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Property Rights Reform in Rangeland China: Dilemmas On the Road to the Household Ranch

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Summary. — This paper contributes to the debate over land tenure in rural China by extending its spatial coverage to the country's extensive rangeland regions. Key characteristics of pastoral tenure, identified from field appraisals in western China, include group tenure and fuzzy boundaries. Although these characteristics give rise to efficiency concerns, from a new institutional economics perspective they also facilitate the realization of certain benefits, benefits that could represent opportunity costs of further exclusiveness. The strengthening of rangeland co-management may constitute a more appropriate path to institutional improvement than the establishment of the household ranch, the current goal of national rangeland policy.

Key words — Asia, China, property rights, land tenure, pastoralism

1. INTRODUCTION

The introduction of the Household Responsibility System (HRS) in Chinese agriculture in the early 1980s re-established the household farm as the basic unit of production. Farm management decisions were largely devolved to the household level and households were entitled to residual income after their meeting of certain quota and tax obligations. The rapid growth of agricultural output and income in the immediate reform period has been widely attributed to improved production incentives under the HRS *versus* the commune system that it replaced (see e.g., Lin, Cai, & Li, 1996; Putterman, 1993). Cropland tenure arrangements under the HRS have been characterized by the assignment of land-use rights to individual households, despite the ongoing collective ownership of land (with associated restrictions on transferability and alienability), and the periodic reallocation of land-use rights in response to demographic changes and in accordance with the equal entitlement rule.

Two general types of analyses of Chinese rural property rights can be distinguished. On the one hand, there is the conventional microeconomics approach that highlights some characteristics of contemporary Chinese cropland tenure, especially periodic reallocations, that may give rise to land tenure insecurity and related inefficiencies (Hu, 1997; Li, Rozelle, & Brandt, 1998; Wen, 1995). The implication of this approach is that the further privatization of land is desirable. On the other hand, there are those that take a more institutional or new institutional economics approach (Dong, 1996; Kung, 2000; Liu, Carter, & Yao, 1998). This approach questions whether the degree of land tenure insecurity is actually that high and, more fundamentally, places efficiency in the context of the broader social and economic environment, characterized by incomplete and imperfect markets and positive transaction costs. The implications of the institutional and new institutional perspectives are that the benefits of further privatization may be overstated and the opportunity costs, including the provision of social insurance *via* equal entitlement, overlooked. Those adhering to this approach emphasize the regional diversity and complexity of land tenure arrangements and partially explain this in terms of a process of decentralized institutional innovation that has enabled local interests and conditions to shape such arrangements.

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This paper attempts to extend the above land tenure debate to China's extensive rangelands, which account for some 40% of its total territory. The conventional analysis of the Chinese rangeland tenure situation is that, prior to the implementation of rangeland policy, there was complete open access to rangelands and, consequently, a classic "Tragedy of the Commons" was in progress. The supposed Tragedy of the Commons has frequently been blamed for rangeland degradation problems in China (e.g., Li & Duo, 1995; Longworth, 1990, 1993; NRC, 1992; Tuo, 1993; Wang, 1995; Yu, Sun, Yu, Chang, & Ba, 1996), which are widely perceived to be worsening. [1] On the basis of this prognosis, contemporary rangeland policy prescribes the partial privatization of pastures, with exclusive and long-term use rights to pasture being allocated to the household level. It is believed that this will give rangeland users the incentive to both stock rangeland within carrying capacity and invest in improvements.

The conventional view of Chinese rangeland tenure is contested both empirically and theoretically in this paper. The empirical focus of this paper is Xinjiang-Uygur Autonomous Region (hereafter Xinjiang) in western China. Xinjiang constitutes one sixth of China's total area and has rangelands almost comparable in size to those of Inner Mongolia and Tibet (Miller, 2000; NRC, 1992). Its pastoral population of 1.2 million is predominantly comprised of Muslim ethnic minority groups. Evidence is introduced that rangeland tenure in Xinjiang is neither completely open access, as implied by the descriptor "tragedy of the commons," nor, at the other end of the property rights continuum, the exclusive household tenure system that is enshrined in rangeland policy. This suggests that the extent of open access and the associated inefficiencies that it gives rise to may be less than what is commonly supposed. More fundamentally, given the resource, social and economic context, it is argued from a new institutional economics perspective that seemingly inefficient aspects of rangeland tenure may actually facilitate the realization of certain benefits, benefits that are missed in the conventional analysis and could represent "opportunity costs" of further rangeland privatization.

A major deficiency of both the conventional and new institutional economic approaches is that they are too closely tied to ideal-type property rights regimes, private and common property respectively. It could be erroneously concluded that the choice was between one or the other, and that significant efficiency costs of one kind or another were unavoidable. Fortunately, however, property rights in practice are far more diverse than what four ideal-type property rights regimes (private, common, state and open-access) encompass. The concept of co-management has gained increasing attention by researchers, policy makers and development practitioners in recent years (Baland & Platteau, 1996; Leach, Mearns, & Scoones, 1999). Co-management means the sharing of responsibilities for natural resource management between national and local governments, civic organizations and local communities. In the context of pastoral China it potentially offers a viable alternative to the household ranch model that currently underpins rangeland policy.

The remainder of this paper is organized as follows. In Section 2, a new institutional economics framework for understanding rural institutions is introduced and features of the economic, resource and social context that have a bearing on the relative "efficiency" of different tenure arrangements are identified. Key characteristics of pastoral tenure in Xinjiang Uygur Autonomous Region, identified from rapid tenure appraisals conducted by the author in 11 pastoral counties [2] in the region in 1998 and 2001, are then presented in Section 3. These characteristics include group tenure and fuzzy boundaries, which are associated with inefficiencies in the conventional analysis. The case is put in Section 4 that group tenure and fuzzy boundaries facilitate certain benefits, namely: external exclusion; economies of size with respect to herd supervision; provision of social insurance; and the abatement of environmental risk. In Section 5, the evolution of institutional arrangements in the future is discussed in light of the preceding theoretical analysis as well as recent changes in other parts of pastoral China. Finally, conclusions are drawn in Section 6.

2. LAND TENURE INSTITUTIONS, EFFICIENCY AND CONTEXT

According to mainstream microeconomics, private property represents the most efficient type of land tenure institution because it embodies the efficiency-enhancing characteristics of completeness, exclusivity, transferability and enforceability [3] (Posner, 1977; Randall, 1975). Underpinning this proposition, however, are

the assumptions of perfect information and zero transaction costs. Transaction costs are invariably associated with the acquisition of information about exchange and include search and information costs, bargaining and decision costs, and policing and enforcement costs (Eggertsson, 1990). In the presence of imperfect information and positive transaction costs, the property rights associated with Pareto-optimality cannot be used as a benchmark for efficiency and it becomes more meaningful to gauge the "efficiency" of an institutional arrangement through comparing it with other, real alternatives to achieve the same objective (Demsetz, 1969; Furubotn & Richter, 1997).

Transaction cost considerations are at the core of the New Institutional Economics approach to land tenure. The transaction costs associated with a given land tenure system, and thus its relative costliness, are in part determined by the degree of completeness and perfection in land and complementary markets. Incomplete or imperfect markets, arising from the presence of positive transaction costs or state intervention, are common in developing rural areas, including those of China (Ellis, 1993; Lin, 1995; Nyberg & Rozelle, 1999; Oi, 1999). The land market in China is considerably incomplete and imperfect because of the prohibition on the private ownership of land, restrictions on the transferability of land use rights, and high transaction costs in the nascent land rental market. Complementary markets, including those for rural credit, labor and grain, are likewise characterized by considerable incompleteness and imperfections, owing to transaction costs and state intervention.

Incomplete and imperfect markets have two implications for land tenure analysis. First, the hypothetical benefits of private property rights in land, including improved access to credit and enhancing-efficiency land transfers, are at best only partly realizable (Dong, 1996). Second, given incomplete and imperfect markets, some institutional arrangements can be explained in terms of being substitutes for markets or acting as nonprice controls (Ellis, 1993; Hoff, Braverman, & Stiglitz, 1993). Thus what appears to be an inefficient institutional arrangement can actually be a device to organize exchange in a transaction costs-saving manner (Furubotn & Richter, 1997). This approach does not necessarily overlook the efficiency losses that are generated by existing institutional arrangements but takes the position that, given the broader economic environment, there may be net benefits associated with the status quo. The recent literature on rural property rights in China has emphasized the role that the land tenure system plays in the provision of social insurance, given the absence of either well-developed insurance markets or a comprehensive state welfare system (Dong, 1996; Kung, 1995, 2000; Liu *et al.*, 1998). Collective ownership, coupled with the periodic reallocation of land into accordance with demographic changes, enables village collectives to ensure relatively equitable household access to land resources. Periodic reallocations have been found to be most frequent and comprehensive in those regions where off-farm work opportunities are limited and land relatively scarce, thus confirming their role in social insurance provision (Kung, 2000; Liu *et al.*, 1998).

The relative costliness of different institutional arrangements also depends on the characteristics of the natural resource. The resource characteristics of rangelands and cropland differ considerably. Rangelands are larger and more spatially dispersed than the case of cropland, and this can make it more costly to establish private exclusion. They also have lower productivity per unit of area and thus the potential benefits of private exclusion are less. Finally, rangelands in arid and semi-arid regions, including western China, are characterized by considerable variability in climate and thus the spatial and temporal distribution of forage (Behnke & Scoones, 1993; Miller, 2000; Scoones, 1995). A common implication of the extensiveness, low productivity and variability of rangelands is that group tenure may be superior to exclusive individual household tenure. Group tenure is associated with a lower cost of exclusion than household tenure, because it reduces the total length of the boundaries to be monitored and enforced (Field, 1989). Opportunistic grazing strategies, necessitated by the temporal and spatial variability in forage, are also better facilitated by group tenure arrangements and, in addition, fuzzy boundaries (Behnke & Scoones, 1993; Scoones, 1995). The potential environmental risk abating function of land tenure will be particularly important in situations where other environmental risk management mechanisms, such as fodder markets and access to credit, are lacking or poorly developed, as in the case of Tibet (Miller, 2000). An additional and widely recognized benefit of group tenure in rangelands is that it facilitates the capturing of economies of size with respect to herd supervision

(Baland & Platteau, 1998) and at lower cost than that possible under an individualized tenure regime, in the absence of well-developed markets for grazing rights and herding labor.

When comparing the relative benefits and costs of different land tenure arrangements, the cost of internal governance in a group tenure situation also needs to be considered (Baland & Platteau, 1998; Field, 1989). These are the costs associated with the negotiation, monitoring and enforcement of rules for the joint use of a resource. Collective action theory, reinforced by empirical studies of common property regimes, indicates that the difficulty and thus costs associated with the overcoming of the problem of collective action are related to group size and homogeneity (Baland & Platteau, 1996; Field, 1989; Ostrom, 1990). The smaller the size of the group and the more homogeneous the group, in terms of mutual dependence on and shared interests in the resource, the lower the costs of internal governance. Social structure also has a bearing on the cost of collective action. Social structures that are characterized by a degree of closure of social networks and repeated and multiplex social relations are associated with a high rate of voluntary rule compliance and the presence of reputation mechanisms with bite (Coleman, 1994). This in turn lowers the cost of collective action. Another typical characteristic of such communities is that they have low-cost mechanisms for the monitoring of rules and arbitration of disputes, including disputes over land rights (Baland & Platteau, 1996; Ostrom, 1990). Thus the cost of internal governance is dependent on the size, homogeneity and social structure of the group and in some social contexts the cost of internal governance may be minimal.

Although the cost of internal governance has been emphasized in the conventional property rights literature, internal governance may have an advantage over the alternative of external regulation. Namely, endogenously-evolved rules are more likely to be appropriate to the local resource, social and economic context than externally imposed ones, and that this can enhance economic efficiency (Baland & Platteau, 1996; Ostrom, 1990). The external governance of rangeland use encounters two, often insurmountable, problems. First, the cost to a central agency of acquiring detailed resource knowledge and devising appropriate rules is high because of the diversity and complexity of rangeland ecologies. Second, the cost of externally monitoring and enforcing resource use rules is also high, given the disparate nature of rangeland resources. High costs coupled with the common phenomenon of underresourced enforcement agencies, that are also prone to corrupt practices, can render effective centralized regulation impossible (Baland & Platteau, 1996). Through the devolution of some authority regarding the derivation and monitoring and enforcement of rules to resource users, the cost of governance can be reduced and its efficacy improved (Swift, 1995).

Finally, when comparing land tenure arrangements, it needs to be emphasized that there are governance costs associated with individual tenure, not just group tenure (Runge, 1986). These transaction costs include social overhead investment in structures for the recording and administering of individual property rights, and the adjudication of disputes. Thus not only are there various potential benefits arising from group tenure and fuzzy boundaries, but the cost of internal governance may be less than that of external regulation.

3. INSTITUTIONAL REFORM IN PASTORAL XINJIANG

The decollectivization of the Xinjiang pastoral sector was initiated in 1983, with the contracting out of commune livestock, and completed by 1985, when the communes were formally de-established and livestock distributed in ownership to households on the basis of household population and labor force. The marketing system for most livestock products was simultaneously liberalized and only wool marketing remains under state monopoly control. Initially, when the communes were de-established, use rights to rangelands were informally allocated to small groups of households, which formed on a voluntary basis, and use rights to hayfields and cropland were allocated to individual households. Over 90 of the rangelands of Xinjiang are utilized on a seasonal basis (Zhang, 1992) and when rangelands were distributed to groups in 1985, groups received a parcel in each of the major seasonal pastures. Summer pasture is located at high elevation in the Tian Shan and Altay Shan mountains, winter pasture in the desert basins, and spring–autumn pasture in the hill country in between. The relatively high productivity of mountain pastures compels migration there during summer, while extreme climate forces a

retreat to the desert basins over winter. The area of pasture allocated to the groups was roughly based on the total number of commune livestock that had been allocated to their constituent members, thus ensuring a degree of equitable land allocation. Boundaries were defined by line-of-sight between natural landmarks, rock piles and posts.

A major step toward the introduction of a more formal framework for rangeland tenure in Xinjiang was the introduction of the Xinjiang Rangeland Law in 1989 and this has since been augmented by a number of regulations issued by the regional government. [4] Contemporary rangeland policy in Xinjiang provides for the continuation of collective or state ownership of grasslands [5] but the contracting out of use rights, with emphasis on the household as the basic unit of contract. [6] According to the Xinjiang Animal Husbandry Bureau (AHB), the contracting of rangeland to individual households is nearly completed, with some 94% of useable rangelands having been contracted to individual households by 1999. Yet the findings from the rapid appraisals that were conducted in the Tian Shan and Altay regions of Xinjiang reveal a considerable disjuncture between *de jure* and *de facto* tenure. Grassland use contracts have been issued to individual households and the contracts specify the area of different seasonal pastures that have been assigned to the households. But the area specified is based on the number of commune livestock that were distributed to households in 1985 and often does not refer to an actual defined household pasture. [7] In practice, the issuance of grassland contracts has not usually resulted in the delineation of household boundaries in rangelands and the group tenure arrangements that were formed in 1985 have largely persisted. [8] Individual tenure has only been firmly established in hayfields and croplands.

Rangeland policy's emphasis on establishing exclusive individual use rights is also contradicted by the persistence of fuzzy boundaries. There has been virtually no fencing of group or household rangeland boundaries in Xinjiang and there is significant seasonal variation in the degree to which internal boundaries are monitored and enforced by pastoralists. In spring–autumn pasture, internal boundaries in pasture, whether group or household, are often not enforced at all and a form of internal open access prevails. In summer pasture, in contrast, there is some adherence to internal boundaries, particularly with respect to the herding of small livestock, and in winter pasture for small livestock internal boundaries are strictly enforced. External (village) boundaries are less fuzzy than internal ones, with communities generally enforcing both external exclusion and seasonal exclusion from their village pastures. Community leaders and pastoralists in the field enforce external boundaries in pasture during their proper season of use, and station one or several households in major village pastures all year round to protect them from out-of-season encroachment. Movement times between different seasonal pastures are established by the local AHBs, to ensure intercommunity coordination, and enforced by community leaders that are represented in the field.

Another point of disjuncture between *de jure* and *de facto* tenure relates to resource use regulation. Rangeland policy provides for the derivation of household stocking rates, their inclusion in grassland use contracts, and their monitoring and enforcement by local AHBs. But stocking rates for household pastures either have not been derived or, where they have been, neither the local Animal Husbandry Bureau nor pastoral communities or groups make any effort to monitor and enforce them. [9] A final characteristic of regional rangeland policy is its emphasis on maintaining land tenure stability. [10] On this account, there has been essential congruency between policy and practice. Rangeland allocation at the village, pasture group and household levels has essentially remained the same since 1985 and rangelands have not been subject to the kind of periodic reallocations experienced in croplands. [11]

4. THE TRAGEDY OF THE COMMONS RECONSIDERED

The prevalence of group tenure and fuzzy boundaries, and the lack of enforced stocking rate controls, indicate the presence of a significant degree of open access in pastoral Xinjiang. Nevertheless, the *de facto* pastoral tenure situation lies somewhere between the complete open access situation that is commonly assumed to have existed before rangeland policy was implemented, and the individualized tenure system enshrined in policy. External and seasonal exclusion from village pastures is enforced and complete internal open access only prevails in spring–autumn pasture. At least a partial tragedy of the commons appears to be in progress, given the evidence that long-term

rangeland degradation is occurring, particularly in spring–autumn pasture where tenure arrangements are least exclusive. Yet the relationship between exclusivity and rangeland degradation does not hold in the case of winter and summer pasture: tenure arrangements are more exclusive in winter pasture but degradation problems are also worse there. Knowledge gaps regarding rangeland ecology dynamics and the relative contribution of grazing *versus* other factors to rangeland degradation compound the problem of establishing a definitive link between tenure arrangements and rangeland degradation. [12]

Aside from rangeland degradation, the observed lack of investment in rangeland improvements could also be interpreted as an indicator of a tragedy of the commons. Pastoralists do not make any investment in the improvement of rangelands, where group tenure arrangements and fuzzy boundaries prevail, but they do invest in the improvement of hayfields and cropland, where individual household tenure prevails. As in the case of rangeland degradation, however, the lack of investment in improvement of rangelands may be less attributable to tenure than what is commonly implied. Arguing in the tradition of Schultz (1964), the lack of private investment may first and foremost reflect a lack of appropriate and financially viable investment opportunities. Although fencing is promoted and partially subsidized by the state, it is not sufficient to establish strict exclusion given the problems of out-of-season encroachment. It does not necessarily save on herding labor, as both fencing materials and livestock are vulnerable to theft and thus still need to be actively monitored. The viability of fencing is further undermined by its considerable direct costs. Aerial sowing and pest eradication more definitely contribute to rangeland improvement but are inherently subject to problems of scale economies, externalities and coordination, and for this reason remain solely undertaken and funded by the state.

It is commonly implied that individual tenure induces households to invest in the conversion of natural pasture to artificial pasture. [13] Although the correlation between individual tenure and artificial pasture is irrefutable, the role of individual tenure in precipitating household investment in artificial pasture is more questionable. In northern Xinjiang, state investment in irrigation schemes usually precedes the implementation of household tenure and the establishment of artificial pasture. It should furthermore be noted that a large proportion of natural pasture is not suitable for conversion to artificial pasture, either because it cannot feasibly be irrigated or it is simply too remote from households' winter bases. Thus the presence of rangeland degradation and the lack of household investment in rangeland improvement or conversion do not necessarily constitute evidence of an ongoing tragedy of the commons, even though they are often cited as such.

5. CONTEMPORARY INSTITUTIONAL ARRANGEMENTS AND ECONOMIC ADVANTAGE

A major deficiency of the conventional analysis is its lack of treatment of transaction cost considerations. This omission has three major repercussions. First, the cost of establishing individualized property is overlooked. Second, the benefits arising from the existing arrangements, or the opportunity costs of further exclusion, are ignored. Third, the lack of transaction cost considerations gives rise to undue pessimism regarding the possibility of successful collective action.

(a) *External exclusion*

The costs of establishing individual household tenure in pastoral Xinjiang include social overhead and direct private costs. Social overhead costs include the costs associated with administering a detailed cadastral survey, establishing and maintaining a comprehensive land registration system, and the resolution of disputes through formal adjudication channels. Characteristics of rangeland resources, including their extensiveness and spatial dispersion, not only exacerbate the cost of implementing a formal cadastral survey and land registration system but also pose problems for the private monitoring and enforcement of household boundaries. It will be recalled from the previous section that fencing is not sufficient to ensure exclusion. During the season in which a rangeland is in use, households could conceivably monitor and enforce their individual boundaries through direct observation in the field. But the total length of the internal boundaries to be monitored and enforced is greater under an individual *versus* group tenure situation and, furthermore, there are economies of size to be captured in boundary monitoring

and enforcement activities. These economies are realizable at least cost through group herding arrangements which, as it will argued shortly, are facilitated by group tenure arrangements. There are also considerable economies of scale to be realized with respect to the protection of household pastures and hayfields from out-of-season encroachment. These economies are currently realized through community-based mechanisms, including the stationing of grassland protector households in pastures all-year round and community monitoring and enforcement of seasonal movement rules. Thus exclusion can be established for less cost in the case of group *versus* individual tenure, and even individual tenure will require community-based mechanisms to aid its enforcement.

(b) *Economies of size in herd supervision*

Economies of size with respect to herd supervision exist because one herder household can typically supervise the livestock of three or four households. Economizing on the use of herding labor is imperative to households because their resource utilization patterns place considerable spatial demands on their labor. [14] Households realize economies of size with respect to herd supervision through forming group herding arrangements. A typical arrangement involves a small group of close kin pooling their small livestock into a single herd and young families or men in the group taking care of their supervision, while others in the group tend to the large livestock, cultivation and haymaking. Alternatively, some households are now contracting commercial herders to supervise their livestock. Because they are remunerated on a per livestock basis, commercial herders also have the incentive to reap economies of size through herding several households' livestock together.

It is postulated that, given the broader institutional environment, group tenure represents a low-cost mechanism for facilitating group herding arrangements and thus the reaping of economies of size with respect to herd supervision. Group herding arrangements imply joint use of pasture. In principle, joint use of pasture could be obtained under an individualized land tenure system, with households that have adjoining pastures combining them into one large, contiguous pasture. There are no obvious benefits from doing this, however, given that the intended outcome, *de facto* group tenure, exists anyway. Alternatively, group herding arrangements could conceivably operate without the formation of a contiguous pasture, as group livestock could be rotated through individual member's pastures even if they were not adjoining. In practice, however, such an arrangement would entail frequent transition across nonmembers' pasture and present the additional challenge of monitoring and enforcing the boundaries of parcels within the same seasonal pasture that were not being used at any given moment in time. A change in the institutional environment in favor of making use rights freely transferable between rangeland users could help to mitigate the difficulties of an individual tenure—joint operation system. But aside from being outside the realm of current political possibility, a market for rangeland use rights would invariably have high transaction costs. The observation that group herding arrangements are almost always exclusive to members of the same pasture group provides evidence of the essential complementarities between group tenure and herding arrangements.

(c) *Social insurance*

The pastoral tenure system, as with the cropland tenure system, plays a role in the provision of social insurance. Pastoral regions share in common with arable regions deficiencies in markets and an absence of state social welfare. Furthermore, given that pastoral regions are characterized by a relatively low incidence of off-farm work opportunities, it can be expected from the Chinese cropland tenure literature that equal access to land constitutes an important form of social insurance in these regions (Kung, 2000; Liu *et al*., 1998). The pastoral land tenure system has been found to facilitate equal access to resources in several different ways. First, group tenure is coupled with rules that grant new households the right to use their parent's pasture and migrant households the right to reuse their former group's pasture should they return.

This raises the puzzle as to why group tenure provides social insurance in the pastoral context but another land tenure mechanism, the periodic reallocation of household use rights, provides social insurance in the arable context. Because of the differences in rangeland and cropland resource characteristics, the periodic reallocations of rangelands would be a much more complex process than that of croplands.

Periodic reallocations in croplands are aided by the existing fragmentation of household holdings into numerous plots, each with clearly defined physical boundaries, and the lack of any obvious need for those plots to be contiguous (with the exception, possibly, of reaping economies of size with respect to mechanical technologies). In the case of rangelands, however, it is imperative for a household's holdings in any single seasonal pasture to be kept contiguous, or else problems regarding the realization of economies of size with respect to herding labor, monitoring and enforcement of boundaries and transit rights would be exacerbated. Furthermore, in contrast to croplands, the periodic reallocations of rangelands would necessitate the periodic delineation of new line-of-sight boundaries, which could be a contentious and exhaustive task. Finally, given that the boundaries in rangelands are only fuzzily observed in the first place, the making of continuous changes to them at the margins could become a rather meaningless exercise. Group tenure, in short, constitutes a more feasible way to ensure access to pasture, and thus the provision of social insurance, than the periodic reallocation of individual holdings.

Fuzzy boundaries also facilitate the realization of the political and social objective of ensuring equal access. Internal boundaries are at their fuzziest in spring–autumn pasture, where *de facto* internal open access prevails. The distribution of pastoral resources in spring–autumn pasture is particularly patchy and this renders the task of ensuring an equitable distribution of rangeland to groups, let alone individual households, very difficult. Another unique resource characteristic of spring–autumn pasture is the spatial concentration of water resources in just a few streams and/or spring ponds. This contrasts with the case of other pastures, where water resources are much more evenly dispersed: in summer pasture, by the numerous mountain streams and in winter pasture, by snowfall. Stock routes could conceivably be delineated but they would have to be numerous in order to connect with all the groups' pastures and the process of delineation would be complex. Internal open access represents the lowest-cost and less contentious method for ensuring equitable access to water, as well as patchy forage, in spring–autumn pasture.

Fuzzy boundaries also serve another purpose that is related to guaranteed household access to pasture and thus the provision of social insurance. An informal rule allows pastoralists to herd their livestock over the pasture of another group or community for transit purposes and this in turn enables them to access their dispersed seasonal pastures. Gaining access to pasture would not otherwise be an insurmountable problem, as stock routes between seasonal pastures could, and to some extent already have, been delineated. Yet having to keep to formal stock routes would significantly prolong movements for some households. Given the location of spring–autumn pasture in the transition zone between summer and winter pasture, the need for mobility across spring–autumn pasture is particularly important and this constitutes another reason for the high degree of open access observed in this pasture.

While pastoral tenure facilitates equal access to land, equal access does not necessarily translate into equal appropriation. Household appropriation is a function of household herd size and, given the considerable disparities in household herd size that have developed since 1985, [15] some households are appropriating significantly more forage than others from jointly used pasture. Thus although equal access potentially provides social insurance by guaranteeing households minimal access to forage, households' capacity to claim such insurance is also contingent on them having significant livestock to support a basic livelihood.

(d) *Environmental risk abatement*

As has been generally proposed by others (Behnke & Scoones, 1993; Miller, 2000; Scoones, 1995), flexibility in land tenure arrangements has been found to help mitigate environmental risk in Xinjiang. During severe winters, characterized by blizzards and heavy snowfall, households that normally graze small livestock on the southern flanks of hill pastures sometimes temporarily reallocate to winter pasture in the desert basin, with pasture boundaries in winter pasture being temporarily redefined in order to accommodate the new arrivals. Within spring–autumn pasture, where pastoral resources are relatively patchy and temporally variable, the practice of internal open access helps to ensure that environmental risk is distributed across the whole community. More evidence of land tenure flexibility enabling the management of environmental risk is provided in the form of local governments and community leaders slightly varying movement

times between seasonal pastures in accordance with climatic conditions.

Nevertheless, the potential for land tenure flexibility to help abate environmental risk is limited because of the high covariance of such risks over feasible migratory zones. [16] This leads to the observed tendency for communities and groups to become, if anything, even more protective of rangeland boundaries when adverse climatic events induce forage scarcity. [17] Finally, households have at their disposal mechanisms other than land tenure flexibility to help them cope with environmental risk, including the pre-emptive sale of livestock and the purchase of feed, which is supplied by local government on a partially subsidized and credit basis.

(e) *The costs of governance*

The group tenure arrangements found in Xinjiang are largely based on pre-socialist social formations and have certain characteristics that are conducive to low-cost and thus successful collective action. Pasture groups are relatively small in size, typically comprising of up to one dozen households, and are homogeneous in terms of ethnicity. Furthermore, given the general lack of alternative livelihood opportunities in pastoral areas and pastoralists' lack of participation in nonpastoral uses of rangeland resources, the groups are homogeneous in terms of their mutual dependence on and interest in pastoral resources. Being based on pre-existing kinship structures, the groups have natural authority structures, and group members also have repeated and multiplex relations (Hudson, 1938; Tsui, 1996). All of these characteristics are conducive to the accumulation of social capital and the overcoming of first and second order collective action dilemmas. Group characteristics, furthermore, can be somewhat generalized to the community level. Evidence of successful collective action at this level exists in the form of relatively effective mechanisms for external and seasonal exclusion and the arbitration of disputes. Communities can quite conceivably undertake these tasks at lower cost than the alternative of external regulation, because of the disparate nature and seasonal use of rangeland resources.

Given the presence of characteristics conducive to successful collective action, and evidence of successful collective action in some spheres, the collective inaction of communities and pasture groups with respect to the regulation of stocking rates represents a puzzle. This puzzle cannot be explained through recourse to new range ecology, as the natural check on livestock numbers that environmental adversities and the winter feed constraint may play are moderated in the Xinjiang context by the availability of external feed inputs. In addition, the scientific evidence that is available indicates that long-term rangeland degradation is occurring in spring–autumn pasture and that overstocking is a contributing factor. [18] This signifies the need for some form of regulation of stocking rates, particularly in spring–autumn pasture. It could be argued that the presence of fuzzy boundaries potentially complicates the problem of collective action by transforming it into a multitier problem. Not only households, but groups and communities as well, need assurance that if they follow stocking rate constraints, others will follow suit. Yet, as is exemplified by the government's derivation of seasonal movement rules and communities' monitoring and enforcement of these rules, a co-management approach can facilitate the resolution of multitier collective action problems.

The lack of community action with respect to stocking rate regulation is instead due to the lack of space for such action allowed for by the state. The limitations of the current centralized state approach to the derivation and monitoring and enforcement of stocking rates are evident. Pastoralists widely perceive the government's fixed stocking rate approach to be inappropriate, given the high degree of interannual variability in rangeland productivity. Furthermore, because of the disparate nature and seasonal utilization of rangelands, the task of externally monitoring and enforcing household stocking rates is costly and certainly beyond the limited resources that the designated agency has at its disposal. [19] Given that the transaction costs associated with external regulation are prohibitive, a co-management approach to the derivation and monitoring and enforcement of resource use rules constitutes a more feasible alternative.

6. IMPLICATIONS FOR INSTITUTIONAL EVOLUTION

The conventional and new institutional analyses above respectively highlight some of the potential efficiency costs and benefits associated with contemporary *de facto* pastoral tenure in Xinjiang. On the one hand, there is a partial

tragedy of the commons occurring because of the presence of fuzzy boundaries and group tenure arrangements without internal regulation mechanisms. On the other hand, the NIE analysis has highlighted some of the potential benefits associated with group tenure and fuzzy boundaries, given the broader economic, resource and social context. These findings may be generalized to Tibet Autonomous Region, where rangelands have also been allocated to groups, boundaries in rangelands are fuzzy and the state does not attempt to monitor and enforce household stocking rates, even if they have been derived (Goldstein & Beall, 1991; Miller, 2000). There is also evidence of overstocking causing rangeland degradation in parts of Tibet (Miller, 2000).

From a conventional property rights perspective, it can be expected that the pastoral tenure cost-benefit *nexus* in Xinjiang and Tibet will change in favor of greater exclusivity over time. Efficiency losses due to the excessive use of rangeland will continue, if not worsen, under the existing tenure regime. The use of fencing to establish strict exclusion will become more feasible over time, as social acceptance of it increases and its cost declines relative to the rising opportunity cost of labor. The development of markets for grazing rights and herding labor could enable the capturing of economies of scale in herd supervision under an individualized tenure system, thus rendering group tenure unnecessary for this purpose. The social insurance role that group tenure plays is likewise likely to decline in importance in the future, as population growth stabilizes, off-farm employment opportunities increase and, possibly, a more comprehensive state welfare system evolves. The land tenure system currently only plays a secondary role in the mitigation of environmental risk and, with increased household fodder production as well as improvement in markets for grazing rights, credit and feed, this role will further diminish in importance in the future. Finally, applying collective action theory, it can be expected that further market integration will erode the conditions necessary for collective action and increase the cost of internal governance, this reinforcing the shift in the cost-benefit *nexus* in favor of individualized tenure.

The major implication of the conventional analysis, and the goal of national rangeland policy, is the creation in due course of the household ranch. Recent developments in select parts of western China outside of Tibet and Xinjiang represent the materialization of the type of land tenure transitions envisaged in national rangeland policy. [20] Winter pastures and winter–spring household pastures have been extensively fenced in some areas and there is a high expectation among local officials and pastoralists that summer household pastures are about to be fenced too. Stocking rates for household pastures have been included in grassland use certificates and pastoralists have been warned that they will need to adhere to them within a set time frame, after which township officials and village committee members are planning to jointly enforce them. If coupled with the careful monitoring of rangeland conditions, such areas can serve as a test bed for contemporary rangeland policy.

The above transitions are closely based on national rangeland policy and represent a form of directed rather than induced innovation. An alternative approach, the strengthening of co-management, and community-based resource management as an integral part of this, has increasingly been piloted in other parts of China (Banks & Sheehy, 2000; Banks, Richard, Li, & Yan, 2003). The co-management approach creates space for induced institutional innovation through allowing substantive community participation in the process of institutional design. The new institutional arrangements emerging under the pilot schemes are varied but a common factor is the use and management of pasture by a group or village in accordance with rules that have been derived with the assistance of the local state and that are monitored and enforced by the actual users. The benefits of group management, as construed by the pastoralists themselves, lends further support to some of the propositions made earlier in this paper. The cost of fencing is lowered, allowing for greater external exclusion, because the length of boundary to be fenced is less than in the individualized tenure case. Internal regulation is improved as the carrying capacity of the joint pasture and the number of stock units that each household is able to graze is ascertained with the help of the local state, and these rules are monitored and enforced by the group. Economies of size in herd supervision are still reaped because households take turns at supervising the joint herd. Social insurance is also provided because every household is entitled to graze a certain number of stock units on the jointly managed pasture. In some cases, households that have small herd sizes and do not utilize all their en-

titlement are allowed to earn a supplementary source of livelihood through renting their surplus entitlements to other households.

The different modes of co-management being piloted appear to represent an improvement on the existing situation by enabling stricter exclusion and appropriate internal regulation but at the same time preserving the benefits of group tenure, including economies of size with respect to herd supervision and the provision of social insurance. Thus co-management represents an alternative to the continuation of the status quo or the strict implementation of the yet unproven household ranch system, and should not necessarily be assumed to be a stopover on a linear path between the two. It could be argued from an new institutional economics perspective that a more individualized management system is not likely to be induced in large areas of Xinjiang and Tibet because their relatively high environmental variation, greater dependence on pastoralism, poor market integration and more intact traditional social structures will continue to indefinitely tip the cost-benefit *nexus* in favor of forms of group management. But given that institutional change in the Chinese countryside has been directed as well as induced (Liu *et al*., 1998), and is likely to continue to be in the future, the degree of political space granted to local governments and pastoral communities will have a critical bearing on institutional evolution.

7. CONCLUSIONS

The purpose of this paper has been to extend the debate on rural property rights in China to its extensive pastoral sector. Land tenure institutions in rangelands and croplands have been found to share in common collective ownership but little else. The distinguishing features of rangeland tenure include group arrangements, fuzzy boundaries, and relatively stable land allocation. While the collective ownership of rangelands and croplands, and associated restrictions on transferability and alienability, give rise to common efficiency concerns, the land tenure differences between them give rise to divergent efficiency concerns as well. The joint use of land and fuzzy boundaries are the major potential sources of inefficiencies in the case of rangeland tenure, whereas the periodic reallocations of land have constituted the focus of the efficiency debate with respect to croplands. In the same way that the cropland tenure debate has proceeded, it has been argued in this paper that the efficiency losses attributed to rangeland tenure are overstated and the direct and opportunity costs associated with further privatization understated. Differences between rangeland and cropland tenure are ultimately attributable to differences in resource characteristics, with rangelands being more extensive, less productive and more variable than cropland. Evidence of the paramount role of resource characteristics is provided by the observation that pastoral households that both graze livestock on extensive rangelands and cultivate fodder crops do so under two different tenure regimes.

It has been argued in this paper that the unique resource characteristics of rangelands give rise to unique transaction cost considerations that in turn largely account for the type of pastoral tenure institutions observed. Group tenure and fuzzy boundaries facilitate, at relatively low cost, external exclusion, the realization of economies of size with respect to herd supervision, the abatement of environmental risk, and the provision of social insurance *via* equal access. The latter is also a benefit associated with the cropland tenure system. Equal access, however, is provided through different tenure mechanisms in the different resource contexts: in grasslands *via* group tenure and fuzzy boundaries, and in croplands *via* periodic reallocations. This reaffirms the crucial role that nature resource endowments have in explaining the diversity of property rights in rural China.

The statement that a "uniform system of land tenure in rural China is unlikely to be successful given its immense diversity" (Kung, 2000, p. 715) becomes an understatement when rangelands are explicitly considered. Although future changes in underlying social and economic conditions may tilt the cost-benefit *nexus* in the direction of greater exclusion, the resource characteristics of rangelands are essentially immutable and thus it cannot be assumed that a convergence of rangeland tenure with cropland tenure will eventually be induced. Nor can it be assumed that the cropland tenure system necessarily constitutes a template for improved rangeland management. Recent institutional innovation in pastoral western China has followed two distinct pathways: the household ranch based on the strict implementation of national rangeland policy, and strengthened forms of co-management based

on substantive community participation. The crystallization of these two distinct pastoral tenure models creates the opportunity for comparative and empirical-oriented research, including into their efficiency and equity dimensions, in the future. But the diversity within pastoral China, both in terms of underlying conditions and the tendency for local states to facilitate or command institutional change, is likely to ensure that pastoral tenure in China remains, at the very least, as diverse as the case of cropland tenure.

NOTES

1. According to official sources, some 90% of China's rangelands are degraded to some degree, including 42% moderately to seriously (SDPC, 1996; SEPA, 1998).

2. The pastoral counties where rapid tenure appraisals were conducted were: Altay and Buerqin (Altay Prefecture); Bole and Wenquan (Bertala Prefecture); Ermin and Wusu (Tacheng Prefecture); and Huocheng, Zhaosu, Cabucaer, Tekeshi and Gongliu (Yili Prefecture). All of these are located in northern Xinjiang, where its extensive rangelands and mobile pastoralists (principally Kazaks and Mongolians) are also concentrated.

3. Exclusivity ensures that users have the incentive to invest in land improvements and adoptable sustainable land management practices. Transferability provides owners with access to credit, since land constitutes an important form of collateral in developing rural areas, and also facilitates the gravitation of resources to the most dynamic agents and their highest-value use. Completeness and enforceability implies that property rights are well-specified and enforced.

4. The two significant Xinjiang Government regulations issued since 1989 are the "Regulation on the Collection and Use of Grassland Management Fees in Xinjiang Uygur Autonomous Region" (Regulation No. 247, 1992) and "Regulation on the Grassland Contract in Xinjiang Uygur Autonomous Region" (Regulation No. 88, June 1996). These are based on national regulations issued by the Grassland Division of the Ministry of Agriculture.

5. Xinjiang Rangeland Law, Article 8.

6. Xinjiang Rangeland Law; Xinjiang Regulation No. 88 (June 1996), Article 5; Xinjiang AHB Document No. 9 (March 1994).

7. The underlying purpose for the specification of the area of different seasonal household pastures appears to be tax related. As grassland use fees vary according to different types of seasonal pastures and apply on a per mu basis, the area of each seasonal pasture needs to be known before the total grassland use fees payable by the household can be calculated.

8. In two pastoral villages in Buerqin County, for example, some 6% and 36% of the original groups formed in 1985 had subdivided by 1998. But the average size of the groups in both villages increased over the same period, due to population growth (see Banks, 2001).

9. In Yili Prefecture stocking rates have yet to be derived; in Altay Prefecture they have yet to be enforced.

10. Policy first prescribed that the term of use rights was "a long time" (Xinjiang Rangeland Law, Articles 9 and 35), before a 30-year term was introduced in 1993 and this was subsequently amended to 50 years in 1996 (Xinjiang Regulation No. 88, Article 4). Furthermore, use rights are inheritable.

11. Circumstances under which boundaries have been modified include when land reclamation projects have diminished the size of pastoral villages' rangeland endowments, and some pasture groups have elected to subdivide their pastures, though usually not down to the individual household level.

12. Other causes of rangeland degradation including rodents, pests and the use of pasture (in the past) for cropping (Tuo, 1993).

13. "Artificial pasture" is Chinese terminology for perennial grass species, such as alfalfa.

14. In Altay Prefecture pastoral households' large and small livestock are grazed in distance pastures for between 3 and 7.5 months a year. In addition, during summer when all livestock are being grazed together in alpine pasture, households must make provision for the cultivation of crops over spring and summer, or the

cutting of hay in summer, at their winter bases over 100 km away.

15. In Altay Prefecture household herd sizes averaged about 141 livestock (June 1997 AHB data) but 28% of households had less than 50 livestock and 10% over 300, and some households had over 800 livestock (June 1998 AHB data).

16. Altay Prefecture's winter of 2000–01, its worst in 50 years, adversely affected rangelands throughout the prefecture. The prefectures of Bertala, Tacheng and Yili experienced low snowfall during the same winter and a dry spring in 2001, and this likewise adversely impacted on the rangelands throughout these prefectures.

17. For example, during a noticeably drier year in Altay Prefecture, communities and pastoral groups expend relatively more effort on monitoring and enforcing their boundaries in summer and spring–autumn pasture.

18. That the effects of growing livestock populations have first materialized in spring–autumn pasture is in part due to the double-use of this pasture in the seasonal migratory cycle (Tuo, 1993).

19. The Grassland Supervision section of the Xinjiang AHB, tasked with the monitoring and enforcement of stocking rates has a total of 2050 employees based in 470 locations at the regional, prefecture, county and township levels. The thinness of spread this represents on the ground is illustrated by the case of Buerqin County, in Altay Prefecture, which has some 3,100 pastoral households and 500,000 livestock, utilising a total of about 670,000 ha of grassland. The total number of county AHB staff amounts to 36, most of whom are assigned to grassland research and extension duties, and the agency only has three jeeps at its disposal.

20. Based on rapid tenure appraisal conducted in Sunan County, Gansu Province, by author in May 2001, Miller (2000) and Richard (2002).

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