GLOBAL LIVESTOCK CRSP

Variation in Risk Perceptions Across Individuals, Time, and Space: Evidence from Pastoral East Africa

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We analyzed risk rankings perceived by pastoralists for over two years during 2000-2002 that lived in multiple locations in northern Kenya and southern Ethiopia. We found that the primary determinants of these risk rankings are community-level variables that change over time, with household-specific and individual-specific variables exhibiting much less influence. These results have several important practical implications. First, the dynamic nature of risk perceptions means that assessments of risk collected in a community in a given point in time may largely be generated by current period conditions, and thus be limited use for predicting future assessments. This is particularly likely to be an issue in the rangelands we study which are characterized by highly variable conditions over time. Second, it is most important to prioritize community-based planning and monitoring of development efforts that address risk exposure. Third, individuals throughout the study area were most concerned about food security, and development efforts that directly address food security should be given highest priority. Concerns over human health, pasture, water, and general insecurity were also prominent.

Background

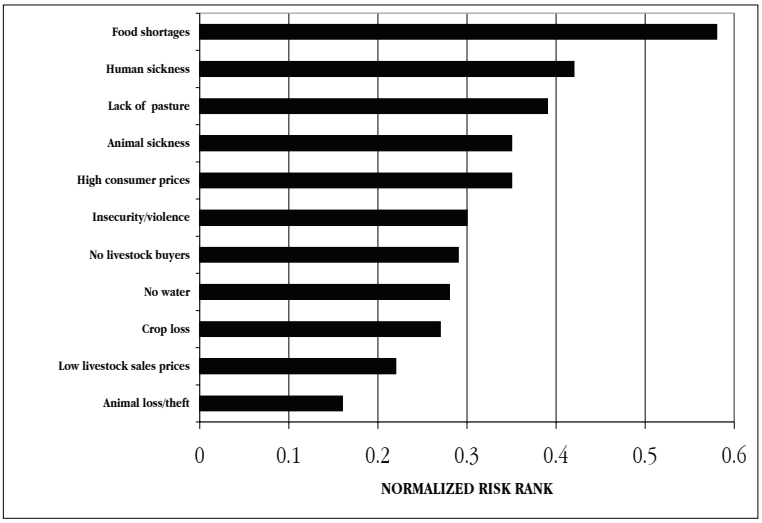
Residents of the arid and semi-arid lands (ASAL) of east Africa are exposed to many risks. Some of these risks originate from the pastoral production systems that comprise the main economic activities in these areas. The ASAL have rainfall patterns that are highly variable temporally and spatially, making pasture and water availability for livestock unpredictable. These risks translate into risks of human food shortages. Other risks originate from government policy; for example, quarantines can halt livestock sales that are the primary source of cash for many pastoralists. The lack of government presence can also lead to increased risk exposure; for example, weak state security services contribute to physical insecurity in these areas. Finally, the relatively poor infrastructure in the ASAL makes ex ante forecasting of these risks problematic and makes ex post coping with risks difficult, as roads, health centers, veterinary services, and markets are poorly maintained or non-existent.

This study investigated how ASAL residents perceive risks facing their households. We examined which risks people are most concerned about and the degree to which risk perceptions vary across time, communities, households within a community, and among individuals within a household. Appropriate policy responses clearly depend on how risks vary across time, space, and among and within households. Expressed risk perceptions are based not only on the objective risks that individuals face – such as the probability of low rainfall – but also on their subjective assessment of exposure to different shocks and their capacity to manage those shocks, ex ante or ex post.

From March 2000 through June 2002, we collected quarterly survey data from over 300 households across 11 communities located within a contiguous livestock production and marketing region in arid and semi-arid lands of northern Kenya and southern Ethiopia. The sites were chosen to capture relative variation in agricultural potential, market access, livestock mobility, and ethnic diversity. Rainfall is low and variable and the study period coincided with a major drought that affected much of the area in 2000, and continued well into 2001 in some locations. The infrastructure—in terms of roads, schools, and health facilities—is extremely marginal throughout the region. In each site a baseline survey was conducted in March 2000. Repeat surveys were conducted quarterly for an additional nine periods through June 2002.

In each household we interviewed the household head and, if applicable, one randomly selected spouse and one randomly selected non-head/non-spouse adult (age 18 years or older.) The head answered questions regarding the income, assets, and activities of the entire household. The other individuals reported on their personal assets, incomes, and activities. In addition to these standard questions, we asked respondents to identify and rank their concerns from a list of twelve different types of risks that could adversely affect their household in the coming three months. These data permit us to relate forward-looking subjective assessments of risk with households' and individuals' current situations.

Figure 1. Risk rankings for pastoral households in northern Kenya and southern Ethiopia aggregated for 2000 to 2002.



Major Findings

Figure 1 presents the overall results of the risk rankings, where a higher number means a risk was ranked as a greater concern. The risks ranked as the greatest concerns were shortages of food, human sickness, lack of pasture, animal sickness, and high consumer prices. Multivariate econometric analysis allowed us to analyze how risk rankings of these concerns are influenced by individual, household, and community-level characteristics as well as by changes over time and space. We report the detailed findings in a separate paper (Doss et al., 2006) and briefly summarize major results here.

At the community level, we controlled the analysis for (1) the mean percentage change in household herd size within the respondent's community over the previous survey period; (2) the occurrence of any livestock raids, animal quarantines, or outbreaks of animal or human diseases in the community during the previous survey period; (3) the deviation of monthly consumer prices from their mean over all months in that location; (4) the number of livestock traders buying animals in the community in the previous three months; and (5) a subjective indicator variable reflecting the ease of selling livestock. This is an unusually rich set of community-level covariates, especially in tracking the evolution over time in such variables, and thereby offers a rare glimpse into the impact of community-level variables on individual-level risk assessments.

Each of the community-level shock variables was statistically significant in explaining the ranking of at least one of the concerns. Wald tests found the community-level shocks were jointly statistically significant for each of the 11 risks studied. Individual-level risk assessments respond significantly to broader, community-level shocks, indicating information flow and social learning with respect to risk.

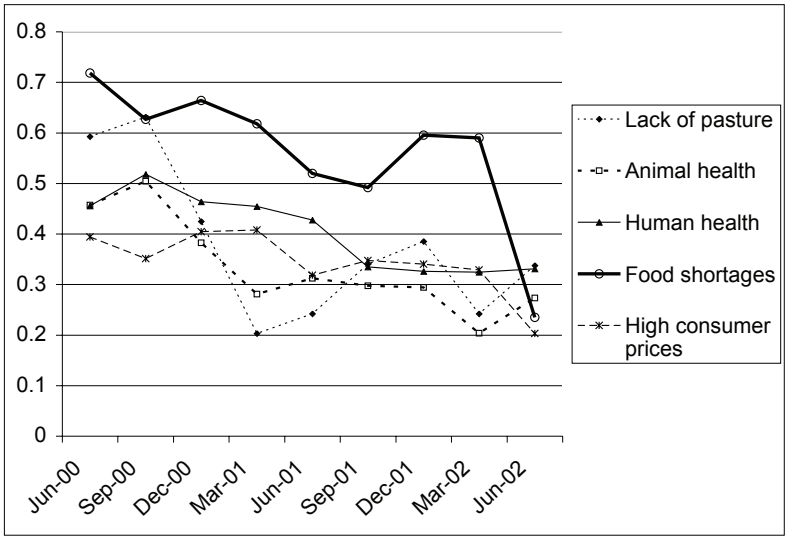
Once we controlled for the community-level variables, the household-level characteristics and shocks had a surprisingly modest effect on risk rankings. There are only two household characteristics—namely asset value and income—that had a statistically significant impact on more than one of the top five concerns. Household size and herd size impacted one ranking each. Jointly, household-level characteristics were statistically significant and associated with individual-level risk rankings for only six of the 11 risks enumerated, in striking contrast to the community-level characteristics that were uniformly (and highly) statistically significant. Even more surprisingly, household-level shocks had little effect on individuals' risk rankings. Human illness was the only household shock variable statistically associated with risk rankings, and this was only for one of the risks. Surprisingly, the indicator of a recent death in the family was not significant for any of the rankings. Joint Wald tests indicate that household-level shocks were not statistically significant in explaining individual rankings with respect to any of the 11 risks we studied. Once one controls for household and community characteristics and community-level shocks, households' idiosyncratic risk experiences seem to have negligible effect on individuals' risk perceptions.

Finally, we considered the impact of individual characteristics. The only statistically significant variable in more than one ranking was whether or not the individual was a head of household. Gender was statistically significant for only one of these five risks. Age, education, and status as a wife did not significantly influence the rankings of any of the top five concerns. Wald test results illustrate that individual characteristics had a relatively modest impact on individual risk rankings, being jointly statistically significant for only six of 11 risks.

Practical Implications

Four important implications can be drawn from this analysis. First, because risk perceptions vary markedly across time, common development practices such as Rapid Rural Appraisal, in which researchers drop into a village for a brief visit to ask about needs and concerns, may give results that are only relevant for that particular moment. For example, within just a 27-month period we observed both sharp seasonal and annual changes in risk rankings that call into question the generalizability of snapshot risk assessments for such dynamic circumstances. Figure 2 illustrates how risk rankings changed over time for our respondents. Local events—such as cattle raids, drought, or imposition of a quarantine for livestock disease control—have an important

Figure 2. Time series of risk rankings as perceived by pastoralists during 2000 to 2002 for the top five concerns.



impact on risk perceptions. Since rapid assessments are frequently fielded in response to such events, they may be especially prone to distortion. These results imply a need for ongoing, longitudinal monitoring of locations thought vulnerable to multiple risks in order that external interventions can adapt appropriately to changing risk profiles in such dynamic settings.

The second implication is that variation in risk rankings is more pronounced between communities rather than within them. Although there can be differences across households as stratified by herd wealth or across individuals based on gender, these differences are much smaller than those we observed across space and time. This implies that community-specific planning to mitigate and cope with risk is needed. A single plan for a large region runs the risk of overlooking community-specific concerns. Since most of this variation is between rather than within communities, community-based monitoring and formulation of development plans may suffice. While a community plan that does not take into account the variation of concerns across and within households runs the risk of being biased towards a subset of community members, our results indicate that it is more important to push for finer-grained analysis between different communities rather than within them.

Third, community-level shocks associated with rainfall, violence, animal and human disease, market conditions, etc., have a pronounced effect on individual-level risk perceptions, while household-level shocks associated with human illness and mortality or herd losses do not. This suggests that people learn actively from the experiences of others around them and adjust their risk assessments quickly in response, corroborating prior work in the area on subjective expectations of rainfall (Lybbert et al., forthcoming.) Although covariate shocks are relatively weakly correlated with individual-level income and asset shocks in this area (Lybbert et al., 2004, Lentz and Barrett, 2005), individuals appear to adapt their risk assessments more in response to community-level shocks than to those that strike their own household. This would also be consistent with the argument that social networks or sharing mechanisms within communities lead individuals to be less concerned about household specific shocks compared to community covariate shocks, though investigating this interpretation is left as a topic for further research.

Fourth and finally, the most prevalent fear was of food insecurity. The fear of food insecurity is largely driven by the fact that the study area regularly suffers from drought, herd loss, and sudden decreases in food (especially milk) availability. The perception of risk is highest for the core outcome of not having enough food, rather than underlying causes such as insufficient pasture, crop failure, high consumer prices, or livestock mortality. Policy responses to food insecurity in the area continue to focus heavily on emergency assistance in the form of food aid, the implementation of which is often not timely or well targeted (Lentz and Barrett, 2005). More emphasis also needs to be given to designing humanitarian assistance that is compatible with pastoralists' preferred drought mitigation strategy: migration (Morton, 2006; Aklilu and Wekesa, 2001). Food aid is all too often distributed from towns, which discourages mobility to remote rangelands (McPeak, 2003). In addition to food insecurity, human sickness is a major concern throughout the study area. Health services are minimal and improving them would help address this risk. Another finding is that lack of pasture is a much greater concern than lack of water, suggesting that pasture rather than water is viewed as the more binding constraint on pastoral production in this area. Finally, as the insecurity in this area is often characterized as a result of "cattle rustling," it is worth noting that the results indicate the fear of losing animals in a raid is relatively minor in our results compared to a general fear of insecurity. Individuals in this area are viewing insecurity as multi-dimensional, suggesting policy responses must go beyond anti-stock theft efforts.

Further Reading

Aklilu, Y., and M. Wekesa. 2001. "Livestock and livelihoods in emergencies: Lessons learned from the 1999-2001 emergency response in the pastoral sector in Kenya." Working Paper No. 3. Medford, MA: Feinstein International Famine Center, Tufts University.

Doss, C., J. McPeak, and C.B. Barrett. 2006. "Interpersonal, Intertemporal and Spatial Variation in Risk Perceptions: Evidence from East Africa." Working Paper. Yale University.

Lentz, E. and C.B. Barrett. 2005. "Food aid targeting, shocks, and private transfers among east African pastoralists." Working Paper. Cornell University.

McPeak, J. 2003. "Analyzing and addressing localized degradation in the commons." *Land Economics. 79(4):515-536.*

Morton, J. 2006. "Pastoralist coping strategies and emergency livestock market intervention." Chapter 13 (pp. 227-246) In J. McPeak and P. Little (eds.) *Pastoral Livestock Marketing in Eastern Africa: Research and Policy Challenges.* Warwickshire, UK: Intermediate Technology Development Group Publishing.

Lybbert, T.J., C. Barrett, J. McPeak, and W. Luseno. Forthcoming. "Bayesian herders: Updating of rainfall beliefs in response to external climate forecasts." *World Development.*

Lybbert, T.J., C. Barrett, S. Desta, and D.L. Coppock. 2004. "Stochastic wealth dynamics and risk management among a poor population." *Economic Journal 114(498):750-777.*

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The GL-CRSP Pastoral Risk Management Project (PARIMA) was established in 1997 and conducts research, training, and outreach in an effort to improve welfare of pastoral and agro-pastoral peoples with a focus on northern Kenya and southern Ethiopia. The project is led by Dr. D. Layne Coppock, Utah State University, Email contact: Lcoppock@cc.usu.edu.

The Global Livestock CRSP is comprised of multidisciplinary, collaborative projects focused on human nutrition, economic growth, environment and policy related to animal agriculture and linked by a global theme of risk in a changing environment. The program is active in East Africa, Central Asia and Latin America.

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