Piloting Index-Based Livestock Insurance in Mongolia

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Mahul and Skees describe the index-based livestock insurance program in Mongolia designed in the context of a World Bank lending operation with the Government of Mongolia. This project presents a unique opportunity to design and implement an original agriculture insurance program using a country-wide agricultural risk management model designed by the World Bank.

The Mongolian country-side remains a herder-based economy. Agriculture contributes nearly one third of the national GDP and herding accounts for over 80 percent of agriculture. Animals provide sustenance, income, and wealth to protect nearly half the residents of Mongolia. Shocks to the well-being of animals have devastating implications for the rural poor and for the overall Mongolian economy. Major shocks are common as Mongolia is a harsh climate where animals are herded with limited shelter. From 2000-2002, 11 million animals perished due to harsh winters (*dzud).* The Government of Mongolia has struggled with the obvious question of how to address this problem.

The management of risk in the livestock sector requires a combination of approaches. Pastoral risk mitigation can better prepare herders for moderate weather events. For *dzud* events, however, high levels of livestock mortality are often unavoidable even for the most experienced herders, and pastoral and herd management must be complemented by financial mechanisms that provide herder households with liquidity in the aftermath of a disaster.

In 2001, the Government of Mongolia (GoM) requested assistance from the World Bank to address an ageless problem –frequent death rates in the livestock population. While the country had a social livestock insurance program during the communist period, several attempts to pass a livestock insurance law in recent years have failed. In 2001, an index-based insurance program using mortality rates by species and *soum* (i.e., county) was recommended, based on significant concerns regarding informational asymmetries and extreme monitoring costs that could would accompany a traditional livestock insurance program in the vast open spaces of Mongolia. The core recommendations also involve a combination of self-insurance by herders, market-based insurance and social insurance. Given that this is a novel approach to a significant problem in Mongolia, the GoM was persuaded to begin a three year pilot program in three provinces of Mongolia – Bayankhongor, Uvs and Khenti, starting with sales in the spring/summer of 2006.

Designing a Livestock Insurance Program

Index-based livestock insurance

The traditional individual livestock insurance (based on individual losses) was ineffective in Mongolia: high loss adjustment costs due to the spread of animals among vast areas, ex ante moral hazard inducing herders failure to take effective measures to protect their stock, and ex post moral hazard leading herders to falsely report animal deaths are among the key endemic problems that plague the traditional livestock insurance program in Mongolia. Monitoring individual herders in the vast territory of Mongolia is a nearly impossible task. The formal financial insurance products related to livestock mortality are unpopular among both insurance companies and livestock owners and are limited almost entirely to a small number of high value livestock.

An alternative approach is to develop a collective system for indemnifications: indemnity payments are based on a transparent index designed to reflect the loss incurred by the herders. Such schemes are known as index-based insurance (e.g., area-yield insurance, weather index based insurance). These schemes present some advantages (e.g., reduction of moral hazard and adverse selection, lower administrative costs), but their main impediment is the presence of basis risk, i.e., the index payout may not exactly match the individual livestock loss.

Weather-based insurance was considered as a first alternative to individual insurance because Mongolia has reasonable historical weather records to support the risk analysis. However, the infrastructure of the weather system is under-funded and has stations that are far apart, limiting the information needs required for weather-based insurance. Furthermore, winter *dzuds* are complex events, consisting of multiple weather phenomena over a period of time, and sometimes non-weather factors, making the classification of risk highly problematic.

An index-based insurance product to indemnify herders based on the mortality rate of adult animals in a given area was recommended. The index-based livestock insurance (IBLI) policy pays indemnities whenever the adult mortality rate exceeds a specific threshold for a localized region (e.g., the *soum* in Mongolia). This system provides strong incentives to individual herders to continue to manage their herds so as to minimize the impacts of major *dzud* events (i.e., if a better herder has no losses when their neighbors have had large losses, the better herder is rewarded for the extra effort by receiving a payment based on the area losses). Finally, a 33 year time series on adult animal mortality rates is available for all *soums* and for the major species of animals, through the annual animal census performed by the Government of Mongolia.

Layering livestock risk

The proposed insurance program under this project is highly innovative. It combines self-insurance, market-based insurance and social insurance. Herders retain small losses that do not affect the viability of their business, while larger losses are transferred to the private insurance industry and only the final layer of catastrophic losses is borne by the government.

The *Base Insurance Product (BIP)* is a commercial risk product, sold and serviced by insurance companies. Herders pay a fully loaded premium rate for this product. This product pays out when the *sum* mortality rates exceed specified "trigger" percentages, (7% in the initial year). Based on analysis of historical livestock mortality data, the maximum payment for the BIP would be when mortality rates reach a specified "exhaustion point" of 25 or 30%.

The *Disaster Response Product (DRP)* is a social safety net product financed and provided by Government, which begins payments at mortality rates exceeding the BIP exhaustion point. Herders who purchase the BIP are automatically registered for the DRP on the same species at no additional cost. Without the purchase of at least the minimum value of BIP, herders must pay a small fee for DRP administrative cost. The payout structure for DRP is the same as the BIP.

How BIP and DRP work

Herders pay a premium based on the value of their animals reported and the relative risk in the soum that they select. The soum is selected based on herder knowledge of where his animals are most exposed during the first six months of the year. Herders are able to insure between 25 to 100 percent of the estimated value of their animals. Payments begin once the predetermined threshold of mortality for the soum (strike) and species is exceeded. The payment rate is capped once the mortality rate exceeds the exhaustion point (cap). BIP payments are the product of the payment rate times the value insured. DRP payments use the full value of animals. The DRP pay for losses beyond the exhaustion point.

As an example, consider a herder who has 36 sheep where the value of a sheep is 28,320 Tg. The herder decides to insure the total value = 28,320 Tg. x 36 ~ 1,000,000 Tg. The premium rate for the BIP, with a strike at 7% and a cap at 30%, is 1.4 %. The herder would pay 1.4 x .01 x 1,000,000 = 14,000 Tg.

The mortality rate in the herder's *soum* during a bad *dzud* year equals 35 %. The payment rate for the BIP is equal to 30% -7% = 23 %, and thus the BIP payment is 23% x 1,000,000 Tg. = 230,000 Tg. Payment for the DRP equals (35%- 30%) x 1,000,000 Tg. = 50,000 Tg.

Source: Authors.

Livestock Insurance Indemnity Pool

Even with the DRP social product that pays for extreme local losses, there are significant risks associated with the commercial BIP product as mortality rates are highly correlated across regions in Mongolia. Given concerns about

financing extreme losses, the pilot design involves a syndicate pooling arrangement for insurance companies – Livestock Insurance Indemnity Pool (LIIP). Herder premiums are deposited into the LIIP until the settlement period. Thus, indemnities are fully protected under this scheme. The LIIP ring fences this line of business and thus protects the domestic insurance market against any financial contagion caused by extreme livestock losses as the GoM fully covers insured losses beyond the financial capacity of the pool through an unlimited stop loss reinsurance treaty.

In the syndicated pooling arrangement, participants share underwriting gains and losses based upon the share of herder premium they bring into the pool. Each insurer also pays reinsurance costs that are consistent with the book of business they bring into the pool. The reinsurance payments are protected and build from year to year to give the opportunity to build up reserves for the overall activity. The reinsurance reserve pays for the first layer of losses beyond the stop loss. Once the reinsurance reserve is exhausted, the Government of Mongolia can call upon the World Bank contingent debt to pay for any remaining losses.

The LIIP has several major advantages: (i) it fully protects other lines of insurance, as the insurance industry in Mongolia is still under-developed; (ii) it fully protects the indemnities needed to pay for losses under the IBLIP, thus eliminating any risk of default on payments; (iii) it allows the insurance companies to pool their livestock insurance portfolio in different regions; and (iv) it facilitates collaboration about the insurance companies selling the commercial product BIP. Given that BIP is a standard product that involves the same premium rates from all companies, the issue of trust and due diligence of the underwriting skills of participating insurers is greatly reduced. This is important as typical pooling arrangements among insurance companies are generally very difficult to organize given the high transaction costs needed to perform due-diligence on underwriting skills of the participating insurers.

The longer term vision is that the pooling mechanism created in the pilot can be well positioned to find risk-sharing partners in the global community quickly as the pooling arrangement is both risky and profitable. Reinsurers might be willing to provide capital and enter quota-share arrangements on that risk. To the extent that the risks within the pool are standardized, using the same measures and procedures, one can also envision this mechanism serving as a means to securitize the livestock risk. Finally, the design also offers the opportunity to transition the system to the market, should herders find the BIP an acceptable product and demonstrate a willingness to pay the fully loaded premiums.

Government fiscal exposure

The Government of Mongolia is double exposed to livestock risk under this livestock insurance program. First, it covers losses exceeding a specific threshold through the DRP. Second, it acts as a reinsurer of last resort for the insurance companies selling the BIP through an unlimited stop loss reinsurance treaty sold to the LIIP. This double exposure needs to be adequately financed to avoid an increase in the fiscal burden of the Government of Mongolia.

The financing of the Government's potential losses during the pilot phase relies on a combination of reserves and a US$5 million IDA contingent credit provided by the World Bank. Once the reinsurance reserves are depleted, the Government will call the contingent debt facility. This facility can potentially provide the Government with a lower cost capital relative to the accumulation of reserves, but the major disadvantage is that once disbursed this facility could exacerbate the debt burden of the country. The effectiveness of this facility would thus depend on the country's post-disaster financial profile and more specifically on its post-disaster ability to service debt. A grace period of several years will allow the Government to recover an acceptable fiscal situation before starting to reimburse the contingent debt.

Statistics used to measure livestock mortality

The GoM has been conducting an annual census of animals in Mongolia for more than 50 years. The procedures are well-established and have numerous laws that attempt to protect the integrity of the process. Nonetheless, there are potential problems with these data once an insurance product is developed to pay based on the mortality rates. New systems to track the same families will be developed at the National Statistics Office (NSO).

To assure a timely payment, a new animal (mid-year) census will be conducted during the pilot at the end of May 2006. Mortality rates of adult animals will be based on the Census at the end of December and the May Census. During the pilot, the traditional methods of reporting mortality and a sample survey will be used to monitor any emerging problems. Additionally, a special technical assistance is provided by the U.S. Department of Agriculture Statistics Service. This assistance will be targeted at a lower cost and more accurate procedure that will use sample survey techniques. At the end of the pilot, an evaluation will be made about the sustainability and reliability of alternative methods for estimating mortality rates.

Basis risk for individual herders

The imperfect match between index payouts and individual livestock losses (basis risk) may be an issue for some herders. To the extent that these losses are not severe when the insured herder does not get a payment or receives too little payment from the BIP or the DRP, the concept of self-retention is still important. However, there are potential problems if there are large losses. Other risk coping mechanisms need to be enhanced. Given that the index insurance should take the big risk out of the system, it can also allow groups of herders to share risk in more creative ways. The project will attempt to link the index insurance to both agricultural lending and microfinance and to herder self-help groups who could facilitate informal risk sharing mechanisms within the group.

Lack of education and knowledge about index insurance among herders

The pilot program has a strong outreach component to inform herders about the attributes of the index insurance product. Software that gives the historic payouts by species will be used to give the herders a clear indication of how the bad years match their losses. Focus groups with herders have already been conducted in every *soum* in the pilot *aimags*. These types of activities will be repeated to learn of herder concerns and to help shape the educational material used. Radio campaigns, local presentations, newsletters, press releases and a wide array of other activities are planned.

Potential for fraud in the countryside

This pilot project represents the first effort to organize sales of insurance in some of the pilot area. The potential for fraud or even unintentional mistakes is not negligible. Every effort has been made to mitigate these problems. Sales agents must undergo training and become certified before being approved to sell BIP. Once certified, agents will be issued a perforating stamp with a unique identification number and a set of numbered sales sheets. For each transaction multiple sales sheets will be perforated with the unique identification stamp. Redundant systems are in place to validate the sales. Herders will also have the opportunity to validate the sales at the local government level in the fall well before any losses occur. All of these systems have been organized to minimize the likelihood that any herder will present a sales sheet at the time of the loss and discover that they are not entered into the record in a proper fashion. Insurance companies have every incentive to maintain the integrity of the system as they will be responsible for any herder losses that occur outside the documented record of sales. Such exposure would also be outside the LIIP and the GoM stop loss system.

Conclusion

As of March 2006, the pilot program is moving forward with three insurance companies approved for sales to begin in April 2006. Companies were required to submit a strategic plan using specially developed portfolio software. This allowed the companies to evaluate the tradeoffs between their administrative costs and the cost of reinsurance. Administrative costs increase as companies attempt to expand their reach into the entire market. Reinsurance costs decline as companies spread their risk over the market. Companies made rational choices. In the initial plans some 90 percent of the market is covered. A few soums were excluded from company plans. In particular, some large soums with low number of animals were excluded. A challenge from the government steering committee was that there should be universal coverage of the product. Here again, the presence of two products, the market-based BIP product and the social-based DRP product, provided some counterbalance to the argument that companies should be selling index-based livestock insurance everywhere. An extensive promotion and public awareness campaign is being planned.

This lending operation, offers the World Bank, for the first time, the opportunity to design and implement a country-wide agriculture insurance program. It paves the way for the development of financially sustainable agriculture insurance programs for the poor. It supports a public-private partnership that aims (i) to offer insurance coverage that is attractive to herders, (ii) to involve the domestic insurance market while protecting it against catastrophic losses, and (iii) to limit the fiscal exposure of the government.