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Intergenerational Wealth Transmission and Inequality in Premodern Societies

Pastoralism and Wealth Inequality

Revisiting an Old Question

by **Monique Borgerhoff Mulder, Ila Fazzio, William Irons,
Richard L. McElreath, Samuel Bowles, Adrian Bell,
Tom Hertz, and Leela Hazzah**

CA+ Online-Only Supplement: Estimating the Inheritance of Wealth in Premodern Societies

Pastoralist societies are often portrayed as economically egalitarian, reflecting the volatile nature of livestock herds and the existence of multiple institutions that allow for the redistribution of wealth as a form of insurance. Motivated by an interest in the role of intergenerational transmission in structuring persistent inequality, we examine the extent of intergenerational transmission of material wealth (four measures) and embodied wealth (one measure) for four pastoral populations from different parts of the world (East Africa, West Africa, and southwest Asia). We find substantial levels of intergenerational transmission and marked economic inequality. We argue that the high correspondence between the material wealth of parents and offspring reflects the importance of the family in the transmission of wealth through bequests, positive assortment by wealth in the domains of marriage and herd management, and positive returns to scale as might occur when raising or defending large herds. We conclude that the analysis of intergenerational transmission provides new insights into the much-debated extent of egalitarianism among pastoralists.

Pastoralism and Intergenerational Wealth Transmission

This paper examines the nature, distribution, and intergenerational transmission of wealth in pastoral societies. Despite the difficulties in working with mobile populations and the complexities in quantifying livestock holdings, researchers

find that pastoralists offer a relatively straightforward opportunity for investigating the role of material wealth in structuring inequality. We focus primarily on the distribution of material wealth and the extent to which such livestock holdings are correlated between generations, with a focus on four populations for which we have relevant data. Our four populations represent the pastoralism typical of East Africa (Datoga, Sangu), West Africa (Juhaina Arabs), and southwest Asia (Yomut Turkmen). We use the results to assess the idea that material wealth is particularly amenable to intergenerational transmission and to evaluate claims concerning egalitarianism among pastoralists. With a sample of only four populations,

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we focus less on the differences between populations and more on the intriguing parallels and what these mean for our understanding of the dynamics of wealth inequality in pastoral populations (Borgerhoff Mulder et al. 2009).

Pastoral Production System: Definition, Origins, Typical Features, and Variability

The pastoralist production system is defined by a heavy but rarely exclusive reliance on herding domesticated animals for subsistence and marketable products (modern ranchers with their exclusive commercial focus are omitted from discussion). The most common domesticates are cattle, camels, sheep, goats, horses, yaks, llamas, and reindeer. The material tool kit is often highly portable, and there is a rich and complex fund of knowledge pertaining to the health, behavior, and productivity of domesticated species. In addition to harvesting milk and meat, pastoralists utilize products such as horn, skin, wool, tendons, bone, and urine and employ specific technologies such as the preserving of milk or the harnessing of cartage animals. Pastoralists' diets are universally supplemented (at least seasonally) with grain, either from trade or cultivation, or with other foraged foods. Mobility, either permanent (nomadism) or seasonal (transhumance), is common. Domestic livestock appeared independently (10,000–8000 BP) at three main centers (Bruford, Bradley, and Luikart 2003), and this appearance represents a robust adaptation to living in grasslands or cold or arid regions where agriculture is marginal or impossible.

Traditional pastoral production is a family-based enterprise (commercial ranchers are excluded from discussion here), often complemented with the labor of other families, especially those who are poor in livestock, and fostered children. Core family production generates some production-system-specific demographic and sociocultural correlates (table 1). High fertility is generally desired, but levels are usually lower than those of agriculturalists (Bentley, Jasienska, and Goldberg 1993; Sellen and Mace 1997) and variable, reflecting multiple factors—mobility, pathogens, maternal workloads, unpredictable child mortality, delayed and/or unstable marriages, and the extended absence of men (Galvin et al. 1988; Hewlett 1991; Leslie and Winterhalder 2002; Randall 1994). Pastoralist systems are commonly organized into patrilineal clans and lineages (54% of the Standard Cross-Cultural Sample [SCCS] sample is patrilineal) that function as corporate livestock-owning units, as in the family-owned stock of Inner Mongolia (Sneath 2000). Men are typically the primary owners of livestock wealth (with exceptions such as the Navaho; Kluckhohn and Leighton 1974). There is a sexual division of labor, although women spend considerable time in livestock-related tasks (Fratkin 1989). Polygyny is predominant (in 60% of the SCCS, either <20% (limited) or >20% (general) of men marry polygynously); in Africa at least, polygynous marriage is positively associated with pastoral specialization (Spencer 1998). Men accumulate wives, children, and labor at their homes

(87% of SCCS has either patrilineal or virilineal postmarital residence) through payments (71% of the SCCS have either token or substantive bride-price or bride-service), and stock are parceled out among polygynously married wives for use and inheritance following what in Africa is known as the “house property” complex (Gluckman 1950). As classified in the SCCS, pastoralists are either egalitarian (19%) or have one (50%), two (25%), or three (6%) social strata (which include forms of hereditary slavery where specific castes or ethnicities live and work in pastoral households without owning livestock). Famously, pastoralists often exhibit a strong cultural ethos of valor and physical prowess (91% of the SCCS populations have an ideology of “male toughness”), in some groups exemplified by special institutions for warriorhood, often embodied in age-set systems and associated gerontocratic institutions. While data from cross-cultural databases suffer from various degrees of reliability a general pattern emerges from descriptive data such as these.

Pastoralist societies are highly variable. Early typologies emphasize the purity of pastoralism (with respect to reliance on nonpastoral foods), nomadism, and aversion to commercial production (Jacobs 1965). Later overviews explore the dimensions of variation, such as specialized versus diversified production (Salzman 1971), autonomy or articulation with neighboring populations (e.g., Galaty and Johnson 1990), and the range of relationships between property and power (Rigby 1985). Most fundamental differences can be seen between the (until recently) autonomously organized pastoralists of East and southern Africa (now tolerated as somewhat fringe pursuits within a typically underdeveloped livestock sector) and the erstwhile nomadic empires, which are most typical of the Asian Steppe (e.g., Kradin 2002) but which occur at smaller scales in North and West Africa (Stenning 1959) and the Near and Middle East (Barth 1961). Factors underlying such differences are ultimately ecological (Richerson, Borgerhoff Mulder, and Vila 1996). Where pastoralists develop trade interdependencies with cultivators (exchanging animal goods and caravan products for grain and services), the symbiosis can lead to their becoming almost indistinguishable economically and demographically from settled neighbors (who may even include erstwhile sectors of the pastoralist group).

A final salient feature of most pastoralist groups is the susceptibility of their households to catastrophic loss from disease, drought, and raids (Barth 1964; Bradburd 1982; Dahl and Hjort 1976; Sandford 1983). The impact of such events can be huge, causing at least a temporary shuffling in wealth differences among households, and is commented on by most ethnographers. Although comparative figures are unavailable, the magnitude of such shocks is probably larger for pastoralists than for agriculturists because of the vulnerability of their “wealth on the hoof” to epidemics and theft. Whether such losses, or the impacts of such losses, are stochastic with respect to wealth differentials is addressed later.

Table 1. Geographic, stratification, and inheritance characteristics of pastoral societies (defined by “pastoral contributes most” under the subsistence economy variable) from the 186 societies comprising the Standard Cross-Cultural Sample

Characteristic	% of <i>n</i> societies (<i>n</i>)
Region (v843):	
Africa	18.6 (16)
Circum-Mediterranean	24.8 (16)
East Eurasia	37.2 (16)
Insular Pacific	0 (16)
North America	0 (16)
South America	6.2 (16)
Descent (v247):	
Patrilineal	53.5 (15)
Duolateral/bilineal	6.7 (15)
Matrilineal	13.3 (15)
Bilateral	13.3 (15)
Mixed	13.3 (15)
Polygamy (v861):	
Polyandry	6.7 (15)
Monogamy prescribed	20.0 (15)
Monogamy preferred	13.3 (15)
Limited polygyny	26.7 (15)
Full polygyny	33.3 (15)
Marital residence (v215):	
Avunculocal	6.2 (16)
Optional	6.2 (16)
Virilocal	12.5 (16)
Patrilocal	75.0 (16)
Bridewealth (v1195):	
Dowry	14.3 (16)
No exchange	14.3 (16)
Gift exchange/token bridewealth	14.3 (16)
Bride-price or bride-service	57.1 (16)
Social stratification (v158):	
Egalitarian	18.8 (16)
Hereditary slavery	50.0 (16)
Two social classes, castes/slavery	25.0 (16)
Three social classes or castes, with or without slavery	6.2 (16)
Ideology of male toughness (v664):	
Absent	9.1 (11)
Present	90.9 (11)
Inheritance of moveable property (v279):	
Matrilineal	6.7 (15)
Children, with daughters receiving less	20.0 (15)
Children equally for both sexes	6.7 (15)
Patrilineal	66.7 (15)
Inheritance distribution of moveable property (v281):	
Equal of relatively equal	80.0 (15)
Ultimogeniture	6.7 (15)
Primogeniture	13.3 (15)

Wealth

Classes: material, relational, and embodied. Livestock are the principal form of *material* wealth among pastoralists, serving as the fundamental form of family capital (the English word “cattle” is the root of the word “capital”) and identity. For the West African Fulani, for instance, it is cattle that allow a man to be free and independent, to achieve personal goals,

and to generate wealth (Grayzel 1990); for the East African Maasai, Waller (1999: 24) surmises that a “very poor Maasai must be either an ex-Maasai or a dead Maasai.”

Contrary to an early belief that herders cumulate livestock for no sound economic reason (an irrational “cattle complex”; Herskovits 1926), pastoralists are repeatedly shown to manage their herds in a highly efficient way, that is, managing not for short-term returns but longer-term prosperity, trading off

meat today for milk tomorrow, consumption benefits now for the children and labor of wives (acquired through bride-wealth) in the future. They also show an opportunism (Dahl and Hjort 1976; Homewood and Rogers 1991; Sandford 1983) well adapted to environments characterized by disequilibrium dynamics (Ellis and Swift 1988). Large herds serve as buffers against disasters, as base capital for maximizing herd growth and milk production, and as capital for payments for wives. While livestock also serve as prestige items whose exchange signals multiple social messages (Harrell 1997) and whose strategic use attracts large followings of loyal allies (Harrell 1997; Koptjoff and Miers 1977), this does not detract from their crucial role in ensuring subsistence (Dyson-Hudson and Dyson-Hudson 1980; Schneider 1979). For all pastoralists, then, herds serve as a critical reservoir for investment in the future; additional material stores of value include jewelry, gold, carpets, saddles, tents, and, in recent years, consumer goods.

Successful herd management involves *relational* as well as material capital. Livestock need water, pasture, and labor. Secure access to such ephemeral resources requires the establishment and maintenance of supportive social relationships within and beyond the community, whether in East Africa (Fratkin, Roth, and Galvin 1994), the Hindu Kush (Balikçi 1990), or the Middle East (Barth 1961). These relationships are serviced through exchanges of stock, gifts of coffee and tobacco, and sexual access to wives, and they create social ties that contribute also to labor and defense (Dyson-Hudson and Dyson-Hudson 1980). In an unusually well-quantified study of how pastoralists cope with drought, Bollig (2006) shows for the Kenyan Pokot how richer households provide meat for poorer households largely through their contributions to communal ritually focused feasts. Such families are not repaid in subsequent years and could better ensure their food security through selling goats for maize, suggesting that their generosity builds “symbolic capital” (Bollig 2006: 186) rather than simple risk reduction. For the neighboring Turkana, Johnson (1999) concludes that social networks that distribute food, livestock, and other sources of support are as important to a herder’s success as having a wealthy father, and in Dassanetch, senior elders “go to dimi” (a ceremonial liquidation of their material holdings by giving away all their animals to bond partners; Almagor 1978), symbolizing the predominance of relational capital. In other parts of the world, Andean llama herders use reciprocal exchanges to increase the size of their herds (Orlove 1981), and in Central Asia it is the *lack* of redistributive mechanisms that may render Basseri families so vulnerable to dropping out of pastoralism (Bradburd 1989). Finally, for the Norwegian Saami, new data show that broad (districtwide) networks of labor are more important than household labor in enhancing reindeer reproductive rates and carcass body mass (Naess, Fauchald, and Tveraa 2009). In short, *relational* wealth is almost universally acknowledged by ethnographers who emphasize herd owners’ concern with reputations as generous and reliable allies and access to labor.

Embodied wealth, which includes both physical and knowledge-based capital (see “embodied capital,” Kaplan 1996), is also important in pastoralist populations. Physical condition, performance, and competition are highly valued in the harsh environmental conditions in which pastoralists live, evidenced in the value placed on masculinity, strength, and women’s and men’s beauty (Sandford 1983). Fertility is also deemed crucial to status, wealth, and the supply of household labor. Detailed research with the Turkana of the arid savannas of Kenya reveals the susceptibility of pastoralists to both seasonal and chronic food shortages (Galvin et al. 1988; Little and Leslie 1999) and the role of household members in supporting one another through periods of ill health. Knowledge of the conditions for successful pastoral production, grazing ecology, weather patterns, migration routes, and the social and political landscape is also critical, although often this information is widely available or accrued through relational wealth, which itself may depend on material wealth. Thus, in Afghanistan only rich shepherds can entertain visitors and obtain the rapidly changing information on economic and security conditions (Balikçi 1990). Intangible property and ritual knowledge, like chant-songs and prayer sticks for the Navaho (Kluckhohn and Leighton 1974) are also very important.

Clearly material, relational and embodied wealth intersect. Herders world over with large livestock holdings can marry multiple wives, produce numerous healthy children, enjoy a large pool of labor to enhance livestock productivity, thereby obtaining status for their families and attracting dependents and political allies who provide critical knowledge on trade, grazing, security, and the connections needed for further success. The implications of such potential economies of scale or synergies among wealth types are revisited in Smith et al. (2010, in this issue).

Intergenerational transmission. Among pastoralists, flows of goods and services are constrained primarily by kin, although raiding or other feats of valor can also be important, especially for raising bride payments. In the SCCS, 67% of the societies show patrilineal inheritance of movable property. Among the inheritors, distributions are relatively equal for 80% of the sample (table 1), though a ruthless meritocracy (informal favoring gifted or energetic sons) is often in evidence. There are many variants in the details, for example, how the sons of cowives are treated, birth order biases, procedures in the case of a patriarch’s premature death, the role of the deceased’s younger brothers in the inheritance process, the timing of transfers, how conflicts are resolved, and daughters’ gifts, topics to which anthropologists have given much attention. Matrilineal cases like the Sahelian Tuareg or the southern African Himba, where men pass wealth to sister’s sons, stand out as unusual. Daughters generally receive little material wealth, leaving home at marriage with only their jewelry and clothes, a severance from the family herd portrayed dramatically in the custom of bride capture (Borgerhoff Mulder 1991). In high-latitude groups, like the Koryak of northern Russia, it

is customary for the reindeer herds to be divided equally between sons and daughters (Ingold 1980).

At one level these mechanisms of intergenerational transmission (gifts, bequests, and inheritance rules) are easy to study—they have different names, are transferred at different stages of the life span, and are imbued with either special ritual or jural status (Gray and Gulliver 1964). But in the real world, the culturally proscribed inheritance process is rife with conflict. A vivid example is Goldschmidt's (1969) account of the political intrigue that occurred at the death of a Kenyan Sebei patriarch, dynamics that enmesh even the most prominent of Africans (Obama 2004). Actual patterns of transmission often depart from normative expectations and are rarely documented in ethnographies, with the exception of Irons's (1994) study of patrimony in the Turkmen. For this reason we focus here on the extent to which livestock wealth (or in the Turkmen case, patrimony) in one generation is correlated with that in the next rather than on bequests per se.

Samples and Methods

Overview of Sample Populations

A pastoralist way of life can guarantee autonomy for a local group or be pursued as a regional economic specialization. Our four populations encompass both types. Whereas the Tanzanian Sangu and Yomut Turkmen represent pastoral specializations within a larger economically diverse ethnic group, the Tanzanian Datoga and Chadian Juhaina Arabs are autonomous groups. On other grounds we cannot claim these four populations represent the range of pastoralist specializations or their geographic range (table 1).

Datoga

Ethnographic background. The Datoga (population estimated between 62,300 and 81,900) were displaced from the fertile highlands of northern Tanzania in the sixteenth to eighteenth centuries and have since migrated across the plains adjacent to Lake Eyasi and beyond. Datoga herd cattle, goats, and sheep, driving their animals to seasonally available pastures while maintaining relatively permanent homestead sites. Their sociocultural characteristics are typical of East African pastoralists—polygynous marriage and patrilineal inheritance, with patrilocal homesteads clustered into loose neighborhoods (Sellen, Borgerhoff Mulder, and Sieff 2000). Livestock are central to Datoga life, with their products consumed as food, used for household maintenance, and sold to generate cash for the purchase of maize, cloth, jewelry, medicines, and honey. Livestock are also exchanged generously in informal networks and slaughtered with abandon at widely attended memorial feasts for deceased elders as a demonstration of family status. Livestock are the only form of accumulated wealth in this population and are primarily owned by men. Datoga attempt to cultivate small millet and maize fields but are generally unproductive farmers (Sieff 1997). The data pre-

sented here come from three field seasons (1987–1989) in eight different neighborhoods during a period when Datoga were experiencing considerable economic stress. Most families were selling off cattle for grain and veterinary medicines, and the poorer households (a majority) were caught in a declining cycle of poverty (Sieff 1999). Outcomes for health, growth, and nutrition were often severe (Sellen 1999).

Wealth measures and methods. Two measures of wealth are used for this population—livestock wealth and reproductive success. The measure of material wealth focuses on multispecies livestock holdings (reported in Tropical Livestock Units weight equivalents; Sieff 1999) that were censused over one, two, or three surveys and averaged. For sons' wealth, a count was made of the stock in the appropriate categories to which married sons have rights, as specified by traditional terms; similarly, wealth of daughters was calculated on the basis of the daughter's dowry cattle together with the animals given to her (with user rights) by her husband (Borgerhoff Mulder 1991; Klima 1964; Tomikawa 1978). Pairing was focused on fathers (i.e., father-son and father-daughter links); the mother's wealth was not analyzed, being difficult to differentiate from that of her husband as her children grow up and leave. Analyses are based on 95 father-son dyads and 40 father-daughter dyads, the difference in sample size reflecting the outmigration of daughters with patrilocal postmarital residence.

Reproductive success (RS) is used as a measure of embodied wealth. As with other pastoralists, fertility is highly valued, but raising children in this environment is not easy. Datoga in Eyasi exhibit poor achievements in child growth (Sellen 1999) and high levels of fertility and child mortality (Borgerhoff Mulder 1992). For these analyses we use the number of children surviving to 5 years, corrected for the child's probability of surviving to their fifth birthday (.67 boys and .71 girls; Borgerhoff Mulder 1992). As with livestock pairings, analyses focus on father-son and father-daughter links. Descriptive statistics for paired individuals were compared with the fuller sample reported in Borgerhoff Mulder 1992 and suggest no sample bias. Both livestock wealth and RS were controlled for age, determined through the use of a locally constructed calendar.

Juhaina Arabs

Ethnographic background. Juhaina Arabs (approximately 18,000) are a population of transhumant pastoralists originally from Yemen and Saudi Arabia who arrived in Chad in the fifteenth century. Juhaina families live in camps of 4–15 tents and migrate together, covering distances of 250–600 km along the north-south axis. Travel corridors are selected on the basis of the distribution of better pastures, the availability of water, and proximity to markets where they raise cash by selling milk. Strong competition for water resources and livestock incursions into cultivated areas often trigger violent conflicts between pastoralist and farming communities. Juhaina are predominantly camel herders, but they also keep goats and

sheep. Camels are their repository of wealth. Female camels are crucial for reproduction and milk production; males are kept for transport. The Juhaina Arabs are a patrilocal and patrilineal society, and families are the principal corporate livestock holding units. Most of the transmission of livestock from father to son occurs while the father is still alive, with sons gradually obtaining rights over these animals as they get married and start having children. Until a man's marriage, or a few years subsequently, his cattle stay together with his father's herd. Social and economic networks rarely exist outside male kin lines, and loans are rare, with preference given to brothers, paternal uncles, and cousins. These paternal kin are those most likely to help in raising the bride-price. Livestock are partially protected against loss by being distributed among homes of cowives, and less commonly in-laws. Women have very limited effective control over the resources, despite formal rights under Islamic law. All data were collected during two dry-season field expeditions at 26 Juhaina camps in the Chari-Baguirmi district.

Wealth measures and methods. A single measure of material wealth is used for the Juhaina—the amount of milk collected from camels. This was preferable to asking awkward questions about exact numbers of livestock owned. Milk collected/day is a good indicator of the number of female camels owned by a family, especially during the dry season (when these data were collected); this is because Juhaina herders are highly engaged in the milk-selling market and seek to maximize milk collection (Fazio 2008). Milk produced was recorded in *koros* (2-L bowls). Analyses were based on 5 women and 16 men, all alive and older than 21 years of age; these individuals were linked to 12 fathers. From this data set, paired wealth measures were available for 21 father-offspring pairs (16 father-son, 5 father-daughter). Analyses were controlled for age, which was determined using local calendars and some important historical events.

Sangu

Ethnographic background. Sangu are the principal ethnic group in the Usangu Plains of western Tanzania. They originate from a mixture of Bantu peoples present in the late 1800s, when they united under a hereditary chief and began raiding their neighbors for livestock and taking slaves (Shorter 1972). At the peak of their power they were wealthy cattle pastoralists who wielded considerable military might. Today they are farmers, although 100 families in the villages around Ukwarheri still keep herds on the plains and practice transhumance, and these are the focus of this study. Pastoralist Sangu live in small patrilineally focused clan-based communities. Household compounds consist of extended families. Livestock are important for subsistence and bride payments. Kin often loan and borrow sections of their herds as an intentional risk-avoidance strategy. Cattle, as well as sheep and goats, are controlled by the head of household, while inheritance rights are assigned to wives following the house-property complex

whereby wives are entirely responsible for the animals assigned to their section of the herd. When sons marry, their initial herds come from a portion of a mother's share of the livestock. In addition to livestock, every household farms at least 1 acre of corn (McElreath 2004), but low rainfall renders a very low yield compared with that of Sangu agriculturalists in the more southern zone. The data here come from three field seasons from 1997 through 2000, in the pastoral regions of Usangu.

Wealth measures and methods. Material wealth among Sangu pastoralists is best measured by livestock herds that grow at a vastly superior rate to money in the bank. Sangu themselves use cattle head as the most prominent measure of status and success. The measures used here come from surveys and owner self-report, as well as verbal reports from neighbors to check for consistency. In a minority of cases, surveys disagreed with self-report and/or neighbor reports. These cases were readily resolved by pointing out the discrepancies to owner and neighbors. Herd sizes can fluctuate from year to year, such that single-year estimates will contribute noise to the attempt to estimate long-term livestock holdings and thus lower estimates of intergenerational transmission. The data presented here focus only on male ownership, as this is the easiest to measure reliably, and includes cattle that have been assigned to wives for later inheritance by male heirs. Data are available on 108 father-son pairs.

Yomut

Ethnographic background. The Yomut (100,000 in Iran) are a relatively prosperous and large Turkmen descent group occupying an area of what is now the Islamic Republic of Turkmenistan and adjacent areas of Iran and Afghanistan. They are a largely endogamous population. The Yomut of the Gorgan Plain consciously divide themselves into two groups, the Chomur (see Shenk et al. 2010, in this issue) and the Charwa. Charwa are primarily pastoral, raising sheep, goats, and horses, although they cultivate a little for cash and subsistence and weave carpets. After sedentarization during the 1930s, Charwa returned to full time migratory existence beginning with the Soviet occupation of northern Iran in 1941 (Irons 2002). They enjoy extensive networks with Yomut traders who live in towns. Politically, like most pastoralists, they are acephalous (with no socially distinct social strata, unlike Bakhtiari, Qashqai, and Komachi; Irons 1994); their defense is based on a segmentary lineage system. Charwa Yomut live in joint families consisting of parents, unmarried children, and married adult sons. Both land and livestock pass from father to son as a patrimony (primarily consisting of sheep and goats) at the time of household division. This takes place either at the death of the father or when the son's children are nearing the age of marriage. Fathers try to give equal patrimonies to their sons, after which there are no further distributions. Polygyny is very limited because of the cost of bridewealth, and dowries given to daughters are trivial in value. The data used

here were gathered over three field trips between 1965 and 1974 in a random stratified sample of households designed to detect variation in demographic parameters within the Yomut population.

Wealth measures and methods. A single measure of wealth is used in this population—the size of the patrimony (Irons 1994) converted into its contemporary monetary value. In 1973–1974, each household head was asked about his patrimony when he became an independent household head and also about the patrimonies that he had given sons who had already separated from the household. Age was not controlled in this analysis, but most patrimonies are transferred when the son is between 30 and 40 years old. Data are available on 22 father-son pairs.

Results and Population-Specific Discussion

The importance of the different classes of wealth to pastoral production is presented in table 2. To obtain these measures, authors used their ethnographic knowledge of the population they studied to provide judgments of the percentage difference in household well-being associated with a 1% change in a given wealth class, effectively a Cobb-Douglas production function of household well-being. Although we are all undoubtedly commonly influenced by the broader pastoral literature, these judgments were made independently, yet they yielded a very consistent pattern. In fact, our α estimates for material wealth are very similar to one subsequently calculated from production functions given by Massell (1963) for the Nyaturu agropastoralists of central Tanzania (see also Berhanu, Colman, and Fayiss 2007 for the Ethiopian Borana). Material wealth is of major significance to pastoralist well-being (average $\alpha = 0.61$), consistent with a whole body of ethnographic evidence outlined above. Embodied wealth is thought to be less than half as important ($\alpha = 0.26$), and relational wealth half as important again ($\alpha = 0.14$). Regarding embodied wealth, it is likely, as noted in the introduction, that although health and fitness are important to well-being, strong family systems support those who are ill or injured, such that they can live normal, even reasonably successful lives. Relational wealth was deemed relatively unimportant (0.10) in the Sangu, Yomut and Juhaina, apart from the Datoga, where it was thought to be important ($\alpha = 0.25$) in assuring protection against local outbreaks of disease and, more importantly, cattle raids. In each of these populations, formal livestock-loaning networks are rare or nonexistent; where loaning, assistance, and exchanges occur, this is mainly among patrilineal kin. Note that α values are not statistical estimates but subjective judgments of researchers based on many months or years of fieldwork.

Our estimates of intergenerational transmission are captured with a unit-free regression coefficient β (table 3; fig. 1). The pattern is very consistent, with high transmission coefficients between parental and offspring wealth ranging be-

Table 2. α exponents for the three classes of wealth for pastoral populations (see text for further explanation)

Population	Embodied	Material	Relational
Datoga	.25	.5	.25
Juhaina Arabs	.28	.62	.10
Sangu (Ukwaheri)	.30	.60	.10
Yomut Charwa	.20	.70	.10
Averages	.26	.61	.14

tween $\beta = 0.535$ and 0.957 , all statistically significantly different from a coefficient of 0. The average material-wealth β is 0.67 (SE 0.07). Weighting the material, embodied, and relational β 's by their importance to wellbeing (α) produces an overall weighted β for pastoralists of 0.43 (SE 0.06), using the β for Kipsigis cattle partners (see Shenk et al. 2010) for the missing relational-wealth measure.

For Datoga sons, the principal wealth transmission mechanism is the bequest. Sons receive most of their livestock directly from their fathers or other paternal relatives. However, the size of the son's herd also reflects the growth of his herd (subsequent to the initial gifts or transfers). This growth factor is not independent of the growth of the father's herd, because of shared exposure to disease and raiding, common access to preferred pastures, and quality of husbandry. It should also be noted that these results focus on the traditional pastoral sector of the Eyasi Datoga; families without cattle who are dropping out of pastoralism (Sieff 1999) are excluded.

Juhaina Arabs also receive most of their animals from fathers and paternal relatives, primarily during their fathers' lives—at birth, circumcision, and marriage. Since sons often continue to camp with their father after establishing independent households, the growth in a son's herd is not independent of that of his father's herd. The β may be slightly underestimated for this population, reflecting measurement error arising from using milk collected from female camels as an indicator of total camel ownership.

Sangu sons similarly receive most of their initial livestock from fathers. Herds subsequently grow with natural increase and bride payments and decline with disease, theft, starvation, sale, and mismanagement. As in other groups, these factors are not independent among fathers and sons because of common environment. A major factor driving wealth accumulation in the Sangu may be the size of patrilineal kin groups. The very high β is driven by two major outliers (although even after deleting these two outliers, bootstrap standard errors show a nonzero elasticity remains). These two men have managed to retain such large herds, relative to other Sangu, perhaps because they are both members of a successful cohort of half-brothers who have supported one another in defense, management, and loans. Thus these kin are buffered against the stochastic effects that lead to herd loss. This notion is supported by other data showing that Sangu herders say they value kin much more than do Sangu farmers (McElreath

Table 3. Wealth transmission and inequality measures for pastoral populations

Population	Wealth type (<i>N</i> pairs)	Wealth class ^a	β transmission coefficient (SE)	<i>P</i> value ^b	Gini coefficient (SE) ^c
Datoga	Livestock (135)	M	.622 (.127)	.000	.386 (.037)
Juhaina Arabs	Camels ^d (21)	M	.535 (.226)	.018	.346 (.037)
Sangu (Ukwaheri)	Cattle (108)	M	.957 (.424)	.024	.694 (.052)
Yomut (Charwa)	Patrimony (livestock) (22)	M	.564 (.167)	.001	.599 (.042)
Average (first four rows)			.67 (.07)	.000	.51 (.06)
Datoga	RS (133)	E	.066 (.060)	.274	.200 (.018)
Kipsigis ^e	Cattle partners (102)	R	.041 (.139)	.767	.446 (.021)

Note. Sex-specific β estimates for livestock can be made for the Datoga (daughters, 0.561 [SE = 0.159], $P = .000$, $N = 40$; sons, 0.565 [0.150], $P = .000$, $N = 95$) and Sangu (daughters, 0.803 [0.465], $P = .084$, $N = 51$; sons, 1.338 [1.029], $P = .193$, $N = 57$). Sex-specific estimates for reproductive success (RS) can be made for Datoga (daughters, 0.155 [0.101], $P = .123$, $N = 40$; sons, 0.010 [0.09], $P = .916$, $N = 93$).

^aM = material, E = embodied, and R = relational.

^b P values calculated from two-tailed tests of hypothesis that true $\beta = 0$.

^cGinis can generally be calculated in larger samples than can β 's (Datoga livestock, 189; Juhaina camels, 33; Sangu cattle, 130; Datoga RS, 186; Kipsigis cattle partners, 181).

^dMeasured by milk collected.

^eRelational wealth based on Kipsigis cattle partners (see Shenk et al. 2010).

2004). More generally, strong intergenerational association makes sense for the Sangu given clear inheritance rules.

The substantial association between father's and son's patrimonies in the Yomut reflects the greater ability of wealthy men to provide for their sons. It also reveals the tendency of economically independent sons to camp with or near their fathers and to maintain cooperation between the two households. Wealth is not diluted because sons contribute substantially to increasing the wealth of the paternal household before taking away a patrimony (Irons 2002). Note that Salzman (1998: 43), following Irons (1994), concludes there is little intergenerational transmission of wealth ranking and that "livestock patrimonies reflected an 88 percent correspondence to a random shuffle." The β of 0.56 calculated here from the same data indicate that a child born into the top wealth decile is over 80 times more likely to be in the top wealth decile than a child born to parents in the bottom decile (for ratio calculation, see Bowles et al. 2010, in this issue). We interpret this as considerable transmission of material wealth, even though Salzman is right to stress there are few *social* distinctions among Yomut (see above).

Sex-specific β estimates for livestock can be made for two populations. In the Datoga, the estimate for daughters (as well as sons) is significantly different from 0; the same pattern is seen in the Sangu but is not significant (see note to table 3). Both patterns are primarily attributable to assortative marriage (see below) since inheritances to daughters are minimal. In the Juhaina, five of the 16 second-generation individuals are women. Juhaina girls receive no animals from their parents, only wedding gifts, jewelry, and house utensils, and they usually marry close kin (who presumably are similar in wealth status).

Our only measure of embodied wealth (RS for the Datoga) shows a negligible coefficient ($\beta = 0.066$) that, as for most other populations in the broader study (see Smith et al. 2010),

does not differ from 0. Given the association between polygyny and wealth we might expect the sons of wealthy and polygynous fathers to be polygynous themselves; this seems to account for the somewhat higher intergenerational correlation in RS found for the polygynous Kipsigis (0.21, $P < .05$; Shenk et al. 2010). One explanation for the low Datoga coefficient may be that the sons in this sample are still quite young and have not yet achieved their full polygynous potential. Another is that livestock ownership in this and many other pastoral groups is not strongly associated with either nutritional outcomes or fertility (Sellen 2003). To the extent that RS is contingent on nutritional status, this might in part explain this nonsignificant outcome.

To quantitatively describe inequality within populations, we use Gini coefficients; these can range from 0 (everyone owns equally) to virtually 1 (one person or household owns everything). Our measured Ginis for material wealth range from 0.346 to 0.694, which when averaged and alpha weighted produce a mean coefficient 0.42 (SE = 0.05).

General Discussion and Conclusion

There is a substantial intergenerational association for material wealth (0.67), the wealth class that is most important for pastoralist populations. Including the single measure of embodied wealth and an estimate of relational wealth (from the agropastoral Kipsigis; Shenk et al. 2010) produces an average weighted β of 0.43. This implies that the child of parents in the top wealth decile is over 16 times more likely to end up in the top decile than a child from parents of the bottom decile. In the discussion we examine what contributes to this substantial intergenerational transmission of material wealth, the limitations of our study, and implications for the broader theme of inequality among pastoralists.

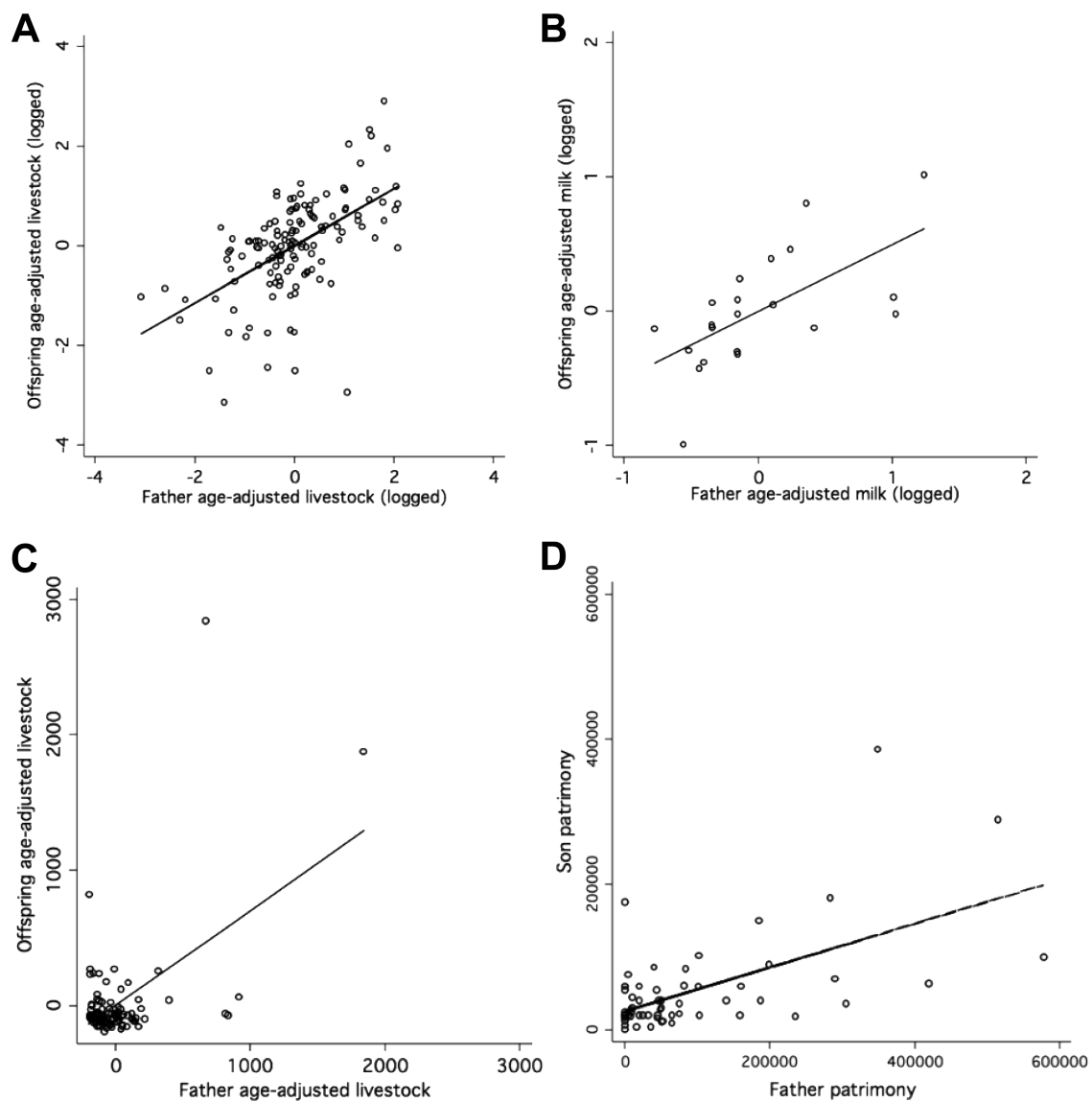


Figure 1. Offspring material wealth plotted on parental material wealth for Datoga (A), Juhaina Arabs (B), Sangu (C), and Yomut (D). Graph depicts the linear regression line in the logged data that generates the estimated elasticity reported in table 3 (for further details see CA+ online supplement “Estimating the Inheritance of Wealth in Premodern Societies” in the online edition of *Current Anthropology*; Borgerhoff Mulder et al. 2009).

Why High Intergenerational Transmission of Material Wealth?

Three processes can contribute to a high β coefficient: institutions that ensure that wealth is transmitted primarily within the family (without dilution), positive assortment (e.g., in marriage or in economic pursuits), and returns to economies of scale in herding. In all pastoralist societies material wealth is principally transmitted within the family through institu-

tionalized bequests, pre- and postmortem. With gifts at life transitions (birth, eruption of first teeth, sexual maturity, and marriage), offspring gradually acquire rights to, if not full ownership of, their parents’ livestock wealth. Usually such transfers are to sons. Bride payments channel livestock out of the family, but these are generally replaced by the incoming payments received for daughters, except in highly male-biased sibling groups. Such payments also establish relational wealth, consolidating long-term cooperation with affines as shown in

East Africa (Håkansson 1990). In short, livestock differentials persist across generations. Kinship is central to the control and transfer of livestock, excluding market exchanges, as already well known.

The question nevertheless arises of how rich pastoralists prevent the dilution of their wealth? Herd size is commonly associated with polygyny and high reproductive success (Cronk 1991; Irons 1979), and therefore, rich men have more potential inheritors. There are several partial answers here. First, rich men rarely marry wives in precise proportion to their wealth; this is because although women generally assort themselves according to an ideal free distribution among men according to men's wealth, they also show a preference for monogamous men (Borgerhoff Mulder 1990). The greater variance in wealth than in number of wives observed in many pastoralist ethnographies suggests this is a general phenomenon. Second, polygynously married women typically have lower numbers of surviving children than monogamously married women, even after controlling for household wealth (e.g., Strassmann 2000), although in some populations this cost is observed only among women married to poorer polygynous men (Borgerhoff Mulder 1997). Third, among most pastoralists, marriage is firmly under the control of elders, as Spencer (1998) shows so clearly for African populations. For example, marriage and fertility in populations depending on slow-breeding camels, such as the Kenyan Rendille, are constrained by parentally monitored cultural conventions that lower fertility and ensure heirs (Roth 2004). These are possible reasons for why polygyny does not lead to a linear increase in number of inheritors and hence the immediate dilution of wealth across generations. Of course parents can explicitly avoid resource dilution through primogeniture (or ultimogeniture), but this form of inheritance is quite rare among pastoralists (see table 1). The possible effect of restricting inheritance to a small set of offspring on equality is discussed in the concluding paper of this special section (Smith et al. 2010), as is the more general topic of partible versus impartible inheritance.

The second process that can contribute to a high β coefficient is positive assortment among families. For sons, this might take the form of herding arrangements. In many pastoralists, a son's animals are herded, at least for several years, together with those of his father (Juhaina, Datoga); in many others, their homesteads are in close vicinity and they continue to share labor (Sangu, Yomut). To the extent these herds can benefit from a father's (or son's) expertise or stock partnerships, such assortment will enhance parent-offspring associations in material wealth. For daughters, positive assortment might occur through marriage, as indicated by gender-specific estimates for both Datoga and Sangu (note to table 3). The extent of intergenerational transmission to daughters in the Datoga and Sanga is a hitherto unrecognized dynamic in pastoralist societies, where wealth is seen almost exclusively as an attribute of men.

Finally, economies of scale might also contribute to high

β coefficients for material wealth in pastoralists. Average productivity per animal generally declines with herd size, as a result of both the diminishing quality of care (Herren 1990, for Mukogodo) and higher mortality (Sperling 1987, for Samburu) observed in larger herds of cattle. It is highly unlikely however that *overall* output declines with the size of the herd, and Berhanu, Colman, and Fayiss (2007) found that investments of pastoral labor into livestock production had positive effect of production in the Borana of Ethiopia (see too Naess, Fauchald, and Tveraa 2009, for the Saami). Thus, there are increasing returns to labor as herd size increases (or an economy of scale); that is, if labor is held constant and additional cows produce a net increase in total output, the marginal cost (labor cost per unit of production) is decreasing. According to these arguments, then, high correspondence in livestock wealth between parents and offspring reflects family-based rules of inheritance, assortative mechanisms whereby the wealthy associated with the wealthy and the poor with the poor, and the economies of scale associated with large herds.

Study Limitations

There are several limitations to this study. First, our measures of material wealth focus only on livestock, even though control over pasture, water, and labor can be critical to success in some systems; indeed the term commons, so frequently used for pastoralists' resources, obscures crucial differences in access, usufruct, and political power (Ruttan and Borgerhoff Mulder 1999). Furthermore, many pastoralist groups integrate raising livestock and farming, investing crop surpluses in capital "on the hoof" and profits from livestock in sacks of grain. By focusing on systems where livestock are the primary source of wealth, we greatly simplify the story, with unknown effects on our estimates of material β .

Second, inheritance rules are far more complex than we have conveyed here, as noted in the introductory essay in this special section (Bowles et al. 2010). Since our interest is in the intergenerational correlation of wealth, not the mechanisms of its transmission, these simplifications are legitimate and probably do not systematically bias estimates upward or downward (see Smith et al. 2010). For example, primogeniture (or ultimogeniture; not observed in our samples) should not affect β estimates if all offspring (inheriting and not) are included in the second generation. However if noninheriting offspring emigrate, β may be overestimated (if wealthy individuals have more children) or underestimated (if only disinherited sons of the poor leave).

A third limitation is data. Given that a principal function of the family is the "management of property and offices and their transmission to the next generation through inheritance and succession" (Harrell 1997: 12), it is surprising there is no quantitative information (other than Irons's data on patrimonies) on the role of *intergenerationally transmitted bequests in redistributing or sustaining wealth differences among households*. This is the case despite fine work on stability (or

lack thereof) of herd size over time (as reviewed in Bradburd 1982). We hope that our conclusions drawn from *parent-offspring associations in wealth* will stimulate more research on this topic.

Pastoralism and Inequality

There is a historical tendency to romanticize pastoralism. Early anthropological work, popular coffee table productions, and even some development consultants' analyses lionize pastoralists as fierce, resourceful, and proudly egalitarian (sources reviewed in Waller and Sobania 1994). Pastoralism is thought to have emerged in Eurasia as a form of anarchic revolt among disgruntled peasant pirates at the margins of agrarian states (Lattimore 1951), which was characterized as an unruly engine priming change across European and Asian society (McNeill 1963). This image leaves a residual expectation that pastoralist communities are essentially egalitarian, even if they occupy a clearly ranked position in the broader political-economic system in which they are embedded, as discussed in the introduction.

The argument for egalitarianism is based on two related claims—the volatility, mobility, and indefensibility of pastoral wealth and the existence of institutions that redistribute wealth as a form of insurance. Regarding the nature of the wealth, Schneider's (1979) argument is classic: in the dry areas of East Africa, where there are no tsetse flies and the livestock to human ratio exceeds 1 : 1, egalitarianism emerges from the inability of any person to monopolize its production. Indeed, almost all ethnographers in both Asia and Africa stress the potential for both rapid growth and catastrophic loss of herds, and the consequential fluctuations in a household's livestock wealth over time. Regarding insurance, herders commonly buffer themselves against unpredictable shocks to their capital by subscribing to institutions that ensure redistribution (as described earlier), such that extreme wealth differences are believed to be relatively short lived. Contemplating such institutions in the Somali and other "tribal" societies, Lewis concludes, "The more one produces the more one is expected to give away; the positive side of this equation is that the greater one's generosity the stronger . . . one's corresponding entitlement to support and succor in time of need" (1976: 176). Thus among the cattle pastoralists in Madagascar lavish funeral feasting redistributes the wealth of the elite (Parker Pearson 1999; see too Almagor 1978).

There is, however, abundant evidence of differentials in livestock holdings, production, health, and control of labor that render this perspective problematic (reviewed in Fratkin, Roth, and Galvin 1994). Economic inequalities are found not just in modern ethnographies where pastoralists suffer at the hands of the modern state but also in careful analyses of livestock accumulation among classic "egalitarian" groups like the Nuer (Kelly 1985) and detailed ethnographies of southwest Asian small stock owners (e.g., Barth 1961). Observing extreme wealth differentials among Maasai in 1912–1913,

Waller (1999: 41) comments we need not invoke the "specter of development" to explain pastoral poverty. Furthermore, in some populations livestock transfers do not reinforce equality but rather buttress patron-client relationships, as in the Himba, where big men dominate over corporate matrilineal descent groups (Bollig 2006). Such economic disparities are exacerbated by gerontocratic institutions that influence reproduction (Roth 2004), access to pasture (Lane 1996), and gender relations (Talle 1988). Indeed 81% of the SCCS populations (table 1) have some form of stratification. Our findings regarding substantial levels of intergenerational transmission of wealth and high Gini coefficients support the view that persistent economic inequality characterizes pastoralists.

Such inequalities are exacerbated by the role of livestock in buffering households from leaving the pastoral sector (Borgerhoff Mulder and Sellen 1994). Those with plentiful stock can get loans, sell animals, and diversify without diminishing their seed capital for new growth. Thus, in the Maasai (Grandin 1989) and Ariaal (Fratkin and Roth 1990), only rich families retain sufficient animals for pastoral subsistence after a drought. Regressing 1989 livestock holdings on 1987 holdings for Datoga shows that, indeed, the rich get richer whereas the poor get poorer (as explored in detail by Sieff 1999), insofar as the slope (1.146 [SE 0.08], $P < .001$) is >1 (a slope of <1 indicates regression to the mean). Echoing the same sentiment, Lakenkhel shepherds of Afghanistan claim, "When you have small number of sheep, about 60, it is very difficult to get more, but when you have 500 sheep and some money on top of that it is possible to increase the flock" (Balikçi 1990: 313); similar dynamics are reported for the southwest Asian Komachi (Bradburd 1982) and Basseri (Barth 1961). Families with large herds also generally enjoy larger and more durable exchange networks (Waller and Sobania 1994); thus, wealthy Kipsigis households have more cattle partners (mean = 0.55, $n = 156$, $P < .001$; Shenk et al. 2010), and richer Pokot and Himba households use their cattle-loaning networks and exchange partners to reconstitute herds more effectively than poorer households (Bollig 2006). Despite this evidence for how the dynamics of pastoral production generate persistent and high levels of inequality, it is important to acknowledge that some of the more complex stratification seen in central Asian states (not represented in our sample) also reflects the regional political-economic systems in which pastoralist communities are embedded.

Before concluding, there are two points to emphasize regarding this emerging picture of pastoralist economic inequality. First, why do they typically view themselves as egalitarian? One answer lies in their perception of the volatility of livestock wealth—thus the Pokot aphorism "Never laugh at a pauper—tomorrow it may be you who is poor" (Bollig 2006: 373) or an equivalent Yomut taunt: "Rich man, the year of Bijin (thought to bring catastrophic bad luck) is coming!" One reason for this emic misconception may be that pastoral communities are rarely demographically or economically discrete, despite apparent social boundaries. Pastoralists move

with alacrity in and out of herding (Barth 1961; Waller 1985), juggling a variety of economic interests and spawning segments of the population with different subsistence specializations. Sometimes in the pursuit of economic specialization they strategically adopt a new ethnicity, such as the bilingual Maasai-Okiek (see Waller and Sobania 1994 for a historical review of such dynamics). In this way the pastoral system with its ideology of egalitarianism persists, even as the populations shed people who chose or are forced to adopt other ways of life. Indeed formal egalitarian ideologies may be essential to the preservation of actual inequality, while inequality is a guarantee of community survival (Waller 1999). A second reason for this emic perception is that, as Salzman (1998) emphasizes, wealth differences do not necessarily produce status differentials; thus, the Yomut do not recognize their considerable distinctions in economic status in social interaction, symbolism, or ideology. The broader complex relationship between economic differentiation and sociopolitical stratification is not addressed in this paper.

Second, there is strong evidence (for Datoga and other populations, reviewed above) that the effects of shocks are not random with respect to wealth—wealthier households weather calamities better than poorer ones. In conjunction with the reliable transmission of material wealth between generations (as shown here), these dynamics generate persistent inequality among households. Bradburd was right to posit that “random fluctuation in herd gain and loss over time is not likely to lead to a long term equalization of wealth among households but, on the contrary . . . to the development of significant differentials of wealth” (Bradburd 1982: 101; see too Barth 1961 and Waller 1999). A further implication of this position is that the prevalence of generosity and leveling mechanisms among pastoralists must ultimately be viewed as signals of goodwill that do indeed effectively buffer the receiver and insure the giver but do not produce the egalitarian systems that they have been credited with ensuring. The analysis presented in this paper demonstrates the importance of not simply cataloguing wealth differences at any one point of time but exploring the underlying mechanisms that contribute to inequality not only over the household’s domestic cycle (as has already been done) but across generations.

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