

SHEPHERDS AND THEIR LEADERS AMONG THE *RAIKAS* OF INDIA

A PRINCIPAL-AGENT PERSPECTIVE

Arun Agrawal

ABSTRACT

This article explicates the logic of decision-making among *raika* shepherds in western India to set the stage for a simple principal-agent model that I deploy to analyze leader-led relations among the *raikas*. Using detailed information on strategies followed by the shepherds to control their leader, the paper formalizes significant features of the context in which the *raikas* earn their subsistence. Information and direct monitoring emerge as the chief variables that allow an equilibrium where the agent (leader) seldom cheats and the principals (shepherds) seldom sanction. The article briefly explores the relevance of the findings to other rural contexts where communities are small, and community members periodically select leaders and interact regularly and closely with each other.

KEY WORDS • *raikas* • principal-agent • Rajasthan • nomadic pastoralism
• monitoring

This article focuses on the relationship between the leaders and ordinary shepherds among the *raikas*, nomadic pastoralists in western India.¹ Nomadic pastoralism continues to provide basic subsistence to millions of households that dwell in the semi-arid regions of Asia and Africa. It also constitutes a dramatically different mode of production in comparison to settled agriculture (Kroeber, 1948; Sadr, 1991; Sandford, 1983: 1–3). Knowledge and institutions of the pastoralists, therefore, remain pertinent for the practically as well as the theoretically inclined.²

To unravel problems stemming from environmental risks, the *raikas* em-

1. Nomadic pastoralists are defined as groups who 'are economically reliant on their herds and who wander seasonally in search of pastures'. This definition as well as a summary of the debate concerning the origins of pastoralism is available in Sadr (1991: 1–11), see also Khazanov (1984: 15–84).

2. As institutional and popular faith in top-down development policies erodes, studies valorizing local knowledge and institutions are gaining ground. An impressive body of research now stresses that the goal of securing an improved life for the poor will be better served if we first appreciate their desires, knowledge and institutions (Chambers et al., 1989; Croll and Parkin, 1992; Kaul, 1996; Oldfield and Alcorn, 1991; Posey and Balee, 1989; Schmink and Wood, 1984). In consequence of these emerging trends in 'development science', new studies on local knowledge and institutions have become increasingly available (Brokensha et al., 1980; Warren, 1991; Warren et al., 1991; McKean, 1992; Ostrom, 1990).

ploy a number of strategies: diversification, storage (on the hoof), exchange and mobility (Halstead and O'Shea, 1989: 1–3). Of these, mobility is perhaps the most critical. Indeed, collective mobility in the face of environmental risks undergirds the survival of most nomadic pastoralists.³ Collective mobility also requires that pastoralists carefully order interactions among leaders and followers. However, as Niamir points out in her comprehensive review of the African literature, few studies provide an in-depth account of relationships between leaders and followers among pastoralists (Niamir, 1990).⁴ Those studies that do exist tend to treat the actions of the ordinary pastoralist and the leader independently of each other.

This study, by using a principal–agent framework, attempts to achieve two objectives at once. It employs a significant tool of rational choice approaches – game theory – to represent the actions of shepherds and leaders, and explain their observed interactions. In contrast to much theorizing about decision-making among hunter–gatherers, it, thus, treats the actions of the *raika* shepherds and their leader – the *nambardar* – as mutually dependent.⁵ Second, in using game theory, the study engages recent arguments which pathologize rational choice theory and suggest its much-heralded achievements are, in fact, deeply suspect (Green and Shapiro, 1994). Green and Shapiro would further assert that fundamental rethinking is needed if rational choice theorists are to contribute to the understanding of politics. One of their most significant criticisms relates to the relative ‘thinness’ of rational choice accounts and the lack of empirical explanatory power. This article accepts Chong’s (1995: 37–8) argument that the value of any theory has to be measured by its empirical power and aims at explaining observed facts regarding the relationship between shepherds and their leaders. In adopting a game-theoretical approach to explain these facts, the article undermines those criticisms of rational choice by Green and Shapiro that are based on its supposed empirical deficiencies. My approach is problem-driven as Green and Shapiro advise, but all such

3. For a discussion of why nomadism/transhumance prevails in certain socioecological niches, see Nugent and Sanchez (1993).

4. Some exceptions are available in the works of anthropologists who have produced several studies on decision-making and organization among nomads and hunter–gatherers. See, for example, Abel and Blaikie (1990), Barth (1961), Mithen (1989), Weissleder (1978). See also Barlett (1980), Gladwin (1979), Ortiz (1967) and Quinn (1975) for anthropological studies of decision-making. Few of these studies, however, focus on leader–led relations. The vast literature on decision-making by game theorists and management scientists suggests possible future directions for research, but few current applications. See, for example, Bell et al. (1990) and March (1988).

5. *Nambardar* literally means ‘the holder of a number’. The term dates back to the British period when the camp-leaders were assigned individual numbers for ease in recording their movements.

approaches must grapple with issues of meta-theoretical foundations. While Green and Shapiro (1995), responding to their critics, side-step the question of whether other theoretical foundations can offer the kind of wide applicability rational choice provides, analysts of empirical puzzles must confront the problem of locating their theoretical moorings in particular paradigms. The analysis in this article seeks to demonstrate how rational choice analysis can elicit insights that would not otherwise be available.

The decision-making arrangements that exist among the *raikas* are best conceptualized as informal institutions.⁶ They are informal because they are neither codified nor legally incumbent upon different groups. They are institutions because they structure, constrain and facilitate interactions and behavior (Bates, 1989; North, 1990). In this article, I first describe the *raikas* and the three groups of decision-makers among them. The next section discusses the major types of decisions. The third section presents an analysis of decision-making by briefly examining why specific types of decisions are made by particular decision-makers. These sections set the stage for examining the association between the shepherds and their leaders – the *nam-bardars*. In the following three sections, a simple game-theoretical model is used to uncover the logic behind the shepherd–leader relationship. While the substantive focus of the article is on nomadic shepherds, the analysis is couched in a generalizable principal–agent framework and thus possesses implications for other contexts where multiple principals hire an agent. The article demonstrates the possibility of deriving useful insights even through easily accessible game-theoretical models in contrast to some recent literature on principal–agent relationships that increasingly deploys highly complex reasoning and models.⁷ To the extent that managers of renewable resources in other parts of the world also periodically select new leaders and confront issues of controlling their leaders, the discussion holds wider relevance, for example, the elections of rural leaders, attempts to co-manage natural resources in many countries in Latin America, Africa and South Asia by creating partnerships between the state and the local communities, or rural thrift and credit associations that periodically select new leaders. The conclusion discusses the implications of the analysis.

6. The primary aim of this article is to delineate the logic of shepherd–leader interactions and decision-making in the camps, and so only limited information on *raika* society and economy and their relationship with their ecological context is provided. For the interested reader, general descriptions of the *raikas* are available in Agrawal (1993, 1994), Kohler-Rollefson (1992), Srivastava (1990, 1991) and Westphal-Hellbusch (1975).

7. The classic defence of the virtues of simplifying assumptions is, of course, available in Alchian (1950) and Friedman (1953). The radical simplification of reality embodied in the model I use, however, still incorporates the most significant features of the social context through the payoff structure of the games I use.

Raikas and their Decision-makers

The *raikas* are the largest group of nomadic shepherds in India.⁸ Most *raikas* live in western India, in the states of Rajasthan and Gujarat, and are believed to have been dwelling in this part of the country for more than 500 years.⁹ Their expertise in tending and herding camels made them an important part of the camel corps of many of the kingdoms in Rajputana in the 18th and 19th centuries, but with the development of more modern means of communication in these semi-arid regions, and the increasing dominance of settled agriculturists, their political importance is far lower. They must rely on sheep, camels, and part-time agriculture to subsist. The shepherds own their animals, but graze them on commonly owned or public pastures, or in fields that belong to others.

While the *raikas* reside in permanent dwellings for a quarter of the year, they migrate with their sheep over distances spanning up to 1200 miles annually. Their migration across state borders brings them in contact with farmers and government officials in far-flung places in Haryana, Uttar Pradesh, Madhya Pradesh and even Maharashtra. As a rule, the shepherds migrate collectively, and move to a new camp location with their sheep almost daily. A mobile camp, the *dang*, embraces up to 18 sheep flocks. Since a flock often comprises 400–500 sheep, a camp can consist of 3000–8000 sheep, 20–100 camels, and, perhaps, 100 men, women and children. It resembles nothing as much as an entire village on the move.

Three major centers of decision-making exist in shepherd camps. Of these, the *nambardar* – the leader of the camp – is the most important. He is an influential shepherd, boasts wide-ranging contacts among other shepherds, farmers, wool and sheep merchants and, on occasion, even government officials. He is familiar with a variety of issues relating to migration routes, the movements of other shepherd camps, outsiders such as government officials and farmers, the purchase of supplies and the sale of pastoral products. His past experience, relations with outsiders and access to multiple sources of information make him pivotal to the success of the migration. The second-in-command in the camp is called a *kamdar*. He assumes the duties of the camp-leader when the *nambardar* is sick or away from the camp. Since both perform the same duties I will not treat them as

8. Whether seasonal mobility and return to a home base marks the *raikas* as transhumants, rather than as nomadic shepherds, requires a debate that is beyond the scope of this article. I use the term 'nomadic' in a generic sense implying movement, either seasonal, or regulated by other socioecological imperatives. For a fuller discussion, see Dyson-Hudson and Dyson-Hudson (1980: 17–18), and Nugent and Sanchez (1993).

9. The literature on 'nomadic' groups in India is far less extensive than what is available for the African or the West Asian context. Some general accounts of nomadic groups in India are available in Leshnik and Sontheimer (1975), Misra and Malhotra (1982) and Prasad (1994).

different loci of decision-making. Usually the second-in-command plays a role as a member of the 'panchayat', the council of elders, in the camp. The council comprises five of the older and more experienced persons in the camp. The five members of the council tend to represent the spectrum of different interest groups in the camp since they often are responsible for mobilizing different shepherds' flocks for the camp, or might represent different villages. Collectively, they possess information and experience that none of the other decision-makers can match. Finally, there is the *mukhiya*, the leader of the individual flocks that comprise the mobile camp.¹⁰ He is intimately familiar with his flock and its dynamics and with the members of the flock.¹¹

Major Types of Decisions

Members of different camps I interviewed identified 60 issues as important for the functioning of the camp (see Table 1 in the next section). Using the classification the shepherds themselves suggested, I divide them into six categories: camp formation and dissolution; migration; flock management; camp management; market interactions; and interactions with the government and settled populations. The characteristics associated with each class of decisions are now described.

Camp Formation and Dissolution

This category contains two major decisions – selection of the camp-leader before the beginning of the migration and the breakup of the camp at the end. To select a new leader, a few flock-owners – the *mukhiyas* – approach an individual they can trust. Once selected, the camp-leader tends to continue for several annual migration cycles. In the normal course of events, the breakup of the camp occurs after the migration cycle is complete. On the return journey, flocks leave the camp at points closest to their villages. They seldom leave before the cycle is over and the *nambardar* takes special care to ensure that members do not get so dissatisfied that they are forced to leave in mid-migration.

10. In the ensuing discussion, I will use the term *nambardar* interchangeably with the term 'camp-leader' and *mukhiya* with the term 'flock-leader'.

11. Rarely, if ever, do women hold positions of formal authority among the *raikas*. Thus, in none of the 30 *dangs* that I surveyed was a woman the leader of the camp. Nor was a woman ever the flock-leader.

Migration

The direction of travel, the timing of migration, the daily distance to be covered and the setting of the camp are the central migration issues. The *raikas* camp in a new location almost every day. Decisions related to setting the camp and the distance to be travelled each day must, therefore, be made repeatedly. For these decisions, the necessary information is not easily available to all shepherds. Familiarity with the migration route and information about the villagers form a prerequisite to decisions about where and when to set camp. Only the more experienced shepherds have such information.

At the same time, decisions on this subject can be considered routine because they are made often and the risks associated with a wrong decision are low. Thus a wrong decision is unlikely to impose huge costs on the shepherds because farmers are rarely hostile and welcome the manure that sheep deposit in their fields during the night.¹²

Flock Management

Two subclasses of decisions can be distinguished: household decisions (about cooking, loading and unloading camels, etc.) and decisions about managing the sheep (grazing, watering, accounting and so forth). Women perform most of the housekeeping; men carry out the sheep management tasks. Decision-making depends on intimate familiarity with the affairs of the flock and an ability to direct individuals in the flock. Few of the tasks, however, require much direction from the decision-maker. All the decision-maker may need to do is to ask that the evening meal be cooked, that camp be broken, or wake the shepherds to take the sheep for grazing.

Camp Management

Three issues affect camp management: the management of people; allocation of collective tasks; and camp security. The management of people includes issues such as arbitrating disputes, dividing responsibilities related to the camp and keeping track of shepherds who leave on various errands. Collective tasks include cooking on festive occasions, taking care of and interacting with visitors, purchasing medicines and supervising expenses from the common fund. The decision-making unit which undertakes these tasks must be able to command. To make arrangements for better security and to ensure that these arrangements will be followed, the decision-maker

12. A number of writers have remarked on hostility between settled and migrant populations. See, for example, Nugent and Sanchez (1993). For the *raikas*, at least, such conflicts are the exception; mutual accommodation is the rule.

must also have contacts among the settled population and familiarity with the migration route.

Market Interactions

Shearing and sale of sheep and wool sales lead to the major decisions needed to operate in markets. Most decisions on market interactions affect the entire camp. High stakes hinge on such decisions as the rate at which sheep should be sold. Other decisions are more routine – to whom should wool be sold? Some decisions demand substantial asset-specific knowledge – when are the sheep ready for shearing or sale? Decisions also entail possession of the latest knowledge about market prices for sheep and wool. Finally, since shearing takes place over a week, the decision-maker needs to persuade farmers to furnish space during this time.

External Relations

This last issue area poses the greatest level of uncertainty. Decisions involve interactions with government, with the legal system, and with settled populations. In addition to low information availability on these issues, shepherds face an additional complication: the stakes are very high. While shepherds make their decisions only irregularly and infrequently, wrong choices can lead to losses of significant sums of money, expedite grave trouble and precipitate major fights with farmers. Right decisions, on the other hand, promise no benefits except that the daily business of the camp can continue as usual. Thus decisions involve high stakes and asymmetries between returns and losses.

Allocation of Decision-making

Table 1 presents the data collected on decision-making in 30 *raika* camps. From column 2 it can be seen that two decision issues fall under the general category of ‘Camp Formation and Dissolution’. Respondents in each camp were asked who made the decisions on each of these issues and there were 58 usable responses. Of these 58 responses, the owners of the flocks – the *mukhiyas* – were mentioned 49 times and the camp-leader – the *nambardar* – was mentioned in nine instances. Of the total of 1800 responses for 60 decision issues from 30 respondents, 37 (2%) were either invalid or unavailable; and thus the number 1763 as the total number of responses.

The flock-owners make most (85%) of the decisions about camp formation and flock management. The *nambardars* have extensive powers to make decisions in all other areas. They make 72 percent of the decisions in

Table 1. Aggregate Data on Decision-making, Classified by Issue Area

Issue Area	No. of Decisions	Decision-making Unit			Total
		Flock-leaders	Nambardar	Council	
Camp Formation/Dissolution	(2)	49	9	–	58
Migration	(11)	1	265	48	314
Flock Management	(13)	322	55	–	377
Camp Management	(16)	53	377	48	478
Market Interactions	(10)	71	171	58	300
External Relations	(8)	8	175	53	236
Total	(60)	504	1052	207	1763

the other general categories of decision-making. The shepherds have delegated the responsibility for making most of the decisions in the areas of migration and camp management to their leaders. In addition, with the council of elders they cooperate to make some of the decisions where interactions with outsiders such as farmers and government officials are involved; and with the flock-leaders they share authority for decisions related to market interactions. Even in these two areas they make 65 percent of all the decisions.¹³

Table 1 suggests that the responsibility for decisions is not distributed randomly in the shepherd camps. Under each category a particular decision-making unit seems chiefly responsible. For camp formation and dissolution the flock-leaders are the primary decision-makers. They select the camp-leader and decide the time at which they will leave the camp. To understand the logic behind the allocation of these decisions recall how a new camp is formed. The flock-leaders approach an individual whom they trust to guide them through the migration. In choosing their leader they abdicate responsibilities for making a large number of important decisions. By selecting a leader to make decisions on their behalf, they save a significant measure of time and energy. They must, however, be able to exercise some control over their leader, else he could easily exploit them. So although they give up the power to make many decisions, they retain the right to choose a new leader and the right to leave the camp if dissatisfied.

For decisions related to flock management, it is again the flock-leaders – the *mukhiyas* – who are responsible. They make 85 percent of the decisions. Their decisions affect only a small number of people, and there are seldom any economies of scale to be harvested. At the same time, the *mukhiyas* have more knowledge about their flock than anyone else in the camp. A

13. Despite the extensive authority, the nambardars were modest about their role in the migration, usually attributing success to God – ‘*Shivji ki kirpa*’.

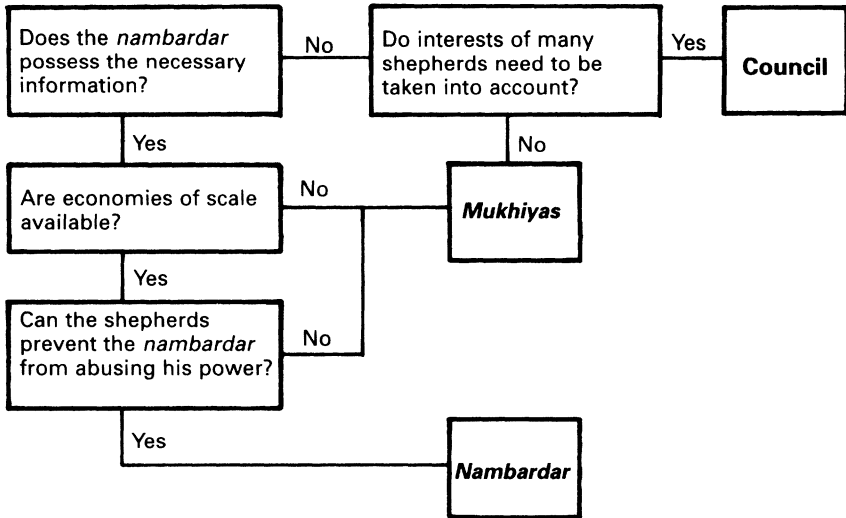


Figure 1. A simplified Model of Decision-making among the *Raikas*

mukhiya can gain no advantage by allowing another decision-maker the right to manage his flock.

The basis on which the shepherds have allocated the rights to make decisions is summarized in Figure 1.

The last part of Figure 1 needs further analysis. How precisely do the shepherds ensure that their leader will not misuse the power that is delegated to him? The shepherds seem caught in a dilemma. On the one hand, they stand to gain substantial economic benefits by delegating to their leaders the power to make decisions in a wide variety of situations. Yet, at the same time, they face the risk that these leaders, especially the *nambardar*, may abuse their powers. In response the shepherds use a comprehensive set of preventive and corrective measures that help guard against opportunistic behavior. An analysis of the mechanisms they deploy helps us to understand better the leader-led relations among renewable resource users who periodically select new leaders.

The analysis is also useful in explicating the dynamics of a variety of other social situations in which individuals face the same type of problems as the *raikas*: how to control an agent who exercises responsibilities and powers on the behalf of a collective. Delegation, by permitting specialization, creates efficiency gains (Lupia and McCubbins, 1994: 93). As Kiewiet and McCubbins (1991: 24) put it in their discussion of the relationship between the American bureaucracy and the Congress,

Delegation (of powers and responsibilities) is the key to the division of labor and development of specialization; tremendous gains accrue if tasks are delegated to those with the talent, training and inclination to do them. This ... is what allows firms to profit, economies to grow, and governments to govern.¹⁴

But delegation also creates a range of opportunities for agents to shirk, subvert or steal. The analysis of the *raika* case shows how a particular group of social actors resolves problems that arise because of delegation, and how their strategy might differ from (or be similar to) that of other actors faced with the same problem.

A Neoinstitutional Perspective

With the recognition that transaction costs, information asymmetries and property rights play exceedingly significant roles in determining economic outcomes, the neoinstitutional literature has burgeoned in the last two decades (Bromley, 1989; Eggertsson, 1990; North, 1990; Williamson, 1985). Many authors, in addition, have begun to apply insights from the neo-institutional literature to rural contexts (Bates, 1989; Berkes, 1989; Cashdan, 1990; Ensminger, 1992; Ensminger and Rutten, 1991; Ortiz and Lees, 1992; Ostrom, 1990; Wade, 1988).¹⁵ For most of these theorists, the notion of contracts among hierarchically located actors is fundamental to the analysis (Kreps, 1990: 91–3).

The agency literature, which was launched by the seminal works of Grossman and Hart (1983), Holmstrom (1979), Hurvitz (1973), Jensen and Meckling (1976) and Ross (1973), focuses specifically on the outcomes that obtain as a result of the divergence in the interests of principals and agents and on the mechanisms that principals may use to tether agents to their will. While earlier theorists (Fama, 1980; Fama and Jensen, 1983; Jensen, 1983) believed natural selection processes lead to the most efficient types of contracts between principals and agents, more recent mathematical literature examines mechanism design at great length to explore how principals may write efficient contracts *ex ante* (Biglaiser and Mezzetti, 1993; Glover, 1994; Laffont and Tirole, 1987; Lewis and Sappington, 1989). Few of these papers, however, consider the situation where multiple principals engage a single agent.¹⁶

14. The ubiquity of principal–agent relationships is captured well in this grudging phrase from Dilulio (1994: 278): ‘Essentially, the so-called principal–agent problem exists whenever one individual depends on the action of another.’

15. Among anthropologists, Bailey (1965, 1988, 1991), Barth (1966, 1967) and Colson (1974) are among the earliest exponents of approaches that are either compatible with, or presage the current institutionalist approaches to, the study of rural or ‘traditional’ societies.

16. But, see Bernheim and Whinston (1985, 1986) and Li (1993). Several works on multiple agents and single principals are also available (Demski and Sappington, 1984; Mookherjee, 1984; Nalebuff and Stiglitz, 1983; and Tirole, 1986). See also Krepps (1992).

This article uses a simple game-theoretical model to understand the effect of information and monitoring in a situation where multiple principals contract for the services of a single agent.

We can consider the mobile shepherd camp as a congerie of relationships based on contracts between ordinary shepherds (principals) and the *nambardar* (their agent). According to this set of contracts, the shepherds select a leader for their migration so that they do not each have to perform tasks that would divert their attention from the daily tasks related to shepherding. In exchange, the *nambardar* gains social prestige, cultivates political contacts and garners leadership status.¹⁷ Even a cursory look at the range of issues over which the *nambardar* makes decisions reveals significant opportunities for malfeasance, graft and moral hazard (see Table 1). The *nambardar* decides upon the course of action in 60 percent of all situations mentioned by the shepherds as important. If we exclude the decision area of 'flock management', which is related to issues internal to the management of each flock, the *nambardar* decides for the camp in nearly three-quarters of all decision situations.¹⁸

Opportunities for graft and exploitation arise from structural differences between the position of the shepherds and the *nambardar*. In turn, these structural differences can be traced to asymmetries of power and information. The *nambardar* possesses time-, place-, and asset-specific information that is unavailable to the shepherds. Indeed, this is the reason why they select him. But at the same time, the asymmetries of power and information place the *nambardar* in a position marked by the possibilities of adverse selection, moral hazard, shirking and corrupt behavior.¹⁹

Each of these – adverse selection, moral hazard, shirking and corrupt behavior – can lead to major losses for migrating shepherds. These types of behavior may occur in any situation where the *nambardar* interacts with outsiders and sums of money or goods change hands. The leader can misrepresent both the true costs and the benefits of actions. Examples of the first type would include bribes negotiated to pay off government officials,

17. Economic considerations seem to play only a small role in the desire to be the leader. The power to make decisions for a group of followers is, perhaps, the primary force impelling some individuals to seek status as a leader.

18. The council of elders plays a relatively minor role as a decision-making body in situations involving principal–agency problems owing to the rather limited opportunities it possesses to abuse authority (see Table 2). See also the next section for a discussion of the situations where graft and malfeasance are possible, and the limited authority of the council in those situations. The council as a decision-making body plays a significant advisory role, however, as discussed earlier and depicted in Figure 1.

19. Adverse selection, moral hazard, shirking and corruption as they are discussed in, for example, Baiman (1982), Ostrom et al. (1993) and Williamson (1985). See Kiser and Tong (1992) for a discussion of different types of corruption, and Shleifer and Vishny (1993) for the relation of corruption to efficiency.

SHEPHERD

LEADER	Sanction	Do Not Sanction
Cheat	$a_3 - a_1; -a_2 - (a_3/N)$	$a_3; -a_3/N$
Do Not Cheat	$-a_1; -a_2$	0; 0

Figure 2. The Relationship between Cheating and Sanctions

payments to settle disputes with farmers, costs of medicines and costs of supplies bought for feasts and festivals. Benefits might be misrepresented when farmers pay the camp for sheep folded in their fields, or merchants pay for pastoral products such as wool and sheep. In response to the wrongdoings of their leader, the shepherds can try to deter him by sanctioning him in two possible ways: (1) by returning home in mid-migration; or (2) by declining to choose him as leader in future migration cycles.²⁰ The following simple game represents the choices for the shepherds and their leaders.

If the leader does not cheat, and the shepherds do not sanction, neither of them incurs any costs, and the payoffs to each are zero. If the leader cheats, and the shepherds do not sanction, the leader gains an amount a_3 , and each shepherd in the camp loses a_3/N where N is the total number of shepherds in the camp. If the shepherds choose to sanction the leader, each of them incurs a cost a_2 as the cost of sanctioning, in addition to the cost of the leader's cheating. The cost on the leader is represented by a_1 , and his payoff is reduced by that amount. If the leader does not cheat, and the shepherds sanction him, the leader suffers the cost of sanctions (a_1), and the shepherds incur the cost of sanctioning (a_2).

As mentioned earlier, the shepherds can impose two types of sanctions on their leader – leave the camp in mid-migration and return home, or decline to choose him as the leader in future migration cycles. Both of these are strategies that entail high costs, for the shepherds (principal), as well as for the *nambardar* (agent).²¹ Leaving the camp in mid-migration is a high-cost/high-risk strategy. It defames the *nambardar*, and carries a significant probability of ruining his reputation. The migration is risky enough for shepherds travelling in a group; for a lone shepherd returning home, it would be highly perilous.²² A flock-leader will follow this strategy only

20. A third alternative is logically possible – that the camp split into two or more parts as a result of dissension between the principals and the agent. I did not observe, nor could the shepherds recall, such a case.

21. None of the shepherds I interviewed felt that the *nambardar* could be removed during a migration cycle, even if he proved incompetent or corrupt.

22. Few shepherds leave a camp in the middle of the migration cycle, but the fact that they possess this choice remains an ultimate restraint on hasty, thoughtless or arbitrary decisions. The extent to which the leader can impose his will is thus limited by the shepherds' freedom

under extreme circumstances. The second possibility – to choose a different *nambardar* or to join a different camp after the current cycle concluded – would hurt the *nambardar*, but only defer the current problem of the wayward agent. The costs of inappropriate performance by the agent will continue to be incurred.

The relationship among the payoffs for the leader and the shepherds are summarized in expressions 1 and 2, respectively. The relationships hold, regardless of the form of sanction the shepherds choose.

Leader

$$a_3 > 0 > a_3 - a_1 > -a_1 \quad (1)$$

Shepherds

$$0 > -a_3/N > -a_2 > -a_2 - a_3/N. \quad (2)$$

It is easy to verify, that under these payoffs, there is an equilibrium in pure strategies, where the leader will cheat, and the shepherds will not sanction. This is clearly undesirable from the point of view of the shepherds. More importantly for analysis, it is also not the equilibrium observed during field research. The dominant strategy for the leader seemed to be seldom to cheat, and for the shepherds, to sanction rarely. How do we explain why the *nambardar* does not cheat?

The Restraint Exercised by the *Nambardar*

The key to understanding the equilibrium that prevailed in shepherd camps lies in the significance of information, and the dynamics of monitoring in the camp. The shepherds, instead of waiting until their agent has successfully defrauded them, have created reliable mechanisms that monitor the *nambardar*, and drastically reduce the possibility of hidden information and hidden actions. Before the *nambardar's* decision to cheat or not cheat, and the shepherds' response to sanction or not sanction, thus, comes the choice of whether to monitor.²³ The *nambardar* also draws upon the expertise of

to express their preferences through exit and voice. The shepherds use 'voice' not in complaining to the *nambardar* or protesting directly to him. Instead, they use voice to talk with other shepherds and thus affect the reputation of a *nambardar* and the possibility of his continued selection as *nambardar* (see Hirschman, 1970). In a rare conversation shepherds remembered an instance where a flock-leader, disgusted with his *nambardar*, left the camp in mid-migration. His *nambardar* was universally condemned by other camp-leaders and shepherds as having behaved in a capricious and wilful fashion. 'It is like a father deserting his son in the wilderness', was a common expression used by shepherds to describe the errant leader's behavior. When the shepherd left the camp, his leader lost status and respect.

23. One of the earliest theorists to stress the necessity of monitoring in principal-agent relationships was Max Weber (1992) who discussed how factors such as complexity and diversity of tasks, and ease of communication and transportation, affect the possibility of effective monitoring.

elder shepherds in the camp (who are usually members of the council as well) to consult in cases where bribes or fines need to be paid to government officials or in disputes with farmers.

To see how the shepherds monitor and use their information, we discuss four situations: the selection of camping sites; the purchase of medicines and supplies for feasts; the dealings with merchants; and finally, the payment of bribes to police, forest and other government officials. These cases represent the greatest possibility of returns to an unscrupulous decision-maker out of all the situations in which decisions are necessitated during the course of the migration. The interactions with outsiders over cash amounts can yield significant profits to a person possessing hidden information and undertaking hidden actions. The specific issues related to each of these situations and the distribution of responsibilities for making decisions over these issues is presented in Table 2. This more detailed quantitative information on the distribution of decision-making responsibilities, together with the ensuing discussion about each specific situation, makes it clear that in most of the situations where opportunities for 'hidden information and hidden action' are present, the interactions are primarily between the *nambardar* and the *mukhiyas*. Among all the listed decisions, the council of elders is involved mainly in determining when merchants and shearers should be called – situations where little opportunity for graft is present.²⁴

Selection of Camp Sites

Raikas mostly camp on private fields. The leader negotiates with the farmers to select the fields in which the sheep will be folded for the night. The amounts the *nambardar* receives on behalf of the shepherds are sizeable – on the average Rs. 500.00²⁵ for each flock over the year (see Table 3).

The shepherds use a simple mechanism to ensure that the *nambardar* does not conceal information or siphon off returns from folding; the negotiations between the farmer and the *nambardar* often take place in the open where one or two shepherds may be present with the *nambardar*, and thus monitor the payment from the farmer.²⁶ Further, in as many as two-thirds

24. The *nambardar* and the council of elders are each responsible roughly for about half of the cases requiring a decision on the time at which sheep-shearers and wool merchants should be called. The most important factor governing who should make the decision seemed to be the size of the camp – in smaller camps, the *nambardar* was far more likely than the council to make this decision. The reason behind this distribution seems to relate to the increasing amount of information needed to make the decision about when the entire camp's sheep would be ready for shearing (as the camp grew in size).

25. At current rates of exchange, US\$1.00 equals Rs. 30.00.

26. As the *raikas* say, 'Even your enemy does not cheat you while looking you in the eye.'

Table 2. Distribution of Decision-making Responsibilities for Specific Issues

Issue Area	<i>Mukhiya</i>	<i>Nambardar</i>	Council
Selection of Camp-site:			
Choice of village	–	30	–
Choice of fields	–	29	01
Purchases:			
Medicines	05	25	–
Supplies for feasts	–	28	02
Market Interactions:			
When to call wool merchants	–	17	13
When to call sheep merchants	–	10	20
When to call sheep shearers	–	12	18
Decision on rate for wool sales	–	27	03
Decision on rate for sheep sales	28	02	–
Decision on rate for shearing	–	28	02
Bribes:			
Police officials	–	28	02
Forest officials	05	21	–
Total	38	257	74

Table 3. Income from Folding, and Expenses Incurred on Bribes and Fines:
Data for 13 flocks (in Rs.)

Flock Number	Income from Folding	Expenses on Fines/Bribes
1	264.00	107.00
2	335.00	134.00
3	227.00	100.00
4	396.00	150.00
5	396.00	150.00
6	335.00	134.00
7	396.00	154.00
8	396.00	160.00
9	791.00	300.00
10	791.00	300.00
11	791.00	382.00
12	396.00	161.00
13	791.00	350.00
Average	485.00	199.00

of the cases, farmers pay in kind. The payments range between 50 and 100 pounds of grain. Because of its bulk, it is difficult, if not impossible, for the leader to misrepresent the amount.

Purchase of Medicines and Supplies

The leader could purchase medicines from vendors known to him personally and skim a commission directly off the price or he could misreport the price he paid. The shepherds guard against the latter possibility by having one or two members of the *dang* accompany the *nambardar* to monitor prices whenever he goes to buy medicines. Generally, on different occasions, different individuals go with the leader. This means that if the leader is successfully and systematically to report higher prices for the medicines he buys, he will have to collude with all the persons who go with him.

By patronizing a particular store and buying the medicine requirements of the entire camp in bulk, the *nambardar* could still make some gains; yet this opportunity for profit is limited by the fact that the prices he reports cannot exceed the prices in other stores. The shepherds use only a few types of western medicines sold in shops and can easily compare prices by random checks whenever they happen to be in a town. But because it is time consuming to visit a town regularly to buy medicines, it makes sense for the shepherds to delegate medicine purchases.

To prevent misreporting of prices of supplies for collective feasts, shepherds have created a similar mechanism: the *nambardar* appoints at least two shepherds to travel to a town to purchase supplies so that an individual cannot exploit the rest of the collective.

Sale of Pastoral Products

Three sets of individuals outside the camp are involved in the sale of pastoral products – the shearers, the wool merchants and the sheep-buyers. The shepherds engage professional wool-shearers called *lavas* to clip the wool. At the same time as the sheep are sheared, wool merchants receive invitations to come and purchase the wool. Individual sheep-buyers frequently visit the camps to take advantage of the culling of sheep which the shepherds are forced to do regularly, owing to persistent cash flow problems.

Two factors prevent wrong reports about the rates for shearing: first, the *nambardar* often makes the decision to invite the shearers in consultation with the council of elders. Since he does not have the discretion to call shearers known to him personally, it is difficult for him to engage in price-fixing. Second, and this is not an intentional strategy, the entire party of 10–20 shearers stays with the camp for a week or more, which increases the chances of discovery if collusion did take place.

The rates for selling sheep are decided by flock-leaders. This is a response to the possibility of large losses in case the *nambardar* colluded with the sheep-buyers. Most flock-owners are so vulnerable that if they did not

get a good price in even one or two major sheep sales, they would be devastated. Also, the quality of sheep varies widely across flocks and few flock-owners trust anyone else to set prices for their sheep. The costs of not delegating remain low, since sheep-buyers visit the camp regularly in the hope of buying sheep from cash-poor flock-owners.²⁷

It is in the case of wool sales that the *nambardar* finds the greatest opportunities for personal gains. He decides on the merchants to whom the wool should be sold, its quantity and the price. The wool merchants or their agents stay in the shepherds' camp very briefly, seldom more than a few hours at a time. Finally, since the price of wool fluctuates relatively rapidly in the urban markets, the ordinary shepherds would find it difficult to ascertain the best price for their wool at any given time. Misrepresentation of prices, therefore, is a simple matter.

However, the shepherds seem to exercise some control over the *nambardar* through ex post information collection. As they migrate, they constantly exchange information with shepherds in other camps on the rate at which *nambardars* sell wool. Sometimes new wool merchants visit shepherds' camps and in the process furnish price information. The vigilance of shepherds, and the *nambardar's* awareness of their vigilance, keeps within limits the commission that the *nambardar* can make on wool sales. Most shepherds believe only minor amounts to be at stake. Many of my interviewees felt that the *nambardar* deserved some returns for all the tasks that he performed for the collective. Using a common metaphor, a shepherd explained to me that the *nambardar* also had a 'stomach to feed'.²⁸ Clearly, as long as their ex-post price monitoring kept his hidden actions to a minimum, they were willing to allow him a little leeway,²⁹ and the efficiency losses from the *nambardar's* 'corruption' seemed low enough for the shepherds to bear, if not grin while bearing.³⁰

Bribes to Government Officials

Few members of the camp have much expertise in the fine art of bribing officials. The 'rules of etiquette' that structure talking with government offi-

27. For a detailed explanation of why sheep-buyers often visit the shepherd camps, see Agrawal (1992).

28. On the other hand, the interviewed *nambardars*, unsurprisingly, did not acknowledge the possibility that they might earn a return without informing their camp-members.

29. See Crémer (1995) and Frey (1993) for a discussion of how tighter monitoring may turn out to be counter-productive. Frey examines the role of trust and loyalty in principal-agent relationships, while Crémer discusses how more information might make threats of punishment less credible. Holmstrom (1979) provides the classical statement regarding the benefits of gaining and using all available information. Lewis and Sappington (1993) discuss how ignorance might introduce discontinuities in the performance of the agent.

30. See Alam (1989) and Shleifer and Vishny (1993).

SHEPHERD

LEADER	Monitor	Do Not Monitor	Probability
Cheat	$-a_5; -a_4$	$-a_3; -a_3/N$	α
Do Not Cheat	$0; -a_4$	$0; 0$	$1 - \alpha$
Probability	β	$1 - \beta$	

Figure 3. The Relationship between Cheating and Monitoring

cials in a rural context, where officials consider themselves superior and gifted, are beyond the ken of shepherds. Even the *nambardar* possesses the necessary skills for negotiating bribes only to a small degree.³¹ He, therefore, enjoys a near monopoly of power in this area of decision-making. Yet, as Table 3 shows, the *nambardar* does not gain much capital from it.

Table 3 indicates that on the average flock-owners pay Rs. 200.00 each in bribes *and* fines during the entire migration cycle.³² As a percentage of the total income, bribes and fines are no more than 3 percent for any of the 13 flocks surveyed. Even if the *nambardar* makes some money for himself in the payment of bribes, it can be only a small amount, a fraction of the money paid out as bribes. More importantly, the shepherds can do little, if anything, about it. They have to interact with government officials and they need someone who can manage the necessary side-payments.³³

Explaining the *Nambardar's* Restraint

The preceding discussion makes it clear that shepherds actively seek information on the activities of their leader. In the various situations where moral hazard might arise – setting camp, purchasing supplies, selling pastoral products, or interacting with government officials – the shepherds monitor their leader closely or collect information after the fact. We find that in most situations where the camp-leader could make money on the

31. The character of the asymmetrical relationship between subaltern groups such as the *raikas*, and those in power such as the police, assumes an almost timeless quality in the Indian context. See Arnold (1985) for a discussion of similar dynamics in South India but with the constabulary as the main character.

32. Usually the fines paid to settle disputes with villagers are negotiated openly. Thus all shepherds know the amount. The negotiations for bribes are carried out more covertly and seldom anyone other than the *nambardar* is involved. An elder member of the camp may contribute his expertise, but most of the time the *nambardar* alone decides the amount of the bribe.

33. In a colorful phrase, a shepherd, evoking widespread laughter, explained to me that government officials absorb bribes just as the parched earth sucks in rain.

side, institutionalized monitoring practices minimize large-scale exploitation. Where the *nambardar* enjoys some discretion in fixing prices and rates, the advantages that accrue to him are quite limited. One can conclude that overall, the shepherds monitor most of the time, and the leader cheats only infrequently. Figure 3 represents the discussion on the restraint exercised by the *nambardar*.

According to the figure, if the *nambardar* (leader) does not cheat, and the shepherds do not monitor, the payoffs to each are zero. If the leader cheats, and the shepherds do not monitor, the leader gains an amount a_3 and each shepherd loses a_3/N (see Figure 2, and page 246). If the shepherds choose to monitor, and the leader does not cheat, each of the shepherds incurs a cost a_4 , and the payoff to the leader is zero. The costs of monitoring, as the discussion in the previous section reveals, are relatively low for the shepherds since they incorporate monitoring in their everyday interactions with the leader, or in the daily routine of their livelihood.³⁴ If the shepherds monitor, and the agent cheats, then the shepherds gain back the amount a_3/N but still incur the low cost of monitoring. If shepherds know that their leader is a cheat, it imposes a cost on him equivalent to a_5 . This cost is negligible in material terms, but high in reputation and prestige. Given the fact that the shepherds monitor the *nambardar* closely, and live with him in daily contact, it should be obvious that systematic cheating would soon be discovered, and the ensuing gossip would affect the *nambardar's* reputation adversely.

The relationships among the payoffs for the leader and the shepherds are summarized in expressions (3) and (4) respectively.

Leader

$$a_3 > 0 > -a_5 \quad (3)$$

Shepherds

$$a_3/N > 0 > -a_4 \quad (4)$$

Under these payoffs, there is no equilibrium in pure strategies.³⁵ There is, however, a Nash equilibrium in mixed strategies, which we can calculate

34. Collectively, the shepherds spend, perhaps, no more than 3–4 hours monitoring the *nambardar* each day since the rest of the *nambardar's* day is filled with innocuous tasks. Individually, each shepherd need spend no more than 10–15 minutes in the course of the daily routine on monitoring tasks. During the approximately 300 days of migration when shepherds work 12–15-hour days, they spend no more than 4–5 days on monitoring tasks. This implies, in monetary terms, an expenditure of about Rs. 100–150 per shepherd in labor time (see also next footnote).

35. The cost of monitoring is very low for the shepherds because they constantly engage their agent in face-to-face interactions. If the cost of monitoring, a_4 , were to rise to a point where it is greater than a_3/N , the losses suffered by the agent's cheating, then there would be an equilibrium in pure strategies. The shepherds will never monitor, and the leader will always cheat.

using the expected values of the payoffs for the leader and shepherds.³⁶ We assign the two strategies of the shepherds (monitor, do not monitor) the probabilities of β and $(1 - \beta)$, respectively. For the leader, we similarly assign α and $(1 - \alpha)$ as the probabilities of cheating and not cheating, respectively. In equilibrium, the leader will be indifferent between cheating and not cheating because his payoff from the two strategies would be the same. Therefore,

$$[\beta(-a_5) + (1 - \beta)(a_3)] = 0 \quad (5)$$

where the left-hand side of the equation represents $E(U_l)$ from cheating, and the right-hand side represents $E(U_l)$ from not cheating. Simplifying, we arrive at the equilibrium value of β as

$$\beta^* = a_3 / (a_5 + a_3). \quad (6)$$

Similarly, the shepherd will be indifferent between monitoring and not monitoring when his payoffs from the two strategies are the same.

$$[(1 - \alpha)(-a_4) + \alpha(-a_4)] = \alpha(-a_3/N) \quad (7)$$

where the left-hand side of the equation represents $E(U_s)$ from monitoring, and the right-hand side represents the $E(U_s)$ from not monitoring. The equilibrium value of α is, therefore,

$$\alpha^* = (a_4N)/a_3. \quad (8)$$

The derived values of α^* and β^* suggest some interesting interpretations. Two of these merit greater discussion. As a_3 (the payoff to the leader from cheating) increases, the equilibrium probability of cheating declines. Why should this be so? The reason can be discovered as we examine the effect of a_3 on β^* , the equilibrium probability of monitoring. It rises, especially, as it becomes high in relation to a_5 , the cost that the shepherd imposes on the leader by monitoring if he is cheating. The rise in the probability of monitoring swamps the possible effect on the equilibrium probability of cheating. Further as a_3 rises high in relation to a_5 , the probability of monitoring gets closer to 1, but never reaches 1, unless $a_5 = 0$. Since equation 8 indicates that α^* will always be greater than zero, the game represented by Figure 3 approximates closely the equilibrium observed among the shepherds where they monitored most of the time, and their agent seldom cheated.³⁷

Second, the value of N , the number of shepherds in the camp, plays an important role in determining the equilibrium α^* . As it rises, the value of α^* also rises. This confirms, perhaps, the 'logic of collective action'; as group

36. We follow the standard procedure for calculating the equilibrium in mixed strategies. See Ordeshook (1986), and Rasmusen (1989).

37. See the exchange between Bianco, Ordeshook, and Tsebelis (1990) in the *American Political Science Review* for the relative merits and problems of using a mixed strategies game model.

size rises, it becomes easier for the agent to cheat. Of course, α^* cannot rise above 1, and this imposes a limit on the value of N . Thus, $\alpha^* < 1$, if and only if, from expression 8,

$$N = \leq a_3/a_4. \quad (9)$$

If N goes beyond this value, then the game will have an equilibrium in pure strategies where α^* will become 1, the leader will always cheat, and the shepherds will not monitor.³⁸ The gains from monitoring for each shepherd will be very low, and the losses from not monitoring for each shepherd will also be very low, enough to make him not wish to incur the costs of monitoring. The other implications of the equilibrium values of α^* and β^* are fairly straightforward, and confirm earlier results for non-cooperative games that have an equilibrium only in mixed strategies (see Tsebelis, 1989). These include the results that as the cost of monitoring goes up, equilibrium probability of cheating goes up, and as monitoring becomes costless, the equilibrium probability of cheating declines to zero; the equilibrium probability of cheating is not affected by the size of penalty imposed on the wayward agent; and the equilibrium probability of monitoring is not affected by the size of monitoring costs.

$E(L^*)$, and $E(S^*)$, the expected returns to the shepherds and their leaders, are easy to determine. Since the leader is indifferent between cheating and not cheating in equilibrium, by (5), we can say that $E(L^*) = 0$. For the shepherds,

$$E(S^*) = \alpha^*(-a_3/N). \quad (10)$$

Substituting α^* in equation 10, $E(S^*) = -a_4$. Since $a_4 > 0$, the expected returns in equilibrium to the shepherds are negative, and a function of the magnitude of their monitoring costs.

A Discussion By Way of Conclusion

This article began with a discussion of collective mobility and the consequent distribution of decision-making responsibilities among nomadic shepherds in Western India. The latter part of the article explicates the relationship between leaders and ordinary shepherds using a model of interactions between multiple principals and a single agent. In contrast to the complexity of much recent writing in agency theory, the article uses a simple model to capture the nature of interactions and explain the observed

38. Given the low cost of monitoring to the shepherds, and the fact that the size of the camp seldom rises above 20 flocks, this constraint seems never actually to be crossed. In other words, the number of flocks in the camp would have to rise far above 20 for the pure strategies equilibrium to emerge.

equilibrium. The analysis relies substantially on the importance of monitoring and effective information collection by the principals. The article shows that the observed equilibrium between the shepherds and their leaders can be better understood if we take into account the monitoring activities of the shepherds, instead of paying attention simply to the range of sanctions the shepherds can impose upon their leaders.³⁹

Information, and who possesses it, emerge as crucial variables in determining whether the leader will cheat. At the same time, the leader's awareness that shepherds can impose sanctions upon discovery of cheating behavior plays a highly significant role in preventing him from mulcting his principals. The fact that the shepherds can choose a new leader for a new migration cycle is critical, then, to keeping the *nambardar's* actions within tolerable bounds. The article, in showing the importance of direct monitoring by the agents, captures an important aspect of the environment in which shepherds operate. Lupia and McCubbins (1994), in their study of bureaucratic accountability, outline three possible methods of information collection for principals. Pointing to the costliness of direct monitoring, and the reluctance of agents to reveal information truthfully, they discuss whether third party information revelation might be efficient. For the shepherds, however, regular and close interactions with the agent, and the way in which monitoring is etched into the structure of their daily lives, means that direct monitoring is the most effective means of information gathering.⁴⁰ This, perhaps, is a difference that marks the social context of many rural development and environmental projects in comparison to the prevailing situations in urban contexts. In most villages, the fact that the community is small and its residents engage in regular, overlapping, and multistranded interactions, implies that they possess substantial direct monitoring capacities over their leaders. The achievement of the right to a voice in the selection and removal of leaders, together with the existing capacity for direct monitoring, might prove highly useful in enhancing the effectiveness of new rural development and environmental projects.

This analysis also presents some counter-intuitive findings, in addition to confirming some of the principal results of two-person non-cooperative games without an equilibrium in pure strategies. The most important of these is that as gains from cheating increase for the agent, a higher probability of cheating behavior can be swamped by the increase in the probability of monitoring. The result is a consequence of several factors that may be common to community settings in a large proportion of the rural areas of the developing world.

39. See, however, Mookherjee and Png (1992). It can be noted that their analysis does not take into account the response of the offender to punishment.

40. As North (1993) suggests, direct monitoring and sanctioning, when feasible, avoids additional principal-agent problems that third-party involvement can introduce.

1. The payoffs to the agent from cheating are related to the losses of the principals;⁴¹
2. The costs of monitoring, in relation to the losses from cheating, are low for the principals;
3. The loss the principals can impose on their agents by monitoring are relatively low when compared to the loss they suffer from cheating; but they still possess the capacity to impose significant costs through sanctions.

In light of these observations, the practical implications of the analysis are normatively attractive, if obvious. Policy provisions that stress greater accountability and permit higher monitoring levels of leaders by followers, especially when there are regular and frequent contacts among them, are likely to reduce a host of principal-agent problems. When unprincipled actions of leaders in their own interests directly reduce the benefits of their followers, extending greater authority to followers to hold leaders accountable is even more likely to reduce cheating behavior.

The second implication of the model, because of the explicit incorporation of the number of shepherds in the camp as a variable to address the existence of multiple principals, is the expected increase in the probability of cheating behavior with group size. The relationship can be interpreted in terms of the free rider problem. A larger number of shepherds in the group weakens incentives to monitor because the losses owing to cheating are spread over more people. If the effect of a larger number of principals is to be overcome, institutional design must aim at lowering the costs of monitoring/collecting information.

One of the limiting assumptions throughout the foregoing analysis is that the shepherds are homogenous in their endowments. While the assumption is not very far-fetched in the case of the *raika* camps, an obvious extension of the analysis to other social settings would require a consideration of the heterogenous nature of principals. The literature on common agency contains some directions for analysis on this issue.⁴²

The formal model of shepherd-leader interactions I develop is simple, but captures some significant aspects of the rural social context in which principals interact with agents. These include the interdependence of payoffs (to agents) and losses (to principals) from cheating, the relationship between community and low monitoring costs, and relatively small group sizes. In outlining this model to theorize situations where multiple principals contract with a single agent, the article formalizes the relationship between the shepherds and their agents, and thereby permits lessons that may apply to other settings outside the context of nomadic shepherds' liveli-

41. See Tsebelis (1989; 1990).

42. I am grateful to one of my anonymous reviewers for pointing this out to me. See Baron (1985) and Braverman and Stiglitz (1982).

hoods. In so doing, it (1) demonstrates the possibility of developing new empirical insights even through simple game-theoretical models; and (2) contributes to a growing literature that attempts to formally analyze ethnographic/descriptive writings to understand rural politics.

Acknowledgements

The field research for this paper was conducted during the summers of 1990, 1992, and 1993. I interviewed individuals from 30 mobile camps of the shepherds, spreading the conversations over a 1-year period. Apart from interviews with shepherds, I also met government officials responsible for development of migrant pastoralists. Financial assistance from the International Institute for Environment and Development greatly facilitated the field work. I acknowledge the Center for Science and Environment, New Delhi, for the use of the maps of India and Rajasthan in the paper. Sri Dallaram Dewasi, Sri Bhopalaram Dewasi, Sri Achalaram Dewasi, Sri Arjundan Charan, Sri Gokulji Dewasi, Sri Sattaram Dewasi and Sri Gairji Dewasi provided incalculable assistance in contacting shepherds and their camp-leaders. I am grateful for their time and conversations. Government officials at the Sheep and Wool Development Board in Jaipur, India, clarified several puzzles. I wish to thank John Aldrich, Robert Bates, Sabine Engel, Kathryn Firmin, Clark Gibson, Michael Goldman, Anil Gupta, Paulette Higgins, D. L. Johnson, HeeMin Kim, Peter Lange, Margaret McKean, Elinor Ostrom, Harold Pollack, Amy Poteete, Michelle Taylor, and three anonymous reviewers for their comments, encouragement or criticisms in the different stages of writing this article. I completed the final draft as a Fellow at the Program in Agrarian Studies at Yale University. Special thanks go to Venkatesh Bala for his help with the technical aspects.

REFERENCES

- Abel, N. and P. Blaikie (1990) 'Land Degradation, Stocking Rates and Conservation Policies in the Communal Rangelands of Botswana and Zimbabwe', *Pastoral Development Network*, Paper 29a. London: ODI.
- Agrawal, A. (1992) 'Risks, Resources and Politics', unpublished dissertation, Duke University, Durham, NC.
- Agrawal, A. (1993) 'Mobility and Cooperation among Nomadic Shepherds: The Case of the Raikas', *Human Ecology* 21(3): 261–79.
- Agrawal, A. (1994) 'I Don't Need it But You Can't Have it', *Pastoral Development Network*, Set 36a, pp. 36–55. London: ODI.
- Alam, M. S. (1989) 'Anatomy of Corruption: An Approach to the Political Economy of Underdevelopment', *American Journal of Economics and Sociology* 48(4): 441–56.
- Alchian, A. (1950) 'Uncertainty, Evolution, and Economic Theory', *Journal of Political Economy* 58: 211–21.

- Arnold, D. (1985) 'Bureaucratic Recruitment and Subordination in Colonial India', in R. Guha (ed.) *Subaltern Studies IV: Writings on South Asian History and Society*, pp. 1–53. New Delhi: Oxford University Press.
- Bailey, F. (1965) 'Decisions by Consensus in Councils and Committees with Special Reference to Village and Local Government in India', in M. Gluckman and F. Eggan (eds) *Political Systems and the Distribution of Power*. New York: Praeger.
- Bailey, F. (1988) *Humbuggery and Manipulation: The Art of Leadership*. Ithaca, NY: Cornell University Press.
- Bailey, F. (1991) 'Why is Information Asymmetrical? Symbolic Behavior in Asymmetrical Organizations', *Rationality and Society* 3(4): 475–95
- Baiman, S. (1982) 'Agency Research in Managerial Accounting: A Survey', *Journal of Accounting Literature* 1: 154–213.
- Barlett, P. (ed.) (1980) *Agricultural Decision-making: Anthropological Contributions to Rural Development*. New York: Academic Press.
- Baron, D. (1985) 'Noncooperative regulation of a non-localized externality', *Rand Journal of Economics* 16: 553–68.
- Barth, F. (1961) *Nomads of South Persia*. Oslo: Oslo University Press.
- Barth, F. (1966) 'Models of Social Organization', Occasional Papers No. 23. London: Royal Anthropological Institute.
- Barth, F. (1967) 'On the Study of Social Change', *American Anthropologist*, 69: 661–9.
- Bates, R. (1989) *Beyond the Miracle of the Market: The Political Economy of Agrarian Development in Kenya*. Cambridge: Cambridge University Press.
- Bell, D., H. Raiffa, and A. Tversky (eds) (1990) *Descriptive, Normative and Prescriptive Interactions*. New York: Cambridge University Press.
- Berkes, F. (ed.) (1989) *Common Property Resources: Ecology and Community Based Development*. London: Belhaven Press.
- Bernheim, B. and M. Whinston (1985) 'Common Marketing Agency as a Device for Facilitating Collusion', *Rand Journal of Economics* 16: 269–81.
- Bernheim, B. and M. Whinston (1986) 'Common Agency', *Econometrica* 54(4): 923–42.
- Bianco, W. (1990) 'Crime and Punishment: Are One-Shot, Two Person Games Enough?', *American Political Science Review* 84(2): 569–73.
- Biglaiser, G. and C. Mezzetti (1993) 'Principals Competing for an Agent in the Presence of Adverse Selection and Moral Hazard', *Journal of Economic Theory* 61: 302–30.
- Braverman, A. and G. Stiglitz (1982) 'Sharecropping and the Interlinking of Agrarian Markets', *American Economic Review* 72: 695–715.
- Brokensha, D., D. Warren, and O. Werner (eds) (1980) *Indigenous Knowledge Systems and Development*. Lanham, MD: University Press of America.
- Bromley, D. (1989) *Economic Interests and Institutions: The Conceptual Foundations of Public Policy*. Oxford: Basil Blackwell.
- Cashdan, E. (ed.) (1990) *Risk and Uncertainty in Tribal and Peasant Economies*. Boulder, CO: Westview Press.
- Chambers, R., N. Saxena and T. Shah (1989) *To the Hands of the Poor: Water and Trees*. London: Intermediate Technology Publications.
- Chong, D. (1995) 'Rational Choice Theory's Mysterious Rivals', *Critical Review: (Special Issue) Rational Choice Theory and Politics* 9(1–2): 37–58.
- Colson, E. (1974) *Tradition and Contract: The Problem of Order*. Chicago: Aldine.
- Crémer, J. (1995) 'Arm's Length Relationships', *The Quarterly Journal of Economics* 110(2): 275–95.
- Croll, E. and D. Parkin (eds.) (1992) *Bush Base, Forest Farm: Culture, Environment and Development*. London: Routledge.

- Demski, J. and D. Sappington (1984) 'Optimal Incentive Contracts with Multiple Agents', *Journal of Economic Theory* 33: 152–71.
- DiIulio, J. (1994) 'Principled Agents: The Cultural Bases of Behavior in a Federal Government Bureaucracy', *Journal of Public Administration Research and Theory* 4(3): 277–318.
- Dyson-Hudson, R. and N. Dyson-Hudson (1980) 'Nomadic Pastoralism', *Annual Review of Anthropology* 9: 15–61.
- Eggertsson, T. (1990) *Economic Behavior and Institutions: Principles of Neoinstitutional Economics*. Cambridge: Cambridge University Press.
- Ensminger, J. (1992) *Making a Market: The Institutional Transformation of an African Society*. Cambridge: Cambridge University Press.
- Ensminger, J. and Rutten, A. (1991) 'The Political Economy of Changing Property Rights: Dismantling a Pastoral Commons', *American Ethnologist*, 18(4): 683–99.
- Fama, E. (1980) 'Agency Problems and the Theory of the Firm', *Journal of Political Economy* 88: 288–307.
- Fama, E. and M. Jensen (1983) 'Separation of Ownership and Control', *Journal of Law and Economics* 26: 301–26.
- Frey, B. (1993) 'Does Monitoring Increase Work Effort? The Rivalry with Trust and Loyalty.' *Economic Inquiry* 31 (Oct.): 663–70.
- Friedman, M. (1953) *Essays in Positive Economics*. Chicago: University of Chicago Press.
- Gladwin, C. (1979) 'Production Functions and Decision Models: Complementary Models', *American Ethnologist* 6(4): 653–74.
- Glover, J. (1994) 'A Simpler Mechanism that Stops Agents from Cheating', *Journal of Economic Theory* 62: 221–29.
- Green, D. and I. Shapiro (1994) *Pathologies of Rational Choice Theory*. New Haven, CT: Yale University Press.
- Green, D. and I. Shapiro (1995) 'Pathologies Revisited: Reflections on Our Critics', *Critical Review: (Special Issue) Rational Choice Theory and Politics* 9(1–2): 235–76.
- Grossman, S. and O. Hart (1983) 'An Analysis of the Principal-Agent Problem', *Econometrica* 51(1): 7–45.
- Halstead, P., and J. O'Shea (eds) (1989) *Bad Year Economics: Cultural Responses to Risk and Uncertainty*. Cambridge: Cambridge University Press.
- Hirschman, A. (1970) *Exit, Voice and Loyalty: Response to Decline in Firms, Organizations and States*. Cambridge, MA: Harvard University Press.
- Holmstrom, B. (1979) 'Moral Hazard and Observability', *Bell Journal of Economics* 10: 74–91.
- Hurvitz, L. (1973) 'The Design of Mechanisms for Resource Allocation', *American Economic Review* 63: 1–30.
- Jensen, M. (1983) 'Organization Theory and Methodology', *Accounting Review* 50: 319–39.
- Jensen, M. and W. Meckling (1976) 'Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure', *Journal of Financial Economics* 3: 305–60.
- Kaul, M. (1996) 'Two Centuries on the Commons: The Punjab', draft manuscript. 159 pp.
- Khazanov, A. (1984) *Nomads and the Outside World*. Cambridge: Cambridge University Press.
- Kiewiet D. and M. McCubbins (1991) *The Logic of Delegation: Congressional Parties and the Appropriations Process*. Chicago: The University of Chicago Press.
- Kiser, E. and X. Tong (1992) 'Determinants of the Amount and Type of Corruption in State Fiscal Bureaucracies: An Analysis of Late Imperial China', *Comparative Political Studies* 25(3): 300–31.
- Kohler-Rollefson, I. (1992) 'The Raika Camel Pastoralists of Western India', *Research and Exploration* 8(1): 117–19.

- Krepps, M. (1992) 'Bureaucrats and Indians: Principal-Agent Relations and Efficient Management of Tribal Forest Resources', Discussion Paper 1601. Cambridge, MA: Harvard Institute of Economic Research.
- Kreps, D. (1990) 'Corporate Culture and Economic Theory', in J. Alt and K. Shepsle (eds) *Perspectives on Positive Political Economy*, pp. 90–143. Cambridge: Cambridge University Press.
- Kroeber, A. (1948) *Anthropology*. New York: Harcourt Brace.
- Laffont, J., and J. Tirole (1987) 'Using Cost Observation to Regulate Firms', *Journal of Political Economy* 94: 614–41.
- Leshnik, L. and G. Sontheimer (1975) *Pastoralists and Nomads in South Asia*. Wiesbaden: Otto Harrassowitz.
- Lewis, T. and D. Sappington (1989) 'Countervailing Incentives in Agency Problems', *Journal of Economic Theory* 49: 294–313.
- Lewis, T. and D. Sappington (1993) 'Ignorance in Agency Problems', *Journal of Economic Theory* 61: 169–83.
- Li, S. (1993) 'Competitive Matching Equilibrium and Multiple Principal-Agent Models', Discussion Paper 267. Minneapolis, MN: Center for Economic Research, University of Minnesota.
- Lupia, A. and M. McCubbins (1994) 'Designing Bureaucratic Accountability', *Law and Contemporary Problems* 57(1): 91–126.
- McKean, M. (1992) 'Success on the Commons: A Comparative Examination of Institutions for Common Property Resource Management', *Journal of Theoretical Politics* (4)3: 247–81.
- March, J. (1988) *Decisions and Organizations*. Oxford: Basil Blackwell.
- Marten, G. (1986) *Traditional Agriculture in Southeast Asia: A Human Ecology Perspective*. Boulder, CO: Westview Press.
- Misra, P. and K. Malhotra (1982) *Nomads in India: Proceedings of the National Seminar*. Calcutta: Anthropological Survey of India.
- Mithen S. (1989) 'Modeling Hunter-Gatherer Decision-Making: Complementing Optimal Foraging Theory', *Human Ecology* 17(1): 59–83.
- Mookherjee, D. (1984) 'Optimal Incentive Schemes with Many Agents', *Review of Economic Studies*, 51: 433–56.
- Mookherjee, D. and I. Png (1992) 'Monitoring vis-à-vis Investigation in Enforcement of Law', *American Economic Review* 82(3): 556–65.
- Nalebuff, B. and G. Stiglitz (1983) 'Prizes and Incentives: Towards a General Theory of Compensation and Competition', *Bell Journal of Economics* 14: 21–43.
- Niamir, M. (1990) 'Herders' Decision Making in Natural Resource Management in Arid and Semi-Arid Africa', FAO Forestry Papers. Rome: FAO.
- North, D. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- North, D. (1993) Personal Communication, during interview for the video, *Common Resources, Uncommon Grounds*, Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington, IN.
- Nugent, J. and N. Sanchez (1993) 'Tribes, Chiefs, and Transhumance: A Comparative Institutional Analysis', *Economic Development and Cultural Change* 42(1): 87–113.
- Oldfield, M. and J. Alcorn (eds) (1991) *Biodiversity: Culture, Conservation and Eco-development*. Boulder, CO: Westview Press.
- Ordeshook, P. (1986) *Game Theory and Political Theory*. Cambridge: Cambridge University Press.
- Ordeshook, P. (1990) 'Crime and Punishment: Are One-Shot, Two Person Games Enough?', *American Political Science Review* 84(2): 573–5.

- Ortiz, S. (1967) 'The Structure of Decision-Making among Indians of Columbia', in R. Firth, (ed.) *Themes in Economic Anthropology*. London: Tavistock.
- Ortiz, S. and S. Lees (eds) (1992) *Understanding Economic Process*. Monographs in Economic Anthropology, No. 10. Lanham: University Press of America.
- Ostrom, E. (1990) *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Ostrom, E., L. Schroeder and S. Wynne (1993) *Institutional Incentives and Sustainable Development: Infrastructure Policies in Perspective*. Boulder, CO: Westview Press.
- Posey, D. and W. Balee (eds) (1989) *Resource Management in Amazonia: Indigenous and Folk Strategies*. New York: The New York Botanical Garden.
- Prasad, R. (1994) *Pastoral Nomadism in Arid Zones of India: Socio-Demographic and Ecological Aspects*. New Delhi: Discovery.
- Quinn, N. (1975) 'Decision Models of Social Structure', *American Ethnologist* 2(1): 19–46.
- Rasmusen, E. (1989) *Games and Information: An Introduction to Game Theory*. Oxford: Blackwell.
- Ross, S. (1973) 'The Economic Theory of Agency: The Principal's Problem', *American Economic Review*, 63: 134–9.
- Sadr, K. (1991) *The Development of Nomadism in Ancient Northeast Africa*. Philadelphia: University of Pennsylvania Press.
- Sandford, S. (1983) *Management of Pastoral Development in the Third World*. Chichester: John Wiley & Sons.
- Schmink, M. and C. Wood (eds) (1984) *Frontier Expansion in Amazonia*. Gainesville: University of Florida Press.
- Shleifer, A. and R. Vishny (1993) 'Corruption', *The Quarterly Journal of Economics* 108(3): 599–617.
- Srivastava, V. (1990) 'In Search of Harmony between Life and Environment', *Journal of Human Ecology*, 1(3): 291–300.
- Srivastava, V. (1991) 'Who are the Raikas/Rabaris?', *Man in India* 71(1, Special): 279–304.
- Tirole, J. (1986) 'Hierarchies and Bureaucracies: On the Role of Collusion in Organizations', *Journal of Law, Economics and Organization* 2: 181–213.
- Tsebelis, G. (1989) 'The Abuse of Probability in Political Analysis: The Robinson Crusoe Fallacy', *American Political Science Review* 83: 77–91.
- Tsebelis, G. (1990) 'Crime and Punishment: Are One-Shot, Two Person Games Enough?', *American Political Science Review*, 84(2): 576–85.
- Wade, R. (1988) *Village Republics: Economic Conditions for Collective Action in South India*. Cambridge: Cambridge University Press.
- Warren, D. (1991) 'Using Indigenous Knowledge in Agricultural Development', World Bank Discussion Paper 127. Washington D.C.: World Bank.
- Warren, D., J. Slikkerveer and D. Brokensha (1991) *Indigenous Knowledge Systems: The Cultural Dimensions of Development*. London: Kegan Paul International.
- Weber, M. (1922) *Economy and Society* (Rpt 1968). New York: Free Press.
- Weissleder, W. (ed.) (1978) *The Nomadic Alternative: Modes and Models of Interaction in the African-Asian Deserts and Steppes*. The Hague: Mouton.
- Westphal-Hellbusch, S. (1975) 'Changes in Meaning of Ethnic Names as Exemplified by the Jat, Rabari, Bharvad, and Charan in Northwestern India', in L. Leshnik and G. Sontheimer (eds) *Pastoralists and Nomads in South Asia*, pp. 117–38. Wiesbaden: Otto Harrassowitz.
- Williamson, O. (1985) *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. London: The Free Press.

ARUN AGRAWAL teaches political science at the University of Florida. His research focuses on politics in relation to nomadic pastoralists, forest using communities, indigenous knowledge, grassroots development, and ethnicity. He is currently working on a book on the *raikas*, provisionally titled *The Politics of Greener Pastures: Mobility and Property in Precarious Environments*. ADDRESS: Department of Political Science, 3324 Turlington Hall, University of Florida, Gainesville, FL 32611, USA. [email: mao@tcd.ufl.edu]

Paper submitted 11 November 1994; accepted for publication 18 December 1995.