Clubs, common-pools and collective actions: discussing complex production systems in light of Sami reindeer pastoralism

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In this paper, I argue that in analyzing over-investment problems in commons, it is useful to discern a specific type of over-investment problem: one where clubs are involved. I use the term 'over-investment problem of clubs' to denote such cases, and the term 'over-investment problem of individuals' to denote cases where no club exists (for example, as is the case in the classical 'tragedy of the commons'). The crucial difference between the two is the types of production factors involved. The 'over-investment problem of individuals' emerges when the system includes only private goods, in addition to the common pool. By contrast, the 'overinvestment problem of clubs' emerges when the system includes not only private goods and the common pool, but also collective- or club goods.

Building on existing literature on collective action and E. Ostrom's design principles, I demonstrate that under a set of certain conditions, the problem of clubs is easier to solve than the problem of individuals. The argument is discussed in the light of Sami pastoralism in Lapland: for Sami reindeer-owners, clubs known as *siida*s provide their members with capital security for their privately-owned investments, thus solving their supply-side collective action problem.

The existence of clubs not only crucially affects the outlook of the over-investment problem in the commons but also may affect the likelihood of its solution. The presence of clubs may bring about several mechanisms which increase the likelihood of solving the over-investment problem. These mechanisms are discussed in detail and in light of Sami reindeer pastoralism.

1. Introduction

State intervention, often justified by the well-known "tragedy of the commons" argument (Hardin 1968), is familiar in many cases of common-pool resources (Ostrom 1990). Scandinavian, particularly Sami, reindeer herding is not an exception as governmental authorities have imposed restrictions on pasture use in all Scandinavian countries despite the lack of evidence on overgrazing before the intervention (Bjørklund 1990).

There seems to be a consensus among researchers that this lack of evidence is, at least partially, due to a local institution called *siida* (e.g. Bjørklund 1990; Riseth and Vatn 2009). *Siida* is a community that consists of several households and of their reindeers. This kinship based community herds privately-owned reindeers collectively. It enforces members' private property rights over their animals, thus securing members' private capital. It also mediates between different factors of production (labour, reindeers, pasture) to the extent that it can be called a management system: *siidas* are under constant restructuring as herders try to find a balance between available pasture, required labour and the number of animals (Bjørklund 1990, 2003). In this article I give a theoretical explanation for the success of *siidas* using the economic theory of clubs (Buchanan 1965) and rational choice theories on norm emergence (Coleman 1990).

Clubs are needed in cases of common-pool resources, e.g. when private investments are not secure and it is expensive or utterly impossible for an individual investor to secure them alone. More generally, clubs may emerge when there are mutual benefits from cooperation in the creation of some factor of production. If this type of factor limits the resource utilization, the overinvestment problem may not even be possible without clubs; e.g. if private investments of users are under risk of being lost, there is less incentive to invest in the commons in the first place. I make an analytical distinction between the overinvestment problem of individuals and that of clubs, and argue that the latter is easier to overcome. My interpretation is that Sami reindeer herders had never encountered an individualistic overinvestment problem before state intervention.

Why is the overinvestment problem of clubs easier to solve than that of individuals? Clubs go a long way in solving the boundary problem in respect of who is allowed to harvest (Ostrom 1990, 90). But they also guarantee that there is a possibility to communicate and some amount of accumulated trust among resource users and, finally, enough interdependency that makes mutual sanctioning possible. These are all either necessary conditions for club emergence or by-products of it, and they all foster further collective action. In other words, using the concept of James Coleman (1990), there is a social closure between resource users, at least within a club (local social closure).

But despite local social closure, clubs might end up overinvesting. Clubs would be in a better position to solve their overinvestment problem if there was a social closure also between clubs (global social closure). Interestingly, *siida* members have incentives to maintain relations with other *siidas* in order to secure their own position in the constant restructuring of *siidas.* As a by-product of this a social closure is also established and maintained beyond a single *siida* – a characteristic that might be lacking in more rigid systems.

But the existence of clubs might help even without extended social closure. If clubs are internally strong enough to be called corporate actors, i.e. they can claim authority over their members' decisions, the overinvestment problem of individuals and that of clubs is of a

different scale. This may fundamentally change the social dilemma at hand from a single equilibrium Prisoner's Dilemma to a multiple equilibria collective action game: a contribution of a single individual may be insignificant, but a contribution of a club (an aggregation of individuals) may very well be significant (Taylor and Ward 1987; Heckathorn 1996; Medina 2007). To summarize: this paper tackles the complex causality problem in the CPR-literature by suggesting that the need for clubs explains some important factors repeatedly associated with successful self-governance (Agrawal 2002; Ostrom 1990; Baland and Platteu 1996; Wade 1994).

The rest of the paper is organized as follows: section 3.1. makes an analytical distinction between the overinvestment problem of individuals and of clubs; section 3.2. discusses the role of *siidas* in Sami reindeer pastoralism; section 3.3. explicates the positive implications of clubs to norm emergence; and section 3.4. discusses the overinvestment problem of clubs more specifically and touches upon the effects of privatization in the presence of clubs.

2. The overinvestment problem of individuals and of clubs

In pastoral systems three factors of production are necessary: labour, animals, and pasture. The stock of animals forms the capital on which the pastoralist seeks return. Like in case of any other private capital, property rights over animals must be created and enforced. In pastoral systems enforcing private property rights can be challenging, but this is especially tricky in reindeer herding because reindeers are only semi-domesticated animals. This reduces human control over the animals and makes reindeers a somewhat risky form of capital. Risks are twofold and can come from the nature (natural losses) or from other human beings (thefts). Unless the capital is secure enough, individuals will not invest in it: large-scale herding is possible only after a functioning property system. The same observation holds for other common-pool resources as well. A fisherman laying a net expects to find it afterwards. A farmer sowing the field expects to be able to reap the benefit later.

I first redefine the classical overinvestment problem for insecure environments. Then I apply the economic theory of clubs by James Buchanan (1965) to the security provision problem. We will see that the individualistic overinvestment problem, where individuals invest beyond the social optimum (Gordon 1954; Hardin 1968), is possible only if individuals can secure their capital with low cost or if it is secured for them by an outside actor (such as a state). Otherwise, the overinvestment problem must be that of clubs. I concentrate here on the provision of capital security. Some other factors of production might also be easier to provide collectively and their existence might very well limit individuals' ability to extract or enjoy the common-pool resource. This generalization is left for later work.

Let the resource limitation in units of investments be L after which the aggregated marginal cost of an additional investment exceeds its marginal benefit for the investor. Classically, the overinvestment occurs, if the sum of individual investments ($m_i, i = 1,2...n$ where n is the number of individuals) exceeds L, that is, if $\sum_{i=1}^{n} m_i > L$.[1]. This, however, assumes that investments are secure. In some environments a better measure would take into account capital insecurity. If p_i is a probabilistic measure of security per a unit of investment by an

[1] An individual investment has an upper limit ($m_i \leq m_{\max}$).

individual i, a simple overinvestment condition for insecure environments is $\sum_{i=1}^{n} p_i m_i > L$.

Lost capital, $\sum_{i=1}^{n} (1 - p_i) m_i$ units, neither provides a yield to investors nor exhausts the common-pool. These are e.g. animals eaten by predators or stolen and consumed by human beings. Assuming identical investors ($m_1 = m_2 ... = m_n = m$ and $p_1 = p_2 ... = p_n = p$) an overinvestment problem can theoretically occur, if $p * m * n > L$, that is, if

$$p \succ \frac{L}{n * m} \qquad (1)$$

The overinvestment problem becomes more likely, when (1) there are very many resource users, high n (oceanic resources), (2) the resource is fragile, low L, (3) investments are cheap, high $m_{\max}$, or (4) the environment is secure, high p, or security provision is cheap for an individual as explicated later. For the current purposes the overinvestment problem in insecure environments can be phrased as follows: given the number of individuals n, the individual investment m, and the resource limitation L, how much security, p, are individuals willing to provide for their investments?

The answer obviously depends on how the security can be provided. A reasonable assumption is that the capital security is a club good (Buchanan 1965). First of all, securing the investment is not free of costs as suggested by our herding example. In addition, under certain conditions and up to a certain point there is "safety in numbers" in provision of capital security. Because of camaraderie, individuals can provide capital security more efficiently in groups of size $k \succ 1$ than alone, that is, the marginal utility derived from additional members is positive (Sandler and Tschirhart 1980, 1484). It is natural to think that this also depends on the amount of investment. A high level of security for small investments can be provided by individual effort alone, but cooperation of many individuals is needed to provide the same security for large investments and, furthermore, there are efficiency gains in doing so. It might be easier e.g. for two herders to secure one hundred animals together than if each secured fifty animals separately.

There is, however, a potential for congestion that might stem from the need for more coordination (e.g. greater organization), from the type of labour needed (e.g. already enough hands for every task), from the characteristics of the underlying common-pool resource (e.g. pasture limitation), or from the type of investment in question (e.g. very large herds could invite diseases, etc.). Due to congestion, efficiency gains from "ganging" cease to exist at some point, that is, the marginal utility derived from additional members eventually turns negative. This should be a rather general phenomenon.

To put it in formal terms; assume that the provision cost of security $C(p, k, m)$ has the following properties:

- $C(p=0,k,m)=0$, for any k,m (no provision, no cost)
- $\lim_{p\to 1} C(p,k,m)=\infty$ (full security is impossible)
- $\frac{dC}{dm}>0$ (larger investments harder to secure)
- $C(p,k=1,m)>C(p,k'>1,m)$, at least for some p,m,k' (clubs bring efficiency gains)

Further assuming that the cost function is continuous and monotonic in p and m[2], it is possible to depict Figure 7 fixing $k=1$:

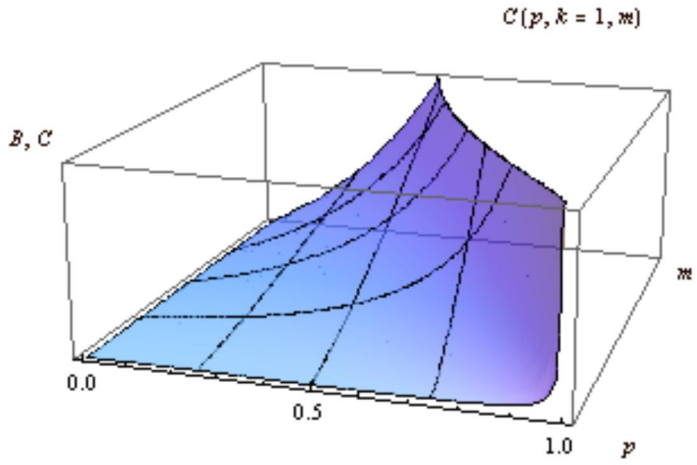

FIGURE 7

It is also natural to assume that the benefits $B(p,m,k)$ have at least following properties:

- $B(p,m,k)=0$, when $p=0$ or $m=0$ (no capital, no gain)
- $B(p_1,m_1,k_1)=B(p_2,m_2,k_1)$, when $p_1 * m_1 = p_2 * m_2$ (only the surviving capital matters)
- $\frac{dB}{dp}>0, \frac{dB}{dm}>0$ for low p,m, but not for high values (the common-pool property)

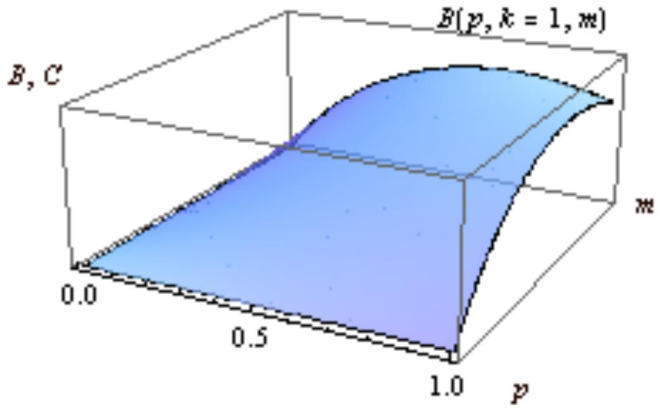

FIGURE 8

[2] Together with earlier assumptions this implies that costs are increasing and convex in p.

In order to illustrate the most important implication of the theory consider Figure 9 in which the utility of an individual is drawn by subtracting her costs from her benefits. The meshed area points out the overinvestment area as given in (1). As the group size is fixed to 1, individual investors do not find it beneficial to invest to the resource and secure their investments to the extent that overinvestment could occur (the highest utilities are not above the overinvestment area). The high cost of security restricts investments.

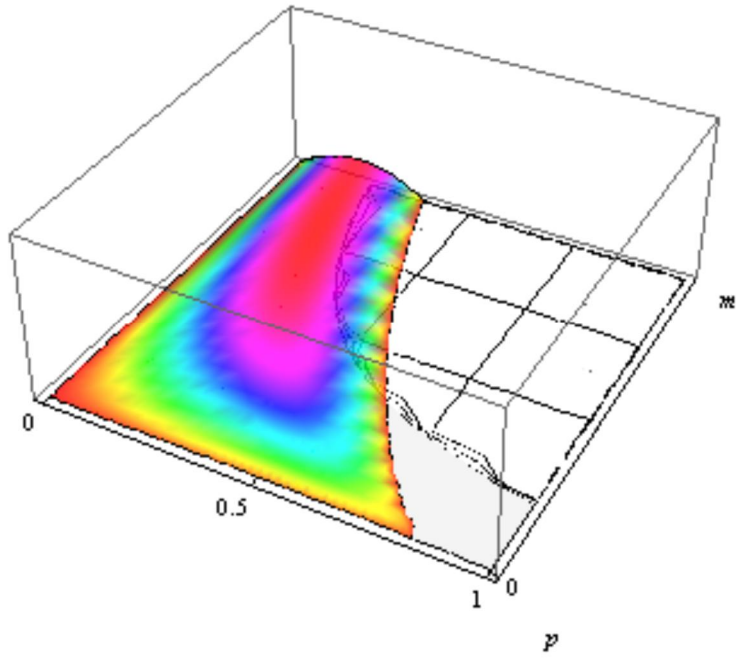

FIGURE 9

It is possible to finally summarize the relevant information in Figure 10 in which Curve 1 gives the optimal security provision for our example. However, as clubs $(k \succ 1)$ could secure the capital more efficiently (i.e. lower the cost of security provision) they may end up overinvesting. The optimal security provision curve could then resemble Curve 2 making the overinvestment possible.[3] In environments that are described by these curves the overinvestment problem of individuals does not occur. Rather, the problem before the emergence of clubs is the underinvestment problem because of the risky environment. It is only after the emergence of clubs that overinvestment can occur.

[3]It is possible that the utility peak (p^*, m^*, k^*) is located in the overinvestment area, because externalities are not internalized in the utilities of the investors. The space here does not allow the discussion of the optimal combination (p^*, m^*, k^*), or necessary conditions for its existence. The graphical method of Buchanan (1965) for obtaining one can be used in principle, but it requires adding the third dimension (for m). We finally end up having three planes, each depicting the optimal value of one parameter as a function of two others. For an equilibrium (following the within-club approach of Buchanan) it is then necessary that these three planes intersect and, furthermore, that the intersection point is stable.

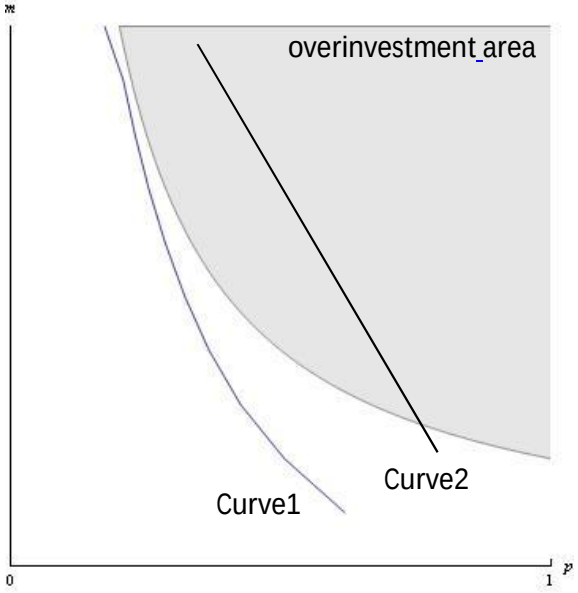

FIGURE 10

My hypothesis is that this description fits better for many examples of commons than the classical story of individualistic overinvestment. In cases of other club goods (not capital security) there are, of course, other technologies as well. Other classical examples include maintaining irrigation systems, providing access to markets, and making use of sophisticated hunting methods. On a bigger scale, capital owners form clubs known as firms that need lots of initial capital to start the production, and which are also primary users of the sink services of the atmosphere. But the general story always remains the same: clubs are needed before any overinvestment is possible. Important questions follow concerning e.g. the conventional policy prescriptions of privatization and state intervention. An analysis that fails to take into account clubs in these environments is likely to make wrong predictions on the effects of these policies. Later I discuss how one governmental intervention in Scandinavian reindeer herding destroyed the existing club structure and made it impossible for herders to enforce their private property rights over animals.

3. The theory of clubs applied to *siidas* in Sami pastoralism

The economic theory of clubs offers an analytic narrative for *siidas* in Sami reindeer herding. The Sami people lived in kinship-based bands already before reindeer pastoralism developed some 400 years ago. Usually these bands, consisting of some families, had exclusive rights to hunt or fish in certain areas, and state officials as well as other bands recognized these rights. The term *siida* then referred to an area and a band performing short migrations in the area depending on the availability of game and fish (Riseth 2006, 558-559). Presumably they enforced their rights of fishing and hunting grounds against others (see Pedersen 2002, 72), and importantly, provided social security for their members. Therefore, the *siida* system was not formed for pastoralism, but adapted to it. No doubt there were similar types of gains for "hunting stag" as described by the economic theory of clubs also before pastoralism.[4]

Before pastoralism, individuals usually had some reindeer that they used for transportation or as decoys while hunting wild deer. But deer and other game grew fewer. This was perhaps

[4] This becomes evident while reading on traditional Sami hunting methods, many of which required extensive cooperation (Vorren and Manker 1962, 67-81).

because of the introduction of firearms and migration from the south (Kortesalmi 2008, 22), or because of increased demand for furs in the European market (Riseth 2006, 558). The pastoral adaptation also coincides with a more general transition to monetary economy. Pastoralism offered better income via sales of meat and skins. (Vorren and Manker 1962, 81.) As a result, some of the Sami people adapted pastoralism. Interestingly, pastoral adaptation also created a feedback loop: large herds of reindeer made it harder to sustain the wild deer population.

In broad terms[5] the pastoral adaptation took place in the west and the north of Scandinavian Lapland, while in the east and the south, reindeer remained a secondary, yet important, source of livelihood next to fishing, hunting and small-scale farming. Swedish tax officials seemed to have recognized this. They collected taxes based on owned reindeer in the western areas already in 1692. In the east the taxes were based on game (such as moose, wild deer, bear, seal, and beaver) and fish (most importantly salmon). A famous 18th century botanist, Carl von Linné, noted in 1732 that the property of a Sami is his reindeer: according to Linné's estimation, a poor person had 50-100 animals, a well-off individual had 300-700 animals, and rich ones owned more than a thousand animals. It seems that the western adaptation was successful: in the east hunger became familiar as game decreased, and to some extent the Sami people gave way to farming migrants or assimilated to them. (Kortesalmi 2008, 20-30.)

Adaptation of pastoralism was not the end of *siidas*. On the contrary, they became the institutional backbone of the new system of production. In fact, the term nowadays refers to both herders that migrate together and to their animals. As before, a *siida* is a kinship-based organization and its migration patterns are more or less recognized by other *siidas* – although disagreements over pasture are possible. *Siida* members herd reindeer collectively, utilizing natural migration patterns, i.e. they collectively enforce one another's private property rights against nature and other human beings.[6] Natural threats included predators (e.g. wolverine, wolf, lynx, eagle, and bear), insects and diseases, reindeers simply wandering away, and also the scarcity of pasture. The latter can occur not only after overuse, but also during harsh winter conditions when pasture is under ice or heavy snow cover. The temporal variations of all of the above affect the costs of security provision, and change the optimal size of the *siida*. Ivar Bjørklund provides an illuminating example of this process:

> *As the herds differ in size through the year according to the varying grazing conditions, so also does the demand for herding task and labour. Consequently, the siida changes size and composition through the year, as the pastoralists divide and regroup their herds. Today in Finnmark, this may take place up to three times a year, the implication being that the pastoralists constitute three different sets of organizations: winter, spring and summer/fall. (Bjørklund 1990, 80-81.)*

Figure 11 illustrates how the *siida* is divided into smaller units when seasonal pasture does not allow a large herd or when there is no need for extensive labour. In the summer and fall *siidas* are large, as the summer pasture allows this (during the summer reindeers eat dozens of different plants): herders group their animals in large herds in order to save in labour. In doing so, herders also utilize the natural tendency of reindeers to defend themselves against

[5]It is not possible here to cover much of the spatial and temporal variations. For a more detailed survey, see Vorren and Manker (1962).

[6] Two remarks should be made: (1) Semi-domestication implies that animals retain some of their natural habits despite human interference making them a somewhat unpredictable form of capital. (2) The presence of state authorities (formal monitoring) is very limited as reindeer herding utilizes large tracks of land and, mostly, in remote areas.

insects (gadfly among many others) by clustering together. During the long winter season insects are not a factor (the average winter temperature is between -5 and -15 °C depending on the region), but the pasture is covered with snow and, occasionally, with ice. The consequences of the latter can be severe. Reindeers dig their way through the snow to eat vegetation, of which the lichen is particularly important during the winter. On a lesser scale reindeers also eat beard-moss. It is no longer possible to keep large herds and, on the other hand, most labour extensive tasks (e.g. counting of reindeers, slaughter, and marking new calves for their respective owners) are already taken care of in the fall. During the winter, unnecessary trampling of pasture must also be avoided as tightly pressed layers of snow makes it harder for reindeers to dig through the snow later in the season. *Siidas* divide themselves into smaller units for winter and spring seasons, only to be united for the summer in order to again reap the benefits of shared work.

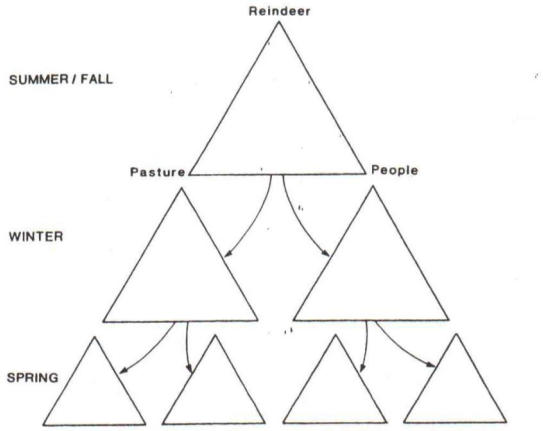

FIGURE 11: Siida constitution through the year (Bjørklund 1990, 81)

In short, the cooperation of club members allows them to maintain and secure larger herds than would be possible by an individual effort. The seasonal variations in the amount of work, pasture, herd size, etc. affect the underlying cost and benefits of ganging (as illustrated in Figures 7 and 8). Pastoralists seek to restructure their clubs accordingly.

However, restructuring is not always just seasonal, so that the *siida* always recovers its original form. If the herd is out of proportion to the pasture, "individual owners will withdraw their animals from the common herd and join other herding units according to kinship relations and available pasture." (Bjørklund, 1990, 81) Restructuring might involve harsh competition as s*iidas* can welcome a limited number of newcomers. Sometimes this leads to migration to new pastures, or forces people to change their livelihoods altogether (Bjørklund 1990, 81-82). There are, for example, Sami fishing settlements along the Norwegian coastline that were formed by people who had to abandon pastoralism (Vorren and Manker 1962, 53). Kin relations reduce the transaction costs of constant renegotiations among *siida* members, as well as the potential conflicts.

Sometimes restructuring also leads to the emergence of new *siidas*. Examples from the north-west of Finnish Lapland, Enontekiö, suggest that a new *siida* is usually founded by a merited herder, i.e. a herder in whose abilities others trust. In two of the most notable new *siidas* that emerged during the 20th century the entrepreneur originally came from outside the area (see Linkola 1972). A partial explanation could be that an outsider with less kin connections in the area might be at a disadvantage during restructuring. Therefore, he (it always was he) might

have had less to lose by taking the risk of "going rogue". In some occasions the new entrepreneur left the old *siida* after a conflict. The fate of a new *siida* crucially depends on its ability to attract members. If enough manpower is readily available, a new *siida* can eventually claim part of the pasture and secure its members' capital. For a political scientist, the comparison to the emergence of new parties is clear: a distribution of pasture over physical space is replaced by a distribution of voters over political space: parties replace clubs and political entrepreneurs replace herders.

It is now hopefully clear how clubs play a role in Sami reindeer herding. Recalling the earlier discussion (Figure 4) it is possible to formulate the role of *siidas*. The adaptation of large-scale pastoralism can be seen as a coordination game of identical[7] players, where players can take care of some reindeer individually and receive the utility of optimal p, m-pair on the $k = 1$ -curve, or play cooperatively which allows them to increase their herds and receive the utility of optimal p, m-pair on the $k*$ -curve (see Figure 12). The *siida*, finally, is the consequence of a successful coordination of the mutually beneficial equilibrium, as well as a (then-emerged) set of institutional statements (Ostrom 2005) that maintain the coordinated outcome over time.

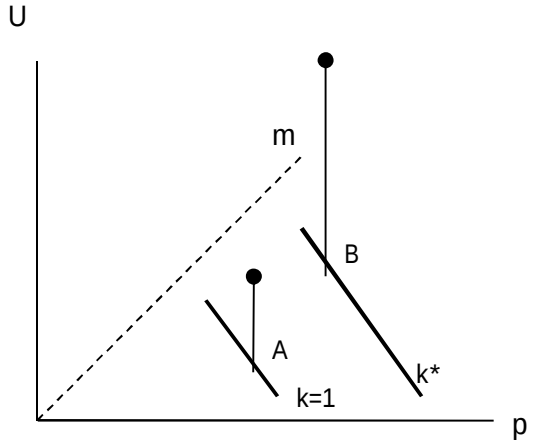

Figure 12

The *siida* system provided the institutional frame that enabled the western areas to make a beneficial transition from point A (few reindeers, less cooperation) to point B (many reindeers, more cooperation), or rather, to the surroundings of point B. The seasonal- and other variations in the natural conditions and available technology affect the cost- and benefit functions and change the optimal solution.

My understanding is that an individual overinvestment problem was not even a theoretical possibility given pre-modern technology and the pastoralist population. In short, it was not possible for an individual to secure so many animals that pasture limitation could have been met. *Siidas*, however, were able to provide security with high enough efficiency. The overinvestment problem, if any, must have been that of clubs. But why is this situation better than the overinvestment problem of individuals? And why does the *siida* system in particular

[7]Identical players are assumed for ease of presentation. In reality *siidas* consist of heterogeneous individuals, e.g. when measured in owned reindeers. Heterogeneity greatly affects the optimal size considerations, but this question is left for future work.

seem to offer an example of robust self-governance? For the answer I turn to the implications of clubs to the overinvestment problem.

4. The positive implications of clubs to norm emergence

An overinvestment problem is a problem of negative externalities. Some set of institutional statements, however originated, could ensure a better outcome for all resource users (Ostrom 2005). In classical rational choice–based sociological literature this task is given to norms (Ullman-Margalit 1977; Hechter 1987; Coleman 1990).

It fulfils my purposes here to define norms as collective action level public goods that ensure a Pareto-optimal move (although not necessarily Pareto-optimality) by changing the incentive structure in the operational level. Simply put, some actions (such as investing above a certain quota) are forbidden and deviators should expect to be sanctioned. The second-level (public good) problem concerns the supply of these sanctions.

I argue that "ganging together", or club formation, has the following positive side effects for norm emergence: (1) Clubs guarantee that resource users already have an arena for communication. (2) There is some amount of accumulated trust between club members as they have already solved one collective action problem – that of jointly providing the club good (e.g. capital security). (3) Resource users are in control of actions that their peers hold of some value, that is, mutual sanctioning is possible. (4) Clubs may also help to solve problems of boundaries and of monitoring.

The importance of these points could be – and has been – justified with the backing of many theories. I would like to stress that the conclusion is not restricted either to any single rational choice account on norm emergence, or (tentatively) even to the rational choice theory more generally. In order to illustrate this, I exercise theoretical triangulation. However, points 1-3 can be summarized using a single rational choice account on norm emergence, linking them to a concept of social closure, which proves to be useful for further analysis (Coleman 1990).

(1) The importance of a communication arena, firstly, can be linked to deliberative processes and to the spread of ideas shaping resource users' understanding of the situation. Political scientists, in particular, are sensitive to the role of ideas when speaking about discourses, paradigms and identities. The importance of a communication arena can then be justified outside rational choice theory, which is not as much a predominant theory in political science or sociology as it is in economics (Hovi et al. 2011, 395-398). Secondly, one could justify the importance of communication by a mere layman account. It is unlikely that any form of conscious collective action, such as institutional design, could occur without communication, unless the problem is very simple.[8]

A third justification is found in Ostrom's (1990, 90) design principles for successful governance. Two of them directly involve communication arenas. One principle states that individuals, who are affected by rules, should be able to participate in their crafting. This crafting requires a collective choice arena. Another principle states that individuals should have low cost access to a conflict-resolution arena. If these public goods have already been established for the purposes of clubs, they can also serve as communication arenas for other problems.

[8] Ruling out unconscious designs, e.g. through evolution.

(2) The importance of mutual trust for norm emergence and collective action seems self-evident. Because club members might value trust vested in them, it enables them to make further credible promises. The importance of trust is also justifiable outside a classical concept of rationality as discussed next. The classical idea of rationality in strategic environments, inherent e.g. in the Nash equilibrium, would not advise the play of a strictly dominated strategy. In the Prisoner's Dilemma this excludes the Pareto-optimal mutual cooperation. A big part of the appeal of the PD is that the mutual defection "should" not be the outcome of the game. This "should" includes the idea that players might convince each other that they are each willing to play a strictly dominated strategy. Assuming that conditions for none of several analytic solutions to the PD are satisfied there is a need for individuals to be irrational in the sense of "preferring A, having a choice, and choosing not A (Howard 1987, 12)". Howard (1987, 12), while using game theory to analyse its own deficiencies, argues that we have a need for this type of behaviour and that "the function of inter-personal emotions [is] to make such irrational intentions credible (*ibid.*)". An important ingredient of many positive inter-personal emotions, such as love and caring, is mutual trust. Therefore, at its best mutual trust can lead to something more than mutually beneficial exchanges in markets, as suggested by many rational choice accounts (Hirshleifer 1984).

(3) Interdependence concerns interests and control, and therefore, implies power relations. Interdependence between two individuals is here defined as one having control over actions in which the other has an interest (Coleman 1973; 1990). In comparison to (1) and (2) this point is probably more difficult to justify outside rational choice theory (see also Hovi et al. 2011, 399-403). The link between interdependency and self-governance is in sanctioning. If resource users are able to (threaten to) sanction each other, they are better able to enforce norms and rules. They then have access to sanctions, which are again among the design principles of Ostrom (1990, 90). The most extreme case of sanctioning is probably ostracism (Hirshleifer and Rasmusen, 1989), which in this case can lead to loss of private capital in addition to social inconvenience. Note that private property is a social institution. If others do not recognize your property rights, but treat your possessions as nobody's property, you are most likely in serious trouble. This is also the reason why capital security can be called an access good.

(4) Clubs also help to solve the problem of borders – at least in respect of defining the resource users (Ostrom 1990). It should also be mentioned that as private capital is secured jointly, club members are in an excellent position to monitor each other. Accountable monitoring, again, is one among the eight design principles by Ostrom (*ibid.*), because it makes sanctioning possible. Club formation seems to help solve the monitoring problem if not between clubs, then at least within a club.

The three first points above – communication, trust, and interdependence – are necessary conditions for what Coleman (1990) calls social closure. Coleman (1990, 667-951) uses an extended version of a classical barter economy model to draw a condition for norm emergence. The model treats a social system as an exchange system, where individuals have control over certain events[9] that can then be traded. Coleman (1990, 785-829) introduces events with negative (positive) externalities distinguishing two regimes, regime *A* and regime *B*. Under regime *A*, actions producing negative externalities are taken (or actions producing positive externalities are not taken), and their joint value in competitive equilibrium (v_a) is

[9] We speak of events rather than goods.

calculated.[10] Under regime B producing actions producing negative externalities are not taken (or actions producing positive externalities are taken), and their value in competitive equilibrium (v_b) is calculated.[11]

The condition for norm emergence is then v_b-v_a>0, that is, the joint value of externalities is higher than the value of action itself. At its face value this condition seems to tell us nothing more than that a Pareto-optimal move is possible and that it serves as a threshold condition for instrumental proposition (see Opp 2001), i.e. a sufficient demand for the norm exists. This means that people who are affected by the externalities are jointly willing to provide enough incentives to individuals in control of the action to effectively either ban or oblige the action. But Coleman (1990) also provides several extensions to the model including communication channels and trust.

Restrictions to communication channels, either transaction costs or total incapability to communicate, decrease beneficiaries' capability to operate sanctions. The extreme case is when every individual forms her own partition in the exchange system being totally unable to communicate with anyone. Naturally, the end result is no exchange at all: people must hold the resources they already control. Target actors also remain in control of the externality producing action. The lack of social closure due to communication difficulties is one story behind Prisoner's Dilemma. When some communication is possible, but it remains expensive, it effectively reduces the willingness of individuals to exchange resources. It is then more expensive for beneficiaries to apply the necessary sanctions.

The same logic applies to interpersonal trust in an exchange network. A successful exchange between two people requires traders to trust each other. If one trader mistrusts the other, they obviously take into account the possibility that the other will not deliver their part of the bargain. As traders weigh in the trust factor it affects the set of deals within their reach. Again, as in the case of no communication, complete mistrust ruins any possibility of a trade leaving both traders with their original possession. Mistrust in general makes it more expensive for beneficiaries to raise the necessary resources for efficient sanctions.

Finally, interdependency implies that traders have something to trade, i.e. as previously said, individuals are in control of actions in which others have an interest. If this condition is not met, there are obviously no beneficial trades to be made. This is also a basic definition of power, and necessary for (both positive and negative) sanctioning. If beneficiaries do not have control over anything that target actors consider to be of some value, they are unable to sanction them. In cases of common-pool resources this would mean that individuals' only interests in others is through the resource they are using. Securing capital is one reason why individuals might be interdependent also through channels other than their shared resource.

It is now hopefully clear why the concept of social closure is a necessary condition for norm emergence in Coleman's theory, and how communication, trust, and interdependency are linked to it. We are then able to analyse the overinvestment problem of clubs further, using the concept of social closure.

[10] Disregarding interests over externalities produced by the action.
[11] Taking only interests over externalities into account.

5. How to tackle the overinvestment problem of clubs?

After the discussion above, it seems that there are theoretical reasons to believe that clubs might favour norm emergence and, thus, robust self-governance. Of course, this is not necessarily so. Consider, for example, the most fundamental of all clubs, the family (henceforth, the household). The household is an aggregation of individuals, and it can be said to enjoy a high form of social closure. Because of this, the household is in a good position (at least in comparison to other entities) to solve its internal social dilemmas. But local social closures of separate households, though encouraging, are not sufficient for cooperative outcomes in a general level: separate households might very well end up overinvesting. The club structure, their sizes and relations become crucial. Here I sketch two roads for a cooperative outcome using *siida* system as an example.

From local to global social closure

In the Sami culture the equivalent of a household was a *baiki*: *siidas* consisted of several *baikis* (Riseth and Vatn 2009, 90). This implies that there was local social closure beyond the level of households. However, when evaluating reasons for the long-term success of Sami pastoralism, it is not sufficient to note that *siidas* enjoyed local social closure. The question of global social closure must also be assessed, and for this the *siida* system provides an illuminating example.

The answer lies in the flexibility of *siidas*. Bjørklund (1990, 81) describes how individual herders leave a *siida* when the herd grows beyond the pasture limits, and joins other units that seem to be more viable. This restructuring is possible because kinship relations spread over *siida* boundaries. Individuals have family members in several *siidas*, and these family connections give them a possibility to join other units. Assuming that kinship relations positively contribute to communication possibilities, trust and interdependency, the social closure expands well beyond individual *siidas*. Furthermore, linkages to many *siidas* are probably of benefit for an individual – the access to other units gives them possibilities for voice and exit (Hirschman 1970). This provides the individual a good position in the competition and bargaining that obviously results from regroupings as already discussed earlier.

In other words, there were incentives for individuals to establish and upkeep their connections beyond *siida* borders. In this respect 19th century herders are not unlike modern workers. Modern workers serve their interests by occasionally having lunch with colleagues from other firms. These connections might be beneficial for the worker in the future by making it easier for them to leave their job. The same rationale makes some married people suspicious of their partner's connections. The constant need to restructure, presumably not encountered in marriage, made *siidas* less suspicious of their members' outside connections. As a by-product this also ensured social closure between *siidas* and gave *siidas* a better ability to solve joint social dilemmas.

The social closure goes a long way to explain why pasture demarcation between *siidas* was closer to discreet negotiations than open conflicts (Linkola 1972). *Siida* members would have undermined their future interests by engaging in an open conflict with other *siidas*. Note that this need not be the case generally: the relation between different clubs can very well be hostile limiting the social closure to that of an individual club.

No doubt the biggest and most difficult restructuring in Sami pastoralism took place at the turn of the 20th century. It was not initiated by *siida* structure or by natural conditions, but by treaties between states (Sweden, Norway and Russia). In these treaties governments closed the borders for Sami pastoralists, who before had freely crossed the national borders migrating from summer pastures to winter pastures.[12] Martti Linkola (1972, 53-57) describes its effects on Sami reindeer herding in the northernmost parts of (then) the grand duchy of Finland using words "turbulence" and "crisis". As people tried to find new pastures, they migrated to new areas with reindeers and old cooperation networks had to be abandoned. Some people lost their capital; some got rich. Thefts were common, and some families descended into raids on one other. In other words, the club structure shattered due to external pressure, private property rights were not enforced, and trust between *siidas* eroded. This counts as evidence of how provision of capital security was in the hands of herders. When they were not able to provide it, private property rights were immediately under threat. It goes without saying that the government policies (border closures) were not supporting the local institutions – quite the contrary. Even though the *siida* system had been successfully restructuring itself seasonally and, to some extent, also in response to economic- and environmental challenges, its institutions (norms and rules) were not able to maintain coordinated, cooperative outcomes in a new situation. Despite these difficulties, which originating externally, the *siida* system is a fine example of how individuals can produce social closure between clubs as a by-product, while aiming to secure their own interests. The story is essentially the same as that of social closure within a club. It is also a by-product of individual actions aimed at something else.

Clubs as corporate actors: rescaling the dilemma

If clubs are understood as corporate actors, i.e. macro-level entities where individuals have vested authority (Coleman 1990, 325-531), this rescaling might fundamentally change the collective action game at hand from a single equilibrium Prisoner's Dilemma to a multiple equilibria game. One of the assumptions making a collective action game a Prisoner's Dilemma is that not one single cooperative decision has a significant effect on the success of cooperation (Taylor and Ward 1987; Heckathorn 1996; Medina 2007). This assumption might not hold if the dilemma is rescaled to the level of clubs. Clubs are aggregations of individuals and their decisions might have considerable impact. After rescaling the game, cooperative equilibria may emerge and the game be transformed into a game of Chicken or Assurance depending on the exact technology (for a good overview, see Heckathorn 1996).

For example, Michael Taylor and Hugh Ward (1987, 357-360) are operating on the level of clubs when they discuss the history of whaling from the point of view of states, and cautiously suggest that the modern history of whaling resemblances the game of Chicken. Whichever multiple equilibria model we are left with after rescaling, it is for the better: unlike Prisoner's Dilemma, all of them have equilibria in which at least some players are cooperating. The question, of course, is: when it is appropriate to change the level of analysis from individuals to clubs? When should clubs be treated as corporate actors? Obviously these questions require a separate study (Coleman 1990). It is sufficient to note here that this usually requires established authority relations, an organization that enforces the will of a

[12] Several reasons for border closures have been suggested including rise of nationalism, desire for better border security, and governments' willingness to promote agriculture over pastoralism and colonization over indigenous population. An interested reader should consult Pedersen (2002). The treaty between Norway and Finland was crafted in 1852 and the treaty between Sweden and Finland in 1888. It, however, took several years until formal treaties had any practical effect.

corporate actor, as well as some system of forming one. Of course, in authoritarian systems these could all be embodied in one person.

It is then interesting to look into authority relations in a *siida*. The *siida* has a chief, who has "absolute authority on all matters, particularly when they concern reindeer management – as long as he manages to hold on to his authority. This is automatically his as long as he owns the greatest number of reindeer and has the greatest experience or ability" (Vorren and Manker 1962, 144-145). The position of a chieftain is not only a respected one, but also a desired one. Entrepreneurs starting a new *siida* must enjoy a level of chieftain reputation in order to attract new members. The important point is that the position of a chieftain, even though based on tradition rather than formal institutions, is a step towards *siida* as a corporate actor. As long as the corporate actor is able to make decisions on behalf of individuals, the dilemma is rescaled and the nature of the problem may change fundamentally. Note that when all users form only one club, which is internally strong enough to be called a corporate actor, the situation strongly resembles a monopoly.

This theoretical discussion suggests the following hypothesis for environments where some important factor of production is a club good: the likelihood of successful self-governance tackling the overinvestment problem is increasing in the ratio of optimal club size and the total number of resource users.

Clubs, privatization and state management

A final note concerns the policies of resource privatization and state management, which have often been suggested as solutions for the overinvestment problem (Ostrom 1990, 8-15). The effects of either of them, however, have not been studied extensively enough in cases where some other factor of production must be produced collectively. Both policies change the incentive structure in which clubs operate. At their worst these policies can have adverse welfare effects for resource users in a similar manner as border closures had for reindeer herders via the inability of *siidas* to maintain capital security. It becomes crucial to know how the club structure adapts to the new situation. The experience of *siidas* suggests that a non-cooperative game theory may be a promising tool in that analysis as the breakdown of cooperation is a very real possibility. However, each case must be analysed separately as the club structure can take many forms.

Recapturing the main points

The main point of this paper has been to suggest that there are important differences between the overinvestment problem of clubs and the classical overinvestment problem of individuals. When some important factor of production is a club good, the existence of clubs may very well be a requirement for any overinvestment. But clubs also seem to imply several conditions that facilitate successful self-governance and norm emergence, i.e. the necessary condition for the problem also provides some elementary tools for its solution. The distinction between environments where clubs are needed and where they are not will hopefully allow more nuanced discussion on complex causality issues in the commons.

In this paper steps are also taken to test the empirical usefulness of the theory by applying it to groups of herders, *siidas*, in Sami pastoralism. *Siidas* provide security over their members' private investments collectively in a risky environment. I propose that the Sami did not face the problem of individuals before the state intervention, but – if anything – they faced the

overinvestment problem of clubs. Interestingly, earlier literature on *siidas* suggests that individual herders had clear incentives to maintain good relations to neighbouring *siidas* due to constant restructuring of clubs. This restructuring was needed because the external conditions (seasonal and other) changed the optimal club size over time. As a by-product, the social closure also extended beyond a single club. Interestingly also, authority relations in *siidas* seem to suggest that the club could claim authority over its members' decisions concerning herding. When this observation holds, it is possible to re-scale the problem to the level of clubs (clubs can be treated as decision makers). After this re-scaling, the nature of the collective action game may change fundamentally, allowing (more) cooperative equilibria.

LITERATURE CITED

Bjørklund, I. 1990. Sami Reindeer Pastoralism as an Indigenous Resource Management System in Northern Norway – a Contribution to the Common Property Debate. *Development and Change* 21:75-86.

Bjørklund, I. 2003. Sami Pastoral Society in Northern Norway – The National Integration of an Indigenous Management System. In *Cultivating Arctic Landscapes*, eds. Anderson, David., Mark Nuttall, 124-135. New York: Berghahn Press.

Buchanan, J. 1965. An Economic Theory of Clubs. *Economica* 32:1-14.

Coleman, James. 1973. *The Mathematics of Collective Action.* London: Heinemann Educational Books Ltd.

Coleman, James. 1990. *Foundations of Social Theory.* USA: The Belknap Press of Harvard University Press.

Cooper, Russell. 1999. *Coordination Games. Complementaries and Macroeconomics.* USA: Cambridge University Press.

Gordon, H. 1954. The Economic Theory of a Common-Property Resource: The Fishery. *Journal of Political Economy* 62: 124-142.

Hardin, G. 1968. The Tragedy of the Commons. *Science* 162: 1243-1248.

Hechter, Michael. 1987. *Principles of Group Solidarity.* USA: University of California Press.

Heckathorn, D. 1996. The Dynamics and Dilemmas of Collective Action. *American Sociological Review* 61: 250-277. 17

Hirshleifer, D. and E. Rasmusen. 1989. Co- operation in a Repeated Prisoner's Dilemma with

Ostracism. *Journal of Economic Behavior and Organization* 12: 87-106.

Hirshleifer, Jack. 1984. On the Emotions as Guarantors of Threats and Promises. *UCLA Department of Economics, Working Paper* #337.

Hirschman, Albert O. .1970. *Exit, Voice, and Loyalty.* Cambridge: Harvard University Press.

Hovi, J. and A. Underdal and H. Ward. 2011. Potential Contributions of Political Science to Environmental Economics. *Environmental and Resource Economics* 48:391-411.

Howard, N. 1987. The present and the future of metagame analysis. *European Journal of Operational Research* 32: l-25.

Kortesalmi, Juhani J. 2008. *Poronhoidon synty ja kehitys Suomessa.* Tampere: Tammer-paino Oy.

Linkola, Martti. 1972. *Enontekiön lappalaisten poronomadismi.* Jyväskylä: Jyväskylän yliopisto.

Medina, Lus Fernando. 2007. *A Unified Theory of Collective Action and Social Change.* USA: University of Michigan Press.

Olson, Mancur. 1971. *The Logic of Collective Action.* USA: Harward University Press.

Opp, Karl-Dieter. 2001. Social Networks and the Emergence of Protest Norms. In *Social Norms,* eds. Hechter, M. and K-D. Opp, 234-273. New York: Russel Sage Foundation.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions For Collective Action.* New York: Cambridge University Press.

Ostrom, Elinor. 2005. *Understanding Institutional Diversity.* Princeton: Princeton University Press.

Pedersen, S. 2002. Norwegian nationalism and Saami areas as no-man's land. In *Conflict and Cooperation in the North.* eds. Karppi, K. and J. Eriksson, 167-182. Umeå: Norrlands Universitetsförlag.

Riseth, J. 2006. Sami reindeer herd managers: why do they stay in a low-profit business? *British Food Journal* 108:541-559.

Riseth, J. and A. Vatn. 2009. Modernization and Pasture Degradation: A Comparative Study of Two Sami Reindeer Pasture Regions in Norway. *Land Economics* 85:87–106.

Sandler, T. and J. Tschirhart. 1980. The Economic Theory of Clubs: An evaluative Survey. *Journal of Economic Literature* 18: 1481-1521.

Schelling, Thomas C. 1960. *The Strategy of Conflict.* Cambridge, Massachusetts: Harvard University Press.

Taylor, M. and H. Ward. 1987. Chickens, Whales, and Lumpy Goods: Alternative Models of Public Good Provision. *Political Studies* 30: 350-370. 18

Vorren, Ø. and E. Manker (1962): *Lapp Life and Customs. A Survey.* London: Oxford University Press.

Ullman-Margalit, Edna. 1977. *The Emergence of Norms.* Oxford: Oxford University Press.