6TH GLOBAL CONFERENCE OF ACTUARIES

FEBRUARY 18-19, 2004, NEW DELHI

AGRICULTURAL INSURANCE IN INDIA-A PERSPECTIVE

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(Subject ode 02 – Subject Group : General Insurance)

Abstract

The on going National Agricultural Insurance Scheme is a good step far ward to insure risk of millions of farmers whose livelihood depends on the pattern and distribution of monsoon rain in India. However, it suffers from some of the major problems inherent in crop insurance programs throughout the world. With this background the paper reviewed the innovative techniques in agricultural/rural insurance, which overcome some of the disadvantages of yield based group insurance and suggests rainfall (weather) index insurance as a better alternative/complement to the existing agricultural insurance scheme. The weather (rainfall) index based insurance is also more compatible with reinsurance practices world wide, which make primary insurers to cover their local/regional risks by reinsuring them selves with international reinsures.

AGRICULTURAL INSURANCE IN INDIA-A PERSPECTIVE

With the passing of Insurance Regulatory and Development Authority (IRDA) Act 1999 Indian insurance sector opened to a healthy competition by entry of new private insurers into insurance business hitherto the area of public sector. Insurance penetration (premium as % of GDP) in India was merely 1.93% showing 0.54% and 1.39% in non-life and life insurance sectors respectively, which is far below from the 16.54%, 13.35%, 11.28% & 11.17% of South Africa, South Korea, Japan & UK respectively (table 1).

Being an agrarian economy, there are immense opportunities in agricultural/rural insurance in India. The new areas like weather insurance, rainfall insurance and cyclone insurance give scope even for new private insurers and reinsures to exploit the opportunities in the niche areas.

Risk Components

In a recent study, Ahsan et al (1982) stated that public subsidies are necessary to make agricultural insurance viable. The essence of insurance is risk sharing. This can be done in two ways. One is through risk spreading and other is through risk pooling. Risk spreading involves persons with possibly different risk attitudes sharing the same risk (for example in a crop-sharing agreement). In standard insurance models, which isolate risk spreading from risk pooling, an individual shares a given risk with an insurance company; the individual assumed to be risk averse, whereas the insurance company is assumed to be risk neutral. Risk pooling refers to a situation where persons with different risks place their risks in a common pool, which they all share; for example insurance is provided collectively to a group consisting of members who may face different probability distributions of loss. Pooling benefits of insurance are then attributed to a potential reduction in the variance of the total loss, which in turn results in a premium reduction; the law of large numbers is usually invoked to justify the existence of such benefits.

Need For Rural/Agricultural Insurance –Indian Case

Indian agricultural sector still depended mostly on monsoons. The erratic and uneven distribution of monsoon rains perpetuated yield/price volatility and hence farmers exposure to risk and uncertainty. In this scenario of high risk and uncertainty of rain fed agriculture, allocating risk is an important aspect of decision making to farmers. This indicates a need for contingent plans that will help to improve the handling of risky outcomes across individuals. The design and implementation of contingent contracts is thus an integral part of development process in Indian agricultural sector.

In India, traditionally risk would be managed either privately or through implicit contracts within the family or network (caste groups/extended families/joint families). Such contracts can be quite useful to handle noncovariant risks. However, yield risks are often locally covariant, implying that these traditional contracts within village and families would not perform well to insurance against yield risks. Another form of risk coping strategy among farmers is income diversification/crop diversification that will reduce variance of their income. If benefits of reduced risk exposure from such crop diversification are large, then farmers may be willing to forego some of the possible gains from trade/specialisation; that is they would diversify crop rather than specialize in the activities in which they have a comparative advantage. This strategy is may seems optimal from individual point of view, but it may undermine the competitive advantage of a nation through specialization that hinders national development. Productivity labour would likely increase under specialisation. Also, agricultural research could focus on fewer products and thereby increase its effectiveness in developing new technologies. Moreover, transportation costs and other market transaction costs would be lowered, thus stimulating trade and increasing the gains from trade. This regional specialization helps in development of infrastructure relating to the production activity.

By reducing the need for farm diversification, these contracts can stimulate specialization. The specializing in competitively advantageous crops/products by regions will increase efficiency of farms as well as helps in easy implementation of research and

development and other crop based government programs through scale economies. The specialization helps in growing of off-farm and non-farm employment opportunities to a large section of rural population.

Hence a development policy which includes explicit insurance arrangements for both farm as well as non-farm activities/workers helps in economic development of the country through specialization and also helps in increase/stabilise income of the farmers/non-farm workers.

Role Of Agro Climatic And Social Factors In Insurance

Agro climatic characteristics play a greater role in risk of farming practices. Increasing rainfall combined with a longer growing season reduce the variability of output, increase the number of possible activities and reduce the covariance among those activities (table 2). Hence, the low rainfall SAT zone is highest risky zone, followed by high rainfall SAT and humid tropics. As one goes from dry to wet areas, the progressive reduction in risk reduces the need for various kinds of insurance substitutes characteristics of these environments. There is less need for capital accumulation as an insurance substitute. Accordingly, one expects to see smaller food stores, few livestock and less jewelry in the humid tropics. In sum, environmental risk reduction reduces the optimal household size by reducing the marginal benefits of additional household members relative to the marginal cost of supervision or of incentive dilution. The above figures indicate that risk and insurance needs vary across agro-climatic zones as well as socio-economic parameters of individuals and farmers.

Moral Hazard And Adverse Selection And High Claims Ratio

The need for individual based crop insurance is highlighted in the above section. However, inherent difficulties in getting reliable and authentic historic actual production histories data are a distance possibility in India. In the absence of the reliable data and asymmetric information among insurer and insured will create many well-known problems, outcomes of which will deviate from the pareto optimal conditions. The two

distinct sources of deviation from pareto optimality: moral hazard and adverse selection. Moral hazard has been defined in the economic literature as an alteration in input use which deviates from social optimality and which occurs because of incompatible incentives and asymmetric information. In insurance models, moral hazard problems occur because the insured can take actions, which affect the probability of losses and cannot be observed by the insurer. Moral hazard occurs after a loan is taken or after the insurance contract is obtained. Moral hazard involves a change in behavior so that the customer represents more risk than what was believed to be the case. Those who are insured may change their behavior in a way that increases the risks beyond what insurer believed they would be when the insurance was developed. Area-Yield based crop insurance, create problem of adverse selection thus farmers with lower expected yields than the area average could purchase more protection than farmers with yield above the average. Farmers with higher expected yields opted out, and farmers with lower expected yields purchase crop insurance. Thus increasing indemnity payments relative to premiums paid.

Moral hazard and adverse selection is avoided if insurance contracts are based on perfect information about each individuals risk. Ahsan (1982)[1] argue in the developing country context public subsidy and public provision of agricultural insurance to counter the problems of moral hazard and adverse selection. As the public subsidy encourages more participation from the high yield farmers and hence reduce adverse selection. Farm-level expected yields and a measure of farm-level variability are fundamental to an individual farmers decision to purchase crop insurance. As level of protection ideally should be tied to some measure of variability. However for the time being until well historical data about individual farmers is generated, Indian crop insurance should focus on area yield based insurance approach as it currently following under National Agricultural Insurance Scheme (NAIS). But the scheme is suffering from heavy losses as claims as a percent of premium is about 340 percent (table 3). However the livestock insurance scheme is not suffering from these losses (table 4). Theoretically if the scheme

[1] Ahsan, S.M., A.Ali and N. Kurian. (1982) Toward a Theory of Agricultural Insurance." American Journal of Agricultural Economics 64: 520-29.

is to be viable in the long run premium payments should equal to the claim payments (indemnity payments) over time, which is also equal to expected loss.

National Agricultural Insurance Scheme

India's modified crop insurance program is called as national agricultural insurance scheme is implementing since rabi 1999-2000.Union budget 2002-03 proposed setting up of Agricultural Insurance Corporation (AIC) with capital participation from General Insurance Corporation of India (GIC), four public sector general insurance companies viz. 1. National Insurance Co Ltd., 2. New India Assurance Co. Ltd., 3. Oriental Insurance Co. Ltd and 4. United Insurance Co. Ltd., and NABARD. The promoter's subscription to the paid up capital will be: 35 percent by GIC, 30 percent by NABARD and 8.75 percent each by the four public sector general insurance companies. The autherised capital of the new organisation will be Rs.1500 crore, while the initial paid-up capital will be Rs.200 crore. National Agricultural Insurance Scheme (NAIS) shall be transferred to the new organisation and shall form the core of business to begin with. Transition to actuarial regime will be made over a period of time. The new organisation will, in due course, cover other allied rural/agricultural risk along with crop insurance. The specific objectives of the program are

To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests and diseases.

To encourage the farmers to adopt progressive farming practices, high value inputs and improved technology in agriculture.

Salient features

1. Scheme is available to all farmers-loanee and non-loanee both- irrespective of their size of holding.
2. Compulsory for loanee farmers and optional for non-loanee farmers
3. Limit for sum assured is the thresholds yield of the crop in the specified area.
4. Cover all crops for which a reasonable past yield data is available.
5. Premium rates are fixed at 3.5 5 for bajra and oilseeds and 2.5 % for other kharif crops, 1.5 % for wheat and 2% for other rabi crops

6. In case of small and marginal farmers 50 % of premium charges are born by the government.
7. Separate agency namely agricultural insurance company of India (AIC) has been established for implementation of NAIS with the help of rural financial institutions, state governments and farmers.

Due to the high claim/premium ratio there is need to refine the program to enhance its economic viability, so that the scheme will sustain overtime to serve large section of the farmers to insure their risk and hence productivity and also enhance competitiveness of Indian agriculture by regional specialization. In recent years some new methods in crop insurance have been come up with innovative actuarial technologies.

Reasons for high claim/premium ration in crop insurance

1. Most of the farmers not participate willingly in crop insurance as farmers expect to receive alternative payments from the government in catastrophic years/ crop failure years irrespective of premium payments.
2. Heavy subsidy on the part of the government, which may encourage excessive risk taking/claims by farmers.
3. Rural income earners such as agricultural labourer, traders, processors, and farm input suppliers are equally affected by crop failure but out of the crop insurance scheme.
4. There is no incentive for insurers to practice sound actuaries practices, as losses will be born by government.
5. No private sector participation in crop insurance business due to lack of incentives.

New developments in the insurance sector give a ray of hope to rural insurance as there will be greater scope of private sector insurer and reinsures in the rural insurance business.

Weather Insurance in India- an alternative/complement

Insurers and reinsures are developing new innovative weather insurance programs for the commodities/products, which effected by weather. In these lines ICICI Lombard has developed a weather insurance product, which is implementing by BASIX. This pilot program demonstrates how rains fed farmers in developing countries insure against failure of monsoons. Main advantage of weather insurance is that it does not cause moral hazard and adverse selection and with low administrative costs which suits India, where most of the farmers are small and marginal.

ICICI Lombard conceptualized and modeled the rainfall insurance policies and sought out reinsurance. BASIX one of India's largest micro finance institutions with nearly 10,000 borrowers in nine states, sold around 250 policies to groundnut and castor farmers in Andhra Pradesh through its KBS Local Area Bank (Skees, 2002)[2] . Having worked on crop insurance pilots for the previous four years, BASIX launched India's first rainfall insurance program in July 2003 through its KBS Bank in Andhra Pradesh state.

Local area banks are limited to operations in three adjacent districts and therefore face limited natural portfolio diversification. To reduce the covariate risk KBS Bank is keen to offer rainfall insurance to its borrowers, as it would mitigate the risk inherent in lending in drought prone areas. KBS Bank bought a bulk insurance policy from ICICI Lombard and sold around 250 individual farmers. The KBS encourages members of community bore well users, water use associations, members of women self-help groups to participate in the program. One of the top five global reinsures has agreed to reinsure this rainfall insurance portfolio.

Advantages of weather index insurance

1. Quality of historic data by different ago-climatic regions is available about rainfall and other weather parameters.
2. It is less costly and easily observable at local level with accuracy.
3. A single indicator of rainfall is sufficient to insure against most of the losses faced by both farmers and off-farm and non-farm entrepreneurs/workers.

[2] Skees, Jerry R (20030 Risk Management Challenges in Rural Financial Markets: Blending Risk Management Innovations with Rural Finance, Paving the Way Forward for Rural Finance An International Conference on Best Practices

4. Even individuals who did not have cultivated area, but likely to be effected by the weather event in same way as the farmer can also able to benefit from it.
5. No moral hazard and adverse selection as it is based on area average yield independent of individual performance.
6. It will allow reinsurance by the primary insurer as it is based on standardized/well defined internationally verifiable data.

An example of weather index insurance

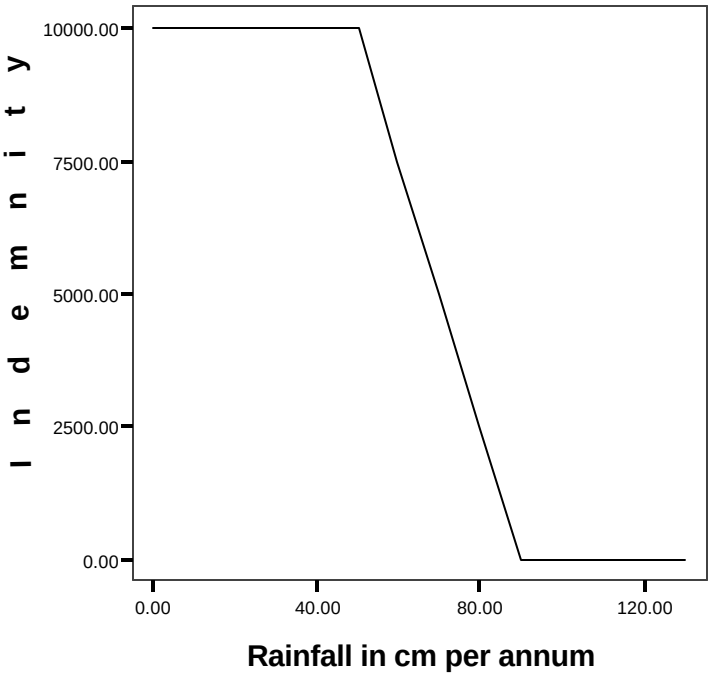
If in an area the average rainfall is 110cm/annum. If an individual or a self-help group in the area purchase a contract where the trigger is 90 cm of rainfall per annum and the limit is 50 cm per annum, the amount of payment for each reduction in a cm rainfall is a function of the sum insured. If a farmer insured Rs. 10000/- with a premium at 5 % of the sum assured, he has to pay Rs.500/- per year as premium.

The indemnity payment for each cm below 90 cm rainfall is

= Rs. 10000/ (90 – 50)

= Rs. 250/- per annum

Figure 1. Indemnity payment of a rainfall index with a sum assured of Rs10000



Scope of index insurance for financial institutions

Index insurance particularly suited to developing country such as India where asymmetric information and poor data create classic problems of insurance. In index insurance there a good historical data available and the new satellite imagery may someday allow insurance providers to offer index insurance that is directly tied to vegetarian growth given specific geographical coordinates.

In the face of liberalization of financial and economic sector and gradual withdrawal of entire subsidies provided by government for crop insurance there is a greater scope for private sector participation in this growing sector but with very little penetration. Many traditional rural financial institutions can make advantage of their customer base in loan and deposit market to distribute their insurance policies. The above BASIX and ICICI Lombard is a good example of those innovative insurance products. The portfolio management is an important aspect of successful practice in insurance business.

However, the index insurance suffers from basis risk for individuals who may use futures markets or purchase index insurance. Basis risk occurs when an individual has a loss and does not receive payment or when there is payment and the individual has not suffered loss. This will happen as the index insurance that pays based on an objective measure of weather or area yield. Basis risk is also present in using futures markets to protect against local price movements.

However, the basis risk can be reduced by innovative financial products, which can be sold by rural financial institutions to the some form of self-help groups or village panchayats/cooperatives collectively. For example if a self-help group purchase the index insurance either price insurance (i.e., if the realized world price is below a certain predefined price, the group can claim the difference between the realized world price and the predefined price by paying a premium) or yield insurance (via weather insurance with claim payments based upon extreme weather event) there are prospect to limit the basis risk. In this case the self-help group/cooperative/village panchayat can redistribute indemnity claim based on the mutual knowledge of its members based on actual loss incurred by the event. Rural financial institutions can also reduce basis risk by incorporating a component of premium is attached to the interest payments by taking advantage of their knowledge about their customers in credit repayments and defaults. That is high risk of default farmers can get credit at higher rate of interest and vice versa. Thereby it will reduce basis risk to some extent.(Skees et al 2003)[3]

An important step in reducing risk of financial institutions in tailoring insurance products is by covering a diversified pool of risk exposure, which allows insurance companies to spread their risk among customers with different sources of income, over geographic space and time.

Agricultural Reinsurance Business-Innovations In Global Insurance Market

The recent innovations in global financial markets creating opportunities for crop insurers to manage their correlated risk and expand their ability to help rural households.

[3] Skees, Jerry, Hazell,P and Miranda, M (2003) New Approaches to Public/Private Crop Yield Insurance to be published by The World Bank, Washington, DC, U.S.A.

As correlated risks at local/agro climatic region level become independent risk at the global level.

1. The use of global futures markets by intermediaries who can offer a form of price insurance
2. Index insurance contracts to shift regional catastrophic calamities into global markets.

Two types of equity instruments are available to securities insurance risk. Exchange traded indexes (e.g., the CAT contract on Chicago Board of Trade (CBOT)) and risk-linked securities (e.g, Catastrophic or CAT bonds). These instruments provide a mechanism of risk transfer from a primary insurer to a large group of investors/speculators as in the same way as reinsurance.

The Property Claim Service (PCS) is an U.S. agency that provides estimates of catastrophic property damage in each regio n foe each quarter. This data used to trade and settle PCS CAT options. There are nine indices (one national, five regional and three state) that are based on the catastrophic loss in each specific region/nation. Thus, purchasing a call option at some specified loss level protect when losses exceed the predefined loss level in that particular period of time. So it will act as reinsurance against a catastrophic of large scale (skees et al 2003).

In the same way CAT bonds are risk-linked securities, mainly used to provide reinsurance protection for primary insurances. CAT bonds like debt bonds provide capital contingent upon the occurrence of a specific event. The premiums generate interest payments for the bond investors. In exchange for assuming the risk, those purchasing CAT bonds receive a relatively high rate of return if there is no catastrophic event. However, they may lose some or all of their investment or earning on their investment if a catastrophe occur. Since catastrophes are independent of general economic and hence stock market trend, there is an opportunity for fund managers to diversify their risk by investing in catastrophic bonds.

Conclusions

The on going National Agricultural Insurance Scheme is a good step far ward to insure risk of millions of farmers whose livelihood depends on the pattern and distribution of monsoon rain in India. However, it suffers from some of the major

problems inherent in crop insurance programs throughout the world. It exclusively insures farmer's yields against the average yield of the area. However, most of the agricultural labourer, rural off-farm and non-farm workers are not covered under the scheme even though they are equally if not more effected by the failure of agricultural crops. The existing scheme is wholly government scheme with no intensives to private finance players, which hinders competitiveness of the scheme. The average yield of a region/locality is not many times accurately measurable which is basis for calculation of indemnities.

To overcome the above problems in insurance this paper studied the advantages of weather insurance against crop insurance, which overcomes most of the problems mentioned above. In addition to that it is more compatible with reinsurance practices world wide, which make primary insurers to cover their local/regional risks by reinsuring them selves with international reinsures.

Table 1. Insurance Density and Penetration cross country comparison

	Insurance Density (Premium Per Capita in USD 2000)			**Insurance Penetration (Premium as % of GDP- 2000)**		
Country	**Total**	**Non-life**	**Life**	**Total**	**Non-life**	**Life**
United States	3152.1	1540.7	1611.4	8.76	4.28	4.48

Canada	1516.8	756.6	757.2	6.56	3.28	3.27
Brazil	75.6	62.7	12.9	2.11	1.75	0.36
Mexico	101.2	50.4	50.8	1.72	0.85	0.86
Chile	175.8	49.7	126.0	4.07	1.15	2.92
Russia	41.8	22.3	19.5	2.42	1.29	1.13
Japan	3973.3	808.2	3165.1	10.92	2.22	8.70
South Korea	1234.1	289.5	935.6	13.05	3.16	9.89
China	15.2	5.7	9.5	1.79	0.67	1.12
India	**9.9**	**2.3**	**7.6**	**2.32**	**0.55**	**1.77**
Malaysia	150.9	64.6	86.4	3.72	1.59	2.13
Indonesia	8.6	4.6	4.0	1.18	0.64	0.54
South Africa	472.1	79.1	392.9	16.86	2.83	14.04
Kenya	8.9	6.5	2.4	2.63	1.91	0.72
Australia	1859.3	665.8	1193.5	9.41	3.37	6.04

Source: Second Annual Report of IRDA, 2001-02.

Table 2. Risk and insurance variables in different agro-climatic regions

Risk and insurance	Low rainfall SAT	High rainfall SAT	Humid tropics
Covariance	Highest	Medium	Lowest
Synchronicity	Highest	Medium	Lowest
Season length	Shortest	Medium	Longest
Capital accumulations as insurance substitute	Greatest	Medium	Lowest
Household size	Largest	Medium	Smallest

Source: Hans P. Binswanger and John McIntire (1987)[4]

Table 3. Performance of national agricultural insurance scheme

[4] Binswanger, H.P. and J. McIntire (1987) behavioral and material determinants of production relations in Land-abundant Tropical Agriculture, economic development and cultural change 35. pp. 73-120.

Particulars	Farmers (no)	Area covered (m.ha)	Sum insured (rs. Crore)	Premium (Rs. Crore)	Claims (Rs.crore)	Claims to premium ratio
Rabi 1999-00	5.8	7.8	356.4	5.4	7.7	141.9
Kharif 2000	84.1	130.0	6903.5	206.5	1179.5	571.2
Rabi 2000-01	20.8	31.1	1602.7	27.8	59.0	212.5
Kharif 2001	85.7	127.6	7300.9	257.0	468.8	182.4
Rabi 2001-02	20.8	32.7	1698.4	34.7	64.4	185.5
Total	217.3	331.4	17861.8	531.6	1823.3	343.0

Source: Various Issues of Union Budget, Ministry of Finance, India

Table 4. Live stock insurance- premium and claims

year	No. of animals insured (million)	Premium collected (Rs. Cr.)	Incurred claim Amount (Rs. Cr.)	Incurred claim ratio (%)
1992-93	13.8	93.6	59.8	64.0
1993-94	17.7	103.9	63.7	61.0
1994-95	14.3	106.9	71.5	67.0
1995-96	15.0	113.4	74.1	65.0
1996-97	14.7	122.5	74.8	61.0
1997-98	6.3	143.5	80.1	56.0
1998-99	7.9	152.0	126.1	83.0
1999-00	9.8	137.1	114.3	83.0
2000-01	7.9	145.5	128.0	88.0
total	107.4	1118.4	792.3	70.8

Source: Various Issues of Union Budget, Ministry of Finance, India

Table 5. Comprehensive Crop Insurance Scheme state wise distribution of beneficiaries

State	Number of farmers benefited 1985-86 to 1996-97
Gujarat	2726305
Maharastra	2656911
Andhra Pradesh	1851600
Orissa	857202
Bihar	737857

West Bengal	626834
Karnataka	360595
Tamil Nadu	357058
Madhya Pradesh	151869
Rajasthan	135749
Uttar Pradesh	129801
Kerala	88835
Assam	18266
Tripura	16464
Himachal Pradesh	6110
Jammu &Kashmir	5291
Meghalaya	3837
Pondicherry	3191
Goa	3019
Andaman & Nicobar islands	6
Total	12103622

Source: Lok Sabha, question no. 1113, 4 December 1998

About the Author

Dr. A. Amarender Reddy born in 12th August 1970. He completed his Ph.D. in agricultural economics from Center for Advanced Studies in Agriculture, Indian Agricultural research Institute, New Delhi in the year 2003. He is currently working as scientist (agricultural economics) in Indian Institute of Pulses Research, Kanpur. His interest areas of research include financial sector reforms and agricultural economics and livelihood analysis of farm households.