

Claim Settlement Efficiency of Crop Insurance in India: A Comparative Study of Public and Private Sector Insurers under PMFBY with Special Reference to Karnataka

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ABSTRACT

Crop insurance is the main financial safety net for Indian farmers against natural calamities, and the completeness and speed of claim settlement decide how quickly farmers recover from a loss. Under the Pradhan Mantri Fasal Bima Yojana (PMFBY), launched in 2016, the scheme is implemented by public and private sector general insurers selected by State Governments through bidding. This study compares public and private insurers on several indicators of claim settlement efficiency, with special reference to Karnataka: claim ratio, claim settlement ratio, unsettled admissible claims, settlement status at a fixed date, claims settled as a share of claims filed, and pending claims. It uses secondary data from the 29th Report of the Parliamentary Standing Committee on Agriculture (2021), Rajya Sabha replies released by the Press Information Bureau, and official PMFBY statements. Company-wise data of 18 insurers for 2016-17 to 2019-20, a period before the Kharif 2020 revamp of the scheme, are analysed using Welch's t-test, the Mann-Whitney U test, permutation and bootstrap checks, and a regression controlling for portfolio size. Public sector insurers paid 95.3 per cent of gross premium as claims during 2016-17 to 2018-19, against 77.6 per cent for private insurers; the difference in mean company-level claim ratio is significant at the 10 per cent level ($p = 0.065$) but not at 5 per cent, and the regression estimate is sensitive to individual insurers. Once claims were admitted, both sectors settled about 97 per cent of them, but settlement status at a fixed date varied widely across companies. In Karnataka, the claim ratio of public insurers exceeded that of private insurers in every year, and the gap persists after standardising for year. Karnataka also had very low pending claims as of June 2025. Data on processing time, rejection and farmer satisfaction are not publicly available, so published farmer surveys are reviewed and a primary survey design is proposed. The paper suggests risk-balanced clustering, company-wise public disclosure including claim timelines, and stronger enforcement of the 12 per cent penalty for delay.

Keywords: Crop Insurance, PMFBY, Claim Ratio, Claim Settlement Efficiency, Multi-indicator Assessment, Public and Private Insurers, Karnataka

INTRODUCTION

Agriculture in India is a gamble on the monsoon. Droughts, floods, unseasonal rain, pests and hailstorms can wipe out a season's income in a few days. For a small or marginal farmer, a single crop failure can mean selling assets, borrowing from moneylenders or leaving farming altogether. Crop insurance is designed to prevent this by transferring part of the risk from the farmer to an insurer.

India has experimented with crop insurance since 1985. The Pradhan Mantri Fasal Bima Yojana (PMFBY), introduced from Kharif 2016, replaced the earlier National Agricultural Insurance Scheme and its modified version. Farmers pay a low, uniform premium of 2 per cent of the sum insured for Kharif crops, 1.5 per cent for Rabi crops and 5 per cent for annual commercial and horticultural crops. The balance of the actuarial

premium is shared by the Central and State Governments (Standing Committee on Agriculture, 2021). The scheme has grown into one of the largest crop insurance programmes in the world. Farmer enrolment rose from 3.17 crore in 2022-23 to 4.19 crore in 2024-25, the highest since inception (PIB, 2025a).

A distinctive feature of PMFBY is that it is implemented through insurance companies selected by each State through a bidding process. These include five public sector companies, namely Agriculture Insurance Company of India (AIC), National Insurance, New India Assurance, Oriental Insurance and United India Insurance, and a number of private sector companies. Since most of the premium is paid from public funds, a natural question arises: do public and private insurers differ in how much of the premium they return to farmers as claims, and in how efficiently they settle those claims? This question has been raised repeatedly in Parliament and in the media, but it has received limited systematic analysis in the academic literature. This paper attempts to answer it using official company-wise data, and examines the position of Karnataka in particular.

Timely settlement matters as much as the amount paid. A farmer who waits many months for compensation may miss the next sowing window or have to borrow again, and delays reduce the value of insurance to the farmer (Clarke et al., 2012). Field studies in Karnataka report delay in claims as the most common complaint (Darshan et al., 2021; Pancharatnam et al., 2020). Claim settlement efficiency is therefore treated in this paper as a multi-dimensional concept and not as a single number. The comparison of public and private insurers is also interpreted with care, because differences in claim outcomes can arise from the risk of the clusters allocated, the year, the State and the quality of yield data, and not only from who owns the insurer.

Claim Settlement Process under PMFBY

Understanding the claim process is necessary to interpret the data. Under PMFBY, yield-based claims are calculated at the level of an insurance unit (usually a village or Gram Panchayat for major crops). The State Government conducts Crop Cutting Experiments (CCEs) and supplies the actual yield data. If the actual yield falls below the threshold yield, the shortfall is multiplied by the sum insured to arrive at the claim. Localised calamities and post-harvest losses are assessed at the individual farm level by a joint committee of the State and the insurance company (Standing Committee on Agriculture, 2021).

Claims are expected to be paid within about two months of the completion of CCEs or harvest, subject to the State releasing its share of premium subsidy. From Rabi 2018-19, insurers delaying payment beyond the cut-off date are liable to pay 12 per cent interest per annum to farmers, and States delaying their subsidy share are liable to pay interest to insurers. From Kharif 2022, a Digicclaim module integrating the National Crop Insurance Portal with the Public Financial Management System has been used for claim payments, and from Kharif 2024 the 12 per cent penalty is calculated automatically on the portal. From Kharif 2025, States must deposit their premium share in advance in an escrow account (PIB, 2025b). Thus, settlement efficiency depends not only on the insurer, but also on the State Government, banks and the quality of yield data.

Policy phases and comparability. The rules of PMFBY have changed several times, so figures from different years are not always comparable. Table 1 groups the years used in this study into three phases. All company-wise comparisons of public and private insurers fall in Phase I, before the Kharif 2020 revamp (Prime Minister's Office, 2020), so they are not affected by that change. Even within Phase I, the 12 per cent penalty for delayed payment applied only from Rabi 2018-19, that is, to the last of the three complete years analysed. Later figures belong to Phases II and III, when enrolment rules, subsidy sharing and payment systems were different. They are reported separately and are not compared directly with Phase I figures.

Table 1: PMFBY Policy Phases and their Relevance to the Data Used in this Study

Phase	Period	Key features relevant to claim settlement	Data used in this paper
I	Kharif 2016 to Rabi 2019-20	Scheme launched; compulsory for loanee farmers and voluntary for others; no cap on the Centre's premium subsidy; 12 per cent interest on delayed claims from Rabi 2018-19	Company-wise analysis (2016-17 to 2019-20); national and Karnataka trends (2016-17 to 2019-20)

II	Kharif 2020 to Rabi 2021-22	Revamp: enrolment voluntary for all farmers; Central subsidy limited to premium rates of 30 per cent (unirrigated) and 25 per cent (irrigated); business allocated to insurers for three years; States delaying subsidy barred from later seasons; eight insurers exited in 2021-22	National and Karnataka trends (2020-21 and 2021-22)
III	Kharif 2022 onwards	Digiclim module for claim payment from Kharif 2022; automatic calculation of the 12 per cent penalty from Kharif 2024; State premium share in advance in an escrow account from Kharif 2025	Pending claims as on 30 June 2025 (descriptive only)

Source: Prepared by the authors from Prime Minister's Office (2020), Standing Committee on Agriculture (2021) and PIB (2025b); exit of insurers from ThePrint (2022).

REVIEW OF LITERATURE

Raju and Chand (2008) reviewed agricultural insurance in India before PMFBY and identified low coverage, delays in claim payment and weak loss assessment as the main problems. They argued that the design of insurance units and the reliability of yield data were central to the success of any crop insurance scheme.

Mahul and Stutley (2010), in a World Bank study of agricultural insurance across developing countries, showed that public-private partnerships can improve efficiency, but only when governments design clear rules for risk sharing, data provision and claim settlement. They cautioned that poorly designed partnerships may leave governments bearing the costs while private firms capture the gains.

Clarke, Mahul, Rao and Verma (2012) examined weather-based crop insurance in India and found that basis risk and delays in claim payments reduced the value of insurance to farmers. Their work highlighted the importance of speed of settlement, not just the amount paid.

The Comptroller and Auditor General of India (2017), in its performance audit of crop insurance schemes preceding PMFBY, reported delays in the release of funds and in the settlement of claims, and weak monitoring of implementing insurance companies by the government.

Gulati, Terway and Hussain (2018) evaluated the first year of PMFBY. They noted that the removal of the cap on premium rates caused a sharp jump in gross premium, and that claim ratios should be assessed over a cycle of good and bad years rather than a single year. They recommended greater use of technology such as remote sensing and drones for faster yield estimation.

Tiwari, Chand and Anjum (2020) reviewed PMFBY and identified low awareness, delays in claim settlement and the dependence on State-level data as major implementation gaps. The Parliamentary Standing Committee on Agriculture (2021) examined the scheme in detail, published company-wise premium and claims data, and recommended time-bound penalties for insurers that delay claims.

Studies that ask farmers directly point in the same direction. A process evaluation of PMFBY in Karnataka, which combined a farmer survey, focus group discussions and stakeholder interviews in four taluks, found that delays in crop cutting experiment results, insurers contesting yield estimates and enrolment errors held up claim payments, that farmers were often not told whether they were eligible for a claim, and that Kharif 2016 claims were not fully settled even in October 2017 (Pancharatnam et al., 2020). A survey of 120 insured farmers in Tumkur district in 2020-21 ranked delay in receiving claims first among the constraints they faced (81.67 per cent), followed by low compensation and a complicated claim procedure (Darshan et al., 2021). These studies do not compare insurers by ownership, which is the question taken up here.

Research Gap

Existing studies mostly evaluate PMFBY as a whole: its coverage, premium burden and overall claim ratio.

Very few studies statistically compare public and private insurers using company-wise official data, fewer still examine this comparison at the level of an individual State, and almost none combine it with more than one indicator of settlement or with evidence on farmers' experience. Karnataka, which is among the States with the largest premium volumes and highly variable weather, has received limited attention in this respect. The present study attempts to fill part of this gap using official secondary data and published farmer surveys. Claim-level timelines and a primary farmer survey are left for further work (Section 11).

Objectives of the Study

1. To analyse the trend of gross premium, claims paid and claim ratio under PMFBY at the national level.
2. To compare public and private sector insurers on several indicators of claim settlement efficiency: claim ratio, claim settlement ratio, unsettled admissible claims and settlement status at a fixed date.
3. To test whether the differences between the two sectors are statistically significant, and whether they persist after controlling for portfolio size and after adjusting for year and State conditions.
4. To evaluate the performance of crop insurance in Karnataka in relation to the national average, across sectors, and in terms of pending claims.
5. To review farmers' experience of claim settlement in Karnataka from published surveys and to outline a primary survey design.
6. To suggest measures for improving claim settlement efficiency under PMFBY.

Hypotheses

H01: There is no significant difference between the mean claim ratio of public sector and private sector insurers under PMFBY.

H02: There is no significant difference between the mean claim settlement ratio of public sector and private sector insurers under PMFBY, measured over 2016-17 to 2018-19 and as settlement status for 2019-20.

H03: After controlling for portfolio size (gross premium), there is no significant association between insurer sector and claim ratio.

RESEARCH METHODOLOGY

Nature and Sources of Data: The study is analytical and based on secondary data. Company-wise premium, admissible claims and paid claims for 2016-17 to 2019-20 are taken from the 29th Report of the Parliamentary Standing Committee on Agriculture (2021), which also provides company-wise data for Karnataka. State-wise and year-wise premium and claims for 2016-17 to 2021-22 are taken from a Rajya Sabha reply released by PIB (2023). Data on pending claims as of 30 June 2025 are taken from PIB (2025b). Only aggregate data published by the Government are used. Claim-level records, the number of days taken to settle claims, rejection data and farmer-level data are not available in the public domain. Evidence on farmers' experience is therefore taken from published field studies (Pancharatnam et al., 2020; Darshan et al., 2021).

Sample: All 18 insurance companies that implemented PMFBY during 2016-17 to 2019-20: five public sector and thirteen private sector companies.

Period of Study: The period for each analysis is as follows. (i) Company-wise analysis: 2016-17 to 2018-19 (three complete years), with 2019-20 used only to assess settlement status as on 14 December 2020. (ii) National and Karnataka year-wise trends: 2016-17 to 2021-22. (iii) Karnataka public-private comparison: 2016-17 to 2018-19. (iv) Pending claims: seasons 2020-21 to 2024-25, as on 30 June 2025. Data for 2022-23 are excluded from (i) to (iii) because claims for that year were still being processed when the data were

released. As Table 1 shows, items (i) and (iii), and the years 2016-17 to 2019-20 of item (ii), lie wholly in Phase I of the scheme, so the sector comparisons are not affected by the Kharif 2020 revamp. The last two years of item (ii) lie in Phase II, and the pending claims in item (iv) in Phases II and III. These are reported descriptively and are not compared with Phase I figures.

Tools of Analysis: Claim settlement efficiency is treated as multi-dimensional. Table 2 lists the indicators, how each is defined, and whether it can be measured with public data. The two main ratios are:

(a) Claim Ratio (CR) = $(\text{Claims Paid} \div \text{Gross Premium}) \times 100$. It shows how much of the premium is returned to farmers as claims.

(b) Claim Settlement Ratio (CSR) = $(\text{Claims Paid} \div \text{Admissible Claims}) \times 100$. It shows how much of the claims admitted as payable have actually been paid.

In addition, unsettled admissible claims are measured as Admissible Claims minus Claims Paid, which equals 100 minus CSR when expressed as a percentage. For Karnataka, the ratio of claims settled to claims filed and the amount of pending claims are also used.

Table 2: Indicators of Claim Settlement Efficiency and Data Availability

Indicator	Definition	Status in this study
Claim ratio (CR)	$\text{Claims paid} \div \text{gross premium} \times 100$	Measured: company, sector, State, India
Claim settlement ratio (CSR)	$\text{Claims paid} \div \text{admissible claims} \times 100$	Measured: company and sector
Unsettled admissible claims	Admissible claims minus claims paid (Rs. crore, and $100 - \text{CSR}$)	Measured: company and sector
Settlement status at a fixed date	CSR for 2019-20 as on 14.12.2020, observed for all insurers on the same date	Measured: used as a proxy for speed of settlement
Claims settled as a share of claims filed	$\text{Claims settled} \div \text{claims filed} \times 100$	Measured: Karnataka, by sector, 2016-19
Pending claims	Claims pending (Rs. crore) by State and season, as on 30 June 2025	Measured: State-wise, not insurer-wise
Processing time (days)	Days from loss or yield data to payment	Not available in public data; settlement status at a fixed date used as proxy
Rejection rate	$\text{Claims rejected} \div \text{claims filed}$	Not available insurer-wise; unsettled admissible claims is the nearest measure
Farmer satisfaction	Farmers' views on access, transparency, communication and fairness	Not in official data; published surveys reviewed (Section 8.10); survey proposed (Section 11)

Source: Prepared by the authors.

Statistical Methods: Welch's independent samples t-test is used to compare the means of the two sectors, because the two groups have unequal sizes and unequal variances (Levene's test $p = 0.62$; Shapiro-Wilk tests do not reject normality, $p = 0.21$ for public and 0.26 for private insurers, although power is low with five public insurers). Since the samples are small, the non-parametric Mann-Whitney U test, a permutation test (20,000 random reassignments of insurers to sectors) and bootstrap confidence intervals are used as robustness checks, and the standardised effect size is reported as Hedges' g . The comparison is repeated after excluding AIC, which alone accounts for about 62 per cent of public sector premium, and with premium

weights. To control for differences in portfolio size, claim ratio is regressed on a public-sector dummy and the natural log of gross premium (a proxy for claim volume) by ordinary least squares, with HC3 heteroscedasticity-robust standard errors as a check and leave-one-out re-estimation to test sensitivity to single insurers. Crop type, district, loss severity and documentation are not published insurer-wise and so cannot be included as controls. For Karnataka, the sector comparison is standardised by year using common premium weights, which holds weather and State conditions constant. Significance is tested at the 5 per cent and 10 per cent levels. Because several tests are run on small samples, results close to these thresholds are read as indicative and not conclusive. The analysis was carried out in Python (SciPy and statsmodels).

Data Analysis and Interpretation

National Trend of Premium, Claims and Claim Ratio

Table 3: Gross Premium, Claims Paid and Claim Ratio under PMFBY, 2016-17 to 2021-22

Year	Gross Premium (Rs. crore)	Claims Paid (Rs. crore)	Claim Ratio (%)
2016-17	21,949.87	16,826.75	76.7
2017-18	24,468.36	22,087.97	90.3
2018-19	29,687.75	29,336.91	98.8
2019-20	32,362.06	27,372.97	84.6
2020-21	31,689.95	20,771.05	65.5
2021-22	29,598.43	17,881.43	60.4
Total	1,69,756.42	1,34,277.08	79.1
Mean (SD)			79.4 (14.7)

Source: PIB (2023), Rajya Sabha reply dated 21 July 2023. Ratios computed by the author.

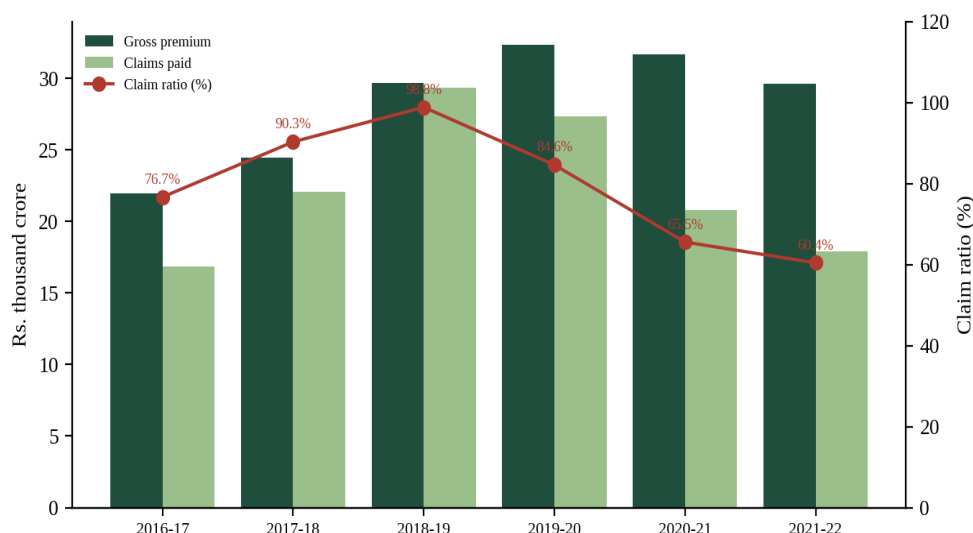


Figure 1: Gross Premium, Claims Paid and Claim Ratio under PMFBY

Source: Based on Table 3.

Interpretation: Gross premium grew at a compound annual rate of about 6.2 per cent between 2016-17 and 2021-22. Over the six years, insurers paid Rs. 1,34,277 crore in claims against Rs. 1,69,756 crore of premium, giving an overall claim ratio of 79.1 per cent. The claim ratio rose to a peak of 98.8 per cent in 2018-19 and then declined steadily to 60.4 per cent in 2021-22. This decline coincided with the exit of eight insurers (four public and four private) in 2021-22 after heavy losses (ThePrint, 2022), and with the revamp of the scheme from Kharif 2020, when it was made voluntary for all farmers. It should be noted that the difference between

premium and claims is not pure profit, since insurers also bear reinsurance and administrative costs of about 10 to 12 per cent of gross premium (Standing Committee on Agriculture, 2021). Years 2016-17 to 2019-20 fall in Phase I of the scheme and 2020-21 and 2021-22 in Phase II (Table 1), so part of the later decline reflects changed scheme rules and not only insurer performance.

Sector-wise Comparison: Public versus Private Insurers

Table 4: Sector-wise Premium, Claims, Claim Ratio and Claim Settlement Ratio, 2016-17 to 2019-20

Year	Sector	Gross Premium (Rs. cr)	Admissible Claims (Rs. cr)	Claims Paid (Rs. cr)	CR (%)	CSR (%)
2016-17	Public	10,800.59	8,712.88	8,698.10	80.5	99.8
	Private	10,861.88	8,057.30	8,052.58	74.1	99.9
2017-18	Public	12,976.84	12,342.82	12,337.47	95.1	100.0
	Private	11,791.50	9,716.44	9,715.23	82.4	100.0
2018-19	Public	12,429.86	14,391.67	13,458.54	108.3	93.5
	Private	16,982.89	13,717.77	12,976.42	76.4	94.6
3 years	Public	36,207.29	35,447.37	34,494.11	95.3	97.3
	Private	39,636.27	31,491.51	30,744.23	77.6	97.6
2019-20*	Public	11,903.25	10,893.30	8,408.17	70.6	77.2
	Private	11,812.83	5,729.63	2,601.12	22.0	45.4

Source: Computed from Standing Committee on Agriculture (2021), para 2.27. *2019-20 claims were not finalised as on 14.12.2020; figures show settlement status at that date.

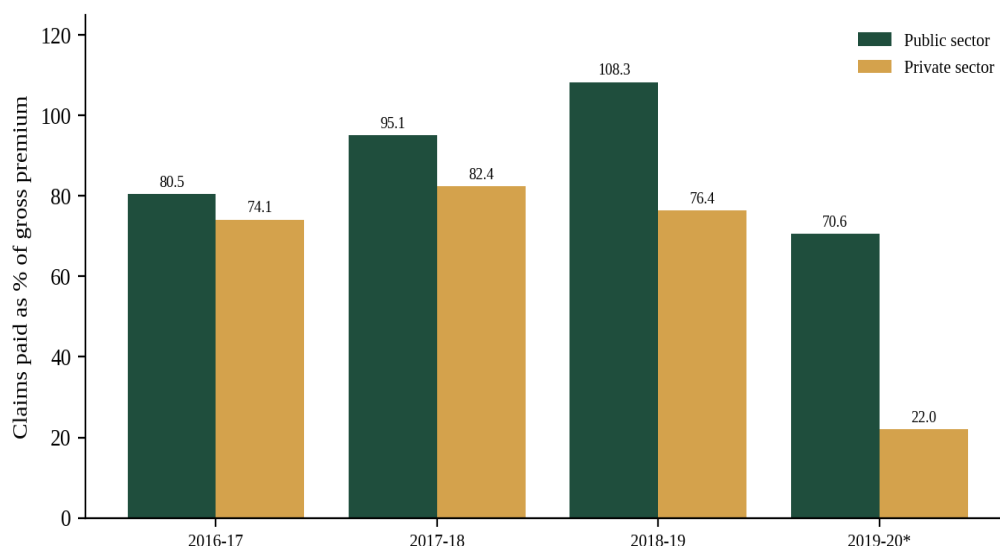


Figure 2: Claim Ratio of Public and Private Insurers

Source: Based on Table 4.

Interpretation: Premium was divided almost equally between the two sectors, yet their claim burdens were very different. Over the three complete years, public insurers returned 95.3 per cent of premium to farmers as claims, while private insurers returned 77.6 per cent. In rupee terms, the gap between premium received and claims paid was Rs. 1,713 crore for public insurers and Rs. 8,892 crore for private insurers. In 2018-19, public

insurers paid more in claims than they received as premium (108.3 per cent). Earlier analyses based on provisional data reported a similar pattern (Factly, 2019).

However, the Claim Settlement Ratio tells a different story. Once claims were admitted, both sectors paid about 97 per cent of them over the three years. The difference between the sectors therefore lies mainly in how much claim liability arose in their portfolios, not in their willingness to pay admitted claims. The 2019-20 status as on December 2020 shows that private insurers had paid only 45.4 per cent of admitted claims compared with 77.2 per cent for public insurers, which suggests slower settlement among some private companies in that year.

Unsettled admissible claims. Table 5 converts the settlement ratio into the amount of admissible claims still unpaid. Over 2016-17 to 2018-19, Rs. 953 crore (2.7 per cent) of public sector and Rs. 747 crore (2.4 per cent) of private sector admissible claims remained unpaid. For 2019-20, as on 14 December 2020, unpaid admissible claims were Rs. 2,485 crore (22.8 per cent) for public insurers and Rs. 3,129 crore (54.6 per cent) for private insurers, together Rs. 5,614 crore. Private insurers held about 35 per cent of the admissible claims for that year but accounted for about 56 per cent of the unpaid amount. This is a snapshot on one date. It depends on when yield data and the State subsidy were received, and it does not show how many days each claim took.

Table 5: Unsettled Admissible Claims by Sector

Period	Sector	Admissible Claims (Rs. cr)	Claims Paid (Rs. cr)	Unsettled (Rs. cr)	Unsettled (% of admissible)
2016-17 to 2018-19	Public	35,447.37	34,494.11	953.26	2.7
	Private	31,491.51	30,744.23	747.28	2.4
2019-20*	Public	10,893.30	8,408.17	2,485.13	22.8
	Private	5,729.63	2,601.12	3,128.51	54.6

Source: Computed from Table 4. *Status as on 14.12.2020; 2019-20 claims were not finalised on that date.

8.3 Company-wise Performance

Table 6: Company-wise Claim Ratio and Claim Settlement Ratio, 2016-17 to 2018-19

Company	Sector	Gross Premium (Rs. cr)	Claims Paid (Rs. cr)	CR (%)	CSR (%)	2019-20 CSR* (%)
AIC	Public	22,348.01	19,419.75	86.9	98.2	90.2
United India	Public	4,455.50	4,036.78	90.6	99.1	100
New India	Public	4,378.87	5,072.15	115.8	98.9	7.7
Oriental	Public	2,574.88	3,654.45	141.9	94.4	45.1
National	Public	2,450.03	2,310.98	94.3	89.2	94.8
ICICI Lombard	Private	7,122.70	6,805.97	95.6	93.1	—
HDFC ERGO	Private	6,181.11	4,738.83	76.7	99.8	99.8
Bajaj Allianz	Private	4,986.30	4,247.34	85.2	98.4	98.4
Reliance General	Private	4,326.00	2,513.19	58.1	100	6.5
IFFCO Tokio	Private	4,245.59	3,308.77	77.9	99.1	0.6
Universal Sompo	Private	3,591.13	2,041.36	56.8	99.7	66.3
SBI General	Private	3,135.80	2,054.94	65.5	98.1	90.8
Tata AIG	Private	2,517.67	2,440.61	96.9	99.5	—

Chola MS	Private	1,277.50	1,325.30	103.7	100	—
Bharti AXA	Private	913.13	433.23	47.4	86.1	9.5
Future Generali	Private	757.21	306.96	40.5	98.7	100
Royal Sundaram	Private	411.18	270.78	65.9	100	100
Shriram General	Private	170.95	256.95	150.3	100	—

Source: Computed from Standing Committee on Agriculture (2021). *Status as on 14.12.2020. “—” = company did not implement the scheme in 2019-20.

Interpretation: AIC alone collected Rs. 22,348 crore, nearly 30 per cent of all premium in the three years, confirming its role as the anchor insurer of the scheme. Among public insurers, Oriental (141.9 per cent) and New India (115.8 per cent) paid far more in claims than they received as premium. Among private insurers, claim ratios ranged widely, from 40.5 per cent (Future Generali) to 150.3 per cent (Shriram General, one year only). Several private insurers, such as Future Generali, Bharti AXA, Universal Sompo and Reliance General, had claim ratios below 60 per cent. This supports the concern, raised by farmer groups and commentators, that some private insurers were able to win relatively low-risk clusters (Tatsat Chronicle, 2023). The 2019-20 settlement status shows extreme variation even within each sector: IFFCO Tokio (0.6 per cent), Reliance General (6.5 per cent) and New India (7.7 per cent) had paid very little of their admitted claims, while HDFC ERGO and Future Generali had paid almost all.

Testing of Hypotheses

Table 7: Results of Welch’s t-test and Mann-Whitney U test

Variable	Public Mean (SD) n = 5	Private Mean (SD)	Welch t (p-value)	Mann-Whitney U (p-value)	Decision
Claim Ratio, 2016-19 (%)	105.9 (23.1)	78.5 (29.0), n = 13	2.10 (0.065)	51.0 (0.075)	H01 not rejected at 5%; rejected at 10%
Claim Settlement Ratio, 2016-19 (%)	96.0 (4.2)	97.9 (4.0), n = 13	-0.88 (0.410)	16.5 (0.124)	H02 not rejected
Claim Settlement Ratio, 2019-20 (%)	67.6 (40.0)	63.5 (44.8), n = 9	0.17 (0.866)	22.0 (1.000)	H02 not rejected

Source: Computed by the author from Table 6.

Interpretation: The average public insurer paid out 105.9 per cent of its premium as claims, compared with 78.5 per cent for the average private insurer. This difference of about 27 percentage points is statistically significant at the 10 per cent level ($p = 0.065$), and the non-parametric test confirms this ($p = 0.075$). It is not significant at the conventional 5 per cent level, mainly because of the small number of public insurers and the wide variation among private insurers. The 95 per cent confidence interval for the difference runs from -2.1 to 56.9 percentage points, and the standardised effect size is large (Hedges’ $g = 0.94$). The sample is therefore too small to estimate the gap precisely; this is not evidence that no gap exists. H01 cannot be rejected at 5 per cent, but there is moderate statistical evidence that public insurers carried a higher claim burden. For claim settlement ratio, the difference is small and not significant, both over the three complete years (96.0 against 97.9 per cent, $p = 0.410$) and for the 2019-20 status as on December 2020 ($p = 0.866$), so H02 is not rejected. In other words, settlement efficiency depends more on the individual company, the State and the year than on whether the insurer is public or private.

Robustness Checks and Controls

Because the two groups are small, Table 8 repeats the claim ratio comparison in several ways, and Table 9 reports a regression that controls for portfolio size, measured by the log of gross premium as a proxy for claim volume. These are the only controls that can be built from company-wise official data.

Table 8: Robustness of the Public-Private Claim Ratio Difference, 2016-17 to 2018-19 (%)

Check	Public	Private	Difference (pct. points)	Result
Welch t-test on company means (baseline)	105.9	78.5	27.4	p = 0.065; 95% CI -2.1 to 56.9
Mann-Whitney U test (medians)	94.3	76.7	17.6	p = 0.075
Permutation test (20,000 draws)	105.9	78.5	27.4	p = 0.078
Percentile bootstrap (10,000 draws)	105.9	78.5	27.4	95% interval 5.0 to 50.6
Excluding AIC (public n = 4)	110.7	78.5	32.2	Welch p = 0.065; Mann-Whitney p = 0.079
Premium-weighted ratio (pooled)	95.3	77.6	17.7	Descriptive; no test
Effect size (Hedges' g)				0.94

Source: Computed by the author from Table 6. Percentile bootstrap intervals tend to be too narrow in samples this small, so the Welch interval is the more cautious guide.

Table 9: OLS Regression of Company Claim Ratio on Sector and Portfolio Size (n = 18)

Variable	Coefficient	Std. error	p-value	95% CI
Public sector (1 = public)	34.75	15.28	0.038	2.18 to 67.32
Log of gross premium	-8.15	6.2	0.208	-21.37 to 5.06
Constant	140.38	47.64	0.01	38.84 to 241.93

Source: Computed by the author from Table 6. R-squared = 0.27, adjusted R-squared = 0.17, F-test p = 0.098. HC3 robust standard error for the public-sector coefficient = 13.78 (p = 0.012). Leave-one-out estimates of the public-sector coefficient range from 25.6 to 39.9 and are significant at 5 per cent in 13 of 18 runs.

Interpretation: The public-private gap in claim ratio does not depend on the test used, and it does not disappear when AIC is excluded or when premium weights are used (Table 8). In this sample, larger insurers have somewhat lower claim ratios (the coefficient is not significant), and public insurers are on average larger. After controlling for this, the public sector coefficient rises to about 35 percentage points and is significant at 5 per cent (p = 0.038), so H03 is rejected in the full sample (Table 9). This result needs care. The regression has only 18 observations, the overall F-test is significant only at the 10 per cent level, and dropping a single insurer (Oriental) raises the p-value to 0.141. The estimate stays positive in every leave-one-out run. The evidence is therefore best described as consistent and moderate in strength, but not conclusive.

Ownership or Structure? Interpreting the Public-Private Gap

The sector gap should not be read as an effect of ownership alone. Four sets of factors may lie behind it, and

the available data can address only some of them. First, portfolio composition: AIC accounts for about 62 per cent of public sector premium, so the public sector figures largely reflect one insurer. The results hold when AIC is excluded (Table 8). Second, cluster risk and year: clusters are allocated through State bidding, and in Karnataka public insurers held about 27 and 26 per cent of premium in 2016-17 and 2017-18 but 64 per cent in the drought year 2018-19. Pooled sector ratios therefore partly reflect which sector held which year; this is handled by year-standardisation in Section 8.8. Third, operational factors such as technology, staffing, field networks, reinsurance and claim-processing systems, which are not measurable from published data. The Karnataka process evaluation, for example, found that insurers contesting crop cutting results was one cause of delay (Pancharatnam et al., 2020), but insurer-wise data on such disputes are not published. Fourth, State-

side factors such as the timing of yield data and subsidy release (Section 2). For these reasons the paper describes differences between the two sectors and does not attribute them to ownership.

Financial Outcome for Insurers

The claim ratio pattern has a direct financial consequence. According to government data compiled from Parliament replies, private insurers earned about Rs. 24,350 crore in gross gains from PMFBY between 2016-17 and 2020-21, while public insurers incurred losses of about Rs. 3,344 crore (Aakhya, n.d.). Over 2016-17 to 2022-23, Oriental, New India and National Insurance reported that claims exceeded premium in their PMFBY portfolios (Tatsat Chronicle, 2023). The same trend is visible in the wider general insurance business: in 2023-24, the incurred claims ratio of public sector general insurers was 97.23 per cent against 76.49 per cent for private general insurers (Business Standard, 2024). The government, however, has maintained that the gap between premium and claims is not profit, since insurers save premium in good years to pay large claims in bad years and also bear reinsurance and administrative costs (Business Standard, 2020).

Crop Insurance Performance in Karnataka

Table 10: Claim Ratio in Karnataka and India, 2016-17 to 2021-22

Year	Karnataka Premium (Rs. cr)	Karnataka Claims (Rs. cr)	Karnataka CR (%)	India CR (%)
2016-17	1,332.73	2,093.84	157.1	76.7
2017-18	1,799.08	856.79	47.6	90.3
2018-19	1,805.99	2,986.69	165.4	98.8
2019-20	2,257.35	1,499.78	66.4	84.6
2020-21	2,073.78	1,024.11	49.4	65.5
2021-22	2,266.65	1,461.45	64.5	60.4
Total / Overall	11,535.58	9,922.66	86	79.1
Mean (SD)			91.7 (54.4)	79.4 (14.7)

Source: Computed from PIB (2023).

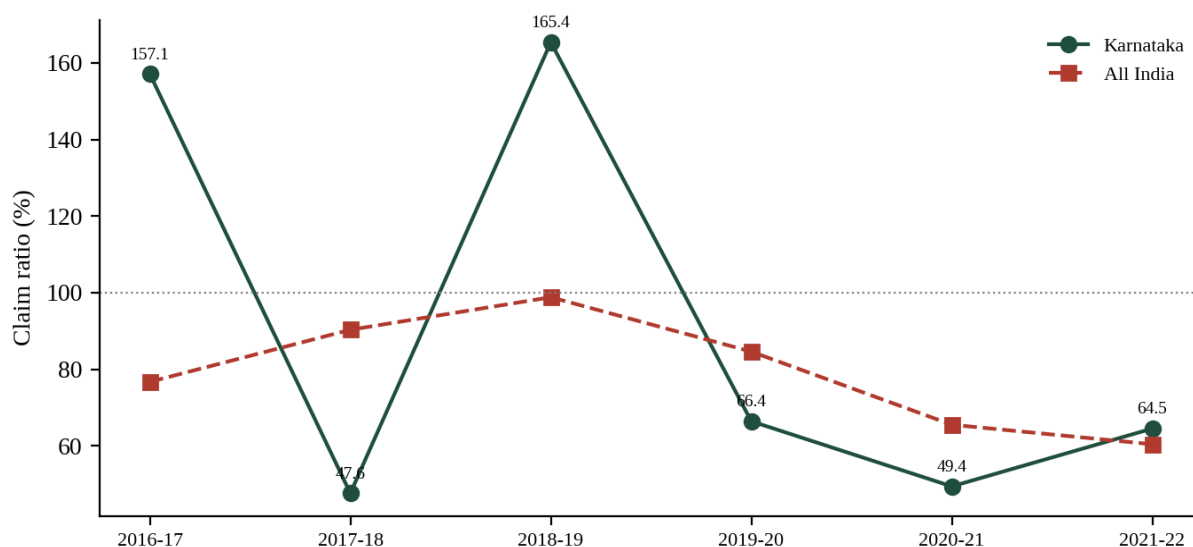


Figure 3: Claim Ratio in Karnataka versus All India

Source: Based on Table 10.

Interpretation: Karnataka's premium grew faster than the national average (a compound growth of about 11.2 per cent against 6.2 per cent between 2016-17 and 2021-22). Its overall claim ratio of 86.0 per cent was higher than the national figure of 79.1 per cent, which means farmers in the State received a relatively larger share of premium back as claims. However, the claim ratio in Karnataka was extremely volatile, with a standard deviation of 54.4 against 14.7 for India. It crossed 150 per cent in the drought-affected years of 2016-17 and 2018-19 and fell below 50 per cent in 2017-18 and 2020-21. The Standing Committee (2021) also recorded very high claim ratios in Karnataka during Rabi 2016-17 (175.7 per cent) and Rabi 2018-19 (248.6 per cent). This volatility shows that crop insurance plays a real protective role in the State, while also making it a high-risk market for insurers.

Table 11: Public versus Private Insurers in Karnataka, 2016-17 to 2018-19

Year	Sector	Gross Premium (Rs. cr)	Claims Settled (Rs. cr)	CR (%)	Settled / Filed (%)
2016-17	Public	363.5	642.5	176.8	100
	Private	980	1,418.60	144.8	99.7
2017-18	Public	469.3	437.8	93.3	100
	Private	1,361.60	420.4	30.9	100
2018-19	Public	1,196.40	2,277.90	190.4	97.6
	Private	662.6	562	84.8	99.9
3 years	Public	2,029.20	3,358.20	165.5	—
	Private	3,004.20	2,401.00	79.9	—

Source: Computed from Standing Committee on Agriculture (2021), para 2.35. Gross premium = farmers' share + State share + Centre share.

Interpretation: The sector gap is sharper in Karnataka than at the national level. Over the three years, private insurers collected about 60 per cent of the premium in the State but paid only about 42 per cent of the claims. Public insurers paid Rs. 165.5 in claims for every Rs. 100 of premium, compared with Rs. 79.9 for private insurers. In 2018-19, United India and New India together settled about Rs. 1,590 crore of claims in Karnataka. At the same time, both sectors settled nearly all claims filed in the State during these years, which reflects well on Karnataka's administration of the scheme. Two cautions apply. First, the premium share of each sector changed sharply across years: public insurers held about 27 and 26 per cent of Karnataka premium in 2016-17 and 2017-18 but 64 per cent in 2018-19, the year with the highest claim ratios, so the pooled three-year ratios partly reflect which sector held which year. Second, to hold weather and State conditions constant, claim ratios were standardised using the State's total premium in each year as common weights. The standardised claim ratio is 151.4 per cent for public and 81.2 per cent for private insurers. The public sector claim ratio exceeded the private sector ratio in each of the three years, by 32.0, 62.4 and 105.6 percentage points, so the Karnataka gap is not an artefact of year composition. With only three years and no district-wise or crop-wise data, however, differences in cluster risk cannot be ruled out.

Pending Claims: Karnataka and Other States

Table 12: Pending Claims under PMFBY and RWBCIS as on 30 June 2025 (Rs. crore)

State	2020-21	2021-22	2022-23	2023-24	2024-25	Total
Rajasthan	10.6	14.7	26.2	194.5	1,279.30	1,525.20
Madhya Pradesh	13.5	7.1	8.4	177.9	1,261.70	1,468.60
Maharashtra	39.7	3.1	55.6	76.6	159.3	334.2

Tamil Nadu	0.1	—	1.9	4.1	118.4	124.6
Uttar Pradesh	0.3	—	30.5	12.5	77.9	121.1
Karnataka	1.7	1.7	2.7	12.5	4.9	23.6
All India	73.5	49.3	289.4	2,732.00	3,338.70	6,456.60

Source: PIB (2025b), Rajya Sabha reply dated 25 July 2025.

Interpretation: Karnataka had only Rs. 23.6 crore of pending claims, about 0.4 per cent of the national total of Rs. 6,456.6 crore. In contrast, Rajasthan and Madhya Pradesh together accounted for nearly 46 per cent of all pending claims. Karnataka is one of the few States that operates its own crop insurance portal instead of the National Crop Insurance Portal (Standing Committee on Agriculture, 2021), and this State-level system may have contributed to faster processing. The national figure also shows that delays remain a serious concern, with over Rs. 6,000 crore pending for 2023-24 and 2024-25 alone. These pending figures belong to Phases II and III of the scheme and are reported by State and season, not by insurer, so they cannot be used to compare public and private insurers. Pending claims for the latest seasons may also include claims that are not yet due, and they depend on the release of State subsidy as well as on insurer behaviour.

Farmers' Experience of Claim Settlement: Evidence from Published Surveys

Official data cannot show how farmers experience settlement, and this study did not collect primary data. Evidence on the farmers' side is therefore drawn from published field studies in Karnataka. The process evaluation by Pancharatnam et al. (2020) reports that farmers were often not informed about their claim status and visited the Department of Agriculture, banks and cooperative societies to find out, and that delays came mainly from contested crop cutting results and enrolment errors. In Tumkur district, insured farmers ranked delay in claims first among constraints (81.67 per cent), and 87.50 per cent suggested that claims should be paid before the next season begins (Darshan et al., 2021). These findings point to aspects that company-level ratios miss: time taken, communication, transparency and fairness. The studies cover specific taluks and years, do not separate public from private insurers, and cannot be generalised to the whole State. They motivate the survey design proposed in Section 11.

Summary of Indicators

Table 13: Public and Private Insurers across Indicators of Claim Settlement

Indicator	Public	Private	Reading
Claim ratio, 2016-19 (pooled %)	95.3	77.6	Public higher; company means $p = 0.065$; with size control $p = 0.038$, not robust to dropping one insurer
Claim settlement ratio, 2016-19 (pooled %)	97.3	97.6	No significant difference ($p = 0.410$)
Unpaid admissible claims, 2016-19 (% of admissible)	2.7	2.4	Similar in both sectors
Unpaid admissible claims, 2019-20, as on 14.12.2020 (pooled %)	22.8	54.6	Large pooled gap, but company means do not differ ($p = 0.866$); wide variation within each sector
Karnataka claim ratio, 2016-19 (%)	165.5	79.9	Public higher in all three years; gap persists after year-standardisation (151.4 against 81.2)

Karnataka claims settled as % of filed, 2016-19	97.6 to 100.0	99.7 to 100.0	Near-complete settlement in both sectors
Processing time, rejection rate, farmer satisfaction	n.a.	n.a.	Not available in public data (Section 11)

Source: Summary of Tables 4 to 11. n.a. = not available.

Interpretation: Across the indicators that can be measured, the clearest difference between the sectors is in the claim burden and not in the completeness of payment. Once claims are admitted, both sectors pay almost all of them. Settlement status at a fixed date shows large gaps for individual companies of both sectors but no significant sector difference. Processing time, rejection rates and farmer satisfaction cannot be measured from public data, and this limits what can be said about settlement efficiency in the full sense.

MAJOR FINDINGS

- Between 2016-17 and 2021-22, insurers paid Rs. 1,34,277 crore in claims against Rs. 1,69,756 crore of premium, an overall claim ratio of 79.1 per cent. The ratio peaked at 98.8 per cent in 2018-19 and fell to 60.4 per cent in 2021-22.
- During 2016-17 to 2018-19, public insurers paid 95.3 per cent of premium as claims, while private insurers paid 77.6 per cent. The gap between premium and claims was about five times larger for private insurers.
- The difference in mean company-level claim ratio is significant at the 10 per cent level ($p = 0.065$) but not at 5 per cent, and it is robust to the choice of test and to excluding AIC. In an exploratory regression controlling for portfolio size, the public sector is associated with a claim ratio about 35 percentage points higher ($p = 0.038$), but this is not robust to dropping a single insurer. The evidence of a heavier claim burden for public insurers is moderate.
- Once claims were admitted, both sectors settled about 97 per cent over the three years. There is no significant difference in claim settlement ratio between sectors ($p = 0.410$ for 2016-17 to 2018-19 and $p = 0.866$ for 2019-20). Settlement status varied more between individual companies than between sectors.
- As on 14 December 2020, five of the 14 insurers that implemented the scheme in 2019-20 (two public and three private) had paid less than half of their admitted claims, and four had paid less than 10 per cent. In pooled terms, 22.8 per cent of public and 54.6 per cent of private admissible claims for that year were unpaid, but company means did not differ significantly.
- Karnataka had a higher overall claim ratio (86.0 per cent) than India (79.1 per cent) but was far more volatile, reflecting frequent droughts.
- In Karnataka, public insurers paid Rs. 165.5 in claims per Rs. 100 of premium, compared with Rs. 79.9 for private insurers, a wider gap than at the national level. The public sector ratio was higher in every year and remained higher (151.4 against 81.2 per cent) after standardising for year.
- Karnataka had very low pending claims as of June 2025 (Rs. 23.6 crore), in contrast with Rajasthan and Madhya Pradesh.
- Published farmer surveys in Karnataka identify delay in claims, contested yield data, enrolment errors and poor communication on claim status as the main grievances. No study separates public from private insurers.
- Processing time, rejection rates and farmer satisfaction cannot be measured from public data, so settlement efficiency could be assessed only through the indicators in Table 2 that are available.

SUGGESTIONS

- Risk-balanced clustering: States should design clusters that mix high-risk and low-risk districts so that no insurer can pick only low-risk areas. Cluster-wise loss history should be published before bidding.
- Company-wise public disclosure: The Ministry should publish company-wise premium, claims, claim ratio and settlement time every season on the National Crop Insurance Portal. This would allow farmers, States and researchers to compare insurers.

3. Strict enforcement of the 12 per cent penalty: The automatic penalty introduced from Kharif 2024 should be monitored closely and its actual payment to farmers should be reported publicly.
4. Performance-based empanelment: Insurers with repeated delays or very low claim ratios over several years should face lower scores in future bidding or temporary de-empanelment.
5. Timely State subsidy: The escrow account system from Kharif 2025 should be enforced strictly, since delay in the State share is a leading cause of late claims.
6. Technology for faster yield data: Wider use of YES-TECH (remote-sensing based yield estimation) and the WINDS weather network can reduce disputes over CCE data and speed up claims.
7. Profit-sharing or pooling mechanism: The government may consider a mechanism in which a part of the surplus earned by insurers in good years is returned to a pool for paying claims in bad years, an idea the government has considered in the past (Business Standard, 2019).
8. Learning from Karnataka: Other States can study Karnataka's State-level crop insurance portal and administrative practices, which appear to be associated with its low pending claims.
9. Claim-level timelines and rejection data: The Ministry should publish, insurer-wise and season-wise, the date yield data was received, the date of payment, and the number of claims filed, admitted and rejected. Without this, processing time and rejection rates cannot be measured and compared across insurers.
10. Farmer feedback in insurer evaluation: States should add farmer-reported indicators, such as whether farmers were informed of claim status and how quickly grievances were resolved, to the evaluation of insurers, supported by periodic independent farmer surveys.

LIMITATIONS AND SCOPE FOR FURTHER RESEARCH

The study has the following limitations. (i) Data: the company-wise analysis is limited to 2016-17 to 2019-20 (Phase I) because this is the latest period for which official company-wise premium and admissible-claims data are available in one published source, and the findings may not hold under the payment systems of Phase III. (ii) Indicators: the study measures settlement efficiency in terms of amounts. The number of days taken to settle claims, rejection rates and farmer satisfaction are not publicly available, and settlement status on a single date (14 December 2020) is only a proxy for speed. (iii) Confounding: claim ratios depend on weather, cropping pattern, loss severity, documentation and cluster allocation, and not only on the insurer's conduct.

Only portfolio size could be controlled at company level, and the Karnataka comparison covers three years. (iv) Ownership: differences between sectors may reflect operational structure, technology, staffing and portfolio composition, which cannot be separated from ownership with published data. (v) Sample size: the five public insurers reduce the power of the tests, several tests were run, and the regression estimate is sensitive to individual insurers. (vi) Primary data: no farmer survey was conducted, so farmers' views are taken from earlier studies that cover specific locations and years.

Future research may use updated company-wise data from recent Parliament replies, request insurer-wise and claim-level data from the National Crop Insurance Portal and the Karnataka crop insurance portal, and apply panel regression with insurer, season and State effects to separate the effect of the insurer from that of weather and State.

Proposed farmer survey. A farmer survey in Karnataka is the next stage of this work. The proposed design is a two-stage stratified random sample. Districts would be selected to cover the northern and southern dry zones and both public and private implementing insurers; claimants would be drawn from the State crop insurance portal. A sample of about 400 claimant farmers would estimate a proportion within 5 percentage points at 95 per cent confidence before allowing for clustering.

The questionnaire would cover awareness of the claim procedure, intimation of loss, time from loss to payment, information received on claim status, grievance handling, perceived fairness and overall satisfaction on a five-point scale. Responses would be compared across insurers using ordered logit models controlling for crop, landholding, loanee status, district and season, and supported by focus group discussions and interviews with department and insurer officials.

CONCLUSION

PMFBY has made crop insurance widely available to Indian farmers at a low cost, and it has returned a large share of premium as claims, especially in drought years. However, the burdens of the scheme are not shared equally among insurers. Public sector insurers, led by AIC, carried a heavier claim burden than private insurers during 2016-17 to 2018-19; the difference is moderate in statistical strength and cannot be attributed to ownership alone, because portfolio size, cluster risk, year and operating structure also differ between the sectors.

Settlement of admitted claims was broadly similar across the two sectors, although individual companies in both sectors had paid very little of their 2019-20 claims by December 2020. Karnataka stands out both for its high and volatile claim ratio and for its low pending claims, which suggests that State-level administration matters as much as insurer performance. The evidence is limited by the absence of public data on processing time, rejection and farmer satisfaction, and published farmer surveys indicate that delay and poor communication remain the main grievances. If the scheme is to remain fair to farmers and to the public exchequer, greater transparency including claim-level timelines, risk-balanced clustering, and strict enforcement of timelines are essential.

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