

# **Technical Note on Pricing of Pradhan Mantri Fasal Bima Yojana (PMFBY)**

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## 1. Introduction

The Company is proposing to participate in the government driven Insurance scheme “Pradhan Mantri Fasal Bima Yojana” that provides coverage for standing crops (sowing to harvesting), prevented sowing/planting risk, post harvest losses and localized calamities. The Company has been participating in a similar product named “Modified National Agricultural Insurance Scheme”.

The “Pradhan Mantri Fasal Bima Yojana” Insurance scheme would be provided to farmers under the aegis of both central as well as state government. The allocation of clusters for each state would be done by the respective state government on the basis of tender undertaken for both Kharif and Rabi Seasons. PMFBY would be backed up by the subsidies provided by both central and state government in equal share.

## 2. Premium:

The premium under the scheme shall be charged as per the rates based on the actuarial premium calculation for different clusters in a particular state. The rates would vary on Crop-Season basis. As per PMFBY, the bifurcation of premium charged would be:

Season/Crop	Farmer's rate of premium	Government's rate of premium
Kharif	2.0%	Actuarial Premium Rate - Farmer's Share of Premium
Rabi	1.5%	Actuarial Premium Rate - Farmer's Share of Premium
Horticulture	5.0%	Actuarial Premium Rate - Farmer's Share of Premium

The Insurance Cover would be backed up by **Quota Share treaty** with retention limit of 20% (Twenty Percent).

## 3. Pricing Details

**(a) Rating Factor:** Past available data is priced using “Yield in kg per Hectare” as the rating factor. The historical yield data is usually available at Taluka/Tehsil/Block/Revenue Circle/Gram Panchayat level with the state governments.

Based on the rating factor, the Gross Premium rates and the Sum Insured in a district usually ranges as per the following table:

Particulars	Minimum	Maximum
Gross Premium Rate	0.5%	90.0%
Sum Insured (Per Hectare)	4,000	250,000*
Insured Area Sown (No. of Hectares)	1,000	200,000**
Sum Insured Amount (In Lacs)	40	500,000

\* The concerned government authority could still revise the amount of Sum Insured per Hectare for every crop.

\*\* Subject to actual crop area insured.

**(b) Calculation of “Yield in kg per Hectare” and Weighted Premium Rate:**

Since, “Yield per Hectare” is the rating factor, the calculation of weighted risk premium rates is done on the basis of past available data for “Yield per Hectare”.

In table below, assumed yield of paddy under PMFBY program during the last 7 years (for Kharif season) is given for an insurance unit area.

Year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Yield in kg/ha	4,500	3,750	2,000	4,250	1,800	4,300	1,750

The years 2011-12, 2013-14 and 2015-16 were declared as natural calamity years (for Kharif season). The total yields of 7 years is 22,350 kg/ha and that of 2 bad calamity years (2013-14 and 2015-16) is 3,550 kg/ha i.e. (1,800+1,750).

Therefore according to the guidelines, average yield of past seven years excluding maximum 2 calamity years will be  $(22,350 - 3,550 = 18,800/5)$  i.e. 3,760 kg/ha.

Hence, Threshold yield at 90% of indemnity levels will be 3,384 kg/ha.

The Authority may note that, the Company uses the pricing software “Agro Risk Metrics-(Y)” to calculate the premium rates.

Weighting Premium Rates - risk premium at applicable indemnity levels for each insurance unit is multiplied by weights of area covered corresponding to each insurance unit i.e.

$$\text{Weighted Premium Rate} = \frac{\text{Sum of [(for each insurance unit) risk premium}^{\#} \times \text{weights of area covered]}}{\text{Total of weights of area covered for each insurance unit}}$$

<sup>#</sup>where risk premium is the percentage of losses occurred as per the past available data.

The following illustration of Uttarakhand State for the given districts shows the calculation of risk premium Rate using weighted premium:

District	Blocks	Risk Premium	Area Sown	Weights
Chamoli	Chamoli	3.1%	5,582	41.0%
	Karnaprayag	5.9%	4,423	33.0%
	Tharali	1.9%	3,466	26.0%
<b>Total</b>			<b>13,471</b>	

In the table above, assuming risk premium of paddy for 3 blocks under PMFBY program for Kharif season 2014-15 has been computed. According to area sown, weights are assigned to each block. Hence,

$$\text{Weighted Premium Rate} = \frac{(3.1\% \times 41.0\%) + (5.9\% \times 33.0\%) + (1.9\% \times 26.0\%)}{(41\% + 33\% + 26\%)} = 3.7\%$$

Hence, the risk premium rate for Paddy Crop is 3.7%.

#### (c) Loading Factors:

The following loading factors are applied on risk premium:

Particulars	Percentage
Portfolio Loss Ratio	80.0%
Administrative Expenses*	12.0%
Other Contingencies	5.0%
Profit Margin	3.0%
Total	100.0%

\*Administrative Expenses include salaries, office expenses, cost of monitoring of crop cutting experiments and Automatic Weather Stations (AWS), bank service charges etc.

As per the guidelines of PMFBY, the premium for the farmer's share is collected by banks for loanee farmers. Hence, the service charges is directly payable to banks at the rate of **4% of farmer's share of premium** as per the following illustration:

The **Actuarial Premium Rate** allocated by the state government for Paddy Crop in Kharif Season is **4.6%** for a particular district with Sum Insured of ₹ 1,00,000. Then as per the PMFBY Guidelines, farmer's share would be 2.0%. Hence,

Particulars	Amount
Premium To be Received by Insurance Company	₹ 4,600
Farmer's Share of Premium	₹ 2,000 (i.e. 2.0%*1,00,000)
Government Share of Premium	₹ 2,600 (i.e. (4.6%-2.0%)*1,00,000)

Service charges payable would be only on farmer's share of premium at the rate of **4.0%** i.e.

Service charges = Farmer's share of premium \* 4.0%

= ₹ 2,000 \* 4.0%

= ₹ 80

Hence, Percentage of Service charges payable to banks is ₹ 80 / ₹4,600 = 1.7% which is close to 1% of the Gross Premium.

For Non-Loanee Farmers (which are usually less than 5%), the premium can be collected either by banks or by rural agents. The Service charges for Non-Loanee farmer's share of premium is 4% for banks and agency commission upto 15% is payable to rural agents.

#### 4. Premium Calculation :

Following range scenarios have been worked out reflecting the detailed statistics:

##### Case:1 When Sum Insured is Maximum.

(Amounts in Lacs)

Premium	Area Sown (Insured) in H.a (1)	Sum Insured per Ha (2)	Sum Insured Amount (3)=(1)*(2)	Gross Premium Rate (in %) (4)	Gross Premium Amount (5)=(3)*(4)	Risk Premium Rate (in %) (6)	Expected Loss (7)=(6)*(3)	Administrative Expenses (8)=(5)*12%	Other Contingencies (9)=(5)*5%	Profit (10)=(5)*3%
Maximum	200,000	2.50	500,000	90.0%	450,000	72.0%	360,000	54,000	22,500	13,500
Minimum	200,000	2.50	500,000	0.5%	2,500	0.4%	2,000	300	125	75

##### Case:2 When Sum Insured is Minimum.

(Amounts in Lacs)

Premium	Area Sown (Insured) in H.a (1)	Sum Insured per Ha (2)	Sum Insured Amount (3)=(1)*(2)	Gross Premium Rate (in %) (4)	Gross Premium Amount (5)=(3)*(4)	Risk Premium Rate (in %) (6)	Expected Loss (7)=(6)*(3)	Administrative Expenses (8)=(5)*12%	Other Contingencies (9)=(5)*5%	Profit (10)=(5)*3%
Maximum	1000	0.04	40	90.0%	36	72.0%	28.80	4.32	1.80	1.08
Minimum	1000	0.04	40	0.5%	0.20	0.4%	0.16	0.02	0.01	0.01

## 5. Scenario Testing:

The Following Scenarios have been tested for assessing the effect of changes in loading factors:

### Assumptions under Optimistic Scenario are:

- Expected Losses decrease by 5%.

### Assumptions under Pessimistic Scenario are:

- Expected Losses increase by 5%.

The detailed statistics are as follows:

SCENARIO	EXPECTED LOSSES	MANAGEMENT EXPENSES	OTHER CONTINGENCIES	PROFIT MARGIN	COMBINED RATIO
Base Scenario	80.0%	12.0%	5.0%	3.0%	97.0%
Optimistic Scenario	76.0%	12.0%	5.0%	7.0%	93.0%
Pessimistic Scenario	84.0%	12.0%	5.0%	-1.0%	101.0%

## 6. Company's Past Experience:

The Company had been participating in a similar yield based crop insurance scheme "Modified National Agricultural Insurance Scheme" till Financial Year 2015-16. Company's experience for last 5 years of each season is:

Database of Modified National Agricultural Insurance Scheme (MNAIS)					
Scheme	Season	Sum Insured (Rs. in Lakh)	Total or Gross Premium (Rs. in Lakh)	Total Claims payable (Rs. in Lakh)*	Loss Ratio
MNAIS	Kharif 2011	1,157.8	91.0	10.8	11.8%
MNAIS	Rabi 2011 -12	5,991.8	184.3	39.1	21.2%
MNAIS	Kharif 2012	6,131.3	663.9	10.9	1.6%
MNAIS	Rabi 2012 -13	3,207.0	83.0	114.0	137.4%
MNAIS	Kharif 2013	3,051.7	294.8	48.2	16.3%
MNAIS	Rabi 2013 -14	1,226.1	34.0	5.1	14.9%
MNAIS	Kharif 2014	61,904.8	4,212.0	3,823.1	90.8%
MNAIS	Rabi 2014 -15	27,111.3	2,002.2	7,152.2	357.2%
MNAIS	Kharif 2015	62,372.9	4,326.0	4,418.3	102.1%

## **7. Conclusion & Recommendation**

From the Company's perspective, the pricing of the product is deemed fair and adequate considering the potential target market and coverage provided by the policy.

This product is funded majorly by subsidies from state as well as central government. Concerned government agencies would subsidize the premium as per the guidelines under PMFBY scheme.

The Product is targeted to the farmers as per the clusters allotted for each state by the respective state government.

From the farmer's perspective, the insurance coverage would start as per the notifications by the respective government agencies.

In light of the above mentioned aspects, the pricing of the product is deemed fair and reasonable and so the Authority is requested to kindly approve this product.