Social Risk-Management Strategies in Pastoral Systems: A Qualitative Comparative Analysis

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Abstract

Pastoralists risk losing their livelihood overnight due to drought, disease, and other disasters. They employ different strategies to minimize these risks, including the following: Mobility, herd maximization, diversification, and social strategies. Social strategies are considered critical because they provide not only a safety net during disasters but also contribute to the resilience of pastoral societies by allowing pastoralists to rebuild herds after disasters. There is, however, much variation in social risk-management strategies (SRMS) across pastoral societies. To understand this variation, we conducted a comparative study of 20 pastoral societies from different socioeconomic, historical, and environmental settings. We used Qualitative Comparative Analysis (QCA) to examine which causal configurations explain the variation in SRMS. This analytical approach helped us to identify four clusters of pastoral groups, in

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which different causal configurations are associated with exchange networks, patron–client relations, and noninstitutional SRMS.

Keywords

social risk-management strategies, pastoralists, Qualitative Comparative Analysis, livestock exchanges, patron–client relations.

Introduction

This article examines variation in social risk-management strategies (SRMS) in a comparative study of pastoral systems. Pastoral systems are often considered the epitome of risk management as herders constantly run the risk of losing their herds to droughts, diseases, and other disasters. Pastoralists employ various strategies to minimize the likelihood and the impact of these threats, including herd maximization, mobility, diversification, and exchange (Halstead & O'Shea, 1989). Many of the strategies for coping with environmental hazards involve both individual action and cooperative social practices. However, social risk-management strategies carry special importance, because they contribute to the social integration of pastoralists as well as to the survival of pastoral societies by providing a way for pastoralists to rebuild their herds after disaster (Barfield, 1993; Bollig, 1998).

Two types of SRMS have been described extensively in the pastoralist literature: reciprocal exchange networks and hierarchical patron–client relations. Exchange networks are typical of African pastoral systems and are created through livestock exchanges such as stock friendships, livestock loans, and bridewealth (Evans-Pritchard, 1940; Goldschmidt, 1974; Gulliver, 1955; Spencer, 1973). For example, among the Pokot marriages are legitimized through bridewealth exchanges in the form of animals, the number of which is negotiated by the two parties (Bollig, 2006). Pokot men seek to maximize the number of livestock gifted to increase the size of their support network among bride givers and receivers. The resulting social networks can be used as support during a crisis in the form of food aid, and these networks can be used to get more livestock loans or gifts after a crisis, enabling herders to rebuild their herds.

Patron–client relations are characteristic of pastoralists in the Near East, where wealthy pastoralists provide subsistence for impoverished pastoralists through the use of shepherd contracts (Barth, 1961; Beck, 1980; Bradburd, 1989). In this system, pastoral nomads who have lost their herds can still remain pastoralists by herding the livestock of wealthier families

with too many livestock and too few laborers (Barth 1961; Black-Michaud, 1972). In some cases shepherds can rebound easily, as among the Yomut, where generous herding contracts allow poorer Yomut to work as hired shepherds until they can rebuild their flocks (Irons, 1994). However, among the Basseri of Southwestern Iran, such herding contracts only transfer limited wealth to the shepherd and do not greatly affect the distribution of wealth (Barth, 1961; Bradburd, 1989).

However, there is much variation within and across regions in SRMS. Livestock exchanges are not limited to Africa; one also finds them among the Mongols (Cooper, 1993) and the Yomut (Irons, 1975). Patron–clients are not limited to the Near East; one also finds them among the Maasai (Little, 1985) and Orma (Ensminger, 1992). Moreover, livestock exchange among Pokot (Bollig, 2006) are much more complex and extensive than among FulBe (Moritz, 2003), whereas the herding contracts among the Yomut are much more generous than among the Komachi (Bradburd, 1989). The question is what produces the variation in SRMS across pastoral systems. Why, for instance, are exchange networks more common in African pastoral systems and patron–client relations more common in Near Eastern systems? What patterns do we find in pastoral systems in other parts of the world?

There have been a number of comparative studies of risk management in pastoral systems within culture areas, including Bradburd's analysis of the Basseri, Komachi, and Yomut (1989), Bollig's comparison of the Himba and the Pokot (2006) and the Global Livestock-Collaborative Research Support Program (GL-CRSP) on Pastoral Risk Management (PARIMA; Little, Smith, Cellarius, Coppock, & Barrett, 2001). However, these studies compare pastoral systems within culture areas rather than pastoral systems across the world. As a result, SRMS in societies outside the Near East and Africa have been often overlooked in the literature on risk management in pastoral societies (for an exception, see the special issue of *Nomadic Peoples* edited by Bollig & Göbel, 1997).

We conducted a comprehensive and comparative study of pastoral systems across the world to describe and explain the variation in SRMS. The study was conducted within the framework of a course in cultural ecology (Anthropology 620.05, Autumn 2009, the Ohio State University), in which undergraduate and graduate students integrated ethnographic and ethnological approaches to come to a better understanding of the ecology of pastoral societies. Students wrote research papers about risk-management strategies in a pastoral society of their choice, and as a class we compared ethnographic data from these societies to examine patterns across societies. We used Qualitative Comparative Analysis (QCA) to examine what causal configurations of the

independent variables of risk exposure, livelihood diversification, economic differentiation, market integration, and political autonomy could explain the variation in SRMS across pastoral societies. This analytical approach helped identify four clusters of pastoral groups, in which different causal configurations lead to one of three different types of SRMS: exchange networks, patron–client relations, and noninstitutional SRMS. We used a nonrandom sample of 20 pastoral societies, chosen from the HRAF database and additional sources, which represent a wide range of pastoral systems in a variety of socioeconomic, historical, and environmental settings across the world.

Explanations for Variation in SRMS

A number of explanations have been put forth to explain the presence, absence, or demise of social risk-management strategies, including risk exposure, livelihood diversification, economic differentiation, market integration, and political autonomy. However, before we discuss strategies to cope with risks, it is important to discuss the concept of risk. In this context, we define risk as unpredictability that can be estimated (Cashdan, 1990) or, in other words, the predictability of variability (Halstead & O'Shea, 1989). The concept of risk has multiple dimensions including the following: Predictability of uncertainty, frequency of hazards, magnitude of the hazard, covariance, variance in outcomes, and likelihood of shortfall. The various dimensions of risk shape SRMS in different ways.

Risk Exposure

The degree of risk exposure, a combination of the frequency and magnitude of risk, affects whether pastoralists invest in social strategies or not. If risk exposure is low, we expect little or no investment in SRMS. Whereas, the covariance of risk affects what kind of strategies we find in pastoral societies. We expect to find social exchange networks when risks are randomly distributed, and roles may be reversed each year (Roe, Huntsinger, & Labnow, 1998; Templer, 1993). When risks are no longer randomly distributed, wealthier households opt out and we may find patron–client relationships. This happened among Orma pastoralist in Kenya and caused the demise of moral economy institutions of livestock exchange (Ensminger, 1992). The reverse is also true when increased risk for all households results in a reemergence of social strategies, which happened in Mongolia when the collapse of the communist state reexposed all pastoralists to similar risks (Sneath, 1993).

Livelihood Diversification

Other risk-management strategies, like livelihood diversification, may minimize the likelihood of shortfall for individual households and limit the need for social strategies. Pastoral households with more diversified means of subsistence, called multiresource pastoralists (Salzman, 2004), that is, those who engage in agropastoralism or draw income from wage labor or other sources, may be less dependent on SRMS to cope with risks. Economic diversification of households effectively reduces the risks and uncertainties of the pastoral economy in two ways. First, diversification leads to stability in wealth and lessens the need for insurance. Second, when livestock production makes up a smaller percentage of household income, risk associated with livestock husbandry decreases, which lessens the need for insurance (Ensminger, 1992). However, there is some disagreement about whether diversification to agropastoralism is more sustainable, as livelihood diversification can complement or interfere with pastoral activities and thus increase risks (Davies & Bennett, 2007).

Economic Differentiation

In most pastoral economies, the risks of losing animals to drought are equal for each household, though the effects on subsistence are not; poorer households are more likely to find themselves below subsistence levels than wealthier households (Bradburd, 1982; Fratkin & Roth, 1990; Roth, 1996). Economic wealth is thus closely related to the ability to withstand risks as well as risk-management strategies. Those in different socioeconomic strata follow different strategies, and it has been observed that the poorer strata end up following strategies resulting in cycles of impoverishment. Increasing economic differentiation can often signal the end of the moral economy of social exchange networks, but it does not necessarily always do so. Patron–client relations function as an inherently inegalitarian system, but this is tolerated as long as both parties profit (Scott, 1976).

Market Integration

Market integration has also been held responsible for changes in SRMS (Bradburd, 1989; Ensminger, 1992). Participation in the market economy may offer pastoralists sources of alternative income and thus diversify livelihoods and minimize risks. Market integration may also increase risk as pastoralists become subject to fluctuations in the market, which is potentially disastrous

when combined with the natural risks of pastoralism (Little et al., 2001). Finally, the market value of livestock may trump their social and cultural values for pastoralists and they may decide to sell livestock rather than invest it in social exchange networks or clients (Barfield, 1993; Dyson-Hudson & Dyson-Hudson, 1980; Ensminger, 1992; Swift, 1977).

Market integration has also been responsible for the variation in patron–client relationships in the Near East. Bradburd (1989) compared the Basseri, Komachi, and Yomut and found that the commodities that pastoralists produce for external markets have an impact on extrahousehold labor requirements and herding contracts. Among the Basseri, there were very few herding contracts because the commodities were lambskins and therefore owners had no large herds or need for extrahousehold labor. Impoverished shepherds were forced to leave the pastoral system (Barth, 1961). The Komachi, however, intensified the production of sheep and cashmere wool in response to market demand. Male animals were the greatest producers of wool and because male and female animals of each species were herded separately, there was a high demand for extrahousehold labor. The commodities produced have a direct effect on the supply and demand of herding labor and thus the terms of the herding contracts. The supply and demand of herding labor and the formation of classes of owners and herders is also affected by alternative livelihood options outside of the pastoral sector. Bradburd has argued, for example, that Komachi hired herders are "trapped" in the pastoral sector because there are few opportunities outside the pastoral economy (1980, p. 605). As a result, the herding contracts were more generous among the Yomut (Irons, 1994) and the Baluch (Salzman, 2004) than among the Komachi, and this allowed for much greater socioeconomic mobility among the former than among the latter because it gave herders access to breeding animals (Bradburd, 1989; Irons, 1994).

Political Autonomy

Although pastoral societies vary widely in their sociopolitical organization due to variations in their ecologies, economies, and the larger political fields in which pastoralists operate, Salzman (2004) argues that one can distinguish two general types of political organization among pastoralists: tribal pastoralists and peasant pastoralists. These ideal types represent two ends of a political status continuum from ruling over others, to political independence, to subordination by others. Today most tribal pastoralists have lost their political independence and are considered encapsulated tribes; they are partially and varyingly under the control of the state, but they have more autonomy and political unity

than peasant pastoralists who are totally dependent on the state. The distinction between tribal and peasant pastoralists is marked by a number of interrelated sociocultural factors in the latter group.

> Lacking the unity of group political action and of collective ownership of major resources such as land, social relations are fragmented, with people having similar interests but few common ones. Competition for the limited good is not balanced by the solidarity of cooperation, sharing, and support, leaving each to weigh his or her separate interests. (Salzman, 2004, p. 123)

Because of the competition and the limited solidarity between pastoralists, there is less investment in social risk-management strategies among peasant pastoralists.

These explanations are not mutually exclusive. In addition, there are multiple overlapping variables, for example, greater involvement in the market economy is also a form of livelihood diversification. Similarly, wealth and diversification often co-occur, as wealthier and poorer households are more likely to pursue diversification, though for different reasons, than households in intermediate wealth classes. However, diversification and market involvement do not always co-occur. QCA is a useful analytical approach to examine how particular constellations of risk exposure, diversification, differentiation, market integration, and political autonomy shape SRMS in pastoral societies.

Method: Qualitative Comparative Analysis

Examining the causal factors leading to variation in social risk-management strategies among a wide range of pastoral societies is a complex problem. The standard approach for teasing out complex causality in social research is an in-depth examination of one or two cases. However, if the goal of the research is to develop empirical generalizations, a more quantitative approach, utilizing a larger sample, is often necessary (Ragin, 1998). QCA, a method developed by Charles Ragin (1987) allows for the development of empirical generalizations while maintaining the ability to examine complex causality within cases, an ability that is often absent from statistical models (Ragin, 1987). QCA is thus a middle ground between two different methodological approaches within the social sciences, one that focuses on complexity, qualitative, case-orientated, and intensive data analysis and another that focuses on generalities, quantitative, variable-oriented, and extensive data analysis (Ragin, 1987; Rihoux & Ragin, 2009). "In a nutshell, QCA provides analytical tools for conducting

holistic comparisons of cases as configurations and for elucidating their patterned similarities and differences" (Ragin, 1998, p. 107).

QCA is a logical rather than statistical technique used to develop complex models that uses the binary logic of Boolean algebra. QCA uses a relatively small number of cases but allows for examination of multicausal analysis and the interaction of causal variables. One of the basic premises of QCA is that there may be multiple paths or causal combinations that can lead to the same outcome. For example, a combination of causally relevant conditions can generate a particular outcome (AB → Y, in which uppercase "A" refers to the presence and lowercase "a" to the absence of a condition), several different causal combinations may generate the same outcome (AB + CD → Y, in which "+" indicates a Boolean "or"), or depending on the context, an outcome may result from the presence and absence of condition in combination with other conditions (AB + aC → Y; Berg-Schlosser, Benoît Rihoux, & Ragin, 2009, p. 8).

The goal of QCA is to arrive at sets of necessary and sufficient conditions for each outcome through a process of *Boolean minimization*. In QCA, these are expressed in Boolean statements such as the following: ABC + ABc → Y, which can be read as [the presence of A and B and C] or [the presence of A and B and the absence of c] lead to [presence of outcome Y]. These two combinations of conditions can be logically reduced or minimized to the minimal formula, also called *prime implicant*, AB → Y because regardless of the value of third variable [C, c] the outcome (Y) is always the same. This process of minimization can be done by hand, but it is recommended to use dedicated software like TOSMANA (Cronqvist, 2009). Although QCA is often considered a nonstandard method, it is steadily gaining ground in comparative research in sociology and political science, and has developed sets of standards and best practices (Rihoux & Ragin, 2009).

Sample. Students enrolled in the course selected a society of their choice for their research paper from a list of pastoral societies from the electronic Human Relations Area Files (eHRAF) and additional sources. The resulting nonrandom sample of 20 pastoral societies represents a wide range of pastoral systems in a variety of socioeconomic, historical, and environmental settings across the world (Table 1). Traditionally, pastoralists have been defined as mobile people who are subsistence oriented and specialized in pastoral production (Dyson-Hudson & Dyson-Hudson, 1980; Goldschmidt, 1979; Spooner, 1973). Yet such a narrow definition ignores the enormous variation across pastoral systems. Chang and Koster's definition captures the diversity and dynamics of contemporary pastoral systems: pastoralists are "those who keep herd animals and who define themselves and are defined by others as

Table 1. Basic Information About the Societies

Society	Location	Ethnographic present	Animals	Key sources
Basseri	Southwestern Iran	1950s	Sheep, goats, donkeys, horses, camels	Barth (1961)
Chukchee	Northeastern Siberia	1900s	Reindeer	Bogoras (1909)
Fulbe: Agro-pastoral	North Cameroon	2000s	Cattle, sheep, goats, donkeys	Moritz (2003)
Fulbe: Nomadic	North Cameroon	2000s	Cattle, sheep, goats, horses, donkeys	Moritz (2003)
Greeks	Greece	1950s	Sheep, goats, donkeys, horses, dogs	Campbell (1964)
Himba	Northwestern Namibia	1990s	Cattle, sheep, goats	Bollig (1997, 2006)
Kurds	Turkey, Iraq, Iran, Syria	1940s	Sheep, goats, horses, donkeys, mules, cattle	Barth (1953]), Leach (1940)
Lur	Western & Southern Iran	1960s	Sheep, goats, camels, donkeys, horses, dogs	Black-Michaud (1972, 1986)
Maasai	Southern Kenya	1980s	Cattle, sheep, goats	Evangelou (1984)
Mongolians: Inner Mongolia	Inner Mongolia	1980s	Horses, sheep, goats	Sneath (2000)
Mongolians: Mongolia	Mongolia	1990s	Horse, cattle, yak, camels, sheep, goats	Bruun (2006)
Navajo	Southwestern USA	1960s	Sheep, horses, goats, cattle	Downs (1964)
Nuer	Southern Sudan	1920s	Cattle	Evans-Pritchard (1940)
Pashtun	Southeast Afghanistan and Western Pakistan	1960s	Sheep, cattle, goats, camels, donkeys, horses	Tapper (1981)
Pokot	Northwest Kenya, East Africa	1980s	Cattle, donkeys, camels, sheep and goats	Bollig (1998, 2006), Bollig & Osterle (2008)
Sherpa	Nepal and India	1960s	Yaks, cattle, yak-cattle hybrids, sheep, goats	Stephens (1989), von Fürer-Haimendorf (1984)
Turkmen	Turkmenistan	1990s	Sheep, goats, cattle, camels	Kerven (2003)
WoDaaBe	Southwestern Niger	1970s	Cattle, horses, donkeys, sheep, goats	Bonfiglioli (1988), White (1990)
Yakut	Siberia, Russia, Sakha	2000s	Reindeer, horses, cattle	Anderson (2006), Takakura (2002)
Yomut	Northeastern Iran	1960s	Sheep, goats, cattle, camels, donkeys, horses	Irons (1975, 1994)

pastoralists" (Iron, 1994, p. 8). We used this broader definition to understand the variation in SRMS in pastoral systems and to not limit our comparative analysis to the usual suspects of East African cattle pastoralists or the Near Eastern shepherds. Our sample also includes pastoral and agropastoral societies from Europe, Siberia, and North America that are often excluded from this category. All the societies in our sample are considered pastoralists by ethnographers and the people themselves.

The societies within the sample have a wide range of key animals including cattle, sheep, goats, yak, horses, and reindeer. A wide variety of environments are represented: desert, savanna, steppe, tundra, mountain, and high plateau. There is variation in the ethnographic present of the sampled societies, which ranges from the early 1900s to 2000s. The ethnographic present was determined by availability of ethnographic data. Thus, for the Chukchee, the ethnographic present is the precollectivization era of the 1900s, whereas for the Yakut, it is the postcollectivization era of the 2000s. Although we recognize that this is not a random sample, we do believe that it is a comprehensive sample and is representative of the variation seen throughout pastoral societies.

Coding. There are multiple forms of QCA, but we used crisp-set QCA (csQCA) in which variables or conditions can take only two values. Each case is evaluated according to its presence (1) or absence (0) of a condition and outcome, and this information is arranged in a truth table (Ragin, 1987). QCA is a theory-driven method and the selection of conditions depends on the theoretical questions at hand. We coded the societies for five conditions that have been identified in the literature as having the greatest impact on SRMS:

1. *Risk exposure* is an indicator of the frequency and magnitude of livestock losses. We expected that SRMS are more important when risk exposure is high.
2. *Livelihood diversification* is an indicator of the dependency on pastoral products. We expected that SRMS are less important when pastoral households are more diversified.
3. *Economic differentiation* is an indicator of the division in economic classes and the degree of socioeconomic mobility in pastoral societies. We expected to find hierarchical rather than egalitarian SRMS when societies have more permanent inequality.
4. *Market integration* is an indicator of the participation of pastoral household's reliance on the market for income. We expected that

households invest less in SRMS when they depend more on the
market.

5. *Political autonomy* is an indicator of the degree to which pastoral-
   ists control the resources on which they depend. We expected that
   SRMS are less important when pastoralists have less control and
   compete with each other for resources.

The coding in csQCA necessarily simplifies the complexity of the cases
because it uses a binominal scale. However, because the coding is based on
a comprehensive analysis of detailed ethnographic data and takes into
account multiple dimensions of a condition, it captures much of the complex-
ity. In coding livelihood diversification, for example, we considered whether
households engaged in agriculture, wage labor, trade or sold finished prod-
ucts like carpets and tent covers. Societies with a low degree of diversifica-
tion were coded "0," whereas those in which wages, trade, and agriculture
contributed significantly to subsistence were coded "1." Another, quantita-
tive way to code diversification would be to assess what percentage of the
diet comes from pastoral sources (Johnson, 2002), but this information is
often not available or accurate; for example, the percentage may not capture
seasonal variation in diet. The qualitative coding scheme, however, repre-
sents a holistic approach as coding decisions are made on the basis of famil-
iarity with the cases and qualitative comparison with other cases.

The coding process worked as follows. Individual students collected data
from their ethnographic sources for all five conditions for their society and
posted the information on the course wiki, which is a type of website that
allows users to add, remove, or otherwise edit and change most content very
quickly and easily. The students also assigned codes (0, 1) for each of the five
conditions for their society. In class, students were divided in groups of five,
organized by condition (e.g., market integration). The groups evaluated and
corrected the coding using two strategies. First, they read through the ethno-
graphical material for each of the 20 societies on the wiki and consulted with
the "experts," that is, the student who was responsible for a particular society.
Then they compared the codes for different pairs of societies to determine
which societies, for example, were more integrated in the market. This
method is similar to how Henrich et al. (2004) initially coded for market
integration in their cross-cultural sample, in which ethnographers lined up in
a row and discussed with each other to what extent their respective societies
were integrated in the market economy. Thus, even though the coding is binomi-
nal, the coding process takes into account the complexities of the different

societies. The coding results are summarized in a truth table, which contains rows of different causal configurations and columns with conditions, outcomes, and cases (Table 2).

Analysis. In csQCA, only two outcomes can be coded for presence or absence. Or, in other words, csQCA can only test for one dependent variable at a time. Yet our experiment had three dependent variables: exchange networks, patron–client relations, and the absence of institutional SRMS. We solved this problem by running three separate but parallel analyses, testing for the presence/absence of each of the three outcomes individually using TOSMANA software. In our first run of csQCA in TOSMANA, we found that the causal configurations were too complicated, did not make much sense when checked back across the ethnographic data, and did not explain the variation in SRMS. Ragin (1987) notes that perfect consistency in outcomes among cases with the same configuration of variables is rare, but that the iterative process of QCA allows the researcher to make changes that result in some level of uniformity among the outcomes within the configurations. The recursive process is an integral part of QCA, akin to the analytical process of grounded theory (Glaser & Strauss, 1967). To this end, we investigated the cases and conditions further.

We decided to eliminate the condition of market integration because there was not much variation in this code, all but three societies were integrated in the market, and there are significant contradictory arguments and findings in the literature about whether market integration reduces or increases risks in pastoral societies (Little et al., 2001). We also added another condition: key economic animal. Exchange networks are most prominent and institutionalized in African pastoral societies with large key economic animals such as cattle. Cattle reproduce every other year, only give birth to one calf at a time, and live relatively long and reproductive lives (Dahl & Hjort, 1976). This makes them quite suitable for exchange, as they provide immediate food aid in the form of milk, allow for the rebuilding of herds, and individual animals are easily tracked. Patron–client relations, however, are more commonly associated with small stock such as sheep. Sheep reproduce much faster than cattle, about twice a year (often twins), but sheep also suffer higher mortality rates than other animals during crisis (Dahl & Hjort, 1976). For these reasons, they do not lend themselves well to livestock exchanges. Additionally, herding contracts in which the number of animals is specified, rather than specific individual animals and their offspring are tracked, are more common with small stock.

When we re-ran csQCA with market integration removed and key economic animal (1 = *large stock*, 0 = *small stock*) added as a condition, we found causal configurations that explained the presence of exchange networks and

Table 2. Truth Table With Three Different Outcomes

		Conditions				Outcomes				Cases	
Market	Risk	Diversification	Autonomy	Differentiation	Animal	Exchanges	Contracts	Non-institutional SRMS	Contradictory	Number	Societies
0	1	1	1	0	1	1	1	0	C	2	Nuer, Yakut
1	1	0	0	0	1	1	0	0		2	WoDaaBe, nomadic FulBe
0	1	0	1	0	1	1	0	0		1	Pokot
1	1	1	0	0	1	1	0	0		2	Maasai, agropastoral FulBe
1	1	0	1	1	1	1	1	0	C	2	Himba, Chukchee
1	1	0	1	1	0	0	1	0		3	Basseri, Pashtun, Lur
1	1	1	0	0	0	0	1	0		1	Yomut
1	1	1	0	1	0	0	1	0		1	Turkmens
1	1	1	0	1	1	0	0	1		1	Sherpa
1	1	0	0	1	0	0	0	1		2	Inner Mongolia, Mongolia
1	0	1	0	1	0	0	0	1		1	Kurds
1	0	0	0	0	0	0	0	1		1	Greeks
1	0	1	0	0	0	0	0	1		1	Navajo

patron–client relations in relatively simple causal configurations. However, the absence of institutional SRMS was not well explained by the csQCA results as we found five different minimal formulas for six different pastoral societies.

Results

This section will first describe the SRMS patterns that we found in our cross-cultural survey of pastoral societies followed by a discussion of the csQCA results. Finally, we describe the four distinct cultural–ecological clusters of pastoral societies, which we derived from interpreting csQCA results and the ethnographic data.

Patterns in SRMS

We found three broad patterns in social risk-management strategies: (a) exchange networks, (b) patron–client relations, and (c) the absence of institutional strategies.

1. *Exchange networks* (or livestock exchanges) are found among agro-pastoral FulBe, nomadic FulBe, Maasai, Nuer, Himba, Pokot, and WoDaaBe. In these societies, individual households that lose their animals can stay in the pastoral society, because they are given or are loaned animals by other households. These exchanges may be part of existing networks of livestock exchanges, including bride-wealth institutions. The gifts and loans may or may not allow pastoralists to rebuild their herds.

2. *Patron–client relations* (or herding contracts) are found among the Chukchee, Yakut, Lur, Pashtun, Yomut, Turkmens, and Basseri. In these societies, individual households that lose their animals are able to stay in pastoral society by providing labor in return for wages to wealthy herd owners. They may or may not rebuild their herds and become independent herders, depending on a number of factors including the terms of the contract.

3. *Noninstitutional SRMS* are found among the Greeks, Kurds, Navajo, Inner Mongolia, Mongolia, and Sherpa. The absence of institutionalized SRMS does not mean that there are no social strategies, but it means first that support is generally limited to residential groups primarily consisting of extended family groups. Noninstitutional SRMS refer thus to social support strategies that are limited to residential groups, are not recognized in cultural concepts, and do not

have clear and widely shared rules for responsibilities and expectations of support. In these societies, individual households that lose their entire herd generally have to leave the pastoral sector and pursue other livelihoods. They may return to the pastoral sector, but they will have to rebuild without much support from others.

Our cross-cultural survey shows that in all societies, aid is provided to impoverished households during crisis. But this aid is temporary and allows households to survive only in the immediate aftermath of a crisis. That means that in societies without institutional SRMS, impoverished pastoralists are generally sloughed off from pastoral society and must pursue alternative livelihoods as sedentary peasants or as part of an urban proletariat. In pastoral societies with institutional SRMS like patron–client or exchange networks, impoverished pastoralists may be able to remain within the pastoral economy, although this does not automatically mean that these pastoralists can rebuild their herds and again become independent, self-sufficient herders. In some societies, like the Lur, impoverished pastoralists are able to stay within pastoral society. Yet due to the nature of herding contracts and labor relations between owners and herders, they are never able to again become independent pastoralists and instead they form a permanent class of poor hired herders (Black-Michaud, 1972).

Thus, there is considerable variation within and across groups in these three categories. As mentioned before, the herding contracts and labor relations between owners and herders are qualitatively different between the Yomut and the Lur. Similarly, the number of livestock exchanged among the Pokot is far greater than that exchanged among agropastoral FulBe in the Far North of Cameroon. As a result, impoverished Pokot may be able to rebuild their herds after disaster strikes, whereas this is very unlikely among the agropastoral FulBe. In addition, there is considerable overlap in social risk-management strategies between these three categories. In fact, the categories refer to the dominant or most prevalent strategy in a society. For example, although livestock exchanges are typical of African pastoralists, herding contracts are also common among contemporary pastoralists, including the Maasai and the FulBe (Bassett, 1994; Little, 1985). Similarly, one also can find livestock loans and gifts among Mongolian pastoralists (Cooper, 1993), even though these exchanges are not institutionalized as among African pastoralists.

Explaining csQCA Results

We ran three separate but parallel analyses in which we tested for the presence/absence of each of the three outcomes individually. We will briefly discuss
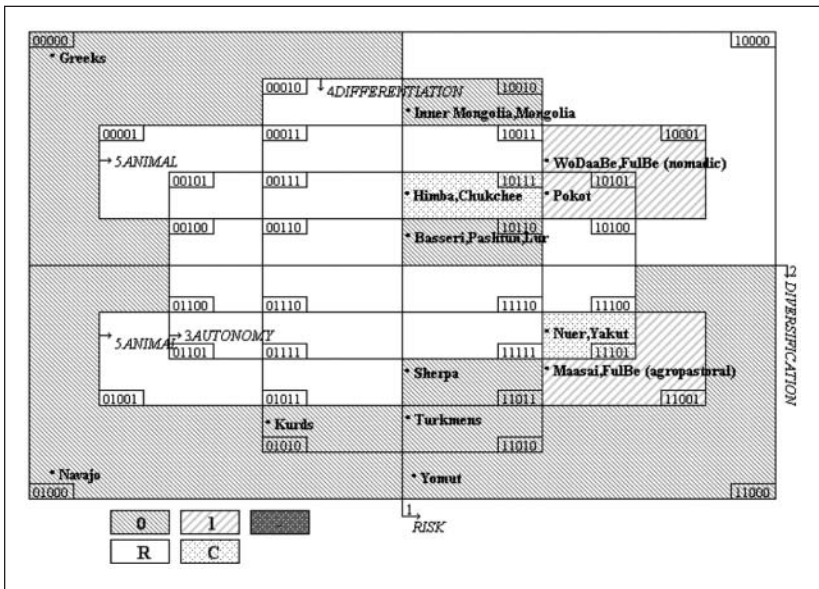
Figure 1. Truth table visualization for exchange networks
Note: When we include the contradictory cases (C) for reduction of the implicants - the Nuer and the Himba are grouped with the Yakut and the Chukchee respectively, which have herding contracts - we find one prime implicant for exchange networks (1).

the causal configurations we found using the minimization procedures in TOSMANA software.

Exchange networks. The csQCA results for the exchange network outcome are the simplest and clearest (Figure 1).

$$RISK \times differentiation \times ANIMAL \rightarrow$$
$$EXCHANGE \ NETWORKS \ (WoDaaBe, nomadic$$
$$FulBe + Pokot + Maasai, agropastoral FulBe)$$

The five African pastoral societies with exchange networks are found in high-risk environments, do not have major economic differentiation, and rely on cattle as their key economic animal. Livelihood diversification and political autonomy have no effect on the outcome. This causal configuration corroborates descriptions in the literature of the African "cattle complex"
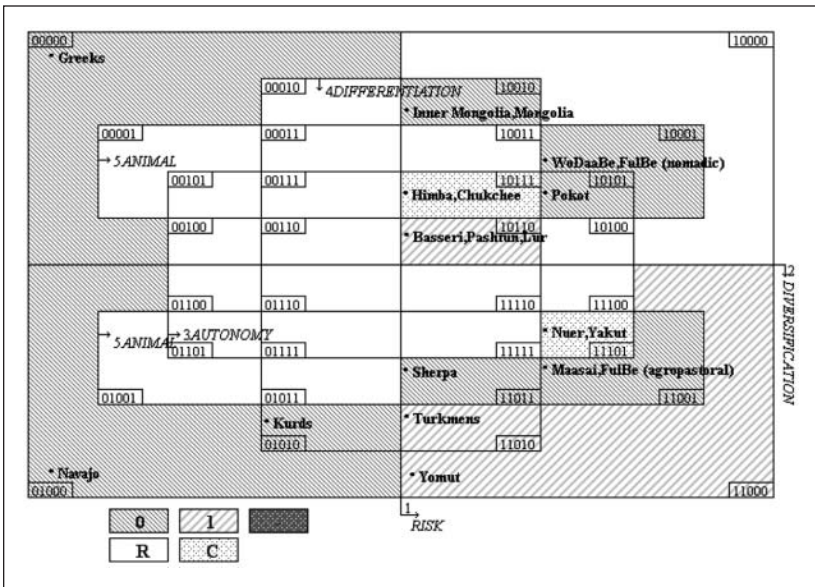
Figure 2. Truth table visualization for patron–client relations
Note: When we include the contradictory cases (C) for reduction of the implicants - the Chukchee and the Yakut are grouped with the Himba and the Nuer respectively, which have livestock exchanges - we find two prime implicants for patron-client relations (1).

with egalitarian exchange systems that are a response to the risks associated with herding cattle in semiarid and arid regions.

Patron–client relations. The csQCA for patron–client relations resulted in two prime implicants, which are associated with two clusters of pastoral societies (Figure 2).

A) RISK × diversification × AUTONOMY ×
DIFFERENTIATION → PATRON–CLIENT RELATIONS
(Basseri, Pashtun, Lur)

This cluster consists of shepherds who live in mountainous areas of Afghanistan, Pakistan, and Iran where risks from temperature extremes, drought, disease, and raiding are high (Barth, 1956, 1961; Black-Michaud, 1986; Glatzer & Casimir, 1983). Their livelihoods are not diversified, in contrasts to the Yomut and Turkmen who are more engaged in diversified activities such as agricultural labor, odd jobs, truck driving, and well digging (Irons, 1975; Lunch, 2003).

In terms of political power, the Basseri, Pashtun, and Lur have some degree of tribal autonomy. It must be noted that this is based on the ethnographic present, which may not reflect the current or prior political status (Amanolahi, 2003). Wealth in Basseri, Pashtun, and Lur societies tends to be highly differentiated and there is little evidence of social mobility (Black-Michaud, 1972; Tapper, 1981). Interestingly, the egalitarian ideal is maintained in these societies despite huge differences between the upper and lower stratum. Although herding contracts in this context may help poor nomads stay in the pastoral system, they also maintain economic stratification between the wealthy, who own large herds, and the poor who provide them with labor. Rarely do herding contracts provide poor pastoralists with enough resources to rebuild their own herds.

B) RISK × DIVERSIFICATION × autonomy × animal → PATRON–CLIENT RELATIONS (Yomut + Turkmen)

The Yomut live on the Gorgan plain in Iran and the Turkmen herders sampled for this study live in the Kara Kum desert in Turkmenistan. The Yomut and the Turkmen face risks similar to the Basseri, Pashtun, and Lur; however, they have far more diversified livelihoods. Despite the great prestige placed on the pastoral lifestyle among the Yomut and the Turkmen, they have always fallen back on other forms of subsistence in the event of catastrophe (Irons, 1975; Lunch, 2003). After major livestock losses, households will practice agriculture and/or different forms of wage labor until they are ready to build a new flock and become nomadic again (Kerven, 2003; Lunch, 2003). The agricultural and pastoral sections of the Yomut are well integrated and households can move with relative ease from one section to another. In fact, it is the relatively generous nature of Yomut herding contracts that allows households to move from the agricultural to the pastoral section (Irons, 1994). At the time of Iron's ethnographic present, most Yomut had been incorporated into the modern Iranian state. Likewise, the Turkmen herders of the Kara Kum desert were long ago dominated by Imperial Russia. For these reasons, the two societies share a lack of political autonomy. Both societies primarily herd sheep, although their herds usually contain camels, goats, cows, donkeys, and horses as well. The main difference between these two societies is in regard to economic differentiation. The traditional patron–client system of the Yomut provided relatively generous herding contracts, which kept herders afloat during tough times (Irons, 1994). Among the Turkmen of the Kara Kum, herding contracts take two forms: (a) lease-holding agreements where shepherds manage state-owned livestock and (b) absentee herding of
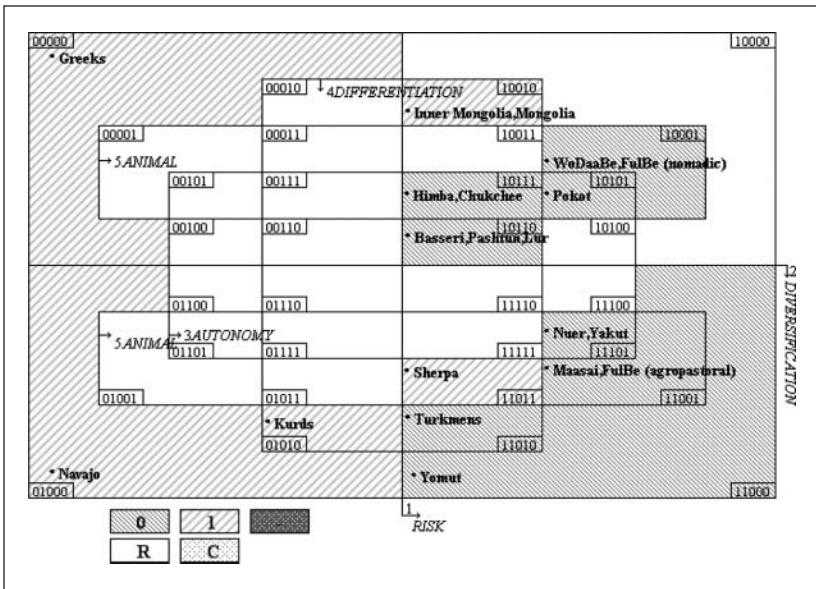
Figure 3. Truth table visualization for noninstitutionalized SRMS

state or privately owned flocks (Lunch, 2003). These contracts are not as gener-
ous and have led to an increasingly permanent gap between poorer and wealth-
ier herders (Kerven, 2003).

Noninstitutionalized SRMS. The csQCA for noninstitutional SRMS resulted
in five different causal configurations and no minimalization (Figure 3). The
cluster of societies without institutionalized SRMS is extremely diverse in
terms of geography and causal configurations.

> A) RISK × DIVERSIFICATION × autonomy ×
> DIFFERENTIATION × ANIMAL → NONINSTITUTIONAL
> SRMS (Sherpa)

The Sherpa are a group of pastoralists who live in a risky high-altitude
environment in the Himalayas. Their key economic animal is the yak, but
they also herd cattle, cattle–yak hybrids, sheep, and goats. Most Sherpas have
diversified livelihoods involving pastoralism, agriculture, trade, and wage
labor outside the villages (Stevens, 1990, p. 90). The Sherpa have been under
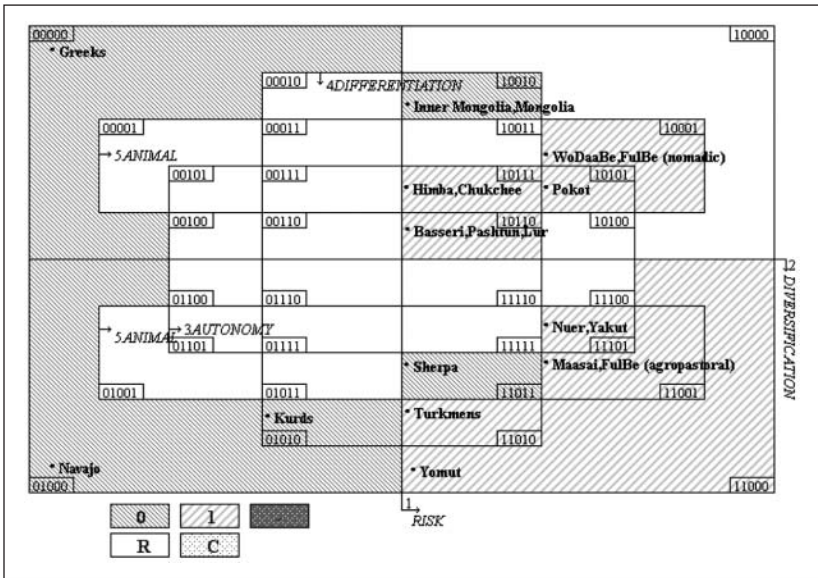the authority of the Nepalese government since the early 18th century, but the

Figure 4. Truth table visualization of institutional SRMS
Note: In this analysis we coded the outcomes for institutional (1) and non-institutional SRMS (0).

government exerted little control over Sherpa communities until the mid-20th century (Stevens, 1990, p. 76). Sherpas paid taxes based on land revenue, but their society otherwise resembled a tribal pastoral system (von Fürer-Haimendorf, 1984, p. 50, 54). Although Sherpa society has a class system in which the wealthy have social and economic advantages, Sherpas maintain that socioeconomic mobility is possible (Ortner, 1999, p. 84).

B) RISK × diversification × autonomy ×
DIFFERENTIATION × animal → NONINSTITUTIONAL
SRMS (Inner Mongolia, Mongolia)

Mongolian pastoralists of the Asian Steppe live in a high-risk environment in which extreme winter conditions or *dzud* affect herding livelihoods (Templer, Swift, & Payne, 1993). Despite years of collectivization, there has been growing inequality between poor and wealthy pastoralists after

decollectivization. They are pure pastoralists whose key economic animals are sheep (Bruun, 2006).

<div align="center">

C1) risk × DIVERSIFICATION × autonomy ×
DIFFERENTIATION × animal → NONINSTITUTIONAL
SRMS (Kurds)

</div>

The Kurds are a group of shepherds living in the mountainous and plateau regions of Eastern Turkey, Northwestern Iran, Northern Iraq, and Syria. There is much variation among the Kurds; some are pastoralists, others agropastoralists or agriculturalists. The Kurds are divided into a labor class and a land-owning class. Although there is a notion that movement occurs between these classes, in reality, it is difficult for herders to move upward in economic class (Barth, 1961, pp. 24-26).

<div align="center">

C2) risk × diversification × autonomy ×
differentiation × animal → NONINSTITUTIONAL
SRMS (Greeks)

</div>

The Greek Sarakatsani shepherds are peasant pastoralists who have no institutionalized SRMS. Through historical processes related to the formation of the Greek nation-state, the Sarakatsani have become dependent on the state and its subsidies as well as market networks to maintain their pastoral livelihood (Campbell, 1964). As they have no community-level SRMS and because they are often in direct competition with other pastoralists for access to resources, they must depend entirely on aid from members of the same residential unit to stay afloat in times of crisis. The Sarakatsani are highly specialized pastoralists who do not often practice agriculture or engage in other forms of employment. They lack social stratification on the basis of economic prosperity, despite being heavily integrated into and dependent on market systems.

<div align="center">

C3) risk × DIVERSIFICATION × AUTONOMY ×
differentiation × animal → NONINSTITUTIONAL
SRMS (Navajo)

</div>

The Navajo have highly diversified livelihoods, which include herding, farming, and the production of rugs, pottery, and baskets (Adams, 1963, p. 124). Before the 1930s, there were clear economic classes, but the stock reduction programs and the maximum herd sizes imposed by the U.S. federal government led to a destruction of Navajo social order and pastoral elite. Although

there are still differences in herd sizes, these differences are no longer the basis for Navajo social strata (Henderson, 1989, pp. 393-399]). The pastoral Navajo communities in the mountains have some autonomy. Remoteness from government and law enforcement has lead to a high dependence on informal social controls (Shepardson & Hammond, 1970, pp. 128-129). Although government-issued permits determine the number of animals an individual is allowed to graze, many Navajo violate these regulations. Instead, access to grazing land is determined by a long-standing system of land tenure (Downs, 1964, pp. 13, 82-83).

Institutional versus noninstitutional SRMS. To solve the problem of three outcomes, we ran separate but parallel analyses. To check our results, we also ran the minimalization procedures of csQCA for institutional (exchange networks and patron–client relations) versus the absence of institutional SRMS and compared the results by running the parallel analysis for exchange networks and patron–client relations separately. When we code the outcomes for institutional (1) and noninstitutional SRMS (0), we find the following prime implicants:

$$\text{RISK} \times \text{differentiation} \times \text{ANIMAL} \rightarrow \text{INSTITUTIONS}$$
(Nuer, Yakut + WoDaaBe, nomadic FulBe +
Pokot + Maasai, agropastoral FulBe)

$$\text{RISK} \times \text{diversification} \times \text{AUTONOMY} \times$$
$$\text{DIFFERENTIATION} \rightarrow \text{INSTITUTIONS (Himba,}$$
Chukchee + Basseri, Pashtun, Lur)

$$\text{RISK} \times \text{DIVERSIFICATION} \times$$
$$\text{autonomy} \times \text{animal} \rightarrow \text{INSTITUTIONS}$$
(Yomut + Turkmens)

These prime implicants are the same as when we run csQCA separately for exchange networks and patron–client relations. This increases our confidence in the results of our separate but parallel analyses (Figure 4).

Cultural–Ecological Clusters

We have used the csQCA results and the ethnographic data to identify four clusters of pastoral societies that represent different cultural–ecological areas (Barfield, 1993), and although there is much variation among these societies, there are also many similarities, including in SRMS. Some of these similarities derive from the fact that pastoralists live in similar environments, keep

the same livestock species, and were shaped by similar historical conditions. To a certain extent, Herskovit's (1926) East African cattle complex captures well the similarities across pastoral societies in East Africa, which, as Schlee (1989) has shown, are partly due to processes of fission and fusion among pastoral groups. Similarly, the transhumance and political organization of Near Eastern pastoral confederacies brought together pastoralists from distinct linguistic and cultural backgrounds in supratribal confederacies, which can explain similarities in these pastoral systems. Based on the resulting causal configurations from the csQCA, we identify four main clusters of pastoral systems:

1. African cattle pastoralists with exchange networks represent a diverse cluster of pastoralists relying on exchange networks to different extents to cope with major livestock losses. This category includes the FulBe, Himba, Pokot, Nuer, Maasai, and WoDaaBe.
2. Near Eastern and Central Asian shepherds with herding contracts form the second cluster, which is divided further into two subgroups.
   a) The first subgroup consists of shepherds from Western and Southern Asia, characterized as nondiversified and politically autonomous. This group includes the Lur, Basseri, and Pashtun.
   b) The second subgroup consists of shepherds from central Asia, characterized as diversified and without political autonomy. This group includes the Yomut and the Turkmen.
3. The third cluster consists of the configurations leading to societies without institutional SRMS. These societies are grouped into three subgroups.
   a) The first subgroup in this category consists of high altitude pastoral Sherpa, who live at high altitudes and whose key animal is the yak.
   b) The second subgroup is made up of Inner Asian pastoralists of the steppe and includes the Mongolians and the Inner Mongolian shepherds who maintain horses as their key animal and sheep as their economic animal. Their economies have been drastically altered under policies of collectivization but are currently rebounding.
   c) The third subgroup consists of peasant pastoralists and includes the Kurds, the Greeks and the Navajo. These groups have in common that they raise sheep in low-risk environments, which justifies grouping these three societies together, despite their different prime implicants and geographic distribution.

4. The fourth cluster consists of Siberian reindeer pastoralists with herding contracts (Chukchee, Yakut), which have been grouped together because of the nature of reindeer herding. Reindeer reproduce relatively quickly, and there are considerable differences in livestock wealth among pastoralists, but these societies also have relatively generous contracts, which are most often between kin or herders within a residential group. This suggests that while they do have herding contracts, they may be qualitatively different from the contracts used in Near Eastern and Central Asian pastoral systems. This cluster is not the result of the csQCA but was based on our interpretation of the ethnographic material.

The similarities in these clusters can be explained in part by the key animal, environment, and shared historical conditions. It lends strong support to the conventional categorization of pastoralists in cultural ecological areas as a pedagogical approach to holistically understand the complexity of pastoral systems (Barfield, 1993).

Discussion

We used csQCA to understand variation in social risk-management strategies in a cross-cultural sample of pastoral societies and found that it is a valuable tool for describing and synthesizing complex phenomena in cross-cultural research. The iterative approach gives researchers systematic and logical tools for evaluating and reevaluating their data set. In the first stage of the process, data coding, we discovered and added a third dependent variable (noninstitutionalized SRMS) to our initial set (exchange networks and patron–client relations). During our csQCA analysis, we found that the five initial independent variables or conditions (market integration, livelihood diversification, economic differentiation, political autonomy, and risk exposure) did not produce clear results. In a second iteration of the analysis, the removal of market integration and the addition of key economic animal produced clearer causal configurations that are associated with different patterns in SRMS.

QCA in Cross-Cultural Research

QCA is extremely useful in comparative analyses of societies; however, it is seldom used in anthropology or cross-cultural research. Bernard's textbook on Research Methods in Anthropology (2006) covers this analytical method in the section Analytical Induction and Boolean Tests (pp. 544-548), and the

anthropologist Schweizer (1996) used it to analyze status and social conflict in a Chinese village. In political science, however, QCA is frequently used in research in which the cases are countries or regions within countries (Rihoux & Ragin, 2009). QCA is holistic analytical approach that focuses on cases and considers how conditions cohere. Its recursive process is akin to grounded theory, an analytical approach that it is widely used in anthropological research. QCA is equally useful in cross-cultural research in which the cases are societies or communities. QCA can be combined with other analytical methods. For example with more cases (or larger data sets) one can create dummy variables for a prime implicant and then control for other variables like ethnographic present or geographical location or language families.

Crisp-set QCA (csQCA), which we used in this study, is one of multiple variants of Qualitative Comparative Analysis. Other forms are multivalue QCA (mvQCA) in which conditions can take ordinal or multiple categorical values; fuzzy-set QCA (fsQCA) in which cases can be more or less members of a particular set (Rihoux & Ragin, 2009); and temporal QCA (TQCA), which is capable of capturing the temporal nature of causal interactions (Caren & Panofsky, 2005). These different QCA approaches are very useful in cross-cultural studies in which researchers work with a small number of cases and a combination of qualitative and quantitative data.

Variation in Social Risk-Management Strategies

We found much variation in SRMS between and within societies. Many societies in Africa have both livestock exchanges and herding contracts, while among pastoral societies in the Near East and Central Asia, we also find livestock exchanges as part of bridewealth payments, such as among the Yomut (Irons, 1975). However, stock friendships, like those seen in Africa, are rare in this region, if they exist at all.

The focus on livestock exchanges and herding contracts in the literature, however, does not cover the full variation in SRMS in pastoral societies. There is a third category consisting of six societies in our sample without institutionalized SRMS: the Sherpa, the Mongolians, the Inner Mongolians, the Kurds, the Navajo, and the Greeks. They come from diverse geographical regions, including Inner Asia, the Near East, southern Europe, and North America. This sample includes not only pastoralists who live in relatively low-risk environments, but also those who live in harsher, high-risk environments. They have a relative lack of political autonomy in common. For these societies, their cohesion as a social group has diminished due to incorporation into the state. For example, in former Soviet republics, this happened because pastoralists

came to rely on collective administrations for social support instead of relying on other pastoralists (Upton, 2008). As a result, their power of collective action disintegrated. In such situations, there is little incentive for households to cooperate, and as a result, households in these societies are often in direct competition with each other for scarce resources (Salzman, 2004).

The variation in social risk-management strategies highlights an important finding of this study. Although the literature has often focused on institutional forms of SRMS, a number of pastoral societies do not have institutionalized SRMS, which indicates that they may not be as critical to the persistence of pastoral societies as has been suggested (Barfield, 1993, Bollig, 1998). The rebounding of Mongolian pastoralists after decollectivization shows that even in harsh environments family-level strategies may provide enough support for pastoral systems to persist. Also, the absence of institutional SRMS also does not mean there is no moral economy with an ideological commitment to guarantee subsistence for group members. In these cases, support is generally given to members of the kin or residential group as opposed to a wider network within the community. We think that livestock exchanges and patron–client relations are hypercognized and therefore receive much attention, whereas strategies in the other societies are hypocognized, even though pastoralists support each other in ways that result in persistent pastoral systems.

Practical Implications

Social risk-management strategies have been a focus in pastoral development programs for some time, such as Oxfam restocking projects in Kenya (Moris, 1988) and Niger (Scott & Gormley, 1980). In a recent study of pastoral adaptations to risk, Davies and Bennett argue that:

> The Afar livelihood is highly adapted to manage risk and social exchange mechanisms are integral to this adaptation. Breakdown of these institutions will compromise pastoralism through the undermining of traditional herding strategies and will reduce the effectiveness of insurance, creating an increased risk of destitution. . . .Development interventions should aim to benefit from the social exchange mechanisms and reinforce rather than undermine them. . . .(2007, p. 508).

The findings from our cross-cultural study have implications for development interventions building on existing SRMS in pastoral societies. First, it is important not to overlook social strategies that are not institutionalized. These noninstitutional SRMS may limit support to residential and kin groups,

but they are effective in that they contribute to the resilience of pastoral systems in high-risk environments. Second, institutional SRMS in pastoral societies do not always allow herders to rebuild their herds. Sometimes SRMS may allow impoverished pastoralists to remain in pastoral societies as permanent proletariat rather than as independent herders.

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