

REVIEW :

Evaluation of weather based crop insurance in Karnataka as a risk management strategy

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BACKGROUND AND OBJECTIVES

In India, many traditional crop insurance programs were implemented to mitigate the risk of farmers and secure reasonable income from the cultivation at the time of occurrence of extreme events leading to crop loss. Weather being a major risk factor, weather index based crop insurance program was experimented to specifically address the weather and its related risks in India. The first experiment was attempted by ICICI Lombard General Insurance Company in 2003 in Andhra Pradesh. Agriculture Insurance Company of India, a public sector agriculture insurance company had taken up the experiment to the next level by implementing it as a commercially viable crop insurance scheme in 2007 and piloted across India in the name of Weather Based Crop Insurance Scheme (WBCIS). Later other registered general insurance companies got license to do crop insurance and entered into crop insurance business. Over the years several improvements were made by various state

Governments and number of farmers insured increased from 6.78 lakhs during 2007-08 to 90.30 lakhs during 2015-16 (Government of India 2016). But slowly the momentum in implementing the scheme is lost and the very purpose of the scheme such as early settlement of claims, quality of risk (weather) data, and compensation for qualitative yield loss (Rao, 2007; Rao, 2011; Clark *et al.* 2012) are missing. Now, all the stakeholders of weather risk mitigation initiative such as insurance companies, State Governments, weather data providers are hesitant to move ahead with WBCIS. One of the reasons is the legal cases related to poor or no claim from WBCIS, poor index design of WBCIS and poor quality of weather data before consumer courts at National, State and district level¹. Several state governments had not notified WBCIS scheme in the recent past, even if notified only for few crops, and found difficult to get insurance companies to operate at competitive rates. At last the ultimate sufferers are the poor farmers who are in need of support to mitigate risk in cultivation and

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the Nation is required to provide a helping hand to farmers who help to achieve self-sustainability in food production in the country.

The main objective of this paper is to study the performance and efficiency of weather based crop insurance program in Karnataka as a risk management strategy in crop production. There are two types of crop insurance schemes *viz.* yield index based and weather index based. Weather Based Crop Insurance Scheme (WBCIS) has inherent advantages in comparison to yield index insurance with respect to moral hazard, adverse selection, fast loss assessment and low monitoring costs (Rao, 2010; Banerjee, 2012; Clarke *et al.*, 2012). Though weather based crop insurance has more advantages, it has not shown improved and consistent performance over the years. So an effort was made here to understand the reasons behind that, study where it performed better compared to yield based crop insurance schemes in India *viz.* National Agriculture Insurance Scheme (NAIS) and Modified National Agriculture Insurance Scheme (MNAIS), study where it lags behind the above schemes and come up with some solutions from the study to make it a better risk management alternative. For this study the state of Karnataka was selected since the state has a diverse set of crops covered under crop insurance



Source: Agricultural Statistics at a Glance 2016. Department of Agriculture, Co-operation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi.

Fig. 1 : Crop insurance Coverage in Karnataka (Kharif, Rabi and Summer)

scheme and it has piloted all new crop insurance schemes in the country. It is one of the States where more crop insurance related problems are recorded and where private sector insurance companies are very actively participating ever since the private sector insurance companies were allowed to do crop insurance business.

This study is based on the analysis of crop insurance related information such as number of farmers insured, area insured, sum insured, premium collected, claim settled, number of farmers benefitted during *Kharif, Rabi*

| Table 1: Crop insurance coverage in Karnataka (all schemes and all seasons) | | | | | | |
|---|--------------------------------|-------------------------|-------------------------|---------------------------|--------------------------|--|
| Year | No. of farmers insured (Lakhs) | Area insured (Lakh Ha.) | Sum insured (Crore Rs.) | Gross premium (Crore Rs.) | Claim amount (Crore Rs.) | No. of farmers received claims (Lakhs) |
| 2000 | 3.68 | 6.86 | 392.57 | 10.49 | 3.27 | 0.23 |
| 2001 | 6.76 | 9.89 | 577.03 | 15.84 | 148.65 | 3.34 |
| 2002 | 10.30 | 15.14 | 1247.29 | 40.85 | 348.20 | 5.99 |
| 2003 | 18.62 | 28.46 | 1553.15 | 44.01 | 526.82 | 12.49 |
| 2004 | 9.63 | 13.82 | 1123.23 | 39.89 | 30.50 | 1.51 |
| 2005 | 9.71 | 16.79 | 1282.41 | 48.52 | 45.37 | 1.31 |
| 2006 | 13.40 | 26.90 | 1535.83 | 47.40 | 206.68 | 6.21 |
| 2007 | 6.81 | 16.56 | 1152.27 | 44.01 | 33.96 | 1.02 |
| 2008 | 13.71 | 21.32 | 1591.91 | 50.13 | 154.38 | 3.74 |
| 2009 | 12.10 | 17.28 | 1655.39 | 59.27 | 243.20 | 5.79 |
| 2010 | 7.82 | 11.38 | 1522.68 | 48.13 | 52.20 | 0.95 |
| 2011 | 17.00 | 22.60 | 2153.85 | 104.04 | 176.89 | 7.07 |
| 2012 | 9.86 | 12.88 | 2011.19 | 133.73 | 249.04 | 5.06 |
| 2013 | 6.63 | 9.12 | 1602.49 | 134.43 | 62.61 | 2.38 |
| 2014 | 11.12 | 15.25 | 3246.86 | 333.81 | 223.82 | 4.99 |
| 2015 | 11.99 | 17.04 | 3698.27 | 94.72 | 872.98 | 8.71 |
| Total | 169.13 | 261.27 | | | | 70.78 |
| CAGR (%) | 2.52 | 1.03 | 10.38 | 16.39 | | |

Source: Agricultural Statistics at a Glance 2016. Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi.

and Summer season in the State of Karnataka. The disaggregated district wise and crop wise data were collected for a period of 16 years from 2000 to 2015 from Crop Insurance Cell, Department of Agriculture, Government of Karnataka. Different crops and districts notified under different crop insurance schemes were collected from the notifications issued by the Government of Karnataka for various years. Other than the crop insurance data collected, discussion was made with officials in AIC of India and Crop Insurance Cell, Government of Karnataka. It was planned to conduct the performance analysis by studying the growth in the above data over the years since inception, analyzing crop wise and district wise crop insurance penetration by calculating proportion of insured area to normal area under cultivation, and comparing with yield based insurance by calculating insurance coverage under both set of schemes. Performance of scheme was also analyzed and compared by calculating average premium rate, average claim rate, average claim cost, claim ratio, pricing multiple, average sum insured per unit of insurance (here it is area in hectare), average claim received per beneficiary farmer and proportion of insured farmers received claims.

The paper is organized as follows. The following section discusses the district wise and crop wise performance of crop insurance schemes in Karnataka. Next section explains the performance of Weather Based Crop Insurance Scheme in Karnataka and then comparative performance analyses with other crop insurance schemes. The paper ends with findings and conclusions of the study.

Performance of crop insurance schemes in Karnataka :

The first ever crop insurance program started in India during 1972 which was based on individual approach and lasted up to 1978. Later Pilot Crop Insurance Scheme (PCIS) and Comprehensive Crop Insurance Scheme (CCIS) were operational in the country from 1979 to 1984 and 1985 to 1999, respectively. From 1999 *Rabi* season, the CCIS was discontinued and replaced by the National Agriculture Insurance Scheme (NAIS), which was being implemented as the flagship yield based crop insurance program by the Government of India.

In Karnataka crops are cultivated during three seasons *viz. Kharif, Rabi* and Summer and for the

| Sr. No. | District | Normal Area under Agriculture Crops | | Average area insured (WBCIS Period 2006-2010) | | Average area insured (MNAIS Period 2011-2015) | | Area insured during 2015 | | |
|---------|-----------------|-------------------------------------|-----------------|---|--------------------------|---|--------------------------|--------------------------|--------------------------|--------------------|
| | | Area | % to total area | Area | % insured to normal area | Area | % insured to normal area | Area | % insured to normal area | % to total insured |
| 1. | Kalburgi | 10.21 | 9.2 | 3.97 | 38.9 | 2.52 | 24.7 | 3.19 | 31.3 | 18.7 |
| 2. | Belgaum | 9.93 | 9.0 | 0.67 | 6.8 | 0.74 | 7.4 | 0.76 | 7.7 | 4.5 |
| 3. | Vijayapura | 9.66 | 8.7 | 1.24 | 12.8 | 1.81 | 18.8 | 1.98 | 20.5 | 11.6 |
| 4. | Raichur | 6.77 | 6.1 | 1.20 | 17.7 | 0.45 | 6.7 | 0.23 | 3.4 | 1.4 |
| 5. | Bellary | 5.72 | 5.2 | 0.17 | 3.0 | 0.15 | 2.6 | 0.22 | 3.8 | 1.3 |
| 6. | Bagalkot | 5.47 | 4.9 | 0.91 | 16.6 | 0.61 | 11.2 | 0.44 | 8.1 | 2.6 |
| 7. | Mysore | 5.19 | 4.7 | 0.05 | 1.0 | 0.06 | 1.1 | 0.04 | 0.8 | 0.2 |
| 8. | Koppal | 4.74 | 4.3 | 1.09 | 23.1 | 0.37 | 7.9 | 0.45 | 9.5 | 2.7 |
| 9. | Tumkur | 4.7 | 4.3 | 0.49 | 10.4 | 0.59 | 12.5 | 0.52 | 11.0 | 3.0 |
| 10. | Gadag | 4.56 | 4.1 | 1.23 | 26.9 | 1.26 | 27.7 | 1.68 | 36.8 | 9.9 |
| 11. | Bidar | 4.47 | 4.0 | 1.94 | 43.4 | 1.16 | 26.0 | 1.25 | 28.1 | 7.4 |
| 12. | Yadgir | 4.24 | 3.8 | 0.64 | 15.0 | 0.62 | 14.6 | 0.84 | 19.7 | 4.9 |
| 13. | Dharwad | 4.11 | 3.7 | 0.84 | 20.5 | 1.57 | 38.3 | 1.95 | 47.3 | 11.4 |
| 14. | Haveri | 4.05 | 3.7 | 1.09 | 26.9 | 1.41 | 34.8 | 1.47 | 36.3 | 8.6 |
| 15. | U.Kannada | 0.95 | 0.9 | 0.39 | 41.3 | 0.43 | 45.7 | 0.45 | 47.6 | 2.7 |
| | Other districts | 25.78 | 23.3 | 2.45 | 9.5 | 1.06 | 4.1 | 1.56 | 6.0 | 9.2 |
| | State | 110.55 | 100.0 | 17.86 | 16.2 | 14.83 | 13.4 | 17.03 | 15.4 | 100.0 |

Source: Normal area data from Government of Karnataka (2016b), Profile of Agriculture Statistics Karnataka State and average area insured data is author's calculation based on data collected from Crop Insurance Cell, Department of Agriculture, Government of Karnataka.

purpose of crop insurance these three seasons are notified separately. Yield data is recorded separately for these seasons, premium collected and claims are settled accordingly. *Kharif* is the major crop cultivation season in Karnataka. On an average 89 per cent of premium collected is from *Kharif* season and remaining 11 per cent is collected during *Rabi* and Summer seasons together².

NAIS scheme was implemented in Karnataka from 2000 onwards till 2015 except 2014. During 2007 Weather Based Crop Insurance Scheme (WBCIS) was introduced

in few districts of Karnataka. Later it was extended to all districts but during 2014, only commercial and horticultural crops alone were covered under the scheme. During 2010 *Rabi* season, Modified National Agricultural Insurance Scheme (MNAIS) was introduced in three districts of Karnataka *viz.* Kalburgi, Tumkur and Shivamoga and later extended to Uttara Kannada during 2011 and all districts during 2014. During 2014, NAIS was withdrawn and only commercial schemes *viz.* MNAIS and WBCIS were operational in all districts. But again during 2015 NAIS scheme was introduced

| Crop | Normal Area | | Average area insured (2006-2010) | | Average area insured (2011-2015) | | Area insured during 2015 | | |
|----------------------------|-------------|-----------------|----------------------------------|-----------|----------------------------------|-----------|--------------------------|-----------------------|--------------------------------|
| | Area | % to total area | Area | % insured | Area | % insured | Area | % normal area insured | % to total insured during 2015 |
| Cereals: | | | | | | | | | |
| Paddy | 13.84 | 12.5 | 2.40 | 17.4 | 1.68 | 12.2 | 1.97 | 14.2 | 11.6 |
| Jowar | 14.08 | 12.7 | 0.81 | 5.7 | 1.26 | 8.9 | 1.43 | 10.2 | 8.4 |
| Maize | 11.66 | 10.5 | 1.72 | 14.7 | 1.97 | 16.9 | 2.44 | 20.9 | 14.3 |
| Ragi | 7.81 | 7.1 | 0.06 | 0.8 | 0.02 | 0.3 | 0.08 | 1.0 | 0.4 |
| Bajra | 3.21 | 2.9 | 0.11 | 3.4 | 0.05 | 1.5 | 0.05 | 1.4 | 0.3 |
| Wheat | 2.65 | 2.4 | 0.19 | 7.0 | 0.41 | 15.4 | 0.28 | 10.6 | 1.6 |
| Minor Millets | 0.42 | 0.4 | 0.01 | 2.0 | 0.01 | 2.2 | 0.00 | 0.7 | 0.0 |
| Total Cereals: | 53.67 | 48.5 | 5.30 | 9.9 | 5.40 | 10.1 | 6.24 | 11.6 | 36.7 |
| Pulses: | | | | | | | | | |
| Bengal gram | 9.04 | 8.2 | 1.03 | 11.4 | 1.52 | 16.9 | 2.68 | 29.6 | 15.7 |
| Red gram | 6.43 | 5.8 | 4.07 | 63.4 | 3.25 | 50.5 | 3.75 | 58.3 | 22.0 |
| Green gram | 3.76 | 3.4 | 1.38 | 36.6 | 1.06 | 28.1 | 1.24 | 33.1 | 7.3 |
| Horse gram | 2.71 | 2.5 | 0.27 | 10.0 | 0.04 | 1.4 | 0.02 | 0.6 | 0.1 |
| Black gram | 1.28 | 1.2 | 0.64 | 49.8 | 0.31 | 24.2 | 0.16 | 12.7 | 1.0 |
| Other pulses | 2.04 | 1.8 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.0 |
| Total Pulses: | 25.26 | 22.8 | 7.39 | 29.3 | 6.18 | 24.5 | 7.85 | 31.1 | 46.1 |
| Total food grains: | 78.93 | 71.4 | 12.69 | 16.1 | 11.58 | 14.7 | 14.10 | 17.9 | 82.8 |
| Oilseeds: | | | | | | | | | |
| Groundnut | 8.42 | 7.6 | 1.84 | 21.9 | 1.25 | 14.9 | 1.51 | 17.9 | 8.9 |
| Sunflower | 9.05 | 8.2 | 2.66 | 29.4 | 0.81 | 9.0 | 0.45 | 5.0 | 2.7 |
| Soya bean | 1.88 | 1.7 | 0.27 | 14.4 | 0.39 | 20.5 | 0.70 | 37.3 | 4.1 |
| Sesamum | 0.78 | 0.7 | 0.06 | 8.2 | 0.07 | 8.9 | 0.03 | 4.3 | 0.2 |
| Safflower | 0.68 | 0.6 | 0.22 | 32.1 | 0.28 | 41.3 | 0.22 | 32.9 | 1.3 |
| Other oilseeds | 0.79 | 0.7 | 0.02 | 2.6 | 0.03 | 4.4 | 0.01 | 1.8 | 0.1 |
| Total Oilseeds: | 21.60 | 19.5 | 5.07 | 23.5 | 2.84 | 13.1 | 2.94 | 13.6 | 17.2 |
| Commercial Crops: | | | | | | | | | |
| Cotton | 4.34 | 3.9 | 0.10 | 2.3 | 0.51 | 11.7 | 0.00 | 0.0 | 0.0 |
| Sugarcane, Tobacco & Mesta | 5.68 | 5.1 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.0 |
| Grand Total | 110.55 | 100.0 | 17.86 | 16.2 | 14.93 | 13.5 | 17.03 | 15.4 | 100.0 |

Source: Normal area data from Government of Karnataka (2016a), Profile of Agriculture Statistics Karnataka State and average area insured data is author's calculation based on data collected from Crop Insurance Cell, Department of Agriculture, Government of Karnataka.

and during 2016 it was replaced with Prime Minister Fasal Bima Yojana (PMFBY) and Restructured WBCIS schemes.

Crop insurance coverage in Karnataka is presented in Table 1 and Graph 1. In Karnataka, under crop insurance 1.69 crore farmers were covered in the past 16 years (2000 to 2015) altogether in all seasons combined and on an average 38 per cent of the insured farmers received claims. Number of farmers insured recorded Compound Annual Growth Rate (CAGR) of 2.52 per cent while Gross Premium collected recorded CAGR of 16.39 per cent. Highest participation of farmers was observed during 2003 (NAIS was the only scheme) followed by 2011 (MNAIS was the major scheme) and 2008 (NAIS was the major scheme and WBCIS was introduced). Under NAIS regime fixed premium was charged which was less and affordable to farmers. Under this scheme, insurance company's claim liability was only up to premium amount and balance claims were shared by State and Central Governments equally. In NAIS scheme, there was sufficient time to participate in the insurance scheme by farmers even after the risk period had been started by observing the weather conditions and thereby whenever weather condition was bad, farmers' participation would be more. Thereby there was more moral hazard and adverse selection issues in NAIS scheme leading to huge loss to exchequer in terms of high claim payouts. Then Government introduced commercial schemes *viz.* WBCIS and MNAIS where the risk (commercial) premium was charged and claim liability rest with insurance companies. Though premium subsidy was given³, premium payable by farmer was higher than premium payable under NAIS scheme and making it less affordable for farmers. When WBCIS was

introduced it was expected to offer lot of benefits such as early claim settlement due to real time weather data (Crop Cutting Experiment (CCE) based data takes long time to generate), fewer claim expenses to insurer compared to yield based scheme (due to no monitoring expenses for CCE), fool proof data (more chances for manipulation in CCE data), meet the insurance needs of commercial and horticultural crop growers and to provide insurance coverage to the crops for which historical yield data was not available. Though WBCIS was introduced during 2007, there was not much increase in premium collection since the scheme was operational in few districts only. Also WBCIS was compulsory for loanee farmers (farmers who availed loan from bank for crop cultivation) in that districts, but non-loanee farmers could opt for NAIS where cut off dates for participation was long. There was a steep rise in premium collection from 2011 onwards because of introduction of MNAIS scheme and it was highest during 2014 since commercial schemes charging risk premium alone were operational during the time.

Performance of crop insurance schemes - district wise analysis :

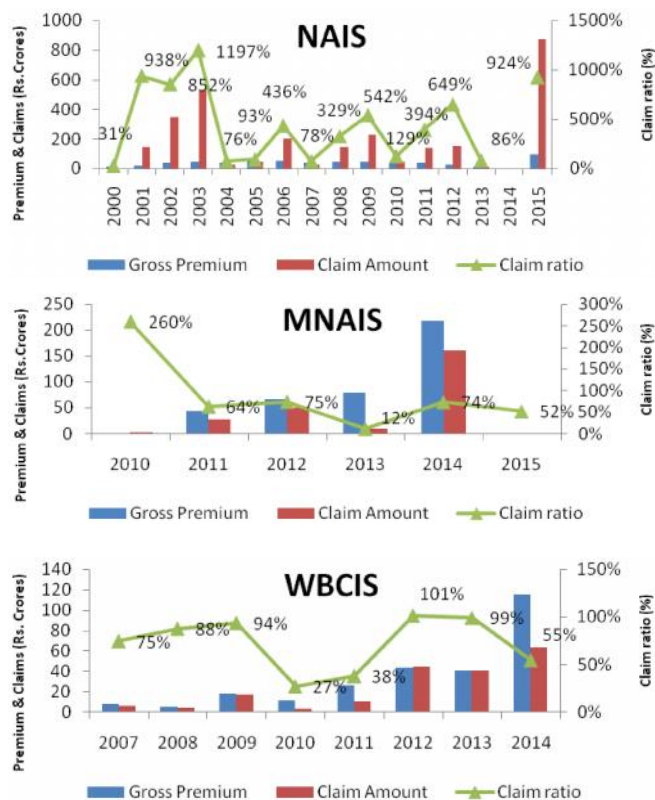
District wise normal area under agricultural crops and area covered under crop insurance schemes are presented in Table 2. Total normal area under agricultural crops is 110.55 lakh ha in the state of Karnataka. Kalburgi, Belgaum, Vijayapura, Raichur and Bellary districts constitutes about 38 per cent of total normal area under agricultural crops. Average area insured is analyzed for two periods. One period is to match with the period of WBCIS implementation and another period from 2011 to 2015 to match with effective MNAIS implementation

Table 4: WBCIS Insurance coverage in Karnataka from inception

| Year | Number of farmers (Lakhs) | Area insured (Lakh Ha.) | Sum insured (Crore Rs.) | Gross premium (Crore Rs.) | Claim amount (Crore Rs.) | No. of farmers received claims (Lakhs) |
|-------|---------------------------|-------------------------|-------------------------|---------------------------|--------------------------|--|
| 2007 | 0.44 | 0.50 | 53.01 | 7.03 | 5.24 | 0.35 |
| 2008 | 0.29 | 0.35 | 44.12 | 4.44 | 3.89 | 0.22 |
| 2009 | 1.08 | 1.32 | 169.78 | 17.44 | 16.38 | 0.71 |
| 2010 | 0.55 | 0.70 | 101.33 | 10.77 | 2.90 | 0.33 |
| 2011 | 1.57 | 1.91 | 248.89 | 25.80 | 9.82 | 1.22 |
| 2012 | 2.12 | 2.69 | 384.51 | 42.91 | 43.54 | 2.06 |
| 2013 | 2.14 | 2.71 | 364.69 | 40.29 | 39.96 | 1.91 |
| 2014 | 1.74 | 1.80 | 963.41 | 115.41 | 62.99 | 1.24 |
| Total | 9.92 | 11.98 | | | | 8.04 |

Source: Crop Insurance Cell, Department of Agriculture, Government of Karnataka.

period. Only in Kalburgi, Bidar, Dharwad, Gadag, Haveri and U.Kannada districts more than 20 per cent of normal area under agricultural crops was insured. There was a huge decline in crop insurance coverage in Koppal and Bidar districts from 2006-2010 to 2011-2015 and huge increase in insurance coverage in Dharwad and Haveri districts during the same period. The reason behind reduction in insurance coverage in Koppal and Bidar districts was the reduction in insurance coverage under Greengram, blackgram, redgram, groundnut, and sunflower crops because of introduction of WBCIS and MNAIS schemes where risk premium was charged which was very much higher than the NAIS flat premium rates for these crops. The increase in insurance coverage in Dharwad and Haveri was due to increase in the coverage of Bengal gram, cotton and maize where insurance coverage of cotton was increased due to the introduction of WBCIS. U.Kannada always topped in insurance coverage with more than 40 per cent of normal area under agriculture covered. In Karnataka, on an average only about 15 per cent of normal area under agricultural crops are insured. Out of 17.03 lakh ha area insured during 2015, Kalburgi (18.7%), Vijayapura (11.6%), Dharwad (11.4%), Gadag (9.9%), Haveri (8.6%) and Bidar (7.4%) districts constitutes about 68 per cent of total area insured and the same trend was observed in the previous years too.



Source: Crop Insurance Cell, Department of Agriculture, Government of Karnataka

Fig. 2 : Premium, Claims and Claim ratio under NAIS, MNAIS and WBCIS in Karnataka

Table 5: Comparison of Insurance coverage under various crop insurance schemes in Karnataka

| Year | Area insured (Lakh Ha) | | | Proportionate Area insured (%) | | |
|------|------------------------|-------|-------|--------------------------------|-------|-------|
| | NAIS | MNAIS | WBCIS | NAIS | MNAIS | WBCIS |
| 2000 | 6.86 | | | 100 | | |
| 2001 | 9.89 | | | 100 | | |
| 2002 | 15.14 | | | 100 | | |
| 2003 | 28.46 | | | 100 | | |
| 2004 | 13.82 | | | 100 | | |
| 2005 | 16.79 | | | 100 | | |
| 2006 | 26.90 | | | 100 | | |
| 2007 | 16.06 | | 0.50 | 97.0 | | 3.0 |
| 2008 | 20.96 | | 0.35 | 98.3 | | 1.7 |
| 2009 | 15.96 | | 1.32 | 92.4 | | 7.6 |
| 2010 | 10.56 | 0.11 | 0.70 | 92.8 | 1.0 | 6.2 |
| 2011 | 17.55 | 3.15 | 1.91 | 77.6 | 13.9 | 8.4 |
| 2012 | 6.56 | 3.63 | 2.69 | 50.9 | 28.2 | 20.9 |
| 2013 | 2.94 | 3.47 | 2.71 | 32.3 | 38.0 | 29.7 |
| 2014 | 0.00 | 13.44 | 1.80 | 0.0 | 88.2 | 11.8 |
| 2015 | 17.03 | 0.01 | 0.00 | 100.0 | 0.0 | 0.0 |

Source: Crop Insurance Cell, Department of Agriculture, Government of Karnataka

Performance of crop insurance schemes - Crop wise analysis :

Crop wise insurance coverage in Karnataka is presented in Table 3. Cereals constituted about 49 per cent of total normal area under agricultural crops but only 10 per cent of them were insured. Pulses constituted about 23 per cent of normal area and about 29 per cent of them were insured during 2006-2010. Oilseeds occupying 20 per cent of normal area, 24 per cent of them were insured during the same period. Insurance coverage under pulses and oilseed crops reduced during 2011 to 2015 period due to high premium charged under commercial schemes viz. WBCIS and MNAIS. Sugarcane crop was insured during 2002 and after that it was never notified in Karnataka. Cotton occupying about four per cent of normal area under agricultural crops, on an average only 2.3 per cent of it was insured during the period 2006-2010. After the introduction of WBCIS in all districts, area insured under cotton increased during the period 2011-2014 (11.7%) and during 2015, it was not notified and not insured and the reasons behind are explained in later section. Out of 17.03 lakh ha insured during the year 2015, redgram (22%), bengalgram (15.7%), maize (14.3%), paddy (11.6%), groundnut (8.9%), jowar (8.4%) and greengram (7.3%) constituted about 88 per cent of total insured area and all other crops constituted the remaining 12 per cent. This indicates that only major cereals, pulses and oilseed crop were insured mainly and minor crops were not given much importance by farmers to protect it from risk of loss. Government and insurance industry haven't shown much interest in protecting low value crops from crop

loss. This is not a good trend observed in the state which will affect self-sufficiency in food production and lead to increased demand for imported food and lead to nutritional imbalance. In case of oilseeds more than 30 per cent of normal area under soya bean and safflower were insured which is a good sign observed from the analysis.

Performance of WBCIS in Karnataka :

WBCIS scheme was implemented in the state of Karnataka from 2007 onwards when it was introduced in the country on pilot basis during 2007. Slowly insurance coverage under WBCIS scheme increased from 0.50 lakh ha during 2007 to 1.80 lakh ha during 2014 and the scheme was withdrawn during 2015 due to unsatisfactory performance under WBCIS during the previous year as observed by the state government¹ (also refer claim ratio given in graph 2). The performance of the scheme is presented in Table 4. Totally about 10 lakh farmers were covered and Rs.264 crore premium was collected during the eight years period (2007-2014). Over the eight years period in Karnataka, insurance companies were able to provide claim benefit to nearly 81 per cent (cumulative across all seasons) of the farmers insured by it. The average claim ratio² in WBCIS for the eight years was nearly 72 per cent which indicates that out of every 100 rupees of premium received, companies have paid out an average of 72 rupees as claims to the insured farmers. Sum insured per hectare for each crop was fixed in WBCIS scheme which was same for both loanee and nonloanee farmers unlike yield based schemes (NAIS and MNAIS) where it was different. Sum insured per

Table 6: Analysis on premium collected and claim settled in Karnataka

| Year | Average premium rate (%) | | | Average claim rate (%) | | | Pricing multiple (%) | | |
|---------|--------------------------|------|-------|------------------------|-------|-------|----------------------|------|-------|
| | MNAIS | NAIS | WBCIS | MNAIS | NAIS | WBCIS | MNAIS | NAIS | WBCIS |
| 2007 | - | 3.36 | 13.26 | - | 2.61 | 9.89 | - | 129 | 134 |
| 2008 | - | 2.95 | 10.06 | - | 9.72 | 8.82 | - | 30 | 114 |
| 2009 | - | 2.82 | 10.27 | - | 15.27 | 9.65 | - | 18 | 106 |
| 2010 | 6.42 | 2.59 | 10.63 | - | 3.33 | 2.87 | - | 78 | 371 |
| 2011 | 12.91 | 2.26 | 10.36 | 8.20 | 8.89 | 3.95 | 157 | 25 | 263 |
| 2012 | 10.40 | 2.34 | 11.16 | 7.79 | 15.12 | 11.32 | 133 | 15 | 99 |
| 2013 | 12.03 | 2.62 | 11.05 | 1.46 | 2.25 | 10.96 | 826 | 116 | 101 |
| 2014 | 9.56 | - | 11.98 | 7.04 | - | 6.54 | 136 | - | 183 |
| 2015 | 9.77 | 2.56 | - | 5.10 | 23.62 | - | 191 | 11 | - |
| Average | 10.18 | 2.90 | 11.10 | 7.71 | 12.64 | 8.00 | 247 | 69 | 171 |

Notes: Average Premium rate=Gross premium/Sum insured, Average claim rate= Claims/Sum insured, Pricing multiple= Average Premium rate/Average Claim rate For NAIS, final average pertains to 16 years period from 2000-2015

Source: Author's calculation based on data collected from Crop Insurance Cell, Department of Agriculture, Government of Karnataka.

hectare was revised upwards in WBCIS scheme during 2014 and thereby there was a big jump in total sum insured and premium collection during 2014 but number of farmers insured and area insured reduced from previous year because of increased farmer premium due to increased sum insured.

Comparative performance of WBCIS scheme in Karnataka :

To analyze the comparative performance of WBCIS scheme, crop insurance data pertaining to other schemes were collected and analyzed. When WBCIS was implemented in the year 2007, it was compulsory for loanee farmers to go with the scheme and optional for nonloanee farmers to go with NAIS or WBCIS. Up to the year 2013, both the field crops, commercial and horticultural crops were notified under WBCIS in the selected districts. In *Kharif* 2014, it was decided by the state government that field crops will be notified under yield based insurance scheme and commercial and horticultural crops will be notified under weather based crop insurance scheme since ascertaining yield data is difficult/cumbersome process for the later. The scheme guidelines of yield based insurance schemes says that for a crop to be notified under yield based insurance scheme, availability of historical yield data for adequate number of years and capacity of the State to undertake requisite number of Crop Cutting Experiments (CCEs). The crops that do not fulfill this criterion usually will be notified under weather based crop insurance scheme by the State Government.

Table 5 reveals that though WBCIS was implemented from *Rabi* 2007, less than 10 per cent of area was insured under WBCIS scheme and remaining

area was insured under NAIS scheme till 2009. When MNAIS scheme was introduced on pilot basis during 2010 *Rabi* season, only about one per cent of area was insured under the scheme, but later area insured recorded steep increase till 2014. From 2013 *Rabi* season NAIS scheme was withdrawn by central government and National Crop Insurance Programme (NCIP) was introduced with two components *viz.* MNAIS and WBCIS. During 2014 area insured under WBCIS declined from previous year because field crops were moved to MNAIS scheme. In 2015 NAIS scheme was again notified in Karnataka replacing MNAIS scheme because of political change at the Centre and the new Government was planning for introducing new crop insurance scheme from the year 2016 onwards. During 2015 WBCIS was not implemented in Karnataka because of its poor performance in previous years and improvement efforts made by the government took time. By the time the government thought of notifying WBCIS scheme, risk period was already exposed and so the scheme was not notified. Again during *Rabi* 2015 season state government made efforts to insure some of the horticultural crops usually notified under WBCIS schemes such as onion, tomato and potato under MNAIS scheme¹. Based on the trial taken during *Rabi* 2015, from 2016 onwards, Karnataka government decided to implement Prime Minister Fasal Bima Yojana (PMFBY) a new yield based scheme for all vegetable crops and ensured that almost all crops are notified under the scheme except fruits and plantation crops which are covered under Restructured Weather Based Crop Insurance Scheme (RWBCIS).

Premium collected, claim settled and claim ratio under NAIS, MNAIS and WBCIS schemes from their

Table 7: Comparison of risk assumed (sum insured) and risk compensated (claim settled) under various crop insurance schemes in Karnataka

| Year | Per hectare Sum Insured (Rs.) | | | Per farmer claims (Rs.) | | | % insured farmers received claims | | |
|------|-------------------------------|-------|-------|-------------------------|-------|-------|-----------------------------------|------|-------|
| | MNAIS | NAIS | WBCIS | MNAIS | NAIS | WBCIS | MNAIS | NAIS | WBCIS |
| 2007 | | 6847 | 10588 | | 4321 | 1486 | | 10 | 81 |
| 2008 | | 7383 | 10089 | | 4270 | 1792 | | 26 | 76 |
| 2009 | | 9307 | 12669 | | 4464 | 2307 | | 46 | 66 |
| 2010 | | 13316 | 14383 | | 7871 | 892 | | 8 | 59 |
| 2011 | 10523 | 8970 | 12984 | | 2646 | 804 | 32 | 39 | 78 |
| 2012 | 17713 | 14478 | 14299 | 9719 | 5845 | 2114 | 23 | 47 | 97 |
| 2013 | 18921 | 19765 | 13458 | 3868 | 6048 | 2087 | 12 | 9 | 90 |
| 2014 | 16988 | | 53395 | 4282 | | 5095 | 40 | | 71 |
| 2015 | 53335 | 21697 | - | 34465 | 10027 | - | 10 | 73 | - |

Source: Author's calculation based on data collected from Crop Insurance Cell, Department of Agriculture, Government of Karnataka.

inception were given in Graph 2. Most of the years in the past 16 years period claim ratio (claim to premium ratio) was more than 100 per cent under NAIS scheme and reverse in case of WBCIS and MNAIS which were commercial schemes and mostly implemented with the participation of private insurance companies along with AIC of India, the Public Sector Undertaking.

From the point of view of insurance company, regulator and the exchequer, claim ratio analysis is an important aspect as it tells how much is paid as claims from the premium income. Average claim ratio under NAIS was 450 per cent, in MNAIS 89 per cent and in WBCIS it was about 72 per cent. It means, from every 100 rupees premium received, 450, 89 and 79 rupees were paid as claims, respectively in NAIS, MNAIS and WBCIS schemes. From this it can be concluded that it is not possible to run crop insurance schemes as like NAIS by charging flat low premium since it was not possible to meet the claims from premium income. When risk premium was charged under commercial schemes *viz.* MNAIS and WBCIS, it was profitable for insurance companies and exchequer too. But when there was a cap on risk premium charged in commercial schemes during 2013 *Rabi* season and 2014 *Kharif* and *Rabi* seasons², it was reflected in reduced claims and claim ratio was less during the time. In case of WBCIS, weather triggers which forms the basis for claim settlement were set to match with capped premium and so it reflected in worst claim ratio under WBCIS during 2014. Being WBCIS a profit making business, private insurance companies have shown much interest in the scheme and actively participated. Because of this, weather trigger setting become a number game, technically difficult for the government to evaluate and resulted in worst performance year after year and at last Government of Karnataka decided to withdraw the scheme during the year 2015.

Next, analysis on premium collected and claim settled under WBCIS scheme was done in comparison with NAIS and MNAIS schemes and results are presented in Table 6. Average premium rate¹ indicates premium charged for every 100 rupees sum insured and average claim rate (cost)² indicates for every 100 rupees sum insured how much was paid as claims. When we compare the average premium rate (premium to sum insured ratio) of three crop insurance schemes, in all the years average premium rate of NAIS was the lowest

followed by WBCIS and MNAIS. When we compare the average claim rate (claim to sum insured ratio) over which loadings were done to arrive at commercial premium it was less than the premium rate in all the years under MNAIS and WBCIS and reverse in case of NAIS. Pricing multiple³ explains the premium loadings⁴ done to arrive at commercial premium quoted by insurance companies. For example if claims are on an average two rupees and premium charged is three rupees, then pricing multiple is 150 per cent. From the analysis, we come to know that loading was on an average 247 per cent in case of MNAIS and 171 per cent in case of WBCIS. Premium loading which takes care of business procurement expenses, claim handling expenses and profit margin should be maintained at reasonable level so that premium rate will be affordable for farmers. In case of NAIS, premium was not sufficient to meet the claim expenses which were known from the pricing multiple which was less than 100. Under MNAIS scheme, during 2013 pricing multiple was 800 per cent which shows how insurance companies were heavily loaded the premium and earned huge profit whose books were also protected through reinsurance arrangements.

In crop insurance, sum insured indicates maximum amount of risk assumed by the insurance company. Likewise risk compensated is the amount of claim settled against the risk of loss to the farmer. Premium rates and claims are expressed as a percentage of sum insured. Analysis of this risk assumed and risk compensated reveals many facts such as how much risk of farmer is insured and against the insured risk how is compensated. The result of this analysis under various crop insurance schemes in Karnataka is presented in Table 7. The base for sum insured in crop insurance schemes is the scale of finance fixed by the banks since scale of finance is fixed based on the cost of cultivation of the crops. When there is loss of crop, farmer is going to lose all the expenses incurred to cultivate the crop and so scale of finance formed the basis for sum insured in crop insurance. Under WBCIS, loss of yield was estimated by proxy index of weather parameters. Weather triggers leading to loss of yield and compensation per unit of trigger above/below the benchmark for each phase of crop growth is defined and maximum sum insured for each phase is also defined and that is called termsheet. Premium is also quoted based on the above term sheet. *i.e.* Sum insured and premium rates are predefined in

the term sheet. But in case of yield based insurance schemes sum insured was fixed differently for loanee and non-loanee farmers.

In NAIS scheme sum insured was the loan amount disbursed for loanee farmer and it was product of Threshold Yield (TY) and Minimum Support Price for nonloanee farmers. Actual total risk of a farmer is the loss in input cost expenses and loss of output. Sum insured basis for loanee farmers covers part of input cost expenses and for non-loanee farmers it covers the risk of loss in output only and so both the basis of sum insured were less than the actual total risk of crops. Later under MNAIS scheme improvement was made in the definition of sum insured as loan sanctioned for loanee farmers and improvement in the definition of TY led to increase in sum insured per hectare for nonloanee. Under MNAIS scheme, TY was defined as the average yield of recent past seven years excluding maximum two declared calamity years yield multiplied by the Indemnity Level (IL). The same in NAIS was defined as three (for paddy and wheat) or five (for other crops) years average yield multiplied by IL. In NAIS ILs were 60%, 80% and 90% for high, moderate and low risks which was improved to 70%, 80% and 90% in MNAIS which further improved to 80% and 90% later. So per hectare average sum insured was comparatively better in MNAIS and WBCIS scheme than NAIS scheme.

WBCIS scheme was really proposed to manage moderate risk or catastrophic risk of crops. Per cent insured farmers received claims shows that under WBCIS scheme, more insured farmers received claims than other two schemes. It means there were frequent claim payments under WBCIS scheme, which was also reflected in less per farmer claims than other two schemes. It also indicates that under WBCIS small risks were compensated or small amount of benefit was given regularly instead of compensating adequately when there was a huge loss and also led to high premium rates because of frequent claim payment. Performance of the crop insurance scheme cannot be judged alone from claim payout to more farmers but need to be judged from adequate compensation when there was a loss.

Summary and Conclusion :

In Karnataka about 90 per cent of the crop insurance premium was collected during *Kharif* crop season and remaining during *Rabi* and Summer season.

District wise analysis of crop insurance schemes' performance in Karnataka reveals that there was huge decline in area covered under crop insurance in some districts where pulses were mainly insured due to the introduction of commercial schemes *viz.* MNAIS and WBCIS where high premium was charged for these crops. At the same time due to the introduction of same schemes in some other districts where commercial and horticultural crops were mainly grown crop insurance area coverage increased. Crop wise analysis reveals that insurance coverage under pulses and oilseed crops reduced during past six years due to high premium charged under commercial schemes *viz.* WBCIS and MNAIS. It also reveals that only major cereals, pulses and oilseed crop were insured and minor crops were less insured. It can also be interpreted that government and insurance industry haven't shown much interest in protecting low value crops from crop loss.

Comparative performance analysis of insurance schemes in Karnataka reveals that for every 100 rupees premium received, 450, 89 and 79 rupees were paid as claims, respectively in NAIS, MNAIS and WBCIS schemes. From this it can be concluded that it is not possible to run crop insurance schemes as like NAIS by charging flat low premium but when risk premium was charged under commercial schemes *viz.* MNAIS and WBCIS, it was mainly profitable for insurance companies and but not for farmers. Average premium rate charged was high in MNAIS followed by WBCIS and low in NAIS. But the average claim rate (claim to sum insured ratio) over which loadings were done to arrive at commercial premium, was less than the premium rate in all the years under MNAIS and WBCIS and reverse in case of NAIS. Premium loading which takes care of profit, expenses other than claims were high enough making commercial insurance schemes unaffordable for farmers. Analysis of risk compensation reveals that under WBCIS, more insured farmers received claims than other two schemes. It means that there were frequent claim payments under WBCIS scheme, which was also reflected in less per farmer claims than other two schemes. It can be interpreted that under WBCIS small risks were compensated regularly instead of compensating adequately when there was a huge loss also leading to high premium rates. From the analyses above it can be concluded that reducing the premium rates under WBCIS and making the scheme pay for large

losses so that farmers themselves manage small and moderate risks will only help in revival of the scheme for which it was originally proposed in the country.

Endnote:

¹This is based on details of legal cases collected from legal department of AIC of India.

²It is calculated based on the season wise data collected for past 16 years.

³Maximum premium under NAIS was 3.5% for *Kharif* and 2.5 % for *Rabi* season. Additional subsidies were there for small and marginal farmers under NAIS. Under commercial schemes, subsidy rates and minimum premium were defined for different premium slabs. For the last premium slab under which most of the crops fall 6% net premium was payable.

⁴Information sourced from correspondence made by State government with Ministry of Agriculture on poor performance of WBCIS during 2014 while stating reason for withdrawal of WBCIS during 2015.

⁵Claim ratio: Claim to Premium ratio

⁶See details at Modified National Agriculture Insurance Scheme *Rabi* Summer 2015-16 Government Order (Government of Karnataka (2015)).

⁷See details in National Crop Insurance Programme (NCIP) Operational Guidelines at www.agri-insurance.gov.in.

⁸Premium rate: Premium as a percentage of Sum Insured

⁹Claim rate (cost): Claim as a percentage of Sum Insured

¹⁰Pricing multiple: Premium rate above the pure claim rate expressed as a percentage of sum insured (Average Premium rate/Average Claim rate). It explains the premium loadings done.

¹¹Premium loadings: In insurance other than claims, insurer incurs cost such as commission to procure the business, administrative expenses, expenses for claim processing and settlement etc. While calculating the commercial premium insurer loads the pure premium *i.e.* claim cost with commission, procurement expenses, claim related expenses and for profit. These are called premium loadings.

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