THE RESEARCH DIALOGUE
An Online Quarterly Multi-Disciplinary
Peer-Reviewed / Refereed Research Journal
ISSN: 2583-438X
© The Research Dialogue | Volume-05 | Issue-01 | April-2026
Available online at: https://theresearchdialogue.com/
DOI : https://doi.org/10.64880/theresearchdialogue.v5i1.41

Risk, Trust, and the Relational Agent:

A Panel Analysis of Insurance Penetration Heterogeneity Across Indian States

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Abstract

India's life insurance market exhibits a persisting pattern: prevailing explanations based on income, access, and/or awareness often fall short trying to account for: regions facing greater uncertainty that, against common wisdom, do not consistently show higher insurance uptake. This paper attempts to understand this as a function of the interaction between risk and the institutional environment that affect household's financial decision making.

Making use of a state level panel of 28 Indian states from 2015–16 to 2022–23, the analysis develops composite risk exposure and the trust environment. It also estimates their joint effect within a two-way fixed effects framework. The results indicate that the relationship between risk and insurance demand is conditional, that is, in lower trust settings, increased risk is associated with reduced or negligible increase of insurance penetration. On the other hand, in higher-trust settings, risk begins to in turn translate into increased participation.

The estimates imply the presence of a Trust level threshold that separates these two paradigms. Only minority of states lie above this threshold. Majority of Indian states remain in a regime where conventional expansion strategies yield limited effects. Results also suggest that insurance agents' contribution is primarily through their role in shaping the trust environment.

These findings help understand the importance of institutional and relational factors in the development of insurance markets. It also suggests that policies aimed at expanding coverage may need to account for underlying differences in trust, rather than focusing solely on supply or awareness.

Keywords: insurance penetration, risk index, trust index, panel data, two-way fixed effects, India, inter-state heterogeneity, life insurance, relational trust, credence goods, institutional trust, financial inclusion, interaction effects

1. Introduction: An Inconsistency That Income Cannot Explain

1.1 The Empirical Puzzle

India's insurance market presents an case that has confounded systematic explanation for almost two decades of post-liberalisation research. As of 2022–23, Arunachal Pradesh, the state with the single highest Risk Index in this study thus indicating extreme income volatility, high infant mortality, and the highest disaster expenditure per capita in the sample leads to individual life insurance premium per capita of approximately ₹149. Compare it to ₹5,943 in Kerala, a state that simultaneously ranks as the lowest-risk in the sample on all three dimensions. This ratio is nearly forty-to-one.

The direction is awkward, the state in need of the most insurance purchases the least.

This finding is not an artifact of Arunachal Pradesh's small size or unusual geography. The same directional relationship holds across the panel. Madhya Pradesh, Orisha, Chattisgarh, and Uttar Pradesh - states with above average Risk Index scores all exhibit below-average premium per capita, Meanwhile Himachal Pradesh, Goa, Tamil Nadu and Kerala - the lowest risk states show the highest premium per capita.

The standard responses appear to be inadequate. The income explanation holds low-risk states are also richer. But once we introduce state fixed effects: income variation within states over period of time is almost entirely absorbed by the year fixed effects. It essentially carries zero within-state predictive power for premium , with within-variance of 0.0084, $p = 0.882$ in M4.

The supply side camps claim insufficient agents in high-risk states. But agent density when entered as a direct predictor within the two-way fixed effects framework comes out to be insignificant ($p = 0.863$).

1.2 The Core Claim

This study puts forward one central claim:

Risk suppresses insurance demand below a critical trust threshold while stimulating it above it.

Insurance demand is determined by the interplay of risk and trust, not separately. Risk essentially provides the motivation and need for insurance. Trust enables that motivation to convert into insurance contracts. In low-trust environments, elevated risk leads to dependence on informal mechanisms, precautionary savings and decreased dependence on formal institutions. Above the trust threshold does conventional wisdom appears to work.

In this framework we are conceptualising the trust environment in India's case. Following Guiso, Sapienza, and Zingales (2004, 2008), institutional trust is usually proxy by a regulatory quality, contractual enforcements and formal financial sectors. This study argues that in India's high-context dependent society (Hofstede, 1980; Hall, 1976) the insurance agent occupies a distinct but important role, not a supply-side distribution worker, but a relational trust figure. They translate formal contracts into the interpersonal trust relation which Indian households find important

1.3 Contributions

This study makes four primary contributions. Firstly, it generates first state-level panel evidence in India that models that risk cross trust interaction as the primary determinant of insurance penetration variation while exploiting within state temporal variation through two-way fixed effects. Second it advances a reconceptualization of the insurance broker as a relational trust point. Third it identifies a threshold (Trust* = 0.938) dividing Indian states into two distinct regimes. Fourth it shows that income and supply centric narratives are not completely adequate.

2. Literature Review

2.1 Risk, Uncertainty and the Demand for Formal Insurance Coverage

The case for insurance demand deems on the von Neumann Morgenstern expected utility framework. A risk-averse agent with a concave Bernoulli utility function will accept an fair insurance contract. This is because the certain premium generates more expected utility than bearing the entire loss. Arrow (1963) showed optimal risk allocation requires complete contingent claims markets that real economies systematically fail to provide. The welfare case for insurance therefore is strongest exactly where risk is highest and markets are incomplete.

Townsend (1994) found that South Indian villages manage consumption smoothing through informal networks relatively. Wll that is until a covariate shock hits everyone at the same time. At that point informal insurance collapses, when it matters most. The theoretical vacuum open for formal insurance is obvious.

Deaton's (1991) buffer-stock model predicts that insurance demand is highest for low-frequency, high-severity shocks: floods, droughts, premature mortality. This is precisely the dimensions the Risk Index captures.

The adverse selection literature Akerlof (1970), Rothschild and Stiglitz (1976) would suggest insurers withdraw from higher risk markets. But LIC as the dominant state-backed insurer, operates universally across Indian subcontinent. The supply is there. The gap exists on the demand side and that is the gap the trust framework is designed to fill.

2.2 Trust, Credence Goods, and Long-Duration Contracts

Insurance is an interesting product. It's quality cannot be verified or tested before purchase, after consumption and not until the event insured actually takes place. And this event might take years, decades to take place, assuming it does. There's also the possibility of the contingency never triggering. It is the prime example of what Dulleck and Kerschbamer (2006) called a credence good. A commitment to an annual life insurance premium payment by households takes place after they make a judgment not merely about value. This assessment is about the insurer's willingness to actually pay the claim that may arise thirty or forty years into the future. As this cannot be based in direct experience with the particular insurance contract, the foundation for judgement will become grounded in broader institutional trust environment.

Guiso, Sapienza, and Zingales (2004, 2008) demonstrated in Italian context something similar. The variation in social capital and trust across regions explained substantial portion of variation in participation in financial markets that income alone cannot explain fully. Their mechanism

was not returns or access, but rather perceived cheating risk. In high trust environments, households were actually more optimistic about contract performance. Zak and Knack (2001) finding provides some cross-country evidence that one standard deviation of increase in trust actually raises annual growth by around one percentage point. This is by operating through reduced contracting costs.

Williamson's (1993) distinguishes between calculative trust: a rational assessment of contractual incentives, and non-calculative relational trust. In case of India's insurance market, one can see that both operate simultaneously, the institutional trust (the regulatory and financial infrastructure and institutions the household has assess to) and relational trust (based on in personal knowledge, experience with and or social accountability of specific agent). This study makes argues that density of agents actually show the weight of non calculative trust, not just supply side respone.

2.3 Agents, Interpersonal Trust, and the High-Context Society

Consider the case of Jharkhand. It is not a transaction between household and institutions. But instead it is a conversation between neighbours. The agent is typically a known community member, who has personal relations with the client. His reputation is staked on the interaction. This is what makes sale possible.

The theoretical foundation for implementing agents as trust proxy draws on Hall's (1976) and Hofstede's (1980, 2001). India has high collectivism score and high power distance which indicate that decisions involving multi-year premium commitments are not made through impersonal product evaluation. Instead personal relationships of trust and accountability is how contracts with contingent payoffs are made.

This has a specific and testable empirical implication. In the supply camp, agent density should be able to meaningfully predict of premium per capita i.e., more agents would reach more households. Under the trust camp, agent density functions as a component of the trust, that shapes the risk–premium slope. Instead of a direct predictor of premium levels. The results are clear-cut. Agents as a standalone control appear to be insignificant ($p = 0.863$), while including them in the Trust Index strengthens the interaction from $p = 0.055$ to $p = 0.038$.

Luhmann's (1979) puts this framework plainly. Where institutional trust is weak, personal trust must carry the weight that system cannot. The insurance agent in Jharkhand or Chhattisgarh acts as a substitute of personal trust, following the vacuum due to absence of the system. This literature on relational intermediaries is not unique as it extends to microfinance (Karlan, 2005), adoption of agricultural technology (Foster and Rosenzweig, 1995) and informal credit (Banerjee and Duflo, 2007). Insurance agents in India occupy a comparable structural position.

2.4 The Indian Insurance Sector: Structure and Distribution

The structure of India's life insurance market was established by the IRDA Act of 1999. It finally ended the monopoly enjoyed by LIC and opened the market up to private and foreign insurers. Sinha (2003) documents this expansion. He notes the rapid post-liberalisation growth in

premium volumes and product variety. He also makes an observation about the fact that penetration still remained low by international standards and concentrated in urban areas.

Krishnamurthy et al. (2005) identify why rural penetration stalled. Intermediation costs were high. Last-mile distribution depended on individual broker and bancassurance development was limited. Informal sector workers, that constitute a meaningful portion of high risk population, were excluded from group insurance schemes.

The existing Indian academic literature reflects this absence. Joe (2018) and NITI Aayog (2019) document regional variation in insurance penetration but they work from cross-sectional design of model. This design cannot separate what persists about a state, its history, its institutions, its culture, from what is actually changing within it over time. A state with low penetration in a cross-section might be low because it has always been low or it might be because something deteriorated recently or maybe it is converging upward from a lower base. Two-way fixed effects separates them, while Cross-sections cannot do that. Dash et al. (2018), working in the Eurozone, found income the dominant predictor. This result that has been imported into Indian policy thinking without adequately testing whether it survives within-state panel structure. Which It does not. Income within states, once year effects are absorbed, has a within-variance of 0.0084 and $p = 0.882$.

The policy literature's focus on supply-side variables i.e., agent counts, bancassurance reach, digital channel penetration, is not an accident. It reflects the lack of a framework in which the trust environment is the binding constraint. IRDAI's successive working groups have recommended expanding bancassurance and digital channels, operating on the implicit assumption that the agent model is an inefficiency that needs to be fixed. This paper's findings suggest the opposite. Brokers in India are not a bottleneck of distribution. They are points of trust. Replacing them with channel-neutral mechanisms does not actually eliminate the problem of credence. It just removes the mechanism that was partially fixing it. Unless we first build institutional trust independently, the channel switch will change how insurance is not bought without much change on the fact that it is not bought.

2.5 Financial Literacy, Education, and Cognitive Trust

There exists a version of the problem insurance non-participation that has nothing to do with trust in the relational sense. A household that just cannot read a policy document, can not calculate whether a premium schedule is actually reasonable and can not interpret exclusion clauses is probably not making a trust judgment. It is operating in the dark. Lusardi and Mitchell (2014) established that financial literacy is a significant predictor of retirement saving, wealth accumulation, and insurance participation. Their with explanatory power survives controlling for income and education levels.

In the Indian context, Klapper, Lusardi, and van Oudheusden (2015) found that fewer than a quarter of adults can correctly answer basic financial literacy questions. This state-level variation in cognitive capacity is is used in this study by making secondary gross enrolment rate (GER) a proxy of it. Argument for this proxy is simple, as it captures the extent of formal cognitive training

in numeracy, reading comprehension, and analytical reasoning that enables households to interpret policy documents and commit to premium schedules with an informed understanding of what they are purchasing.

The combination of relational trust (Section 2.3) and cognitive trust is what produces the specific index adopted in this study. GER acts as proxy cognitive trust while bank branches proxy trust in institutional infrastructure and agents proxy relational trust. Each of the dimensions captures a distinct mechanism. They enable the translation of risk into insurance adoption and their combination reflects the view that all three mechanisms must achieve sufficient level before the trust environment reaches the threshold at which risk in turn generates formal insurance demand.

2.6 Research Gap

The empirical literature on Indian insurance penetration is not so wrong as much as it is incomplete in three systematic ways that matter for policy.

First is methodological. It relies predominantly on cross-sectional designs that cannot control for persistent state-level features. These characteristics muddle the risk–insurance and trust–insurance relationships.

Second is more theoretical. Risk and trust are treated as independent additive determinants of insurance demand. That is, more risk = more insurance; more trust more insurance. But this is missing a conditional interaction i.e., trust is the condition under which risk generates demand.

Third, and most importantly, it hasn't identified where insurance agents belong in the equation: trust environment or the supply side. This identification has real implications on policy design.

3. Hypotheses, Research Design, and Methodology

3.1 Formal Hypotheses

Three hypotheses follow directly from the theoretical framework and are tested empirically in Sections 5–6:

Formal Hypotheses H1 (Interaction): The coefficient on Risk × Trust is positive ($\beta 3 > 0$). Trust moderates the risk–premium relationship. Higher trust raises the marginal effect of risk on insurance demand.

H2 (Threshold): There exists a trust level Trust* at which the marginal effect of risk on premium crosses zero. It divides states into a suppression regime (Trust < Trust*) and a stimulation regime (Trust > Trust*).

H3 (Agent Channel): Insurance agent density operates through the trust environment rather than as a direct supply predictor. Agents are significant as a trust component but insignificant as a standalone control.

All three are identified within the two-way fixed effects framework discussed in Section 3.5.

3.2 Scope and Research Questions

This study analyses individual life insurance premium per capita across 28 major Indian states over 2015–16 to 2022–23, yielding a panel of 224 state-year observations. Union territories are excluded. Their insurance market and administrative governance are structurally different

enough from states that pooling them would introduce noise, which fixed effects cannot cleanly absorb.

The period was not chosen for convenience. It includes demonetisation in 2016–17, which disturbed cash-dependent informal financial networks across the country and the COVID-19 shock in 2020–21 and 2021–22, which elevated risk perceptions and compressed household budgets. It also encompasses LIC's IPO year in 2021–22, which brought unusual public attention to life insurance as an asset class. These are not hurdles for the analysis. National shocks of this kind are precisely what year fixed effects are designed to absorb as they affect all states simultaneously and drop out of the within-state identification. What remains after is the variation this paper is actually trying to explain: why, within a given state, do premium levels move with risk and trust in the pattern the interaction predicts?

3.3 Dependent Variable

The dependent variable is the natural logarithm of individual life insurance premium per capita in rupees, ln(premium_pc). IRDAI Annual Reports provide Premium in crores of rupees. This is then converted to rupees and divided by state population. Premium per capita is preferred over policy counts per thousand population for 2 reasons. It captures both the extensive (a policy is purchased) and the intensive margin (the value of coverage). Robustness Check 4 confirms the results holds with log absolute premium.

3.4 The Risk Index

The Risk Index is a standardised composite of three components. Firstly, Income volatility is the three-year rolling variance of real per-capita GSDP growth which is computed over the window ending in year t to ensure the measure is time-varying and reflects recent economic conditions. This helps capture the income uncertainty, that motivates precautionary behaviour under the Deaton (1991) buffer-stock model. Second component is The infant mortality rate (IMR) per thousand live births, from the RBI. This captures demographic vulnerability and exposure to health shock. Lastly, Disaster relief expenditure per lakh population is scaled per lakh — rather than in absolute terms — to prevent large states from being assigned artificially high disaster risk.

All three components are individually standardised to z-scores using pooled means and standard deviations across all 224 observations, then averaged with equal weights. Equal weighting is preferred over PCA-based weighting. This is because each component is theoretically motivated and equal weighting helps produce transparent and replication-robust composites.

3.5 The Trust Index: Three Components

The Trust Index is a capture of 3 distinct mechanisms at play: cognitive, institutional, and relational dimensions of the trust environment. Secondary gross enrolment rate (GER), from RBI annual reports, proxies cognitive trust. The argument is not that educated households are simply smarter consumers. But instead it is the capacity to evaluate, understand and commit to contracts and complex financial instruments. Bank branches, from the RBI Handbook of Statistics, mutated per lakh proxies institutional infrastructure trust. A household that has

transacted through banking has accumulated first hand experience with financial institutions behaving as per the contract, which transfers partially to insurance products. Life insurance agents per lakh population, from IRDAI Annual Reports, proxies relational trust. It essentially measures the role of network of interpersonal trust through which insurance contracts can be intermediated.

All three components are winsorised at the 95th percentile before standardisation. This leads to capping bank branches at 22.66 per lakh and agents at 308.16 per lakh, retaining all 28 states. The components are standardised and then averaged with equal weights to form the Trust Index, which ranges from −1.490 to +2.158.

3.6 Econometric Specification

The primary empirical model is a two-way fixed effects panel regression:

$$\ln(\text{premium\_pc})_{st} = \beta_1 \, \text{RiskIndex}_{st} + \beta_2 \, \text{TrustIndex}_{st} + \beta_3 \, (\text{RiskIndex}_{st} \times \text{TrustIndex}_{st}) + \mu s + \lambda t + \varepsilon_{st}$$

State fixed (μs) effects absorb persistent state characteristics. λt are year fixed effects absorbing all common temporal shocks i.e., shocks that hit all states at the same time. Standard errors are clustered at the state level using the HC1. The interaction term β3 is the coefficient of interest. The theoretical prediction is $\beta 3 > 0$ (H1). The trust threshold is derived as $\text{Trust}^* = -\beta 1/\beta 3$ which is the level at which the marginal effect of risk on premium crosses zero (H2). The Hausman test is used to choose between fixed and random effects.

One point on causal interpretation deserves to be clearly stated. The two-way fixed effects design controls for persistent state heterogeneity and common time trends which is considerably more than what cross-sectional designs have to offer. The interaction result should be interpreted as a strong conditional association rather than a structural causal relationship estimate. The potential threat is omission of time-varying state-level confounders correlated with both the risk–trust interaction and premium. This is addressed partially by the robustness checks.

3.7 Identification Strategy

Identification logic is worth shedding light on. The Trust Index's within-variance after two-way demeaning is 0.0408. This is low by design, as it captures slow-moving institutional characteristics: Banking infrastructure, secondary enrolment, and agent networks do not transform within a state over eight years in ways that produce large within-variation. The Risk Index's within-variance is 0.1160. And interaction term's within-variance is 0.1193. This largest among all regressors which confirms that the interaction is generating genuine within-state variation instead of being absorbed. Identification comes from this structure. The interaction of the slow-moving structural factor (Trust) with the time varying treatment (Risk). Trust establishes the regime for each state and Risk provides the time variation within that regime. Income essentially drops out almost entirely. The near zero within variance of ln(per-capita GSDP) (0.0084) substantiates that income variation within states is almost entirely absorbed by national time trends, thus validating its exclusion from the main specification.

3.8 Data Sources

Variable	Definition	Source	Role	N
ln_premium_pc	Log of individual life insurance premium per capita (rupees)	IRDAI Annual Reports 2015–16 to 2022–23	Dependent	224
RiskIndex	Avg. z-scores: income volatility, IMR, disaster exp./lakh	RBI Handbook; SRS; MHA Annual Reports	Key exp.	224
TrustIndex	Avg. z-scores: GER secondary, banks/lakh, agents/lakh (winsorised p95)	UDISE+; RBI Handbook; IRDAI	Key exp.	224
Risk×Trust	RiskIndex × TrustIndex (interaction)	Constructed	Interaction	224
TrustIndex_2	Avg. GER + banks/lakh only (two-component)	UDISE+; RBI Handbook	Rob 5	224
ln_pcgsdp	Log per-capita GSDP at 2011–12 prices	RBI Handbook	Rob 6	224

Table 1: Variable Definitions, Sources, and Roles

4. Descriptive Analysis and Index Properties

4.1 Summary Statistics

Table 2 presents summary statistics for the principal variables across the 224 state-year observations (28 states × 8 years).

Variable	N	Mean	SD	Min	Median	Max
ln(premium per capita)	224	6.509	0.614	5.000	6.560	8.394
Risk Index	224	0.000	0.454	−1.108	−0.003	1.653
Trust Index (3-comp.)	224	0.000	0.767	−1.490	−0.251	2.158
Trust Index (2-comp.)	224	0.000	0.828	−1.585	−0.237	2.954
Risk × Trust	224	−0.011	0.367	−1.690	−0.013	1.761
IMR (z-score)	224	0.000	1.000	−1.769	−0.086	2.120
Disaster exp./lakh (z)	224	0.000	1.000	−0.804	−0.383	4.142
Income volatility (z)	224	0.000	1.000	−1.392	−0.141	3.219
GER secondary (z)	224	0.000	1.000	−2.842	0.062	2.108
Banks/lakh winsorised (z)	224	0.000	1.000	−1.610	−0.384	1.629
Agents/lakh winsorised (z)	224	0.000	1.000	−1.427	−0.363	1.620
ln(per-capita GSDP)	224	11.12	0.482	9.864	11.12	12.38

Table 2: Descriptive Statistics — Key Variables (N = 224, 28 states × 8 years)

The Risk and Trust indices are by construction mean-zero as they are standardised. The Trust Index has a wider range than the Risk Index. This may institutional capacity varies more dramatically than objective risk exposure. The near-zero mean of Risk × Trust (−0.011) confirms that the two indices are very weakly negatively correlated in the pooled sample. This is consistent with the low cross-sectional correlation r = −0.121 reported below.

4.2 State-Level Index Rankings

The state level rankings of average Risk Index reveal picture that is a geographically coherent. Arunachal Pradesh leads at 0.992, the highest average Risk Index. This is driven by extreme disaster expenditure per lakh (z = 1.89) thus showcasing chronic exposure to floods, landslides, and other disasters in the Eastern Himalayas. Combine this with high income volatility (z = 0.693) and you get the highest risk index. Odisha at 0.611 and Madhya Pradesh at 0.543 follow. Both of them carry persistently high IMR and a history of severe drought and cyclone events. At the low-risk end, Kerala at −0.667 achieves the lowest composite score, thus reflecting low IMR, low disaster expenditure and moderate income volatility. These outcomes attributable are to decades of human development investment and stable service-sector income.

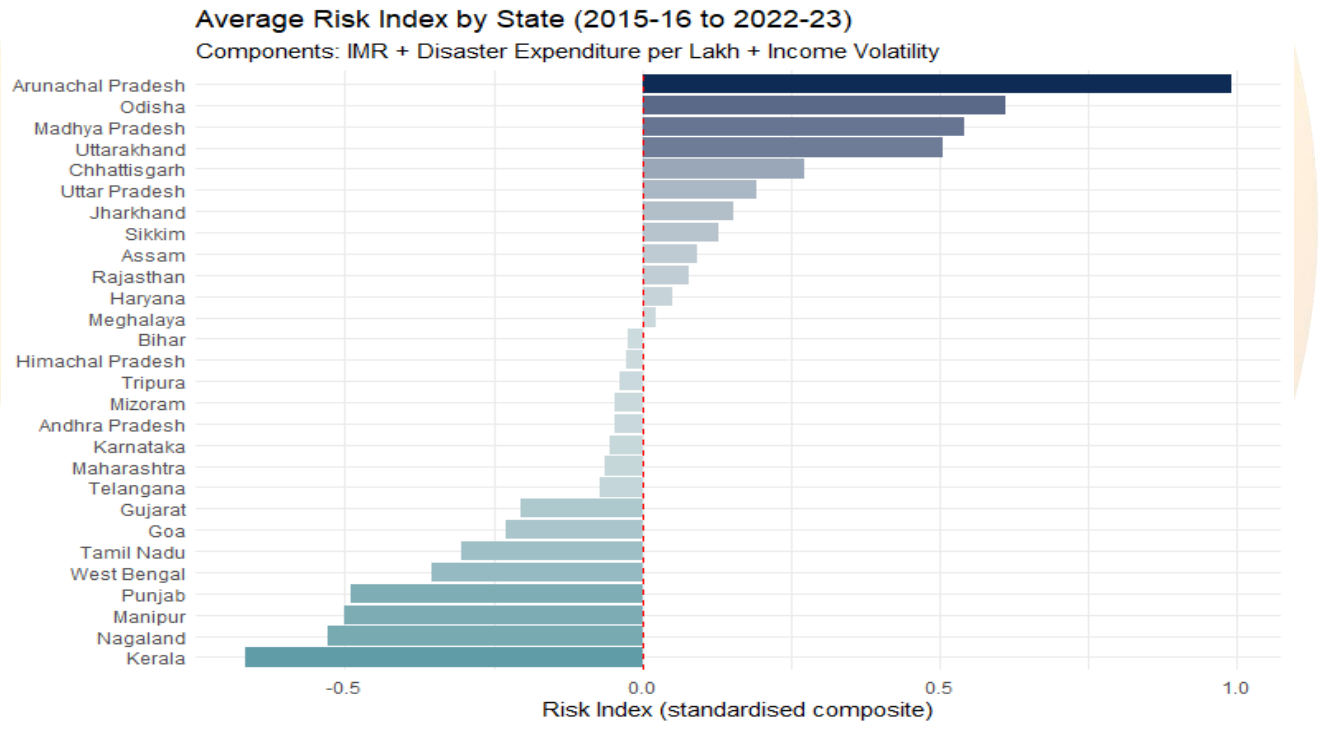

Figure 1: Average Risk Index by State (2015–16 to 2022–23). Components: IMR + Disaster Expenditure per Lakh + Income Volatility. States ranked by composite score.

The Trust Index tells a different story. Rankings reveal a geographic pattern that is only moderately correlated with the Risk Index at r = −0.121, thus confirming only weak correlation between the two composites. Himachal Pradesh is leading on Trust at 1.52, reflecting its dense banking infrastructure, high secondary enrolment, and agent density which is supported by a financially engaged hill population. Goa (1.46), Sikkim (1.32), Kerala (1.25) and Uttarakhand (1.02) complete the list of the top five. At the bottom we can see Bihar at −1.34 and Nagaland at −1.19 reflect the joint failure of all three trust components.

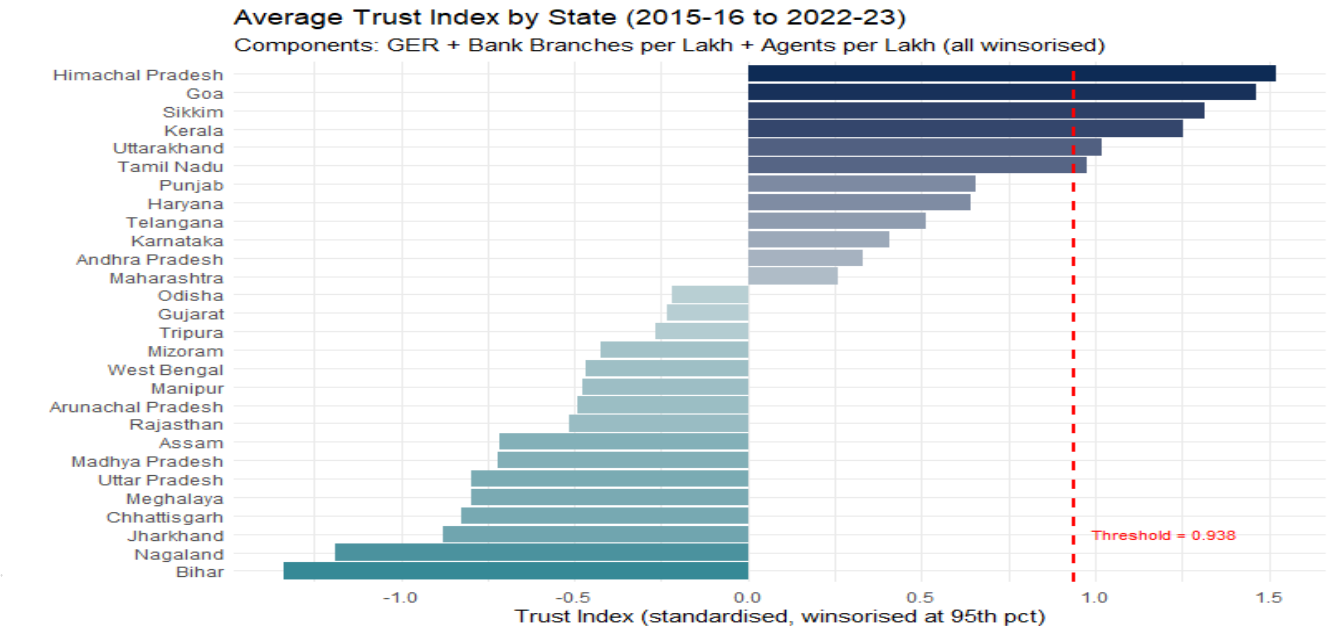

Figure 2: Average Trust Index by State (2015–16 to 2022–23). Components: GER + Bank Branches per Lakh + Agents per Lakh (all winsorised at p95). Red dashed line marks Trust = 0.938.*

The stacked bar decomposition of the Risk Index (Figure 3 below) reveals informative insight in terms of Heterogeneity within states. Arunachal Pradesh's extreme score is roughly driven in equal parts by disaster expenditure and income volatility, while IMR plays a secondary role. Sikkim has very high disaster exposure at $z = 1.93$ driven by glacial lake outburst floods but strongly negative IMR ($z = -1.30$), producing a moderate composite score.

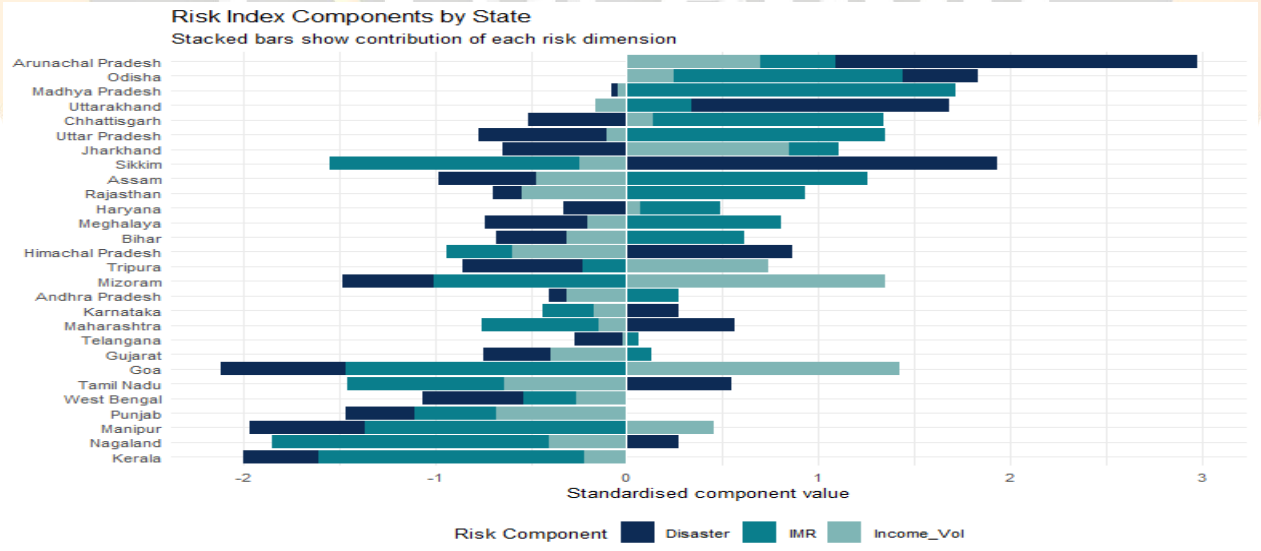

Figure 3: Risk Index Components by State. Stacked bars show contribution of each risk dimension (Disaster, IMR, Income Volatility) to the composite standardised score.

4.3 Within-Variation Diagnostics

Table 3 presents within-variation diagnostics after two-way demeaning, central to understanding what the fixed effects estimator can identify.

Variable	Within-Variance	Interpretation
Risk × Trust (interaction)	0.1193	Largest within-var - primary identification vehicle
Risk Index	0.1160	Substantial time-series movement; identifies risk effect
Trust Index (3-comp.)	0.0408	Low by design - structural moderator, slow-moving
ln(premium per capita)	0.0884	12× larger than policy-count alternative
ln(per-capita GSDP)	0.0084	Near-zero - absorbed by year FE; justifies exclusion from main spec

Table 3: Within-State Variation After Two-Way Demeaning

Three features are essential to the identification strategy. First we can observe that the interaction term has the largest within-variance (0.1193) thus making it the principal source of within-state identifying variation. Risk fluctuates on yearly basis in response to economic shocks. Trust provides a stable cross-sectional scaling of how much each unit of Risk variation can translate into premium variation. Second, the Trust Index's low within-variance at 0.0408 is the not unexpected of a structural moderator. Third, ln(pcgsdp)'s within-variance of 0.0084 confirms that the income channel is absorbed by year effects suggesting income variation has limited explanatory power within-state once common national trends are absorbed.

5. Main Regression Results

5.1 Hausman Test and Model Selection

The Hausman test statistic is chi-squared = 3405.5 with 3 degrees of freedom ($p < 2.2 \times 10^{-16}$). This is not a close call but instead overwhelming rejection of the random effects null. States with higher risk tend to have different institutional histories, banking sectors, and cultural engagement with formal insurance. All of these time-invariant differences are correlated with the Risk and Trust Indices. The random effects estimator is misspecified, as it is treating these state effects as uncorrelated with the regressors. Substantive inference tend to use the two-way fixed effects estimator.

5.2 Main Regression Results

Table 4 reports results across four specifications. State-clustered HC1 standard errors are in parentheses for Models 3 and 4; OLS standard errors for Models 1–2.

	(1) Pooled OLS	(2) State FE	(3) Two-Way FE	(4) + GSDP
Risk Index	−0.002	0.005	−0.037	−0.038†
	(0.054)	(0.045)	(0.023)	(0.023)
Trust Index	0.554***	1.101***	0.102	0.103
	(0.031)	(0.071)	(0.066)	(0.067)
Risk × Trust	0.011	0.011	0.040**	0.041**
	(0.060)	(0.044)	(0.019)	(0.020)

ln(Per Capita GSDP)	-	-	-	−0.041
				(0.275)
State FE	No	Yes	Yes	Yes
Year FE	No	No	Yes	Yes
SE Type	OLS	OLS	Clustered	Clustered
Observations	224	224	224	224
Adj. R^2 (within)	0.591	0.494	−0.142[1]	−0.148[1]
Hausman (chi-sq)	-	-	3405.5***	-

*Table 4: Insurance Penetration - Panel Regression Results. †p < 0.10; **p < 0.05; ***p < 0.001. Trust Index is the three-component composite including agents. [1]Negative adjusted within-R^2 is an artefact of the degrees-of-freedom penalty in a short panel with many fixed effects; unadjusted within-R^2 ≈ 0.043 (see Section 5.4).*

5.3 Model Progression: From Cross-Section to Within-State

The progression from Model 1 to Model 3 is worth talking a walk through. Pooled OLS finds Trust out to be strongly significant (0.554, p < 0.001) and the interaction near zero (0.011, p = 0.851). OLS is picking up persistent state characteristics about high trust and low trust states. And this is what dominates cross-sectional correlation between trust and premium. State fixed effects in Model 2 remove everything persistent about each state. Trust still remains significant at a larger coefficient (1.101). The interaction remains near zero (0.011, p = 0.880) because year-to-year national trends remain in the error.

Model 3 adds year fixed effects. This removes common temporal trends on top of accounting for persistent state trends. The results reveal an interesting story. Neither Risk nor Trust individually achieve significance at conventional levels, but their interaction is positive and significant at five percent (0.040, p = 0.038). This pattern of individual terms insignificant, interaction significant is what our theory predicted. It is a sign of a strong conditional mechanism at play. Risk does not drive premium on its own within states. Trust does not drive premium on its own within states. It is their joint effect what drives within-state premium variation. This provides strong empirical support for H1.

5.4 On the Negative Adjusted Within-R^2

The adjusted within-R^2 of −0.142 in Model 3 needs honest discussion. With 27 state dummies, 7 year dummies, and 3 regression coefficients estimated against 224 observations, the degrees-of-freedom adjustment is severe. This means 37 parameters are consumed against an effective within-sample of 187. The negative adjusted R^2 is just a standard artifact of two-way FE on short panels and does actually not affect the consistency or significance of the coefficient estimates.

5.5 Marginal Effects Analysis and the Trust Threshold

The marginal effect of the Risk Index on ln(premium_pc) as function of trust level is as follows:

ME(Risk | Trust) = −0.037 + 0.040 × TrustIndex

The trust threshold Trust* = −(−0.037)/0.040 = 0.938 is the central finding, helping confirm H2. It categorises only six states in the stimulation regime: Tamil Nadu (0.977), Uttarakhand (1.020),

Kerala (1.250), Sikkim (1.320), Goa (1.460), and Himachal Pradesh (1.520). The remaining 22 states are placed in the suppression regime.

Trust Context	Trust Level	ME of Risk	Economic Interpretation
Bihar (lowest trust)	−1.34	−0.091	1-SD risk rise reduces premium per capita by ~9.1%
One SD below mean	−1.00	−0.077	Strong suppression of insurance demand by risk
Sample mean trust	0.00	−0.037	Risk suppresses demand even at average trust
Trust threshold (Trust*)	**0.938**	**≈0.000**	Knife-edge: risk is demand-neutral
Uttarakhand	1.020	≈+0.004	High-risk, high-trust — risk stimulates demand
Himachal Pradesh (highest)	1.520	≈+0.024	Clearest risk-responsive insurance market in sample

Table 5: Marginal Effect of Risk on ln(Premium per Capita) at Selected Trust Levels

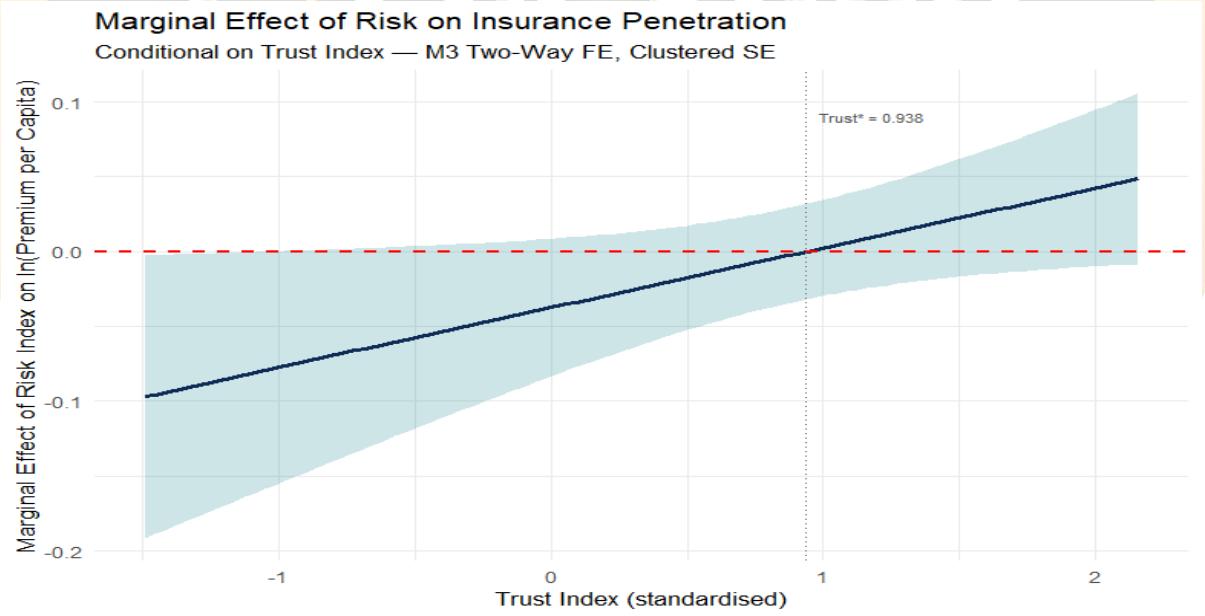

Figure 4: Marginal Effect of Risk on Insurance Penetration, conditional on Trust Index (M3: Two-Way FE, Clustered SE). Shaded band shows 95% confidence interval. Vertical dotted line marks Trust = 0.938, the trust threshold where the marginal effect crosses zero.*

The economic magnitudes are worth sitting with. At Bihar's trust level (−1.34), a one-standard-deviation of increase in the Risk Index is associated with a 9.1 percent decline in premium per capita. This is approximately ₹61 per person at the unconditional mean. This means household decided to redirect ₹61 away from insurance. The mechanism is probably a combination of 2

factors. Firstly budget compression which means elevated risk consumes liquid resources that would have funded premiums. And second, trust withdrawal which means households in distress retreat to informal coping networks and abandon formal contracts requiring multi-year commitment. The mechanism is thus doubly suppressive in low-trust states. Risk crowds out insurance financially and undermines the trust environment on which formal insurance commitment depends upon.

5.6 State Regime Classification

Table 6 classifies all 28 states by regime, ranked by average Trust Index.

State	Avg. Trust	Avg. Risk	Avg. ln(prem)	Dist. to Trust*	Regime
Bihar	−1.34	−0.024	5.63	2.278	Suppresses demand
Nagaland	−1.19	−0.528	5.71	2.128	Suppresses demand
Jharkhand	−0.880	0.152	5.85	1.818	Suppresses demand
Chhattisgarh	−0.825	0.274	5.87	1.763	Suppresses demand
Meghalaya	−0.799	0.024	5.88	1.737	Suppresses demand
Uttar Pradesh	−0.796	0.192	5.95	1.734	Suppresses demand
Madhya Pradesh	−0.723	0.543	5.94	1.661	Suppresses demand
Assam	−0.714	0.093	5.98	1.652	Suppresses demand
Rajasthan	−0.516	0.080	6.10	1.454	Suppresses demand
Arunachal Pradesh	−0.490	0.992	5.46	1.428	Suppresses demand
Manipur	−0.478	−0.502	6.14	1.416	Suppresses demand
West Bengal	−0.469	−0.355	6.18	1.407	Suppresses demand
Mizoram	−0.424	−0.046	6.21	1.362	Suppresses demand
Tripura	−0.268	−0.038	6.23	1.206	Suppresses demand
Gujarat	−0.231	−0.205	6.32	1.169	Suppresses demand
Odisha	−0.220	0.611	6.11	1.158	Suppresses demand
Maharashtra	0.259	−0.063	6.71	0.679	Suppresses demand

Andhra Pradesh	0.330	−0.046	6.65	0.608	Suppresses demand
Karnataka	0.408	−0.054	6.69	0.530	Suppresses demand
Telangana	0.514	−0.072	6.72	0.424	Suppresses demand
Haryana	0.640	0.052	6.74	0.298	Suppresses demand
Punjab	0.657	−0.489	6.69	0.281	Suppresses demand
Tamil Nadu	0.977	−0.303	7.12	+0.039 (closest above threshold)	RISK STIMULATES demand
Uttarakhand	1.020	0.507	7.25	Above threshold	RISK STIMULATES demand
Kerala	1.250	−0.667	7.60	Above threshold	RISK STIMULATES demand
Sikkim	1.320	0.128	7.08	Above threshold	RISK STIMULATES demand
Goa	1.460	−0.230	7.41	Above threshold	RISK STIMULATES demand
Himachal Pradesh	1.520	−0.026	7.58	Above threshold	RISK STIMULATES demand

Table 6: State Classification by Risk–Trust Regime (Trust = 0.938). Sorted by ascending Trust Index. Distance to Trust* shows units below threshold for suppression states.*

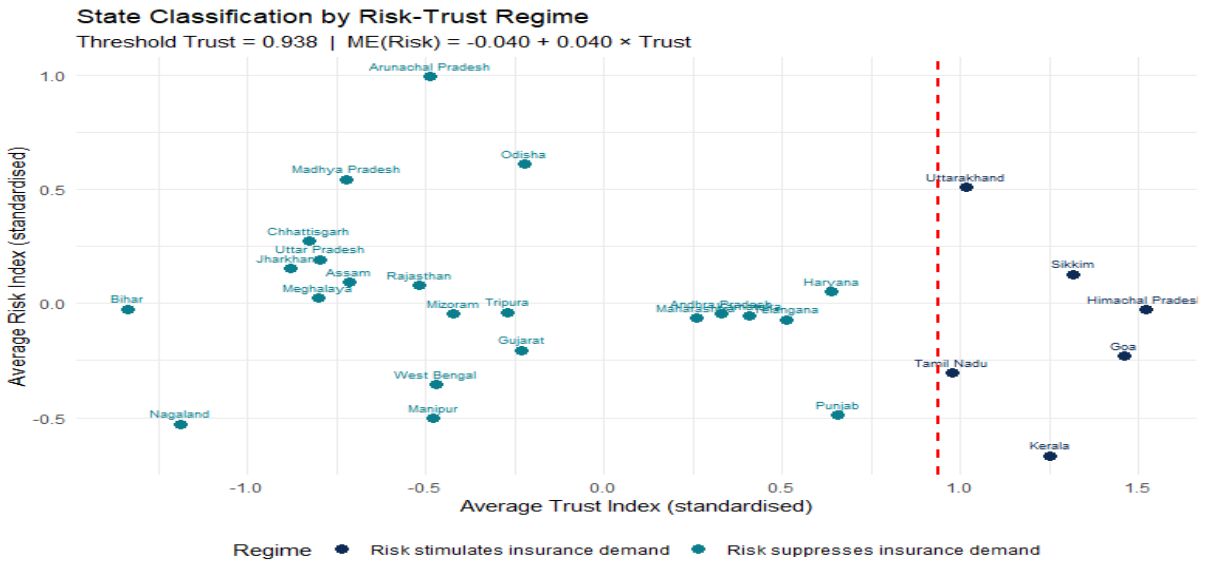

Figure 5: State Classification by Risk–Trust Regime. Red dashed vertical line marks Trust = 0.938. States to the right are in the stimulation regime; states to the left are in the suppression regime. Darker points indicate above-threshold states.*

6. The Relational Agent: Trust Channel versus Supply Channel

6.1 The Apparent Paradox and Its Resolution

The treatment of insurance agents in this study generates what at first appearance appears to be a contradictory. Agents are included in the Trust Index as a structural component of the trust environment. But when agents are entered as a standalone control, they are insignificant as a direct predictor of insurance premium within states over time (coefficient = −0.00018, p = 0.863). How can agents be relevant to insurance penetration through the trust channel but at the same time irrelevant as a direct supply predictor?

The paradox dissolves once we distinguish supply channel from the trust channel. The supply channel belief says that agents increase premium volume. They do this by expanding access as each additional agent reaches additional households and in turn helps convert latent demand into realised premium. The trust channel on the other hand predicts that agent density shapes the environment of trust. This by creation of network of the relational trust through which formal insurance contracts can be credibly intermediated. This network shapes the slope of the risk premium relationship rather than actually affecting the level of premium directly. The data supports the trust channel, thus confirming H3.

6.2 Empirical Tests of the Two Channels

The supply channel test is simple. Agents per lakh are entered as an additional control in the two-way FE model alongside Risk, Trust (not including agents), and their interaction carries a coefficient of −0.00018 (clustered SE = 0.00102, p = 0.863). This is economically negligible . This means a doubling of agent density would predict a change of approximately −0.018 percent in premium per capita. This is smaller than measurement error. The supply channel can be observed to be inoperative within states over time.

The trust channel is established by the comparison between the three-component Trust Index (including agents) and the two-component Trust Index (not including agents). With the two-component index we find the interaction coefficient is 0.040 (p = 0.055). this is significant at ten percent but not at five. With the three-component index the interaction term comes out to be 0.040 (p = 0.038) thus crossing the five percent threshold. Including agents does not change the magnitude of interaction coefficient (both come out to be 0.040 to three decimal places). Instead, it reduces the clustered standard error from 0.021 to 0.019. This improvement in precision is the sign of the trust channel at play. Agent density adds relational trust infrastructure to the index that is complementary to GER and banking components.

6.3 Why the Distinction Matters in India's High-Context Economy

The supply–trust distinction is not a nuance that applies to all insurance markets everywhere. In low-context and high institutional-trust societies, ones with a strong legal enforcement of financial contracts, high level of financial literacy, and a well-established reputation of insurer,

which is backed by credible regulation, insurance agents primarily function as a supply channel. Households have already essentially resolved the credence problem through their decades of experience with formal financial products. Here agent's role is purely distributional.

In India's context, the sequence seems to reverse. It is high context, collectivist, and grounded interpersonally economic culture. The credence problem is not solved in 22 of 28 states by institutional means. Formal institutional trust is inadequate to cross the threshold. It is the combination of institutional infrastructure and relational intermediation that helps overcome this. The agent provides sort of an interpersonal guarantee. There exists social accountability, feeling of community, and personal reputation when interacting with agents. This transforms the insurer's formal contractual promise into a personal promise the household can believe. Social accountability is not a feature of the product. It is what leads to the product being bought at all. This mechanism is grounded in Luhmann's (1979) distinction between system trust and personal trust. There are also parallels with the role of relational intermediaries in microfinance (Karlan, 2005), adoption of agricultural technology (Foster and Rosenzweig, 1995), and informal credit markets (Banerjee and Duflo, 2007).

One might argue that agents flow to states where insurance sales are high. This endogeneity concern would predict a significant positive relationship between agent density and premium as a standalone separate variable. But the data show the opposite ($p = 0.863$).

7. Robustness Checks

Table 7 presents six robustness specifications alongside the main Model 3. The interaction coefficient is the primary focus across all specifications.

	Main M3	**R1: Drop 7**	**R2: Double Cluster**	**R3: No Winsor**	**R4: Abs DV**	**R5: 2-Comp**	**R6: +GSDP**
Risk	−0.037	−0.013	−0.037	−0.040	−0.038	−0.040	−0.038†
	(0.023)	(0.031)	(0.025)	(0.025)	(0.024)	(0.024)	(0.023)
Trust	0.102	0.103	0.102	0.095	0.099	0.078	0.103
	(0.066)	(0.110)	(0.066)	(0.064)	(0.067)	(0.055)	(0.067)
Risk×Trust	0.040**	0.043	0.040**	0.034**	0.042**	0.040†	0.041**
	(0.019)	(0.031)	(0.016)	(0.015)	(0.019)	(0.021)	(0.020)
Obs.	224	168	224	224	224	224	224
p (RiskTrust)	0.038	0.170	0.013	0.026	0.029	0.055	0.043

*Table 7: Robustness Check Results.. R1: drops Maharashtra, Tamil Nadu, Karnataka, UP, West Bengal, Goa, Sikkim. R2: two-way FE with double clustered (state and year) HC1 standard errors. R3: non-winsorised Trust Index. R4: ln(absolute premium). R5: two-component Trust (GER + banks, no agents). R6: adds ln(pcgsdp) control. †p < 0.10; **p < 0.05; ***p < 0.01.*

The interaction is positive across all six specifications. It is also significant at five percent in four (R2, R3, R4, R6).

R1 drops seven states. This reduces the cluster count to 21. Cameron, Gelbach, and Miller (2008) found a bias in finite-sample with smaller number of clustering. This in turn hampered the reliability of clustered standard errors. Here the interaction loses significance at five percent. Perhaps an observation can be made that the coefficient (0.043) is actually numerically more stable than the main model, not less. The standard error might be inflated by the smaller cluster count instead of genuine instability.

R2 applies double-clustered standard errors by both state and year. The interaction coefficient was found to be unchanged at 0.040. The standard error fell from 0.019 to 0.016. This leads to an improvement in significance, that too meaningfully from p = 0.038 to p = 0.013. One can infer that the main interaction result is not dependent on a narrow covariance specification. It actually remains robust to more flexible assumptions regarding both serial and cross-sectional error correlation.

R3 removes winsorisation. The interaction strengthens to p = 0.026 which indicates that winsorisation might be too conservative. It caused a compression of variation in components.

R4 replaces log of premium per capita with log of absolute premium. The result at p = 0.029 confirms that per-capita transformation is not the primary driving factor.

R5 uses two component trust index by not including agents. The p value at 0.055 directly validates H3. Agents meaningfully contribute to information needed to estimate trust in institutions. Their removal weakens the interaction.

R6 shows income variation within states has little to no independent predictive power. ln_pcgsdp p = 0.882 confirms the income channel is not operative in this panel structure.

8. Heterogeneous State Analysis: Theory Meets Geography

8.1 Uttarakhand: The Unique Case

Uttarakhand occupies a peculiar position that no other state can relate. A state that is both the fourth highest-risk state in the sample with Risk Index = 0.507, and also the only high-risk state above the trust threshold with Trust Index = 1.020. At the same time. Uttarakhand's high risk is something real. The state encompasses some of India's most seismically active territory. It has experienced catastrophic flood events, the 2013 Kedarnath flood being the most severe. These have dominoed into high disaster expenditure per lakh ($z = 1.34$).

Uttarakhand's trust level creates an image of relatively developed hill-station banking infrastructure it possesses. With migration of educated worker population, it also has higher-than-average secondary enrolment. And lastly for trust, the agent density is supported by LIC's strong presence in the Garhwal and Kumaon regions. These factors jointly tip it just over the threshold that 22 other states cannot cross. Uttarakhand is where the risk trust insurance chain operates as theory predicts. Real risk coexists with sufficient institutional infrastructure. The data shows premium to be stimulated by the risk experienced.

8.2 Arunachal Pradesh: The Deepest Institutional Trap

Arunachal Pradesh is Uttarakhand's mirror image, sitting at the extreme opposite corner of the regime map. With highest average Risk Index in the sample at 0.992 and a Trust Index well below threshold at −0.490 it represents the deepest institutional trap in Indian insurance markets. Despite it needing formal insurance the most, it is the one unable to generate it. All three risk components are contributing to it's high risk index. It has high income volatility at $z = 0.693$. Infant mortality rate is also significant normalised score of 0.393. Most importantly, it is by far the highest disaster expenditure per lakh in the sample with $z = 1.89$. It can be attributed to constant exposure to flash floods, landslides and seismic events in the East of Himalayas. But the Trust Index of −0.490 places it below the threshold. Thus it is in the suppression zone even with it's high risk profile.

8.3 The BIMARU Cluster: Risk Without Trust

Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh i.e., the BIMARU states occupy the lower-left quadrant of the regime map. They have above-average to high risk with deeply below-threshold trust. Table 8 summarises their institutional profile.

State	Risk	Trust	Dist. to Trust*	Avg ln(prem)	Primary Trust Deficit
Bihar	−0.024	−1.34	2.278	5.63	All three components below average
Madhya Pradesh	0.543	−0.723	1.661	5.94	Low GER; sparse banking
Uttar Pradesh	0.192	−0.796	1.734	5.95	Low GER; low agents per lakh
Rajasthan	0.080	−0.516	1.454	6.10	Low GER; banking improving

Table 8: BIMARU State Institutional Profile Against Trust Threshold

The BIMARU states collectively make up for approximately 40 percent of India's population. They also have disproportionately large portion of uninsured, high-risk households. Bihar is the extreme case. It has Trust Index of −1.34, which is 2.278 standard deviations below the threshold. This gap in institutional framework is the largest in the sample studied. The average premium per capita for these four states ranges from 5.63 to 6.10 in log terms. This is noticeably lower than the sample mean of 6.509. Madhya Pradesh demonstrates an institutional confine. With a high risk score of 0.543 and a trust gap of 1.661 units, in theory people are aware of risk they are exposed to. But institutional infrastructure is highly inadequate to convert this awareness into actual formal contractual participation.

8.4 Kerala: The Trust-Paradox State

Kerala is difficult to fit neatly inro the framework. Thus, It presents the most theoretically interesting case among the six states above the threshold.

With the highest Trust Index at 1.250 and the lowest Risk Index −0.667 in the sample, it places comfortably in the lower-right quadrant of the regime map. Its classifies as a stimulation state. This works on a numerical basis as the marginal effect of risk on premium is approximately +0.013. But the actual story is different from Uttarakhand. For Kerala, risk captured by Risk Index are not what households react to. Its insurance demand is driven primarily by the mortality risk of Gulf migrant workers. There is also the longevity risk due to it being India's oldest age structure. Population with high healthcare dependence and expectation of utilisation means a meaningful health cost risk. The asset protection risk due to high homeownership rates can also be observed. Kerala's insurance market makes case for the demand-side pull that has outgrown the risk dimensions.

9. Policy Implications: Two Indias, Two Strategies

The trust threshold at Trust* = 0.938 bifurcates India's insurance market into two systematically different problems. And they both require fundamentally different solutions. If we were to apply a universal insurance promotion strategy across all 28 states, it will not accurately identify the binding constraint for 22 of them. The following implications are framed as sort of directions rather than instructions. They are strategic orientations rather than prescriptions. We must remember the finding are associational in nature rather than causal. This is due to the limitations of aggregating at state level.

9.1 Below-Threshold States: Build Institutions Before Promoting Insurance

The results for the 22 below-threshold states is unambiguous in direction. Elevated risk can be seen to be associated with lower or neutral insurance premium spending within states over time. The number of agents is not the binding constraint. Agent density turned out to be extremely insignificant as a direct supply predictor. This suggests IRDAI's efforts that primarily aimed toward agent licensing drives or rural business mandates in these states will have limited intended impact. Thus increase in premium per capita i.e., insurance uptake might be difficult to achieve using solely these measures.

Trust build is likely the first order of intervention in below threshold states. Expanding of banking infrastructure, achieving higher literacy especially financial and claims settlement credibility can help achieve that goal. Jan Dhan Yojana is one of the most relevant ongoing initiatives. It builds the institutional trust. It also creates banking relationships with households.

And yet, that is not the complete picture. A household can have a Jan Dhan account that has been unused for months or years. This would lead to banking access without actual engagement. Instead the trust building would require an active participation. It would need regular transactions, credit experience, adoption of digital payment, making financial sector a part of their lifestyle.

A case can be made for government mandated group insurance and subsidised scheme based coverage. They provide social protection aspect of insurance. It also allows institutional environment for voluntary participation develops in the background. They do not require voluntary long duration commitments. Thus there is also no need for the same level of household.

They are more appropriate in the near term for below-threshold states as an introductory solution.

9.2 Near-Threshold States: High-Return Targets for Incremental Investment

Six states sit close enough to the threshold that consistent institutional investment has a reasonable chance of crossing it, which can be achieved by thought-out policy framework. Punjab (0.281 units below threshold), Haryana (0.298 below), Telangana (0.424 below), Karnataka (0.530 below), Andhra Pradesh (0.608 below), and Maharashtra (0.679 below) are within reach of threshold crossing. This can be achieved within a time span of five to ten years with targeted and relevant institutional investment.

Telangana and Karnataka are most promising candidates. They are demographically large states with rapidly growing banking infrastructure, thanks to regional rural banking networks. Expanded bancassurance arrangements under IRDAI's open architecture regulatory framework could realistically help tip them over the threshold within a five-year planning horizon. Punjab's borderline threshold position with low objective risk means that crossing the threshold will activate risk reactive demand. This is from a low-risk base leading to modest incremental premium. Haryana offers a more attractive risk trust environment. It has near threshold trust and near average risk making it the prime target that will achieve more meaningful premium growth on after crossing threshold.

9.3 Above-Threshold States: Product Design and Market Deepening

The six above threshold states are a different problem entirely. The institutional work is done. Trust is sufficient enough to convert risk into demand. The problem here is not how to build the environment for insurance. It is what insurance to build for the environment that already exists. Uttarakhand provides the single most important product development opportunity. It is the only state that is simultaneously high risk while being above threshold. It is the only place where a disaster linked product would find both an actuarial need and the household will trust it enough to actually buy it. A term policy priced on Uttarakhand's history of disaster mortality rather than national mortality tables which is distributed through the banking network in the high-exposure Garhwal and Kumaon river basins is not a product concept that is speculative. It actually addresses a documented risk. Combine that with a distribution channel that already exists and a trust environment that already works and we have the perfect product for the state.

Tamil Nadu sits comfortably just above the threshold with a negative Risk Index (−0.303). Thus stimulation applies. The risk signal, on the other hand, is weak. This suggests an extensive coverage is already relatively developed. Priority is not costumer acquisition but instead deepening of premium. Thus goal should be to increase sum assured per existing policyholder and upgrade low value traditional endowment policies to term or health riders. There is also the need to develop wealth-protection products for a state with an ageing demographic and relatively higher accumulated household assets. The SHG bank linkage network is the most cost-effective and viable distribution channel for this. It reaches households that are already financially engaged. It also does not have the intermediation costs of the individual agent model.

Kerala's insurance frontier, as mentioned in Section 8.4, is not entirely aligned with what the Risk Index measures. Gulf migrant mortality protection for a population with disproportionate exposure to overseas occupational risk. Long-term care insurance for one of India's oldest age structures. Annuity products for a high-life-expectancy population that has genuinely outrun informal old-age support mechanisms. Educational endowments for a state where educational attainment expectations are high and the costs of funding them are also quite real. None of these are out of ordinary products in developed insurance markets. But in India they are largely absent. Kerala is the state where the demand, the trust infrastructure and the distribution network all exist. The missing element is product tailored to its needs.

Sikkim and Goa are smaller markets where the above-threshold classification has limited aggregate policy significance but meaningful product-specific implications. Sikkim's extreme disaster exposure — glacial lake outburst flood risk that the composite partially conceals — makes it a candidate for the same disaster-linked product logic as Uttarakhand, at smaller scale. Goa's income volatility from tourism cyclicality, the dominant component of its Risk Index, points toward income protection and business interruption products rather than mortality or catastrophe coverage.

9.4 The Agent Policy Conclusion

The relational agent finding cuts directly against the direction of current IRDAI policies. Most consistently push toward channel diversification, with bancassurance, digital distribution, aggregator platforms, on the premise that the individual agent model is a problem to be gradually done away with. The data suggest this premise to be inconsistent in below-threshold states and roughly right in above-threshold ones. The blindspot of policy is applying the same logic to both. In below threshold states, expanding agent numbers as a penetration tool would not work. The standalone supply result makes that clear. But deprioritising the agent model in these states would also be a mistake. The agent is not failing as a salesperson. He is functioning, although imperfectly, as a relational trust intermediary in an environment. But this environment possesses no institutional substitute. The question is not whether to have agents but how to regulate and incentivise them to build that trust more effectively.

Currently, agent performance in India is measured almost entirely on premium volume: policies sold, premiums collected, targets met. This metric optimises for the supply channel. But does nothing for the trust channel that is actually doing the work. It doesn't measure the contribution to "context". A regulatory shift toward long-term engagement metrics including renewal rates, sum assured growth over the policyholder relationship, claim satisfaction scores and lapse rates would reorient agent incentives toward the behaviours that build relational trust rather than extract short-term premium.

In above-threshold states the viewpoint changes. Institutional environment partially resolves the credence problem. Households have enough banking experience and enough secondary education. They also possess enough trust in formal financial institutions to evaluate insurance products without needing a personal guarantee of an intermediary. The agent's function is less

about load bearing when system trust is doing primary work. Here bancassurance and digital distribution are genuinely more efficient. Channel efficiency is the right priority above the threshold.

The policy conclusion is neither pro-agent nor anti-agent. It is instead conditional on the trust regime.

10. Conclusions

10.1 Summary of Findings

The standard explanations for India's insurance penetration deficit are not just incomplete. They are empirically innacurate within states over time. After absorbing national time trends Income variation within states has a within-variance of 0.0084 and p = 0.882. It predicts next to nothing. Agent desnity also has low prediction power. As a standalone supply variable, it has p value of just 0.863. Awareness campaigns and distribution drives directed at below-threshold states are solutions to a problem these states do not have, a supply shortage. But instead they are leaving untouched the problem they do have.

The problem is institutional trust. Specifically, the failure of the trust environment in 22 of India's 28 major states to reach the threshold at which objective risk exposure can actually convert into formal insurance demand.

The core finding is this: below Trust* = 0.938, risk suppresses insurance demand. Above it, risk stimulates demand. The Risk × Trust interaction is positive and significant at five percent in the main specification ($\beta_3 = 0.040$, clustered SE = 0.019, p = 0.038). The interaction remains positive across all robustness specifications and statistically significant in five of six, including four at the five-percent level. The income channel and the supply channel each had a fair test under two-way fixed effects. Neither received empirical support. The conditional trust interaction is the only mechanism consistently positive across all specifications and supported by most of them.

The second finding concerns what insurance agents actually are in India's economy. The contrast between two numbers tells a story. Agents as a component of the Trust Index produce an interaction significant at p = 0.038. But when treated as a standalone supply control, they produce p of 0.863. Same variable, two specifications. But two completely different answers because the two specifications are testing two different things. The testing supply channel asks whether more premium can be predicted by more agents within a state. The answer is no. The trust channel test asks whether agent density combined with banking infrastructure and secondary enrolment, creates the environment in which risk can convert into demand. It does. Agents in India are not salespeople who just so happen to know their customers. They are points of trust and relational trust network in an economy where 22 of 28 states cannot yet solve the credence problem through institutional means alone.

These two findings together reframe the policy problem. India does not have an insurance distribution problem disguised as a penetration problem. It has a trust deficit. In the majority of its states no distribution strategy can substitute for this deficit and a small set of above-threshold

states where voluntary insurance markets are working roughly as theory predicts, waiting for products tailored to match the risk needs of households.

10.2 Theoretical Contributions

Three contributions stand out, each with implications that extend beyond this paper.

The first is methodological. This is the first state-panel study in India to model the risk–trust interaction as the primary within-state determinant of insurance premium variation under two-way fixed effects. The design choice matters more than it might appear. Cross-sectional studies of Indian insurance penetration have consistently found trust and income significant but cross-sections cannot separate what is persistent about a state from what is changing within it. Two-way fixed effects strips away the persistent layer and asks what moves together within states over time. The answer, the conditional interaction, would not be visible in a cross-sectional design

The second contribution is theoretical and travels beyond Indian insurance. The reconceptualization of the insurance agent as a relational trust intermediary has implications for markets with credence goods in high context societies. The general claim is as follows: in these markets, the density of the relational network of intermediaries is a trust factor, not a supply variable. Empirical models that treat it as the latter will misidentify the binding constraint on market development and policy built on those models will consistently intervene in the wrong place.

The third contribution is the trust threshold itself. It helps policy makers and regulators determine where to direct resources, which states to prioritise, or when the institutional environment is ready for voluntary market promotion It identifies a institutional level that separates qualitatively different policy regimes. Six states are above it. Twenty-two are below it. The distance each below threshold state sits from the boundary is a tractable planning parameter. Whether the specific value of 0.938 survives replication in other contexts is an open empirical question. That a threshold exists, that the relationship between risk and insurance demand is conditional rather than monotonic, is a finding with implications for how insurance policy in developing economies is framed wherever the institutional environment is heterogeneous enough to produce regime variation.

10.3 Limitations

Four limitations deserve transparent treatment rather than the brief acknowledgment sections like this often receive.

The first is proxy validity. The Trust Index measures trust infrastructure not trust attitudes directly. It is institutional conditions under which trust can develop. GER captures educational attainment. It does checkt whether households believe insurers will honour claims. Bank branches capture physical access, not whether households have had positive experiences with them. Agent density does not the tell quality of the relational intermediation those agents actually provide. It just provides a measure of depth of agent network. The gap between infrastructure and actual attitude is real. A state can have dense banking networks populated by dormant

accounts. There could be high secondary enrolment driven by rote attendance rather than genuine financial literacy. Agent counts could be driven by churn, instead of embedding them in community relationships. Future work using state-level financial trust survey data would enable a more precise test of the mechanism this paper theorises but cannot measure directly. These could be direct household measures of perceived insurer credibility, claims settlement confidence, and institutional reliability.

The second is aggregating at state-level. Uttarakhand's aggregate Trust Index of 1.020 places it above the threshold. This can be attributed to Garhwal river basin districts alongside LIC's historical presence and a dense banking infrastructure. But in the remote high-altitude districts of Chamoli and Uttarkashi banking access is seasonal and agent networks are thin. The aggregate threshold crossing conceals a within-state regime boundary that the state-level data cannot precisely locate. This problem is most severe for geographically heterogeneous states: Uttarakhand, Maharashtra, Madhya Pradesh. Here averaging across districts that are structurally different produces an aggregate Trust Index that describes no district accurately. District-level data from IRDAI and UDISE+, when consistently available, would allow the threshold analysis to be more precise. This will help achieve a precision where policy is actually implementable.

The third is causal identification, and it needs to be stated plainly. The two-way fixed effects design controls for persistent state heterogeneity and common time trends. This is more than cross-sectional designs offer. Yet it does not eliminate time-varying state-level confounders. At the same time, the interaction result remains robust to alternative covariance estimators, including double-clustered standard errors by both state and year. This reduces concerns that inference is driven by narrow assumptions regarding residual dependence. A state-specific policy shock that simultaneously elevates both the trust environment and premium like an unusually effective Jan Dhan rollout following a major flood year could generate a spurious interaction. This the design cannot rule out. Stronger identification would require instruments: rainfall shocks for the risk component, bank branch licensing policy changes or the historical rollout of branch nationalisation for a better and improved institutional trust component. The main finding is to be interpreted as a strong conditional association under two-way fixed effects instead of a structural causal estimate.

The fourth limitation is context specificity. Trust* = 0.938 is calibrated to India's institutional environment over this specific panel period. The Trust Index components reflect the mechanisms through which trust develops in India. But this finding is in the particular combination of high-context culture, federal institutional structure, and post-liberalisation financial sector development. The theoretical mechanism that risk and trust interact conditionally in credence good markets in high-context economies may well generalise to other developing country contexts. The specific parameter values and index composition should not. Applying universal threshold at 0.938 to countries like Indonesia or Nigeria without re-estimation would be a misuse of the finding. The framework may hold. The numbers would not.

10.4 Future Research Directions

Three directions can be followed. Each will address a different limitation of the current study.

The most immediate extension is micro-data. IRDAI publishes state-level premium data consistently. Panel structure requires consistent measurement across units and time. Thus state-level analysis is where this study had to start. But the threshold mechanism is a household-level phenomenon. A household in Uttarakhand's Chamoli district makes an insurance participation decision based on its local institutional environment. It is not affected by the state aggregate. The NSSO and SECC household surveys, linked to district-level trust proxies constructed from UDISE+ and RBI branch data, would enable a within-state test of the threshold. This will help achieve the resolution where the mechanism actually operates. The payoff is not just statistical precision. It will unable us to identify hyperlocal regime boundaries that the state-level analysis cannot detect and that district-level policy implementation requires.

The second direction is cross-country replication. The theoretical prediction is specific enough to be testable: the Risk × Trust interaction should be positive in all high-context collectivist economies. The threshold value may vary by institutional development level. A multi-country panel covering South and Southeast Asian insurance markets like Bangladesh, Indonesia, Vietnam, the Philippines alongside India would test whether Trust* = 0.938 is an India-specific calibration or an instance of a more general pattern. The theoretical framework predicts the latter. If the interaction is positive across contexts but the threshold varies systematically with institutional development, lower thresholds in more institutionally developed economies, higher ones in less developed ones, that finding would substantially strengthen the generalisability claim. It will also provide a comparative benchmark for where India sits in the regional institutional development distribution.

The third direction is gender. It is the most underexplored dimension in the existing literature. It is also the one where the trust mechanism has the most uncomfortable implications. IRDAI data show that female-headed households and female policyholders are systematically under-represented in individual life insurance even within above-threshold states. These are states where the institutional environment shouldbe sufficient to support voluntary market participation. The trust mechanism as modelled here is gender-neutral by construction. But the same can not be said about the agent network through which relational trust operates in India. It is predominantly male and embedded in social structures that give male agents differential access to male household decision-makers. It is also regulated by metrics that do not capture whether female-headed households are being reached or retained. Whether the threshold is effectively higher for female household heads is a question the state-level data cannot answer. It is also has direct regulatory implications that the current IRDAI framework does not ask.

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Cite this Article:

Mridul, "Risk, Trust, and the Relational Agent:*A Panel Analysis of Insurance Penetration Heterogeneity Across Indian States*" The Research Dialogue, Open Access Peer-reviewed & Refereed Journal, Pp-351–379, Volume-05, Issue-01, April-2026, https://theresearchdialogue.com/

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Risk, Trust, and the Relational Agent:

A Panel Analysis of Insurance Penetration Heterogeneity Across Indian States

Published in 'The Research Dialogue' Peer-Reviewed / Refereed Research Journal and E-ISSN: 2583-438X, Volume-05, Issue-01, Month April, Year-2026, Impact Factor (RPRI-4.73)

Dr. Lohans Kumar Kalyani
Editor- In-chief

Dr. Neeraj Yadav
Executive-In-Chief- Editor

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DOI : https://doi.org/10.64880/theresearchdialogue.v5i1.41