i -th household can be modelled as maximizing the present value of streams of net benefits by picking the j -th alternative from among the J discrete choices available such that:

$$\text{Max}_J \{E(NB_{ij}) = f_j(X_i) + \varepsilon_j, \quad \text{for } j = 1, 2, \dots, J.\}$$

Where f_j is a function of $X_i = (X_{i1}, \dots, X_{in})$, which is a $(1 \times n)$ vector of attributes of the i -th household that are expected to potentially affect the desirability of an alternative.

The probability that household i chooses alternative j is equal to the probability that the net benefit of alternative j is greater than the net benefits of all other alternative choices set. That is,

$$(3) \quad \Pr(NB_{ij} = j) = \Pr(NB_{ij} > NB_{ik}) \quad \forall j \neq k$$

In the study area, we can distinguish among three major categories of institutional arrangements that agropastoralists seek for practice in managing accommodation and facilitate the mobility of the pastoralists: (1) reciprocity, (2) sharing calves, and (3) the right to use milk. Given the multinomial nature of these institutional arrangements, a nominal logit econometric technique can be used in the empirical investigation of the factors associated with the decision to accommodate pastoralists.

Therefore, a multinomial logit model from Greene (2003) was used for the analysis. Since NB_{ij} is latent, it is not observable. Therefore, let Y_{ij} be the indicator variable, so that:

$$(4) \quad P(Y_{ij} = j) = \frac{\exp(\beta_j X_i)}{\sum_{k=1}^J \exp(\beta_k X_i)}$$

where $\Pr(\cdot)$ is the probability that the i -th household prefers and practices the j -th arrangement ($j = 0, 1, \dots, J$). Respondents are asked whether they have hosted pastoralist during the last five

years and if yes which institutional arrangement they practiced and preferred most. Then the model is estimated with four alternatives, namely: $j=0$ if the respondent indicated s/he did not host any pastoralist or do not have any opinion regarding the best arrangement; $j=1$ if the respondent indicated s/he has hosted pastoralist on reciprocity. That is, the head of household recognizes that agropastoralists livelihoods are also subject to ecological uncertainty and therefore they can be faced with adverse conditions forcing them to migrate to areas normally inhabited by pastoralist. In this case, these communities will accommodate them in response to their good treatment in adverse conditions. $j=2$ if the respondent indicated s/he has hosted pastoralists in exchange for sharing the new born animals within the herd during the entire stay of the pastoralist with the agropastoralists household. That is, if the herd gave for six young animals (calves), then the agropastoralists is entitled to take three. $j=3$ if the respondent indicated s/he used the milk from the herd during its stay. The first arrangement, $j=0$, which is that the respondent indicated s/he did not host any pastoralist, is used as the reference choice. X_i represents a vector of demographic, economic and spatial characteristics for the observed individual households. β_j s are a vector of estimated parameters.

Normalization of the alternatives by one of the categories ($\beta_k = 0$) yields the multinomial logit model as:

$$(5) \quad P(Y_{ij} = j) = \frac{\exp(\beta_j X_i)}{1 + \sum_{k=1}^J \exp(\beta_k X_i)} \quad \text{for } j = 1, 2, \dots, J.$$

The probability of omitted (j -th) alternative can be derived from the formula:

$$(6) \quad P(Y_{ij} = j) = \frac{1}{1 + \sum_{k=1}^J \exp(\beta_k X_i)}$$

Since the coefficients of such models are not directly interpreted in contrast to OLS results, marginal effects were estimated to express the probability of change alternative arrangement in accommodating pastoralists with respect to each independent variable, measured from the mean of the variable. The marginal effect can be expressed as:

$$(7) \quad \frac{\partial P_{ij}}{\partial X_{ij}} = (\beta_{jx} - \sum_{k=1}^J P_{kj} \beta_{kx}) P_{ij} \quad \text{for } j = 0, 1, \dots, J.$$

where β_{jx} is the coefficient of X for alternative j . The marginal effect on the redundant category is obvious as the sum of the marginal effects of all alternatives equal to zero. The data are analyzed employing LimDep version 7.0 econometric software. Moreover, descriptive analysis will be used to provide detailed description of the rules and institutions that govern resource entitlement, use and system performance.

5. Results and Discussion

5.1. Descriptive Characteristics of the Sample Households

Household demographic profile of the 146 respondents surveyed indicates that the average number of persons per household was 6.93 in Daketa valley and 6.30 in Yerer valley with an overall average of 6.70. The adult female members of the household, who constitute on average 24%, shoulder great pressure and responsibility in the household affairs of the community we surveyed. Their responsibility include, among other things, cooking, gathering firewood, caring for children and the elderly. They are also responsible for caring for sheep and goats, the breeding stock, including milking cows and young animals, as well as for marketing animal products, particularly milk. Fetching water for human consumption, among other responsibilities of women, was raised as the most time consuming and labour demanding task. Not only does the distance to water sources increase during dry seasons, but the water level in the wells also drop thus making the task even more difficult for women.

The respondents were also asked in the household survey: “How wealthy do you consider yourself?” and the answers were coded 1, lower than most; 2, same as most; and 3, higher than most. Even though such a subjective measure of poverty is advantageous in terms of simplicity for collecting information, the response may be influenced by considerations that do not reflect the actual welfare of the household. Particularly, some household-heads may be unwilling to admit that they are poor as it may imply low status in the community. Whereas, others may claim that they are poor if they anticipate that the survey results will bring them some assistance. Table 1 shows the frequency distribution for the two locations under consideration.

(Table 1 here)

Proportionately more households (33.7%) in Daketa valley consider themselves less wealthy than other members of the community, whereas the corresponding value for Yerer valley is 16.7%.

For agropastoralist societies in the study area livestock and livestock products are the main source of livelihoods. Therefore, data was gathered on livestock ownership of each respondent household. The results reveal that agro-pastoralist households in the study area had an average of 11.79 Tropical Livestock Units (TLU) per household. Agro-pastoralist in Daketa valley own relatively larger herds, and this is also statistically significant ($P < 0.01$). The results also show that cattle (cow, ox/bull, and young animals) constitute large proportion of the livestock population. The cattle herd was also female dominated with a cow to ox/bull ratio of 6.01:1, 4.5:1 and 5.64:1 for Daketa valley and Yerer valley, and the whole respondents, respectively. A more female-dominated herd structure is of course a common feature of pastoralist communities.

With an average of 9.41 animals per household, Daketa agro-pastoralists had the larger herd of small ruminants. Small ruminants are valuable assets to the households particularly in terms of their contribution to food security, especially during the onset of drought. It is this category of the livestock that households prefer to dispose of in order to get food in exchange. They are also considered to contribute towards “efficient” utilization of household labour as they employ young children’s labour that would have remained idle otherwise. Agropastoralists in Daketa and Yerer valleys consider water as perhaps the most fundamental resource because trekking of livestock to water sources is among the major duties for the members of the community. The information obtained through the household survey revealed that on average households trek their livestock for 2.97 kilometers during dry season and 0.94 kilometers during wet season to watering points.

When pastoralist communities living in the semi-arid areas of Somali Region suffer from resource scarcity and pressure due to prolonged drought seasons, their community leaders will negotiate conditions for sharing pasture resources in the more fertile Yerer and Daketa valley. An agreement between the community leaders will enable the pastoralists to move towards the territories of the agro-pastoralists and seek sharing arrangement with specific agro-pastoralist households in exchange of receiving entitlements to the grazing resources. Depending on

household wealth and asset endowments of agro-pastoralist households, these sharing arrangements on household-to-household level take different forms.

Table 2 shows that 87.6 percent of households who consider themselves “lower than most” in terms of personal wealth accommodated pastoralists in return for either the right to use milk or sharing calves, whereas 57.10 percent of the wealthier groups looked for reciprocal arrangement. This illustrates that asset-poor households can use such sharing arrangements to translate their endowments to grazing land in concrete benefits and asset transfers, while the wealthier households invest more in long-term reciprocal obligations rather than asking for immediate asset transfers.

(Table 2 here)

The results of the survey reveal that the poorer a household is, the more it is involved in an arrangement that enables it to share calves. All community members who accommodate pastoralists in exchange for sharing calves own an average of 10.67 TLU per household. The possibility of poor agro-pastoralists engaging in hosting pastoralists has persuaded the relatively wealthier community members to call for mutual arrangements with the poorer members to exclude potential entrants, thereby benefiting from reduced overstocking on common rangeland. Failure to reach an agreement, however, may result in disputes.

The reciprocal arrangement is found to be largely a risk-management strategy by relatively wealthier community members. Wealthier members of the agro-pastoral communities accommodate pastoralists and extend their resources particularly the rangelands and water points for the major reason that they expect the same treatment from pastoralists in case members of the agro-pastoral communities face drought and are forced to migrate to areas under the control of pastoralists. The survey results reveal that those respondents who hosted pastoralists based on reciprocity arrangements had an average of 17.06 TLU per household. The existence of such reciprocal arrangement has been crucial for sustaining agro-pastoral and pastoral communities in their production systems. Reciprocity also plays an important role in enhancing livelihoods of the pastoral and agro-pastoral communities by extending resource availability through institutional arrangements between community members and others, and so creating greater security.

A summary of the descriptive statistics of the study variables is given in Table 3. The results indicate that those households who have not practiced any institutional arrangement are characterized by the longest distance from the road and watering point, on average. Whereas households who practiced reciprocal arrangement are characterized by the least distance to the office of a development agent, the largest number of livestock holding in terms of tropical livestock unit and longest distance to primary grazing lands. The longest average distance to town (3.73) is reported by those households who are engaged in sharing calves. It is also evident from the results that households who practiced using milk are more aged, have the highest average number of children per household (1.97), more than average dependency ratio¹ (1.50), the least holding in terms of tropical livestock unit and number of cows per household.

Care must be taken when describing the values in the discrete variables section of Table 3. We will try here to explain some. Consider the raw referring to the sex of household head. The descriptive statistics results showed that 89 percent of the household heads are male. When we look into the gender composition of households who practiced the various institutional arrangements we find that female headed households constitute 5, 7, 11 and 19 percent of households who preferred not to engage in any arrangement, reciprocal, sharing calves and the use of milk, respectively. Further disaggregation of results showed that 43.75 and 31.25 percent of female headed households preferred for using milk and sharing calves, respectively, whereas 31.54 and 30 percent of male headed households practiced reciprocal and sharing calves, respectively.

(Table 3 here)

Those households who did not host pastoralists most frequently use (i.e., 86% of them) hand dug well as the main source of water for their livestock, followed by those who practiced using milk (78%). Of the 21 households who responded as they have not practiced any form of institutional arrangement 17 (81%) used stream beds as their primary source of water during the dry season, whereas the corresponding proportion was found to be 68, 77 and 81 percent for those who practiced reciprocal, sharing calves and using milk to host the pastoralists.

¹ Dependency ratio is the ratio of the number of household members younger than 15 years and older than 64 years old to the number of household members between 15 and 64 years old.

5.2. Determinants for Institutional Arrangement

The multinomial logit analysis was performed using the LimDep 7.0 Discrete choice logit procedure. Table 4 reports the results for estimation, marginal effects and standard error of each of the variables in each of the jointly determined models. The model chi-squared statistic (111.38 with 36 degrees of freedom) is significant at the 1% level of probability. In addition, the predicted shares for each institutional arrangement are relatively consistent with the actual shares (Please, see the last three rows of Table 4). For all arrangements, there are three to five observable characteristics of household under consideration that provide statistically significant predictive power for practicing a given arrangement.

The model was determined as systems of equations in which equations for various institutional arrangements among the pastoral and agropastoral community members were jointly determined using iterated seemingly unrelated regression. The parameter coefficients of such models are difficult to interpret directly. Instead the marginal effects are the only means to effectively interpret the effect of explanatory variables on the distribution of proportion of dependent variables. Marginal effects are the probability of change in favour of a specific arrangement with respect to each independent variable, measured from the mean of that variable. A positive or negative sign of marginal effects, the only reliable indicator in such models, indicates an increase or decrease in the probability of engaging in the arrangement under consideration.

There are some statistically significant variables that provide predictive information on the engagement of households in institutional arrangement. Overall, variables including the sex of household head, dependency ratio and personal wealth ranking provide the most predictive power as to whether or not the household engages in reciprocal arrangement, whereas number of household members, distance from home to the nearest market centre and personal wealth ranking were found to be more relevant in determining to engage sharing calves. On the other hand, sex of household head, number of household members, distance to watering point and distance to primary grazing land were found to be statistically significant in determining the likelihood that a household engage in the use of milk.

While the marginal effect of sex of household in reciprocal arrangement was positive and statistically significant, it was negative for both sharing calves and using milk, though the former

is not statistically significant, while the latter is statistically significant. More specifically, if a household is headed by a man, it is 30.2 percent more likely that it will engage in reciprocal arrangement and 27.9 percent less likely to engage in using milk. Theoretical expectation was that as age of the household head increases, it would be more likely that the household engage itself in reciprocal arrangement. Because in such agropastoral societies traditional institutions play a great role in mitigating environmental uncertainties through mutual arrangements, mediated by elders, in which the immediate and material benefit is not much of importance. It is, therefore, unclear why the marginal effects of age of household head are not statistically significant for any of the arrangements.

If a household increases household size by one person, he/she is 9.2 percent more likely to fall in using milk and 6.8 percent less likely to engage in sharing calves. While the remaining coefficient on the household size is not statistically significant, it indicates that a household is 1.6 percent less likely to practice reciprocal arrangement. The marginal effect for dependency ratio, however, indicates that if dependency ratio increases, a household is 21.9 percent more likely to engage in reciprocal arrangement. The expectation was that an increase in dependency ratio implies addition of more children as household members which largely depend on milk for their daily nutrition.

Hence, other things being equal, an increase in dependency ratio would have a positive and significant effect on using milk. Even though the sign of the marginal effect for dependency ratio is positive as expected, it is not statistically significant. An explanation for this may be sought in terms of the consumption pattern of the pastoral and agropastoral communities. In such communities, animal products particularly milk constitute an important component in the daily consumption. Therefore, what matters is the household size as it determines the aggregate demand for milk as compared to the share of children which is relatively low.

(Table 4 here)

A household nearer to the market centre is 10.7 percent more likely to share calves, but 4.8 percent less likely and 2.2 percent more likely to engage in reciprocal and using milk, even though the marginal effects are not statistically significant.

The order in which the household head places his personal wealth against other members of the community has also relatively strong predictive power regarding the probability of engaging in a certain institutional arrangement. The positive and statistically significant estimated marginal effect for whether or not the household consider itself better than most, average and lower than most supports the study's theoretical expectations that if a household is better off it will prefer reciprocal arrangement. Households who consider themselves better off in terms of wealth are 49.1 percent more likely to engage in reciprocal arrangement and 60.7 percent less likely to engage in sharing calves. They are also 8.5 percent more likely to engage in sharing milk, but this is not statistically significant. The statistically significant results indicate that there is sufficient evidence to believe that wealthier households are more likely to engage in reciprocal arrangement and less likely in sharing calves, implying that the poor should seek the other way round. Meaning, the poorer a household is, the less likely that it prefers reciprocal arrangement and the more likely it will engage in sharing calves.

5.3. Entitlements, Capabilities and Peaceful Co-existence

Some research has cautioned against assuming that common property regimes guarantee equitable distribution of benefits (Agrawal and Gibson, 1997). Our finding is that in the case of the Daketa and Yerer valleys of Ethiopia, such institutional arrangements enhance the capability of asset-poor community members to make the most from the common grazing land. Times of resource scarcity may actually offer asset-poor households opportunities to stabilize or even expand their asset base. This paper has tried to elucidate the linkages between status of wealth and engaging in strategic choice to facilitate herd mobility of pastoralists. The results indicate that poor members of the agro-pastoral community transform their endowments (right of access and use) of common grazing land and social assets to actual entitlements of economic value of livestock through institutional arrangements. This process takes place because sharing arrangements with pastoralists allows these households to activate dormant (not utilized) endowments to common grazing land and translate them into concrete entitlements and capabilities.

Our analysis suggests that sharing arrangements between agro-pastoralist and pastoralist households have important distributional implications within the agro-pastoralist community: Asset-poor households of the agro-pastoralist community may engage themselves in mutual

arrangements with outside pastoralists making use of their information, social assets and their access rights to common grazing land by virtue of their membership to the incumbent community. These asset-poor members exchange their social assets as being part of the agro-pastoralist community which grants them with access rights (endowments) to grazing pasture. In this arrangement, they can transform their endowments to grazing land into concrete entitlements (benefit streams), and gain a share in the additional utility that the outsider pastoralists gain from being allowed to graze livestock on this pasture. This enhances the capabilities of asset-poor agro-pastoralists. Their concern is a short-term asset transfer to stabilize or enhance their material asset basis.

Wealthier households, instead, tend to engage rather in reciprocal arrangements, which tend to establish social and political assets, ties which the households may rely upon in times of particular scarcity or economic stress. These ties may also be important to stabilize relationships and to foster peaceful co-existence in times of gradually increasing resource scarcity. However, when natural disaster provides economic shocks throughout a region, those social assets based on reciprocal relations may not be transferable into material assets at times of extreme scarcity, because pastoralist households will similarly suffer distress and thus be unable to reciprocate. Thus, those reciprocal relationships may be more important as political assets for stabilizing the overall conditions of the territories and for securing peaceful co-existence. In other words, while asset-poor households may derive tangible benefits from sharing arrangements, those benefits may be less tangible in the case of reciprocity arrangements sought after by wealthier households.

6. Conclusions

Kaplan's "Coming Anarchy" and the simplistic scarcity = conflict causality inherent in it and in some literature on environment and conflict need not necessarily be the template for African common-pool resources. Our case study from Somali Region in Ethiopia indicates that supply-induced scarcity or demand-induced scarcity alone cannot properly explain whether violent struggles between competing resource users does or does not occur. We have argued that, instead, we have to understand the local-level institutions of resource governance. In fact, McCarthy et al. (2002) conclude from a study on pasture management in the Borana plateau in southern Ethiopia that "one of the key elements in fostering co-operation will be methods for

handling the increased heterogeneity among community members and in more effectively managing *the communities' relationship with outsiders who use community pastures*" (p. 24, own emphasis).

We have analyzed a case study where resource users from different communities find peaceful sharing arrangements for the use of pasture land in periods of scarcity. The Daketa and Yerer valleys with their relatively better quality rangelands and availability of water points create good conditions for grazing during dry seasons, which, in turn, attract a number of pastoralists, thereby necessitating the creation of institutional arrangements to get access. Note, that these territories were located in an area, which is known for inter-clan violence, contraband trade and the absence of state power, hence the seeming conditions for Kaplan's anarchy.

The research used household survey data in Daketa and Yerer valleys in eastern Ethiopia, and employed descriptive statistics and multinomial logit model to predict household's decision to engage in a specified sharing arrangement based on observable demographic and socio-economic factors. The results of the multinomial logit model revealed a set of important factors that determine household's decision for specific institutional arrangement. Those statistically significant variables that provide predictive information on whether or not the household engages in reciprocal arrangement include the sex of household head, dependency ratio and personal wealth ranking. Whereas, number of household members, distance from home to the nearest market centre and personal wealth ranking were found to be more relevant in determining to engage sharing calves. On the other hand, sex of household head, number of household members, distance to watering point and distance to primary grazing land were found to be statistically significant in determining the likelihood that a household engage in the use of milk.

Endowments to common grazing land are exchanged to pastoralists for being able to utilize an agreed share of the pastoralist's livestock resources. These sharing arrangements were particularly attractive for asset-poor households of the receiving agro-pastoralist community. Such institutional arrangements can reduce the vulnerability of poor community members who traditionally depend on common pool resources. They take advantage of the stock of goodwill and social networks among community members (i.e., social capital) to facilitate access for the pastoralists that enables poor community members to build livestock asset. Hence, supply-induced resource scarcity does not necessarily need to make asset-poor households more vulnerable.

Arguably, since asset-poor households gain from mutual arrangements with outsider pastoralists, their incentives to fight against outsider intruders may be diminished. These sharing arrangements may change the incentive structures *within* the agro-pastoralist communities: in particular asset-poor households have an interest to enter into sharing arrangements, because this can stabilize or even enhance their asset-base. Their incentives to fight against pastoralist intruders are therefore diminished. This may put pressure on agro-pastoralist community leaders to negotiate peaceful resource access arrangements with the pastoralist community leaders. Such mutual agreements then enable pastoralists to enter the grazing resources without violent struggles with the agro-pastoralist community. A full understanding of the implications of these intra-group dynamics requires more careful study, though.

Cooperation and institutional arrangement constitute forms of social assets through which members can generate and acquire assets that would be difficult or impossible for them to obtain in isolation, or without this particular legacy. There are considerable incentives for sharing regimes even in times of scarcity, which may prevent violent struggles to emerge between competing resource users. The Malthusian trap can be mediated if local-level institutions and economic incentives are favourable. At the same time, scarcity may increase to a level where such sharing arrangements as observed in Yerer and Daketa Valley, may fail to come into effect, because no suitable institutional arrangement can be found to allow adequate sharing of pasture resources. Therefore, we would like to argue that instead of developing simple causal determinisms between scarcity and violence, we need to better understand the institutional context why scarcity-induced violence may emerge in some and does not in other cases.

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Table 1. Frequency distribution for personal wealth ranking (% of respondents)

Personal wealth ranking	Location (COMM)		Overall sample (n = 146)
	Daketa (n = 92)	Yerer (n = 54)	
Lower than most	33.7	16.7	27.4
Same as most	50.0	72.2	58.2
Higher than most	16.3	11.1	14.4

Table 2. Percentage of respondents who hosted pastoralists by wealth and institutional arrangement

Personal wealth ranking (PWR)	Institutional arrangement				Total (n = 146)
	Not practiced (n = 21)	Reciprocal (n = 44)	Share calves (n = 44)	Use milk (n = 37)	
Lower than most	3.42	---	13.7	10.3	27.4
Same as most	10.96	21.92	13.02	12.3	58.2
Higher than most	---	8.22	3.42	2.74	14.4
Total	14.38	30.14	30.14	25.34	100.0

Table 3. Mean and standard deviation of major attributes by practiced institutional arrangement

Attributes	Institutional arrangement									
	Overall (N = 146)		Not practiced ² (N = 21)		Reciprocal (N = 44)		Share calves (N = 44)		Use milk (N = 37)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age of household head (HAGE)	39.66	13.21	39.95	14.95	38.41	13.47	39.30	12.03	41.43	13.57
Children less than 6 years old (CLD6)	1.73	1.42	1.29	1.31	1.59	1.53	1.86	1.41	1.97	1.32
No. of adults (ADLT)	3.16	1.78	3.00	1.41	3.14	1.34	2.91	1.25	3.59	2.70
Household size (HHS)	6.70	3.15	5.62	3.26	6.61	2.88	6.45	2.61	7.70	3.78
Adult equivalent unit (AEU)	5.42	2.62	4.60	2.68	5.35	2.36	5.21	2.06	6.23	3.27
Dependency ratio (DEP)	1.28	0.91	0.84	0.87	1.23	0.83	1.35	0.91	1.50	0.95
Dist. to road (DistRD) ³	1.02	0.69	1.28	0.94	0.90	0.63	0.96	0.60	1.10	0.67
Dist. to town (DistTWN)	2.94	2.63	2.48	1.05	2.31	0.67	3.73	3.69	3.01	2.99
Distance to development agent (DistEXTN)	0.66	0.52	0.47	0.47	0.75	0.52	0.62	0.47	0.72	0.59
Tropical livestock (TLU)	11.80	11.10	9.25	5.88	17.06	12.19	10.67	11.19	8.34	9.92
No. of cows (COW)	5.47	4.86	4.24	2.68	7.75	5.20	5.11	5.17	3.89	4.10
No. of oxen owned (OX)	0.97	1.19	0.62	0.74	1.61	1.40	0.77	1.05	0.65	0.98
Distance to watering point (DistWTR)	2.97	1.07	3.05	1.08	3.00	0.92	2.93	1.10	2.96	1.22
Distance to grazing land (DistGRZ)	2.05	3.71	1.25	1.61	3.05	4.83	1.93	3.26	1.44	3.38
Discrete variables		Percent of households who responded "yes"								
Household head is male (HSEX=1)	0.89		0.95		0.93		0.89		0.81	
Use hand dug wells	0.70		0.86		0.66		0.59		0.78	
Use stream bed	0.76		0.81		0.68		0.77		0.81	
Use pond	0.10		0.10		0.11		0.02		0.19	
Use hand pump	0.26		0.29		0.34		0.27		0.14	
Use reservoir	0.08		0.14		0.00		0.02		0.19	

² "Not practiced" implies that the respondent indicated s/he did not host any pastoralist or do not have any opinion regarding the best institutional arrangement

³ Distance is measured by kilometers required to walk to the respective destination.

Table 4. Multinomial logit model predicting institutional arrangement, marginal effects, and standard errors in parentheses.

Variable	Reciprocal		Share calves		Right to use milk	
	Coeff.	Marginal effect	Coeff.	Marginal effect	Coeff.	Marginal effect
Constant	-7.18	-0.802 (0.4504)	-2.235	0.830 (0.459)	-5.268	-0.258 (0.380)
COMM	1.13	-0.035 (0.1760)	1.508	0.100 (0.183)	1.267	0.002 (0.161)
HSEX	0.44	0.302 (0.1761)*	-0.781	-0.056 (0.198)	-1.690	-0.279 (0.144)**
HAGE	-0.07	-0.004 (0.0061)	-0.038	0.008 (0.006)	-0.081	-0.007 (0.0053)
HHS	0.09	-0.016 (0.0304)	-0.024	-0.068 (0.033)**	0.492	0.092 (0.027)***
DEP	2.47	0.219 (0.1124)**	1.337	-0.141 (0.118)	1.733	0.012 (0.0951)
DistRD	-2.03	-0.054 (0.1242)	-2.006	-0.068 (0.1038)	-1.748	0.024 (0.085)
DistTWN	1.36	-0.048 (0.0562)	1.794	0.107 (0.04)***	1.611	0.022 (0.029)
DistEXTN	1.88	0.128 (0.1369)	1.185	-0.094 (0.155)	1.577	0.042 (0.139)
PWR	1.19	0.491 (0.183)***	-2.077	-0.607 (0.18)***	-0.246	0.085 (0.145)
TLU	-0.13	0.007 (0.028)	-0.197	-0.017 (0.031)	-0.147	0.002 (0.031)
DistWTR	0.56	-0.013 (0.060)	0.439	-0.068 0.0634	1.036	0.114 (0.054)**
DistGRZ	0.004	0.015 (0.014)	-0.022	0.011 0.0187	-0.156	-0.028 (0.016)*
Predicted (%)	35.62		27.40		21.92	
Actual (%)	30.14		30.14		25.34	
χ^2 statistic	= 111.38		<i>df</i> = 36		Prob> χ^2 0.000	

*, **, and *** represent 0.10, 0.05, and 0.01 levels of statistical significance, respectively.

Note: redundant category is “not practiced” any institutional arrangement.