

# Reinsurance Governance, Insurer Risk-Taking, and Financial Sustainability in Emerging Asian Insurance Markets

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# **REINSURANCE GOVERNANCE, INSURER RISK-TAKING, AND FINANCIAL SUSTAINABILITY IN EMERGING ASIAN INSURANCE MARKETS**

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## **Abstract**

A resilient and financially sustainable insurance sector is a cornerstone of sustainable economic development, climate risk adaptation, and socio-economic stability (aligned with UN SDGs 8, 11, and 13). However, whether traditional risk-transfer mechanisms genuinely support long-term insurer sustainability remains contested. This paper examines whether reinsurance restrains or amplifies insurer risk-taking in emerging Asian insurance markets. Using a panel of 45 insurers across East, South, and Southeast Asia from 2019 to 2023, we estimate a dynamic two-step difference GMM model to account for risk-taking persistence, firm heterogeneity, and potential endogeneity in reinsurance choices. The results show that a higher reinsurance ratio is significantly

associated with greater insurer risk-taking. This pattern is consistent with a risk-shifting channel: rather than functioning purely as a stabilising buffer, reinsurance may relax underwriting and capital constraints, thereby incentivising insurers to expand risk exposure and potentially undermining their long-term financial sustainability. The evidence contributes to the literature on sustainable insurance and governance in emerging markets by demonstrating that risk-transfer instruments can generate unintended behavioural hazards when institutional monitoring and supervisory discipline are evolving. To safeguard sustainable financial institutions (SDG 16), regulators and insurers must align reinsurance programmes with enterprise risk management, evaluating not only the volume of ceded risk but also the incentive design and long-term solvency implications embedded in reinsurance arrangements.

**Keywords** Reinsurance · Risk-taking · Insurance governance · Moral hazard · Emerging Asia · Financial sustainability · Sustainable insurance

## 1. Introduction

Insurance companies play a foundational role in fostering sustainable economic development by absorbing, pricing, and redistributing risk across society. Within the United Nations Sustainable Development Goals (SDGs) framework, a resilient insurance sector directly supports decent work and economic growth (SDG 8), resilient infrastructure (SDG 9), sustainable cities and communities (SDG 11), and climate action (SDG 13) by providing a financial safety net against environmental disasters and socio-economic disruptions (Arena 2008; Outreville 2013). However, insurers can only fulfil this societal buffer function if their own operations and risk-bearing architectures remain financially sustainable over the long run. Recent global shocks have intensified concerns regarding the long-term sustainability of insurers and the managerial incentives that shape their risk-taking behaviour. The COVID-19 pandemic exposed insurers to large, correlated losses, challenging underwriting capacity, capital adequacy, and the insurability of systemic risks (Liedtke 2021; Richter and Wilson 2020). Subsequent geopolitical tensions, inflationary pressures, and escalating climate-related catastrophes have further tested how insurers adjust their risk profiles under volatile operating conditions (Caldara and Iacoviello 2022; Hemrit 2022). Consequently, understanding whether core risk-management tools promote prudent stability or induce excessive risk-taking is vital for ensuring sustainable financial institutions.

Reinsurance is traditionally viewed as a prudential risk-transfer mechanism. By ceding part of their underwriting exposure to reinsurers, primary insurers may reduce loss volatility, stabilise earnings, preserve underwriting capacity and obtain capital relief (Cummins et al. 2021; Lee and Lee 2012; Li and Shiu 2021). From this perspective, reinsurance strengthens insurers' ability to absorb shocks and supports market stability. Yet the behavioural implications of reinsurance are less straightforward. If reinsurance reduces the effective marginal cost of bearing downside risk, weakens the consequences of adverse underwriting outcomes or relaxes capital constraints, it may also encourage insurers to expand risk exposure (Cheng and Weiss 2013; Doherty and Smetters

2005). In this sense, reinsurance may operate not only as a stabilising risk-management tool but also as a channel through which risk-taking incentives are altered (Cummins et al. 2021; Mankaï and Belgacem 2016). The central issue is therefore not whether reinsurance transfers risk mechanically, but whether its use is associated with more prudent or more aggressive insurer behaviour.

This ambiguity motivates the main research question of this study: does reinsurance constrain insurer risk-taking through improved exposure management, or does it facilitate risk shifting by relaxing capital and incentive constraints? Existing research provides important foundations for this question but does not fully resolve it. Prior studies show that insurer risk-taking is shaped by institutional, behavioural and market conditions (Sun 2021), that reinsurance generates both stabilising benefits and costs (Cummins et al. 2021), and that it may enhance insurers' debt capacity and financial flexibility (Li and Shiu 2021). Other contributions examine the determinants of reinsurance demand, including catastrophe exposure, organisational structure, governance and insurer–reinsurer relationships (Drexler and Rosen 2022; Ho et al. 2022; Chen and Shiu 2025). These studies establish that reinsurance is closely connected to capital management, governance and underwriting outcomes. However, less attention has been paid to whether reinsurance utilisation itself is associated with higher or lower insurer risk-taking under competing prudential and risk-shifting interpretations.

Emerging Asian insurance markets offer a useful setting in which to examine this issue. These markets combine rapid insurance-market development, increasing demand for risk protection and rising exposure to catastrophe, macroeconomic and financial risks (Chang and Berdiev 2013; Singhal et al. 2020). At the same time, insurers in these markets operate under heterogeneous supervisory frameworks, uneven domestic risk-bearing capacity and different levels of capital-market development (Altuntas et al. 2015; Berry-Stölzle et al. 2013; Rubio-Misas 2024), making reinsurance an especially important mechanism for managing underwriting volatility and preserving capacity (Cole and McCullough 2006; Sheikh et al. 2018). This institutional and market diversity creates a useful empirical setting for assessing whether reinsurance functions primarily as a prudential risk-transfer mechanism or whether it may alter insurers' incentives toward greater risk-taking.

Using a panel of 45 insurance companies from emerging Asian markets over 2019–2023, this study investigates the effect of reinsurance utilisation on insurer risk-taking across East Asia, South Asia, and Southeast Asia. Employing a dynamic panel specification estimated via two-step difference GMM (Arellano and Bond 1991; Windmeijer 2005), we account for persistence in risk behaviour, unobserved heterogeneity, and potential endogeneity. To our knowledge, this study provides one of the first firm-level dynamic examinations of the reinsurance–risk-taking nexus in emerging Asia, offering three key contributions to the sustainability and risk-governance literature. First, it reframes reinsurance as a corporate sustainability and governance mechanism that shapes long-term risk-bearing incentives, moving beyond its traditional view as a purely technical risk-transfer contract. Second, it empirically adjudicates between competing prudential and risk-shifting

hypotheses in emerging markets, demonstrating how capital relief without commensurate governance discipline can compromise financial stability. Third, it provides actionable policy insights aligned with the UNEP FI Principles for Sustainable Insurance (PSI) and UN SDGs (particularly SDG 8 and SDG 16), guiding regulators and boards in designing reinsurance frameworks that reinforce, rather than erode, institutional resilience.

The remainder of the paper is organised as follows. The next section reviews the related literature and develops the hypotheses. The following section describes the data, variables and empirical strategy. The subsequent section presents and discusses the empirical results. The final section concludes the paper and outlines policy implications.

## **2. Literature review and hypothesis development**

### **2.1. Literature review**

Reinsurance is a core risk-management mechanism in the insurance industry. Through reinsurance contracts, primary insurers transfer part of their underwriting exposure to reinsurers in exchange for a premium, thereby redistributing losses across specialised risk-bearing institutions (Plantin 2006; Schwepcke and Vetter 2022). This function is particularly important when insurers face concentrated exposures, low-frequency but high-severity events or shocks that may place substantial pressure on capital and claims-paying capacity (Drexler and Rosen 2022; Froot 2001). From a prudential perspective, reinsurance can reduce the volatility of retained losses, stabilise earnings and support solvency resilience by limiting the balance-sheet consequences of adverse underwriting outcomes (Olaewaju and Msomi 2022; Sheikh et al. 2018). Reinsurance should therefore be understood not only as a contractual arrangement for sharing losses, but also as part of insurers' broader risk-bearing architecture.

A substantial body of empirical research supports this stabilising interpretation. Cummins et al. (2021) show that reinsurance entails measurable costs but generates important benefits by reducing underwriting risk, suggesting that insurers use it deliberately to control exposure volatility. Drexler and Rosen (2022) further demonstrate that reinsurance demand is closely linked to catastrophe exposure, indicating that reinsurance responds to the nature and severity of underlying risks rather than being a purely mechanical balance-sheet decision. Evidence from Taiwan similarly shows that reinsurance dependence is materially connected to insurers' operating outcomes and firm performance (Lee and Lee 2012). In emerging-market settings, Sheikh et al. (2018) provide further support for this view by showing that reinsurance utilisation is significantly associated with insurers' capital-structure decisions in Pakistan. Taken together, these studies suggest that reinsurance functions not only as an exposure-management instrument, but also as part of insurers' broader financial-management toolkit.

The role of reinsurance, however, extends beyond immediate loss transfer. Because underwriting capacity is constrained by capital availability, solvency requirements and the cost of external finance, reinsurance is also closely connected to insurers' capital-management decisions (Cummins and Sommer 1996; Harrington and Niehaus 2002). Plantin (2006) argues that

reinsurance may partly substitute for costly capital by allowing insurers to sustain underwriting activity without retaining the full risk burden internally. Consistent with this view, Li and Shiu (2021) find that reinsurance is associated with greater debt capacity and financial flexibility, implying that risk transfer can ease balance-sheet constraints and improve insurers' ability to absorb shocks without sharply reducing business activity. This line of research positions reinsurance as a mechanism through which insurers jointly manage risk, capital and strategic capacity.

Yet this stabilising interpretation does not fully resolve the behavioural implications of reinsurance. Reinsurance decisions are unlikely to be made independently of insurers' capital positions, underwriting strategies or exposure profiles. Mankaï and Belgacem (2016) show that risk-taking, capital and reinsurance are jointly determined in property–liability insurers, while Garven and Lamm-Tennant (2003) argue that reinsurance demand reflects firm-specific financial and risk-management considerations. More recent evidence reinforces this view. Ho et al. (2022) show that organisational structure and corporate governance affect insurers' reinsurance decisions, suggesting that reinsurance demand is shaped not only by technical exposure-management needs but also by firm-level governance and strategic considerations. Taken together, these studies indicate that reinsurance should not be treated as an exogenous stabilising device whose consequences are automatically prudential. Rather, it forms part of a broader decision system in which risk retention, capital management, governance structures and managerial incentives interact.

This interaction creates an important theoretical ambiguity. On the one hand, reinsurance may constrain risk-taking by reducing retained exposure, lowering loss volatility and strengthening insurers' capacity to absorb adverse underwriting outcomes. From this perspective, greater reinsurance utilisation should be associated with a more prudent risk profile because insurers use reinsurance to manage exposure and protect solvency (Cummins et al. 2021; Lee and Lee 2012). On the other hand, reinsurance may also alter the marginal incentives attached to underwriting decisions. When part of the downside risk is transferred to reinsurers, primary insurers may face weaker discipline to limit risk accumulation, especially if reinsurance provides capital relief or relaxes internal capacity constraints (Cheng and Weiss 2013; Doherty and Smetters 2005). Broader corporate risk-management theory similarly suggests that hedging and risk-transfer arrangements can influence financing, investment and incentive structures rather than merely reduce volatility (Froot 2007). In the insurance setting, reinsurance may therefore either support prudent exposure management or facilitate more aggressive risk-taking.

Existing research has not fully settled this behavioural question. One stream of literature examines reinsurance as a mechanism for reducing underwriting volatility, managing catastrophe exposure and preserving financial flexibility (Cummins et al. 2021; Li and Shiu 2021; Drexler and Rosen 2022). Another stream investigates the determinants of insurer risk-taking, including institutional, cultural and balance-sheet conditions (Mankaï and Belgacem 2016; Rubio-Misas 2024; Sun 2021). These studies establish that reinsurance matters for risk management and that

insurer risk-taking is shaped by firm-level and institutional conditions. However, they do not directly resolve whether greater reinsurance utilisation is associated with a more prudent or a more aggressive insurer risk profile. The key unresolved issue is therefore not whether reinsurance transfers risk, but whether this transfer changes insurers' behavioural incentives. This gap provides the basis for the hypothesis development that follows.

The key unresolved issue is therefore not whether reinsurance transfers risk, but whether this transfer changes insurers' behavioural incentives. From a sustainable finance perspective, resolving this tension is essential: if reinsurance induces moral hazard and excessive earnings volatility, it may weaken the institutional stability required for insurers to serve as long-term risk absorptive pillars in developing economies. This gap provides the basis for the hypothesis development that follows.

## **2.2. *Hypothesis development***

The theoretical relationship between reinsurance utilisation and insurer risk-taking is inherently ambiguous. Reinsurance redistributes underwriting exposure from primary insurers to specialised reinsurers, thereby reducing retained loss volatility and strengthening insurers' capacity to absorb adverse shocks. However, because it also transfers part of the downside consequences of risk-bearing decisions to external counterparties, reinsurance may alter managerial incentives and affect insurers' willingness to assume risk. This ambiguity can be interpreted through contingency theory, which argues that the effectiveness of organisational arrangements depends on their fit with internal capabilities and external conditions rather than on a universally optimal design (Lawrence and Lorsch 1967; Donaldson 2001). Applied to reinsurance, this perspective suggests that the behavioural effect of reinsurance is unlikely to be uniform. It may discipline risk-taking when used to manage retained exposure under strong governance and supervisory oversight, but it may intensify risk-taking when it relaxes capital constraints and weakens marginal risk discipline.

From a prudential risk-management perspective, reinsurance should be associated with a more conservative insurer risk profile. Corporate risk-management theory suggests that hedging and risk-transfer arrangements can reduce expected financial distress costs, ease financing constraints and support firms' ability to maintain operating capacity under uncertainty (Smith and Stulz 1985; Froot et al. 1993; Froot 2001). In the insurance context, reinsurance performs a similar function by transferring part of the underwriting burden to reinsurers with broader diversification capacity. This can reduce the concentration of retained losses, limit the balance-sheet impact of severe claims and stabilise underwriting outcomes. Empirical evidence is consistent with this interpretation, showing that reinsurance can reduce underwriting risk, support operating performance and strengthen insurers' financial flexibility (Cummins et al. 2021; Lee and Lee 2012; Olarewaju and Msomi 2022; Li and Shiu 2021). Under this view, greater reinsurance utilisation reflects deliberate exposure management rather than heightened risk appetite.

### **H1a. Reinsurance utilisation is negatively associated with insurer risk-taking.**

A competing risk-shifting perspective predicts the opposite relationship. Agency theory suggests that when firms can transfer part of the downside consequences of risky decisions to external counterparties, decision-makers may have stronger incentives to pursue riskier strategies that preserve upside gains while sharing losses with outside stakeholders (Jensen and Meckling 1976). In insurance markets, reinsurance provides a direct channel through which such redistribution of downside exposure may occur. By ceding part of severe or concentrated liabilities, insurers may reduce the private cost of adverse underwriting outcomes and become more willing to expand into riskier business segments, tolerate greater underwriting volatility or pursue faster premium growth. This mechanism may be reinforced when reinsurance provides capital relief or relaxes internal capacity constraints, allowing insurers to increase the scale or riskiness of their operations beyond what retained capital alone would support. Consistent with this reasoning, prior evidence shows that reinsurance, capital and insurer risk-taking are jointly determined, suggesting that greater reliance on reinsurance may coincide with more aggressive risk-bearing behaviour under certain conditions (Garven and Lamm-Tennant 2003; Mankaï and Belgacem 2016; Ho et al. 2022).

**H1b. Reinsurance utilisation is positively associated with insurer risk-taking.**

**3. Research methodology**

**3.1. Data and sample**

This study examines a panel of 45 insurance companies operating in emerging Asia over the period 2019–2023. Firm-level financial and operational data are obtained from S&P Capital IQ, while country-level macroeconomic indicators are collected from the World Bank. The sample construction begins with insurance companies located in Asian markets classified as emerging under the S&P market classification. The screening process then applies two main criteria: first, firms must have the financial and operational information required to construct the reinsurance ratio, the risk-taking measure and the control variables; second, they must have a sufficiently complete time series over the sample window to support the dynamic panel specification. After applying these criteria, the final sample consists of 45 insurers distributed across three major emerging Asian subregions: East Asia, South Asia and Southeast Asia. This composition allows the study to capture variation across emerging Asian insurance markets while retaining a common context in which insurance demand, regulatory development and domestic risk-bearing capacity are still evolving. **Table 1** presents the regional composition of the final sample.

**Table 1** Sample composition

| Subregion      | Countries                        | N firms |
|----------------|----------------------------------|---------|
| East Asia      | China and Taiwan                 | 21      |
| South Asia     | India                            | 9       |
| Southeast Asia | Indonesia, Malaysia and Thailand | 15      |
| Total          |                                  | 45      |

*Source: Authors' compilations*

### 3.2. Variable measurement

The dependent variable is insurer risk-taking. This study adopts an outcome-based measure of risk-taking, defined as the standard deviation of return on assets over a rolling three-year window (John et al. 2008). This measure captures the instability of realised financial performance and is suitable for examining whether reinsurance utilisation is associated with more stable or more volatile risk-bearing behaviour over time (Mankaï and Belgacem 2016). It is calculated as follows:

$$\text{Risk-taking}_t = \text{Standard deviation of } ROA_{t-2}, ROA_{t-1}, ROA_t \quad (1)$$

A higher value of indicates greater volatility in financial performance and is interpreted as a higher level of insurer risk-taking.

The main independent variable is reinsurance utilisation, proxied by the reinsurance ratio, defined as ceded premiums written divided by gross premiums written. This ratio captures the extent to which an insurer relies on external reinsurance capacity relative to the scale of its underwriting operations. It is widely used in empirical insurance research and is particularly appropriate for a multi-country setting, as premium-based indicators are more consistently reported across firms and jurisdictions than contract-specific information such as attachment points, treaty structures or counterparty terms (Cole and McCullough 2006; Lee and Lee 2012; Mankaï and Belgacem 2016). A higher ratio indicates greater reliance on reinsurance. The variable is calculated as follows:

$$\text{Reinsurance ratio} = \frac{\text{Ceded premium written}}{\text{Gross premium written}} \quad (2)$$

Lagged risk-taking is included to reflect the dynamic and path-dependent nature of insurers' risk profiles. Risk-taking behaviour is unlikely to adjust fully within a single period, as current risk outcomes may be shaped by previously realised exposures, established managerial practices and gradual revisions in strategic orientation. Prior evidence suggests that corporate risk-taking evolves through persistent organisational routines rather than discrete year-by-year re-optimisation (Faccio et al. 2011; John et al. 2008).

Asset tangibility is incorporated to account for differences in firms' balance-sheet structure and financing capacity. Tangible assets may ease information frictions, increase recoverable collateral value and reduce the cost of external financing, thereby expanding the scope for firms to undertake risk-bearing activities (Almeida and Campello 2007; Shleifer and Vishny 1992). At the same time, greater reliance on collateralised assets may be associated with tighter creditor monitoring and reduced managerial discretion, potentially constraining risk-taking (Rampini and Viswanathan 2010).

Leverage controls for the influence of capital structure on insurers' risk incentives. Higher leverage can intensify shareholder–creditor conflicts because equity holders may capture much of

the upside from risky strategies while part of the downside is shifted to debtholders when outcomes deteriorate. This mechanism can encourage more aggressive risk-taking, especially when debt obligations are substantial relative to firm value (Bhagat et al. 2015; Jensen and Meckling 1976).

Revenue growth is used to capture firms' expansion orientation and growth opportunities. Rapidly growing insurers may pursue larger market shares, broaden product offerings or scale up underwriting activity, all of which can be associated with greater variability in financial outcomes (Berry-Stölzle et al. 2013; Cole and McCullough 2006). A revenue-based indicator is appropriate in the insurance setting because insurers' operating income may derive not only from premium generation, but also from fees, commissions and investment-related activities.

Firm size is included because scale may influence risk-taking through several competing channels. Larger insurers often benefit from broader diversification, stronger market positions, greater access to funding and higher loss-absorption capacity, which may enable them to undertake riskier activities. Conversely, size may also encourage more conservative behaviour due to stronger regulatory scrutiny, reputational concerns and more formalised internal governance systems (Bhagat et al. 2015; Wang et al. 2021).

At the macroeconomic level, inflation is adopted because it affects insurers' risk environment through cost pressures, uncertainty and changes in the real value of future cash flows. Higher inflation can raise financing costs, weaken the predictability of operating outcomes and discourage risk-bearing behaviour, while a more stable price environment may support longer-term planning and investment decisions (John et al. 2008; Shahzad et al. 2019). GDP growth is included to capture business-cycle conditions. Stronger economic growth may stimulate insurance demand, improve investment prospects and encourage firms to expand risk-bearing activities, whereas weaker growth can reinforce caution and constrain the willingness to assume additional risk (John et al. 2008; Olalere and Mukuddem-Petersen 2023).

**Table 2** summarises the variable measurement, notations, expected signs and sources used in the empirical analysis.

**Table 2** Variable description

| Variable                    | Measurement                                                                              | Notation | Expected sign | Reference                                                                               |
|-----------------------------|------------------------------------------------------------------------------------------|----------|---------------|-----------------------------------------------------------------------------------------|
| <i>Dependent variable</i>   |                                                                                          |          |               |                                                                                         |
| Risk-taking                 | Standard deviation of $(ROA_{i,t-2}, ROA_{i,t-1}, ROA_{i,t})$                            | RT       |               |                                                                                         |
| <i>Independent variable</i> |                                                                                          |          |               |                                                                                         |
| Reinsurance ratio           | $\frac{\text{Ceded premium written}}{\text{Gross premium written}}$                      | RR       | +/-           | Cole and McCullough (2006); Lee and Lee (2012); Mankai and Belgacem (2016)              |
| <i>Control variables</i>    |                                                                                          |          |               |                                                                                         |
| Lagged risk-taking          | Standard deviation of $(ROA_{i,t-3}, ROA_{i,t-2}, ROA_{i,t-1})$                          | l.RT     | +             | Faccio et al. (2011); John et al. (2008)                                                |
| Asset tangibility           | $\frac{\text{Net fixed assets}}{\text{Total assets}}$                                    | AT       | +/-           | Almeida and Campello (2007); Rampini and Viswanathan (2010); Shleifer and Vishny (1992) |
| Leverage                    | $\frac{\text{Net assets}}{\text{Total equity}}$                                          | LEV      | +/-           | Bhagat et al. (2015); Jensen and Meckling (1976)                                        |
| Revenue growth              | $\frac{\text{Total revenue}_t - \text{Total revenue}_{t-1}}{\text{Total revenue}_{t-1}}$ | RG       | +/-           | Faccio et al. (2011); Cole and McCullough (2006)                                        |
| Size                        | $\ln(\text{Total assets})$                                                               | SIZ      | +/-           | Bhagat et al. (2015); Wang et al. (2021)                                                |
| Inflation                   | $\frac{\text{CPI}_t - \text{CPI}_{t-1}}{\text{CPI}_{t-1}} \times 100\%$                  | INF      | +/-           | John et al. (2008); Shahzad et al. (2019)                                               |

GDP growth

$$\frac{\text{GDP}_r^t - \text{GDP}_r^{t-1}}{\text{GDP}_r^{t-1}} \times 100\%$$

GDP

+/-

John et al. (2008); Olalere and  
Mukuddem-Petersen (2023)

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*Source: Authors' compilations*

### 3.3. Research model

To examine the relationship between reinsurance utilisation and insurer risk-taking, the study estimates the following dynamic panel model:

$$RT_{it} = \beta_0 + \beta_1 RT_{i,t-1} + \beta_2 RR_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t} \quad (3)$$

where  $RT_{i,t}$  denotes insurer risk-taking,  $RT_{i,t-1}$  is lagged risk-taking,  $RR_{i,t}$  represents the reinsurance ratio and  $X_{i,t}$  is a vector of control variables including firm size, asset tangibility, revenue growth, leverage, inflation and GDP growth.

A dynamic specification is appropriate because insurers' risk profiles are likely to exhibit persistence over time. In addition, reinsurance utilisation may be endogenous: insurers with higher underlying risk may purchase more reinsurance, while both reinsurance and risk-taking may be shaped by unobserved firm-specific characteristics. These features make conventional pooled OLS, fixed-effects and random-effects estimators potentially biased in a short panel with a lagged dependent variable. To address these concerns, the study employs the two-step Difference Generalized Method of Moments estimator developed by Arellano and Bond (1991), which removes time-invariant firm heterogeneity through first differencing and uses lagged levels of endogenous variables as internal instruments.

All estimations use heteroskedasticity-robust standard errors with the Windmeijer finite-sample correction (Windmeijer 2005). To limit instrument proliferation, the instrument matrix is collapsed and lag depth is restricted, following Roodman (2009). Model validity is assessed using the Arellano–Bond serial-correlation tests and overidentification tests based on the Hansen J-statistic and, where reported, the Sargan statistic. The absence of second-order serial correlation and the validity of the overidentifying restrictions are required for the internal instruments to be considered appropriate.

## 4. Results and discussion

### 4.1. Results

Descriptive statistics for the sample are reported in **Table 3**. The mean value of risk-taking ( $RT$ ) is 0.95, with a standard deviation of 1.07, pointing to substantial cross-firm and intertemporal dispersion in risk outcomes over the sample period. Its values range from 0.02 to 8.44, suggesting substantial heterogeneity in risk profiles within the sample. Some insurers exhibit relatively stable return dynamics, whereas others display markedly higher fluctuations in realised profitability. The reinsurance ratio ( $RR$ ) has a mean of 0.32, indicating that, on average, approximately 32% of gross written premiums are ceded to reinsurers. This dispersion is central to the empirical analysis, as it allows the study to assess whether greater reinsurance utilisation is associated with higher or lower levels of insurer risk-taking.

**Table 3** Descriptive statistics

| Variable | Obs | Mean    | Std. dev. | Min     | Max     |
|----------|-----|---------|-----------|---------|---------|
| RT       | 225 | 0.9552  | 1.0698    | 0.0150  | 8.4360  |
| RR       | 223 | 0.3206  | 0.2155    | 0.0014  | 0.8106  |
| AT       | 225 | 0.0693  | 0.0661    | 0.0007  | 0.2849  |
| RG       | 225 | 0.1018  | 0.4976    | -0.7830 | 5.1017  |
| LEV      | 225 | 0.0400  | 0.0474    | 0.0000  | 0.1805  |
| SIZE     | 225 | 11.8616 | 2.7369    | 8.6064  | 17.5705 |
| GDP      | 225 | 4.6670  | 3.0719    | -7.3491 | 8.5701  |
| INF      | 225 | 7.9569  | 7.6971    | 0.2348  | 49.7211 |

*Source: Authors' compilations*

**Table 4** reports the Pearson pairwise correlation coefficients among the study variables and serves as an initial diagnostic for linear association patterns and potential multicollinearity concerns in the subsequent regressions. Overall, the correlation structure indicates limited collinearity: all coefficients remain comfortably below the conventional 0.80 benchmark commonly used to flag severe multicollinearity risk and most associations fall within low-to-moderate magnitudes. The strongest pairwise relationship is observed between SIZE and RR, with a correlation of  $-0.6770$ . Taken together, these correlations provide reassurance that the baseline specification is unlikely to suffer from severe multicollinearity, supporting the interpretability of the multivariate estimates reported in later tables.

**Table 4** Pearson correlation matrix

|      | RT      | RR      | AT      | RG      | LEV     | SIZE    | GDP     | INF    |
|------|---------|---------|---------|---------|---------|---------|---------|--------|
| RT   | 1.0000  |         |         |         |         |         |         |        |
| RR   | 0.1579  | 1.0000  |         |         |         |         |         |        |
| AT   | 0.1086  | 0.2855  | 1.0000  |         |         |         |         |        |
| RG   | -0.0953 | -0.2084 | -0.1780 | 1.0000  |         |         |         |        |
| LEV  | -0.0844 | -0.3684 | 0.0197  | 0.0283  | 1.0000  |         |         |        |
| SIZE | -0.3188 | -0.6770 | -0.4424 | 0.2390  | 0.5588  | 1.0000  |         |        |
| GDP  | -0.1351 | 0.1044  | 0.0988  | 0.1309  | 0.1006  | 0.0370  | 1.0000  |        |
| INF  | 0.1542  | 0.2836  | 0.0519  | -0.2078 | -0.3481 | -0.4669 | -0.4946 | 1.0000 |

*Source: Authors' compilations*

**Table 5** reports the estimates from the two-step difference GMM specification. The post-estimation diagnostics collectively support the adequacy of the dynamic panel design and the credibility of the instrument set. The Hansen J-test does not reject the null of instrument validity

( $p = 0.613$ ), suggesting that the instruments are jointly exogenous under the maintained moment conditions. Consistent with this conclusion, the Sargan test of overidentifying restrictions is also insignificant ( $\text{Prob} > \chi^2 = 0.330$ ), providing additional reassurance that the model is not overfitting endogenous variation through invalid instruments. Finally, the Arellano–Bond test indicates no evidence of second-order serial correlation in the differenced residuals ( $\text{AR}(2) p = 0.829$ ), which is a necessary condition for the consistency of the difference GMM estimator. Taken together, these diagnostics imply that the estimation strategy is well-specified and that the reported coefficients can be interpreted as arising from a valid set of identifying assumptions.

**Table 5** Two-step difference GMM estimation result

| Variable            | Coefficient                    | Std. err. | $P >  z $ |
|---------------------|--------------------------------|-----------|-----------|
| RT L1               | 0.3026267                      | 0.109957  | 0.006***  |
| RR                  | 9.747323                       | 3.158614  | 0.002***  |
| AT                  | -2.612753                      | 2.435808  | 0.283     |
| RG                  | -0.4456856                     | 0.2405423 | 0.064*    |
| SIZE                | 1.046977                       | 0.5330565 | 0.050**   |
| LEV                 | -25.0202                       | 18.29546  | 0.171     |
| GDP                 | 0.0348778                      | 0.0196158 | 0.075*    |
| INF                 | 0.0235945                      | 0.0145291 | 0.104     |
| No of Obs.          | 134                            |           |           |
| No of groups        | 45                             |           |           |
| Instrument variable | 21                             |           |           |
| AR(2) test          | $\text{Pr} > z = 0.829$        |           |           |
| Sargan test         | $\text{Prob} > \chi^2 = 0.330$ |           |           |
| Hansen test         | $\text{Prob} > \chi^2 = 0.613$ |           |           |

*Note:* \*\*\*, \*\* and \* denote statistical significance at the 1%, 5% and 10% levels, respectively  
*Source:* Authors' compilations

## 4.2. Discussion

The main estimates show that the reinsurance ratio is positively and statistically associated with insurer risk-taking. This result supports **H1b** and rejects **H1a**. Substantively, the finding suggests that greater reliance on reinsurance is associated with a more aggressive insurer risk profile in the sample of emerging Asian insurers. Rather than operating solely as an ex post mechanism for

stabilising loss volatility, reinsurance may also function as an ex ante capacity-enhancing instrument that alters insurers' risk-bearing incentives.

This interpretation is consistent with the view that reinsurance, capital and risk-taking are jointly determined insurer decisions rather than isolated balance-sheet choices (Garven and Lamm-Tennant 2003; Mankaï and Belgacem 2016). By transferring part of the downside consequences of underwriting losses to reinsurers, primary insurers may reduce the effective marginal cost of additional risk (Doherty and Smetters 2005). This can make insurers more willing to expand underwriting activity, tolerate higher volatility in underwriting outcomes or enter higher-variance business segments while remaining within formal solvency constraints (Cheng and Weiss 2013). The positive coefficient on reinsurance utilisation therefore does not imply that reinsurance is inherently destabilising. Rather, it suggests that the behavioural effect of reinsurance depends on whether reinsurance arrangements are accompanied by sufficient underwriting discipline, monitoring and supervisory scrutiny.

The result is particularly relevant in emerging Asian insurance markets, where insurers may face binding capital constraints, uneven domestic risk-bearing capacity and heterogeneous supervisory development (Altuntas et al. 2015; Berry-Stölzle et al. 2013; Rubio-Misas 2024). Under such conditions, reinsurance may partly substitute for internal capital by allowing insurers to support larger underwriting portfolios without a proportional increase in equity capital. This interpretation is consistent with studies that view reinsurance as a mechanism for relaxing capital constraints and improving financial flexibility (Plantin 2006; Froot 2007; Li and Shiu 2021). In this respect, the findings extend the empirical evidence of Mankaï and Belgacem (2016), who document a substitution effect between reinsurance and capital in U.S. property-liability insurers, to the context of emerging Asian markets where capital constraints are likely to be more binding. When the binding constraint is not the availability of growth opportunities but the ability to finance and retain underwriting risk, reinsurance may loosen that constraint and be associated with greater volatility in firm-level outcomes. When the binding constraint is not the availability of growth opportunities but the ability to finance and retain underwriting risk, reinsurance may loosen that constraint and be associated with greater volatility in firm-level outcomes. In the context of sustainable market development, this implies a critical trade-off: while reinsurance facilitates rapid premium expansion and market penetration in emerging Asia, unmonitored reliance on external risk transfer may cultivate fragile business models that are vulnerable to severe financial distress during systemic or climate-induced downturns.

The finding also reinforces the contingency-theoretic interpretation developed in this study. Contingency theory suggests that organisational instruments do not produce uniform effects across all settings; their consequences depend on the fit between the instrument, firm-level constraints and the surrounding governance environment (Lawrence and Lorsch 1967; Donaldson 2001; Mikes and Kaplan 2014). Applied to reinsurance, this means that risk transfer may support stability when it complements strong underwriting discipline, transparent contract design and effective supervisory review. However, it may be associated with higher risk-taking when capital scarcity, weak monitoring or growth pressure make reinsurance a substitute for internal risk-bearing

capacity. The evidence in this study is more consistent with the latter interpretation: in emerging Asian insurance markets, reinsurance utilisation appears to be linked to an expansion of insurers' feasible risk-bearing capacity rather than to a purely conservative reduction in retained exposure.

The positive and statistically significant coefficient on lagged risk-taking indicates persistence in insurers' risk behaviour. This result supports the use of a dynamic panel specification, as current risk-taking is partly conditioned by prior exposures, established underwriting practices and gradual changes in strategic orientation (Faccio et al. 2011; John et al. 2008). In practical terms, insurers' risk profiles appear to adjust over time rather than changing immediately in response to current market conditions.

Among firm-level controls, revenue growth is negatively associated with risk-taking. This suggests that insurers with stronger top-line performance may prioritise earnings stability and franchise-value protection rather than pursuing additional variance. This result is consistent with a precautionary interpretation, although it contrasts with the expansion-oriented view that growth opportunities may encourage greater risk exposure during favourable periods (Berry-Stölzle et al. 2013). Firm size, by contrast, is positively associated with risk-taking. Larger insurers may have broader diversification capacity, stronger capital buffers and better access to financial resources, allowing them to absorb higher volatility and undertake more risk-bearing activities (Bhagat et al. 2015). The result is therefore more consistent with a risk-capacity interpretation than with the view that larger insurers necessarily behave more conservatively because of regulatory scrutiny or reputational concerns.

The macroeconomic controls suggest that insurer risk-taking is procyclical. GDP growth is positively associated with risk-taking, indicating that stronger economic conditions may encourage insurers to expand underwriting and investment risk. This is consistent with the idea that economic expansions improve growth prospects, relax balance-sheet constraints and increase firms' willingness to bear risk (John et al. 2008). Inflation, however, does not show a statistically significant association with insurer risk-taking in the estimated model. One possible explanation is that insurers may partly absorb inflationary pressure through repricing, product redesign and portfolio adjustment.

Asset tangibility and leverage do not emerge as significant drivers of insurer risk-taking. The insignificant coefficient on asset tangibility suggests that traditional collateral-based channels may be less relevant for insurers than for non-financial firms, given that insurers' risk profiles are shaped more directly by underwriting decisions, solvency constraints, asset-liability management and risk-transfer arrangements (Cummins and Sommer 1996; Harrington and Niehaus 2002). Similarly, the insignificant leverage coefficient suggests that conventional debt-based measures may have limited explanatory power once regulatory capital constraints and reinsurance utilisation are considered. This finding reinforces the argument that insurers' effective risk capacity is shaped not only by balance-sheet leverage, but also by the broader interaction between solvency regulation, capital structure and reinsurance architecture.

## 5. Conclusion

Ensuring the financial sustainability of insurance institutions is vital for enabling emerging economies to absorb macroeconomic shocks, bridge protection gaps, and adapt to escalating environmental and socio-economic risks. Against this backdrop, this study examines whether reinsurance constrains or amplifies insurer risk-taking in emerging Asian insurance markets. Using a dynamic panel of 45 insurers across East Asia, South Asia, and Southeast Asia over the period 2019–2023, our two-step difference GMM estimates reveal that higher reinsurance utilisation is positively and significantly associated with insurer risk-taking. This finding supports the risk-shifting hypothesis over the conventional prudential view. While reinsurance remains an indispensable instrument for transferring underwriting exposure, greater reliance on ceded premiums in emerging Asia coincides with more volatile financial profiles, suggesting that insurers utilise the resulting capital relief to expand risk-bearing activities aggressively.

Theoretically, the study contributes to the sustainable finance and insurance governance literature by demonstrating that risk-transfer mechanisms do not automatically translate into institutional stability. Consistent with contingency theory, the sustainability implications of reinsurance depend heavily on how it interacts with firm-level capital constraints, managerial incentives, and the external regulatory environment. Where domestic capital is scarce and supervisory monitoring is still maturing, reinsurance can act as a double-edged sword—expanding underwriting capacity in the short term while amplifying corporate risk exposure over time.

These findings carry concrete policy and practical implications for advancing sustainable insurance in emerging Asia, directly informing UN SDG 8 (sustainable economic growth), SDG 13 (climate risk resilience), and SDG 16 (effective and accountable institutions). First, in line with the IAIS Insurance Core Principles (specifically ICP 13 on Reinsurance and ICP 16 on Enterprise Risk Management) and the UNEP FI Principles for Sustainable Insurance, regulators should not interpret a high reinsurance ratio as a standalone indicator of conservative risk management. Supervisory frameworks must transition from volume-based compliance to risk- and incentive-based oversight. Specifically, regulators should closely monitor insurers exhibiting simultaneous spikes in ceded premiums and earnings volatility, requiring comprehensive stress testing to verify that reinsurance programmes genuinely enhance net solvency resilience under adverse economic or catastrophe scenarios. Second, for insurance executives and boards, reinsurance procurement must be integrated into holistic sustainability and enterprise risk management (ERM) frameworks. Rather than using reinsurance as a substitute for adequate internal capital or prudent underwriting discipline, boards should establish strict risk-appetite thresholds and counterparty governance to ensure that risk transfer supports long-term corporate longevity.

Several limitations of this study offer avenues for future research. First, our reliance on annual firm-level data may not fully capture short-term quarterly adjustments in reinsurance and underwriting behaviour around acute stress episodes. Second, the aggregate reinsurance ratio cannot disaggregate specific contractual structures, such as proportional versus non-proportional treaties or dedicated climate-catastrophe coverages. Third, while our dynamic GMM framework

addresses persistence and endogeneity, the results represent robust empirical associations rather than definitive causal effects. Future studies could leverage granular contract-level data, incorporate ESG and governance interaction terms, and examine how green reinsurance or catastrophe bonds specifically influence the long-term sustainability of insurers in developing markets.

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