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Custodian of wealth: an assessment of insurers' risk management practices

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ABSTRACT

Unlike the banking industry, the insurers' risk management framework (RMF) is not governed internationally. For this reason, their risk management (RM) practices are not comparable. We surveyed insurance personnel regarding understanding risk and risk management (URRM), risk identification (RI), risk assessment and analysis (RAA), risk monitoring (RMON), and risk management practices (RMP). These insurance personnel were working at various hierarchical levels in life and non-life insurance. These insurers were operating in developed and emerging insurance market. We took USA and UK insurers as a proxy for developed insurance market. Meanwhile, Chinese, and Pakistani insurers were substituted for emerging insurance market. We analyzed the data through descriptive statistics and an ordered logit model. Our results showed that insurers' RM is stronger, but large differences exist at the hierarchical, insurer type and country levels. Apart from policy implications, our findings suggest that to achieve sustained competitive advantage insurers should minimize these differences.

Abbreviations: RAA: Risk Assessment and Analysis; RI: Risk Identification; RM: Risk management; RM: Risk Management Framework; RMON: Risk Monitoring; RMP: Risk Management Practices; ORSA: Own Risk and Solvency Assessment; URRM: Understanding Risk and Risk management

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1. Introduction

The insurance industry is a crucial part of the modern economic system. However, its purpose of merely providing '*protection in case of adverse financial event*' is often downplayed by society. In reality, the insurance industry serves the social purpose of providing '*stewardship of people's wealth*', which is of greater social and economic value. Insurance (whether life or nonlife) assists in maintaining people's standards of

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living by ensuring income and business continuity (Ostaszewski, 2018; Khelfaoui et al., 2020, 2022a, 2022b). For instance, HIH was a major insurer in the construction business in Australia. However, for a short period of time, the construction of buildings in Australia was halted after HIH was liquidated. Therefore, the critical role and success of the insurance industry can be considered through the lens of temporal stewardship theory (e.g., McCuddy & Pirie, 2007; Muhamat & Mclever 2019). That is, the success of the insurance industry can be measured through profitability and service to the community. Similarly, insurers are considered competitive in managing the risk of others. Through effective risk management, insurers can successfully fulfill their social service of providing *'stewardship of people's wealth'*.[1]

The prior financial crisis (e.g., 2007–2009) focused the world's attention on the subject of risk management (RM). Globally, scholars and policy-makers have argued about the role of RM during the prior financial turmoil and how RM in the financial services industry can be adjusted to prevent such failures from reoccurring. For instance, critics (e.g., Gasper, 2002; Vaughan, 2009) have argued that regulatory guidelines focusing on insurers' RM should be uniform (Schwarze & Croonenbroeck, 2017).[2] Accordingly, in this paper, we analyzed the differences in insurers' risk management (RM) frameworks at the hierarchical, industry type and country levels. Generally, the RM process involves (a) understanding risks, (b) risk identification, (c) risk assessment, (d) management of threatening events, and (e) monitoring processes that make dealing with those events possible. Similarly, our RM model comprises the following variables: understanding risk and risk management (URRM), risk identification (RI), risk assessment and analysis (RAA), risk monitoring (RMON) and risk management practices (RMP). We argue that differences exist in insurers' RM at the hierarchical, insurer type, and country levels. Similarly, insurers should formulate a risk strategy to reflect these differences.

The literature on RM has focused on various dimensions, and researchers have discussed the financial benefits of RM implementation (Froot, 1993; Doherty & Smith, 1993; Dvorsky et al., 2021; Glowka et al., 2021; Hope et al., 2016; Stulz, 2008). Some studies have highlighted the characteristics of RM-implementing firms (Guo & Jiang, 2020; Liebenberg & Hoyt 2003, Kleffner et al., 2003; Babbel & Merrill 2005; Beasley et al., 2005; Pagach & Warr, 2008). In addition, some researchers also studied different types of risks and their impact on firm performance (e.g., Meulbroek, 2002; Saeidi et. al., 2021). Other RM studies in the context of the insurance industry have discussed RM implementation status (Atluntas et al. 2011; and Acharyya & Mutenga, 2013; Tillinghast, 2006), the influence of RM on firm value (e.g., Hoyt & Liebenberg 2011), and insurers' understanding of key RM tools and terminologies (e.g., FSA, 2003; FSA, 2006; PRA, 2016). Arguably, past literature took a particularist approach (Atluntas et al., 2011; Elshandidy et al., 2018; Miller, 1992), focusing on one particular factor, and did not cover RM subprocesses (hereafter, items). This particularist approach has left a narrow gap unattended. Considering the longevity of the risks faced by the insurance sector (Nocco & Stulz, 2006; Sabato, 2010), this paper intends to address this gap by investigating the differences in insurers' RM at the organizational (hierarchical), industrial (insurer type) and regulatory (country) levels. We argue that insurers' RM activities may be limited by their managerial capacity,

industry practices, and regulatory guidelines. The goal of our research is to answer the following questions:

RQ1: What percentage of insurers have adopted benchmark RM practices?
RQ2: What are the differences in insurers' RM at different hierarchical levels?
RQ3: What are the differences between life and nonlife insurers in the context of RM?
RQ4: What are the differences in RM between developed and emerging insurance markets?

To examine insurers' RM, we asked insurance personnel from developed and emerging markets their perceptions regarding the extent to which the benchmark RM practices referred to in our questionnaire are prevalent in their organizations. We analyzed their responses through percentage distribution. We also conducted MANOVA to investigate subgroup differences. To analyze the differences at the hierarchical level, insurer type and regulation levels, we estimated a cumulative ordered logit model (as proposed by Agresti, 2013). We found large differences in insurers' RM at the hierarchical, insurer type and country levels. We concluded that for RM to give a sustained competitive advantage, insurers should eliminate these differences. Moreover, our results showed that developed insurance markets (i.e., the UK and the U.S.) were more competitive. On the other hand, Chinese insurers' RM was observed to be more competitive than that of Pakistani insurers. We also found that insurers heavily rely on traditional RM tools and that their own risk and solvency assessment (ORSA) is less common in the U.S., China, and Pakistan.

The paper is divided into six sections. The structure of this paper is as follows: section II provides the contextual setting of prevailing RM practices of developed and emerging insurance markets, section III presents a brief literature review featuring the most relevant RM studies; section IV presents the methodology adopted and data features; section V provides the results and a thorough discussion; and Section VI provides practical implications and draws conclusions summarizing the findings and showing the significance and limitations of the study. Finally, section VII consists of the Appendix.

2. Contextual setting

The turning point in the modern risk management practices of the insurance sector was the European Union (EU) Solvency II Directive, which was formalized through the joint efforts of the EU nations in 2016. The EU Solvency II law requires that insurers maintain economic capital in the value at least equal to solvency capital requirement (SCR), conduct own risk solvency assessment (ORSA) and adopt sophisticated risk assessment tools (like Monte Carlo simulation, stochastic modeling, etc.). This law also requires European insurers to conduct risk-related reporting. Since this law was recently implemented, its merits and demerits are yet to be witnessed. On the other hand, in the USA, the National Association of Insurance Commissioners

(NAIC) solvency modernization initiative (SMI) also requires US insurers to conduct own risk and solvency assessment (ORSA), maintain solvency reserves and submit risk reports. Moreover, China risk-oriented solvency system (C-ROSS) takes a three-dimensional approach: (a) institutional characteristics, (b) supervisory pillars, and (c) supervisory foundation. Under the C-ROSS regime, Chinese insurers are required to maintain quantitative capital requirements, qualitative supervisory requirements and market discipline mechanism. On the other hand, the Pakistani insurance market has also shifted towards risk-based supervision through Insurance Bill 2016. However, this bill is yet to be implemented in Pakistan.

After the 2007-2008 financial crisis, insurance regulation around the world has shifted towards risk- and solvency-based supervision. The insurance regulators in the developed and emerging markets have adopted the standard valuation model approach for principle-based reserving. They require insurers to conduct ORSA and maintain SCR. Hence, it can be argued that solvency is the bottom line of modern regulatory guidelines[3]. However, the banking industry RM is considered superior and unlike the insurance industry, they are fairly regulated worldwide[4]. However, insurers' risk management practices (RMPs) are regionally controlled.

3. Literature review

The prospective virtues of risk management have been contended by numerous researchers. Some researchers argued that financial risk management yields reduced taxes, increased debt capacity and avoidance of financial hardship costs, providing a comparative advantage (Froot, 1993; Doherty & Smith, 1993, Nocco & Stulz, 1996).

Past researchers have also focused on RM topics in the context of the RM framework and its adoption in the insurance industry (Acharyya, 2006; Atluntas et al., 2011), including enterprise attributes in implementing ERM (Liebenberg & Hoyt 2003; Kleffner et al., 2003; Babbel & Merrill 2005; Beasley et al., 2005; Pagach, 2011). Because enterprise profit (i.e., cashflows) volatility is inversely linked with its value, financial risk management (particularly interest and exchange rate risk) through financial derivatives lowers cashflow unpredictability and adds value to the enterprise. Moreover, Meulbroek (2002) and Gates (2006) urged strategic and operational risk through improved identification and control, well-informed decisions, higher management agreement, strengthened management responsibility, flattened risk governance, ability to achieve strategic goals, improved communication with BOD, reduced earnings turbulence, higher profitability, achieving competitive edge and corrected risk tailored pricing. Hoyt and Liebenberg (2011), taking data from 117 American listed life and P/C insurers from 1998 to 2005, studied the value addition of RM to the insurance sector and found a positive relationship between RM adoption and enterprise value. Acharyya and Mutenga (2013) analyzed U.S. P/C insurers for the period of 2000–2009 in the context of three key value drivers: return on capital and surplus ratio, combined ratio and operational ratio. They observed that RM-adopting insurers had constantly managed to reduce fluctuations in their key value driver.

Liebenberg and Hoyt (2003) took CRO hiring to analyze the factors for RM implementation. They observed that CRO hiring insurers were more leveraged. Atluntas

et al. (2011) conducted a survey of 113 German property-liability insurers on the expansion of ERM implementation. Their study showed that a significant number of German property-liability insurers had corporate risk strategies to tackle various risks. They also observed an immense rise in the adoption of quantified risk models. They concluded that although challenges persist, ERM has emerged as an important business practice and that only insurers that can cope with these challenges with effective ERM strategies will survive.

In 2003, FSA surveyed 39 UK life and nonlife insurers. Their survey showed that nonlife insurers' RMFs were not at par with life insurers, the RM framework was formulated merely to comply with regulators, the separate risk assessment function (RAFs) was not given independent resources, and none of the insurers had connected their risk appetite with their capital and risk strategy. Furthermore, a handful of general insurers could not calculate their regulatory capital requirements.

In 2006, FSA conducted another survey of 26 UK life and nonlife insurers. Although the survey revealed favorable RM adoption results, some deficiencies were also observed. Many insurers had set up risk committees, but BOD's significantly depended on them. A handful of insurers incorporated RM into planning. Few RAF concentrated on certain risks. Some of the insurers incorporated risk-based capital (RBC) into their long-term planning, and the BOD's comprehension of RBC was not comprehensive.

In 2006, Tillinghast, an RM consultant, conducted a survey of insurance executives on ERM adoption status. They focused on risk assessment and quantification and covered 204 life and property-liability multinational insurers within Europe, Asia Pacific, North America, and Latin America. This study showed that many insurers opted for risk strategy adoption, quantified economic capital assessment and organizational risk models.

In 2013, the American Academy of Actuaries studied the RM framework of U.S. insurers. Based on their findings, they recommended that the corporate risk profile and prevailing risk metrics understanding were crucial to gathering the right data for the RM framework. They also proposed that the RI system should be extensive, and the common risk assessment and quantification methods should involve internal communication. They argued that economic capital models, stress and scenario tests, and an overall actuarial RI program should be conducted after regular intervals or when a notable change in the corporate risk profile is witnessed. They highlighted that the insurer's RM program should be well documented. The risks, risk assessment methods, model assumptions, scope, constraints, and limitations should be briefly described. They also recommended that improved RMON is the bottom line of effective RM.

In 2015, the Prudential Regulatory Authority (PRA) conducted stress tests with 26 UK general insurers. Their findings were reported in the PRA's annual report (2016). The authors found that although insurers' ERM positions were strong against some market stresses, economic stresses were found to be largely negative due to a decline in corporate bond value. They also found that insurers had different understandings of stress terminologies (e.g., liability and cyber stresses), and that their assessment structures did not match. Most of the potential risks identified that might occur in

the context of a once-in-a-200-year event did not match among insurers. Moreover, significant reliance on reinsurance was also witnessed.

4. Data and methodology

4.1. Instrument description

To study the RM of the insurance industry, a modified version of the questionnaire previously used for banks was adopted (e.g., Al-Tamimi & Al-Mazrooei, 2007; Hassan, 2009 and Abu Hussain & Al-Ajmi 2012). The authors modified the questionnaire to fit the insurance sector in different regulatory regimes. Our RM model comprised URRM, RI, RAA, RMON, and RMP constructs, which are measured by benchmark items as recommended by various actuarial bodies, industry experts and risk management (RM) laws in the U.S., UK, China, and Pakistan.[5–7]

The questionnaire used in this study was segmented into two parts. Part 1 consisted of five nominal scaled questions related to respondent profiles, such as gender, industry experience, operational position, assigned department and qualifications. Part 1 also includes three questions on insurers' features such as insurer type, incorporated country, and majority shareholders. Part 2 includes 26 ordinal and dichotomous scaled questions to achieve the study objectives. Part 2 is further divided into five segments, with each representing URRM, RI, RAA, RMON and RMP. The ordinal questions were measured on a five-point Likert scale. The respondent opinions were measured on a continuum ranging from strongly disagree to strongly agree. However, dichotomous questions had only two options (i.e., yes or no). The questions asked in the questionnaire were in both English and Chinese.

4.2. The survey description

A self-administered survey was conducted covering both life and nonlife insurers operating in the U.S., UK, China, and Pakistan. The questionnaires were distributed to insurance companies having a significant market share in their respective countries[8] and having AM best ratings greater than or equal to B-. The questionnaires were randomly distributed to respondents working in the life and nonlife sectors through the social networking platform *LinkedIn*. However, in China and Pakistan, where authors had geographical access, some of the questionnaires were distributed in print versions. The survey was carried out from October 2016 to March 2017. The survey was conducted on a referral basis with informal assistance from the North American Association of Insurance Commissioners (NAIC), the Institute and Faculty of Actuaries (UK), the Insurance Association of Pakistan (IAP), the Pakistan Society of Actuaries, Deloitte China, the University of International Business and Economics, Beijing, China, and the China Association of Actuaries. Respondents who completed the questionnaire were requested to forward it to their colleagues. Respondents were provided an incentive to participate in the survey and were informed that for every successful questionnaire, one dollar would be donated to the *Save the Children Inc., Syrian refugees fund*. In total, 269 questionnaires were successfully completed. However, only 1 questionnaire from each department and insurance company was

considered, resulting in a total of 240 successfully completed questionnaires included in this study.[9] Consequently, we were able to cover 73 insurers (i.e., 21 American, 19 British, 24 Chinese and 9 Pakistani companies) from both sectors. Furthermore, our sample countries served as representatives of developed (i.e., the UK and the U.S.), developing (i.e., China) and underdeveloped (i.e., Pakistan) insurance markets. According to the Swiss Re Sigma world insurance report 2017, the countries covered in this study contribute 44.92% of the world insurance market with respect to gross written premiums (the U.S., 28.9%; China, 28.9%; the UK, 7.03%; and Pakistan, 0.5%).

The survey consisted of two phases: 1) distributing the online/print version and collecting the completed versions, and 2) conducting a few follow-up interviews to obtain deeper insights and to determine any inconsistency among answers. To assess insurers' RM, we asked insurance personnel from these markets their opinions regarding the extent to which the benchmark practices referred to in our survey are prevalent in their organizations.

Table 1 shows the frequency distribution of the sample. It can be noted that Pakistani (28.8%) and Chinese (46.7%) insurance industries dominate our sample. Approximately half of the sample comprised China and a quarter comprised Pakistan because the authors had geographical access to these countries, and more questionnaires were completed by on-site visits. However, in the case of the U.S. (11.7%) and the UK (12.9%), questionnaires were distributed online with a lower response rate. The overall sample is approximately equally distributed in the life and nonlife sectors, with life insurers representing 46.3% and nonlife insurers representing 53.8%. Moreover, more than half of the insurers (54.6%) were publicly owned.

The notable features of the respondents are as follows. More than half the respondents had working experience of approximately 5 years or more, with 52.1% of the respondents having experience of 5 years or less, 20.8% more than 5 years but less than 10 years and 27.1% more than 10 years. More than three-quarters of the respondents were directly involved in routine organizational management (i.e., supervisory level 12.1%, executive/director level 12.5%, middle management level 27.1% and operational level 48.3%). Approximately half the respondents (i.e., treasury and investment 5.8%, finance 10.4% and actuary/risk management 32.5%) were directly involved in routine risk management operations, and more than one-quarter of the respondents (i.e., operations 25.4% and other 17.9%) were indirectly involved in ERM. All respondents had a sound academic background (i.e., doctorate 4.6%, professional certification 22.5%, graduation 37.1% and master's degree 41.2%). These characteristics indicate that all our respondents have sound knowledge and experience of insurers' risk management practices, and they are also involved in the risk management process of the insurance sector.

4.3. Data analysis techniques

For analysis purposes, we use these five dependent latent variables (i.e., URRM, RI, RAA, RMON and RMP) (e.g., Al-Tamimi & Al-Mazrooei, 2007; Hassan, 2009; and Abu Hussain & Al-Ajmi 2012) and three independent ordinal variables (that is, hierarchical, industry type, and country). The latent variables are represented by several

Table 1. Sample features.

Features	Frequency	Percentage distribution (%)
Gender		
Male	162	67.5
Female	78	32.5
Experience		
5 years or less	125	52.1
More than 5 years but less than 10 years	50	20.8
More than 10 years	65	27.1
Position		
Executive/director level	30	12.5
Middle management level	65	27.1
Supervisory level	29	12.1
Operational Level	116	48.3
Department		
Operation	61	25.4
Finance	25	10.4
Actuary/risk management	78	32.5
Treasury/investment	14	5.8
Others	43	17.9
Highest degree		
Graduate	76	37.1
Master's	99	41.2
Doctorate	11	4.6
Professional	54	22.5
Type		
Life	111	46.3
Nonlife	129	53.8
Incorporated Country		
U.S.	28	11.7
UK	31	12.9
China	112	46.7
Pakistan	69	28.8
Majority Ownership		
State owned	71	29.6
Publicly owned	151	54.6
Foreign-owned	38	15.8

Source: created by authors.

items, each representing a complementing business process or its characteristic. The details of the items are presented in Appendix A1. We expect that differences in items are positively linked with differences in hierarchical, insurer type and country levels/subgroups. However, due to the small sample size, the statistical significance is small because hierarchical, insurer type and country effects will not be significant unless the subsamples have large differences. It is worth mentioning here that even if tests do not produce significant results, descriptive statistics also indicate statistical significance; that is, these tests cannot be interpreted as differences not existing (Laas et al., 2016). Figure 1 shows a graphical representation of our conceptual model.

Our analytical strategy is fourfold. 1) First, we analyze insurance personnel responses through percentage distribution to obtain the overall picture of prevalent RM. 2) Then, we investigate the RM differences among different groups (i.e., hierarchy, life/nonlife insurers and countries) through multivariate analysis of variance (MANOVA) tests used for statistical significance of differences between variances of different subsamples (see Tabachnick & Fidell 2012 for details).[10] 3) We analyze the hierarchical, insurer type and country-level effects and estimate cumulative ordered logit models as proposed by Agresti (2013). The ordered logit model results indicate

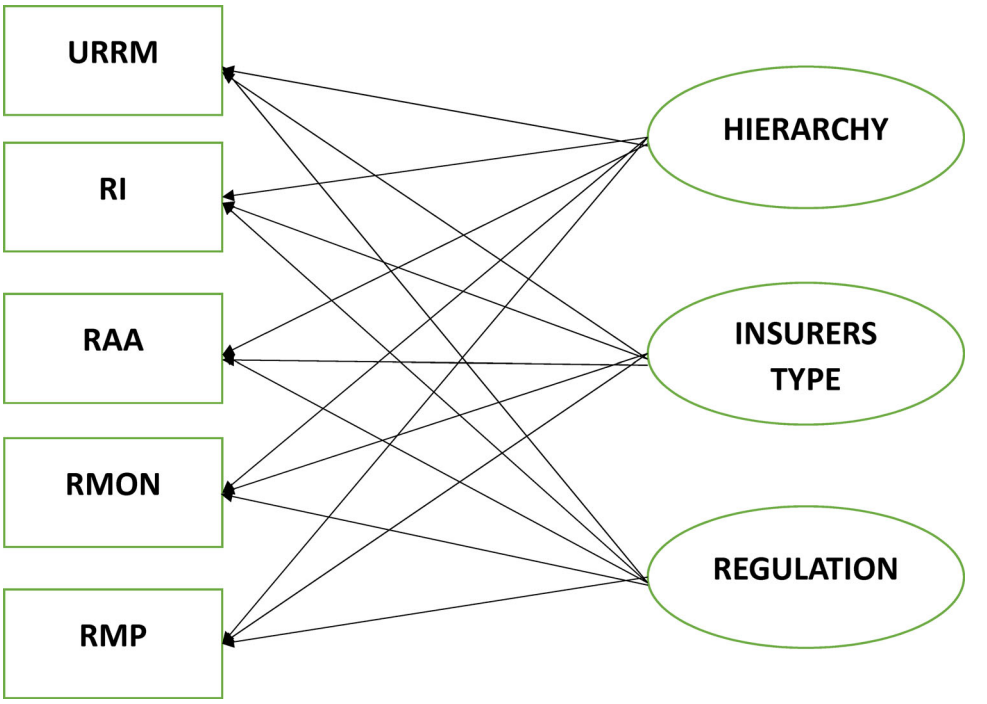

Figure 1. Conceptual model.
Source: created by authors.

the likelihood of a Likert variable (or ordinal variable) being rated more highly. 4) We also conduct trend analysis of responses with respect to hierarchical, insurer-type and country levels. In addition, we estimate Kendall's rank correlation coefficients (Kendall, 1938 and Kendall, 1948) (see Appendix Tables: D1–D5).

5. Results

5.1. Understanding risk and risk management

Firms need absorptive capacity to create sustained competitive advantage, which is characterized by the effective use of (external) knowledge. Absorptive capacity refers to the aptitude of a firm to identify, modify and assimilate (external) knowledge (Milagres & Burcharth, 2019). Organizational absorptive strategy exists at two levels, i.e., individual, and collective absorptive capacity. Collective absorptive capacity is the aggregation of individuals' absorptive capacity and firm attributes, for instance, coordination and motivation (Milagres & Burcharth, 2019). To absorb new knowledge, individuals should adjust their routine activities and communication with peers. A good understanding of key RM terminologies (e.g., corporate risk profile and risk appetite) at the individual level will clarify strategic roles.

Table 2 presents the percentage distribution and MANOVA F test results for differences in URRM items at the hierarchical, insurer type and country levels. The percentage distributions show that more than 50% of respondents rated all Items 4 and

Table 2. Understanding risk and risk management.

Item	1	2	3	4	5	Hierarchical	Insurer type	Country
URRM1	2.2	13.8	16.5	**53.6**	13.8		***	***
URRM2	0.9	15.2	15.2	**54.5**	14.3		**	**
URRM3	1.3	14.7	18.3	**54.5**	11.2			***
URRM4	0.4	15.2	11.2	**55.8**	17.4			***
URRM5	1.3	14.3	14.3	**53.6**	16.5			
URRM6	4.0	8.5	32.6	**36.2**	18.8		***	***
URRM7	0.4	7.6	37.1	**37.5**	17.4			**
URRM8	0.9	8.5	15.2	**55.8**	19.6			
URRM9	1.3	8.9	17.9	**47.8**	24.1			**

The first five columns indicate the items' Likert scale (from strongly disagree to strongly agree) percentage distributions, with the highest ones highlighted in bold. The last two columns with ***, ** and * indicate the significance of the MANOVA F test for hierarchical, insurer type and country effects at the 1%, 5%, and 10% levels, respectively. The detailed hierarchical, insurer type and country-level ordered logit model results are represented in Appendix Tables B1, B2, and B3. The percentage distribution of responses by country and insurer type are given in Appendix Tables C1 and C2, respectively.
Source: created by authors.

above. The results indicate that nearly half of the insurance personnel have the same articulation of their organizational risk profiles, risk appetite, risk tolerance and responsibility in the RM process, with 53.6%, 54.5%, 54.5%, 55.8% and 53.6% of respondents agreeing with statements URRM1, URRM2, URRM3, URRM4, and URRM5, respectively. Approximately one-third of the respondents (36.2% for URRM6 and 37.5% for URRM7) think that their RM framework is in accordance with international laws and that senior management understands modern RM tools. Moreover, only half of the respondents thought that their RM framework and strategy were effective (URRM8 55.8% and URRM9 47.8%). This shows that insurers generally have a good understanding of key RM terms.

The MANOVA results show that large differences exist at the insurer type and country levels. We also conducted an ordered logit model analysis to investigate the differences. The ordered logit model estimates with respect to various hierarchical levels are presented in Appendix Table B1. It can be noted that all the ordered logit beta coefficients for lower hierarchical levels are nonsignificant (except URRM9). The results for likelihood ratio tests are also nonsignificant. Our URRM results showed that insurance personnel at middle and supervisory levels have the same understanding of their RM framework. The beta coefficients for items URRM 1 to URRM 9 are insignificant for middle and supervisory levels. The beta coefficients for items URRM1 to URRM4 are also insignificant for the executive/director level. The results suggest that insurance personnel fully comprehend their organizational risk profile (URRM1), risk appetite (URRM2), risk tolerance (URRM3) and risk responsibility (URRM4). Items URRM 5 to 9 are significant at the executive level, suggesting that executive management in insurance companies has a better understanding of their RM accountability (URRM5) and stress testing output (URRM7). Past studies (e.g., Atluntas et al., 2011 and Tillinghast, 2006) also reported that only a greater proportion of insurance personnel had a clear understanding of their accountability to the RM process.

Ordered logit model analysis for URRM items with respect to insurer type showed that life and nonlife insurers have the same understanding of their organizational risk tolerance (URRM3). They also have a clear understanding of their risk responsibility

(URRM4) and stress testing output (URRM7). Descriptive statistics showed no notable differences in either sector; more than three-fifths of the respondents rated all the items four and above (see Appendix Table B2).

The country effect results showed significant results for all the items. The results for responses from Pakistan are not reported (see Appendix Table B3). The reason behind this is that responses from Pakistan were taken as a reference point for the ordered logit model in SPSS and were treated as redundant. The likelihood ratio Chi-square test for all items is statistically significant. However, the residual deviance test of the null hypothesis that the fitted model explains the data fairly well (i.e., no asterisks indicate that the model can explain the variation in the data) is rejected for some items (e.g., URRM1-3, URRM5, URRM8, URRM9), which is more likely because of the small sample size. The ordered logit beta coefficient for all the items is also statistically significant for all countries except URRM5. Moreover, it can be noted that items URRM4, URRM5, and URRM7 are also nonsignificant for China. Based on our results, we conclude that huge differences between countries exist in URRM items. Our findings are in agreement with PRA (2015), which found that many of the UK general insurers had a diverse understanding of stress testing terminologies; likewise, their assessment models also did not match. Through feedback interviews, it was reported that in China and Pakistan, most risk management functions are outsourced to actuarial organizations, which is why local staff did not have a thorough understanding of their RM roles.

Countrywise descriptive statistics for URRM items reported no notable differences between U.S. and UK insurers; in both countries, more than 70% of respondents rated all the items approximately above 4 (see Appendix Table C1). However, Chinese insurers far exceeded Pakistani insurers, where more than 60% of respondents rated all the items four and above, compared to Pakistan, where more than 50% of respondents rated 4 and above.

Figures 2–4 shows the trend analysis of responses to the URRM construct with respect to position, insurer type and country. Positionwise response analysis demonstrated an upward trend for the executive level, a mixed trend for middle management level and a similar trend for supervisory and operational levels (see Figure 2). Furthermore, Figure 1 shows that average ratings for URRM construct items are relatively higher for executive and supervisory levels. Discernibly, we conclude that insurance personnel serving in executive/supervisory positions have a relatively better comprehension of key RM terminologies and RM processes than middle management/operational levels. This finding is quite alarming because middle management plays a vital role in designing key risk processes and approving/disseminating key risk reports to BOD. An inferior understanding of key RM terminologies may make these risk processes and risk-related reporting flawed. In addition, insurer-typewise analysis revealed a similar trend for both insurer types (see Figure 3). However, the average ratings for nonlife insurers were higher than those of life insurers. Our insurer-typewise trend analysis revealed that insurance personnel working in nonlife insurance had a superior understanding of RM processes. Similarly, countrywise response analysis showed a similar trend for U.S. and UK insurers. Furthermore, average response ratings for UK and U.S. insurers were higher than those for China and Pakistan.

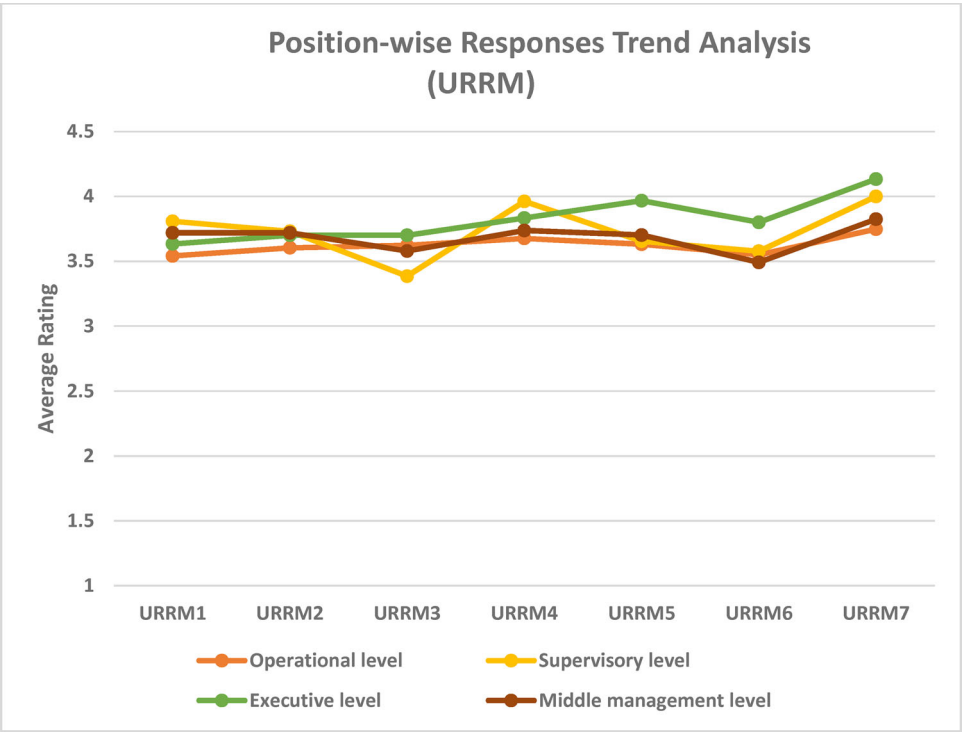

Figure 2. Position-wise responses trend analysis (URRM).
Source: created by authors.

Average response ratings for Chinese insurers were higher than their Pakistani counterparts (see Figure 4). Our country-wide findings imply that insurers operating in developed markets have a sound understanding of risk and risk management. However, in emerging markets, Chinese insurers had a relatively better grasp of key RM terminology and RM processes.

5.2. Risk identification

The effective identification of potential internal and external risks is crucial for effective risk strategy formulation. From an operations management perspective, RI can be considered a firm's efforts aimed at process improvement (PI). PI refers to structured methods that improve the production process (Matthews & Marzec 2017). Bhatt (2000:1334) argued that the *'goal of PI is to make business processes—interrelated activities, procedures, and behaviors—efficient, effective and flexible'*. RI involves determining which internal (e.g., business activity) and external (e.g., industry-specific changes) factors might affect the firm and/or risks faced and their reference values (e.g., equity capital).

Table 3 presents the results for the RI items. The descriptive statistics show that more than 50% of insurers rated RI Items 4 and above. Moreover, MANOVA F statistics showed differences between countries and insurer types. We also conducted ordered logit estimation, and the results showed significant differences at the hierarchical, insurer type and country levels. The beta coefficients for RI1 are

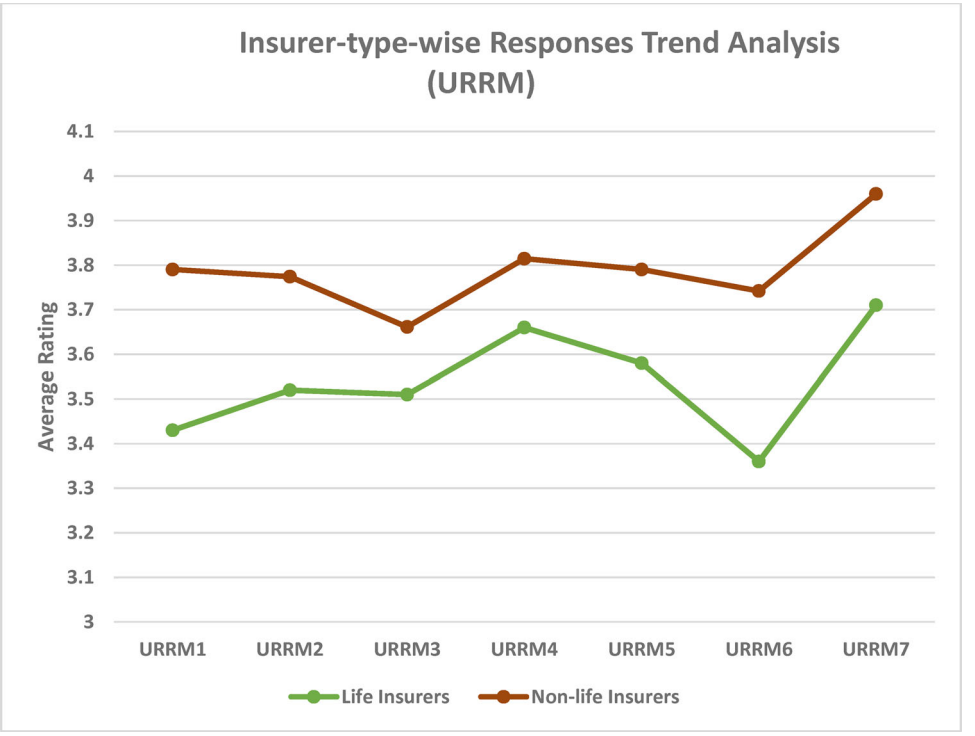

Figure 3. Insurer-type-wise responses trend analysis (URRM).
Source: created by authors.

insignificant at the supervisory level. Beta coefficients for RI2 are also insignificant for executive/management and supervisory levels. Respondents at the executive management and supervisory levels do not think their internal model is able to identify risk changes. One possible reason behind this is that new sophisticated RM schemes (NAIC's SMI, Solvency II Directive, CROSS, and Insurance Bill 2016) are in the implementation phase in all the countries covered; thus, it will take some time to discover their merits/demerits by insurers, and the requirements set forth by these schemes are not comparable.

The industrywise analysis showed that nonlife insurers are ahead of life insurers in RI. Ordered logit model results demonstrated that life insurers also lacked state-of-the-art internal models, which hinders their ability to easily track and quantify potential risks. The results show that 80% of nonlife insurance respondents think that their risk identification procedure is comprehensive compared to 55.8% of the life insurance respondents. Moreover, 63.4% of nonlife insurers' internal models can recognize risk changes; in contrast, 53.7% of life insurers can do the same (see Appendix Table C2).

Countrywise analysis of RI items showed no large differences between the U.S. and the UK. Our results show that the developed insurance market is stronger in RI than in the emerging market. The RI2 beta coefficient for China is not significant. It can be argued that the Chinese insurers' risk quantification process is similar to that of Pakistan. The RI item percentage distributions showed no major differences between the U.S. and the UK. Both economies exceeded China and Pakistan. Similarly, more

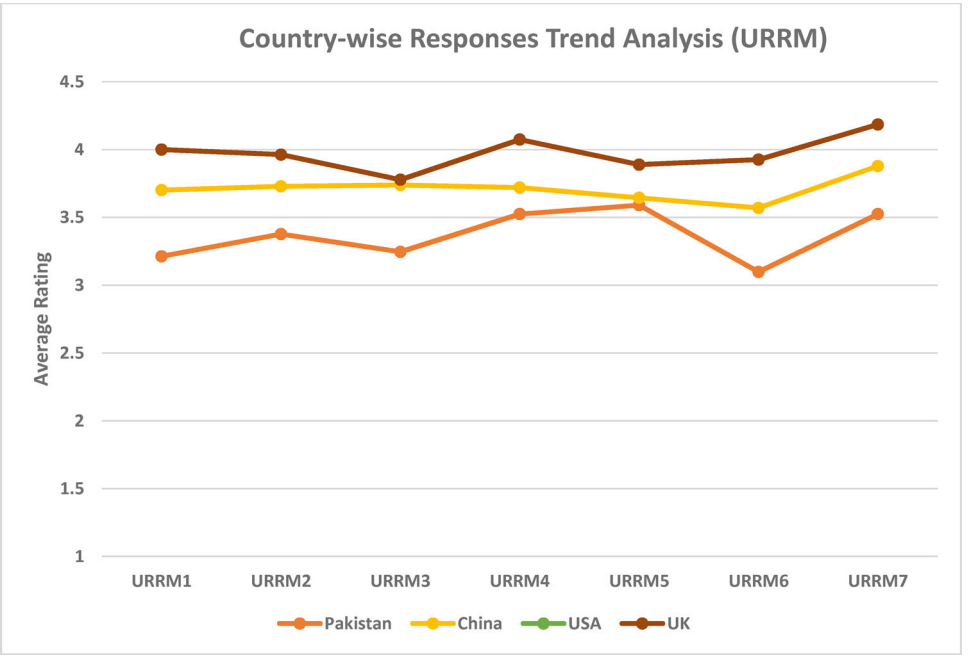

Figure 4. Country-wise responses trend analysis (URRM).
Source: created by authors.

Table 3. Risk identification.

Item	1	2	3	4	5	Hierarchical	Insurer type	Country
RI1	1.8	9.4	19.2	**51.8**	17.9		**	***
RI2	1.8	11.6	25.9	**52.2**	9.4			***

The first five columns indicate the items' Likert scale (from strongly disagree to strongly agree) percentage distributions, with the highest ones highlighted in bold. The last two columns with ***, ** and * indicate the significance of the MANOVA F test for hierarchical, insurer type and country effects at the 1%, 5%, and 10% levels, respectively. The detailed hierarchical, insurer type and country-level ordered logit model results are represented in Appendix Tables B1, B2, and B3. The percentage distribution of responses by country and insurer type are given in Appendix Tables C1 and C2, respectively.
Source: created by authors.

than 70% of respondents in the U.S. and UK rated all Items 4 and above. In RI2, no notable differences were witnessed between China and Pakistan; more than 60% of Pakistani respondents think that their RI procedure (RI1) is comprehensive, compared to 50% of Chinese respondents. Our finding agrees with Tillinghast (2006), who found that 77% of respondents reported that their employer's RM efforts focus on quantification processes. We argue that the reason behind the weakened RI is that in emerging insurance markets, such as China and Pakistan, regulatory guidelines are weaker; furthermore, they merely ask for minimum capital requirements to be met and few financial ratios.

Figures 5–7 presents the response trend analysis of responses for RI items with respect to position, insurer type and country. Position-wise analysis showed downward trends for all hierarchical levels. However, the average response ratings for executive and supervisory levels were higher for both middle management and operational levels. Similarly, average responses for middle management levels were higher

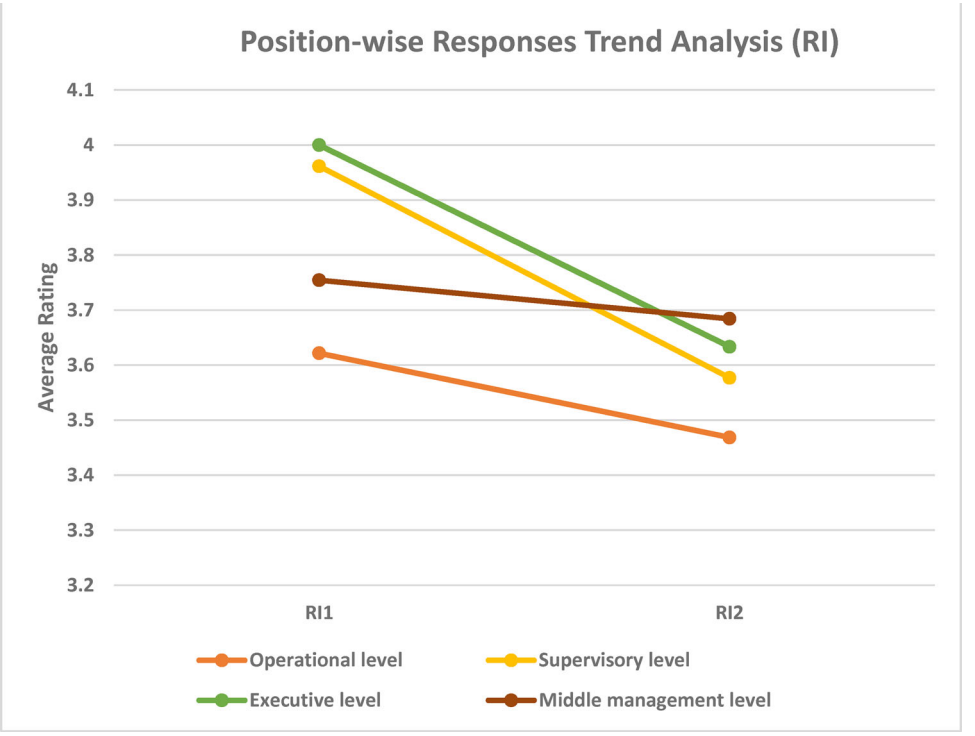

Figure 5. Position-wise responses trend analysis (RI).
Source: created by authors.

than operational levels (see Figure 5). Our trend analysis findings show that insurance personnel working at the executive and supervisory levels are more aware of the strength of their organizational risk identification processes compared to middle management and operational levels. Insurer-typewise analysis also demonstrated a downward trend for both insurer types. However, the average response rating for nonlife insurers was higher than that for life insurance businesses (see Figure 6). We can conclude that RI processes for nonlife insurers are relatively more competitive than those for life insurance businesses. Moreover, country-wise trend analysis showed that average response ratings for RI items were higher for developed markets than for emerging markets. Similarly, in emerging markets, average responses from Chinese respondents were higher than those from Pakistani respondents (see Figure 7), implying that the RI identification processes of insurers operating in developed markets are superior to those operating in emerging markets.

5.3. Risk assessment and analysis

RAA can be seen as a failure mode, effects, and criticality analysis (FMECA) technique[11]. FMECA is a proactive root cause analysis conducted during routine operations to assess the likelihood of failure (i.e., potential shocks) against the adversity of their consequences. During FMECA, all failure modes (potential shocks) identified are assessed based on three risk factors: likelihood of occurrence (O), the severity of

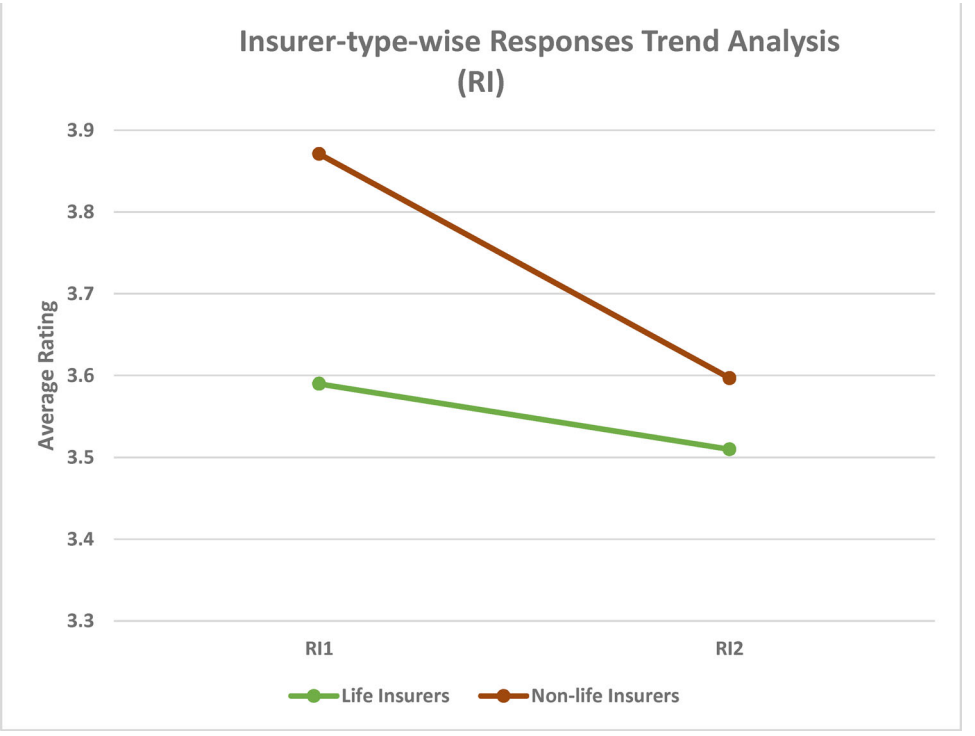

Figure 6. Insurer-type-wise responses trend analysis (RI).
Source: created by authors.

its effect (S), and a chance that that failure mode will be detected (D) (Koomsap & Charoenchokdilok, 2018).

Among the justifications presented regarding subprime risks faced by financial institutions during the 2007–2008 crisis, an important clarification proposed by policymakers, bank supervisors, and academics is that there was a failure of risk assessment at financial institutions. Both executives and traders with high-powered compensation schemes were knowingly taking excessive tail risks and could not be restrained by risk managers (Senior Supervisors Group, 2008), Kashyap et al. 2008) or managers were unaware of their risk exposures because they were assessing risks historically and neglected what appeared to be low-probability, non-salient events that turned out to be significant (Darren & Francesco, 2018; Peček & Kovačić, 2019; Shleifer, 2011).

The results of the MANOVA F tests of RAA items and their percentage distributions are presented in Table 4. Our F test results show that large differences exist with respect to insurer type and country. More than two-thirds of the respondents agree with the statements RAA1 to RAA5. Some of the risks faced may be difficult/expensive to quantify. More than two-thirds of the respondents reported that the potential risk faced by insurers is assessed both quantitively and qualitatively. Our finding is consistent with Atluntas et al. (2011), who found that 21% of German P/C insurers quantified qualitative risks and 5% quantified all the risks. An organization may face hundreds of risks, but it must address the most significant risks only. More than two-thirds of the respondents agreed that they prioritize risks identified and risk

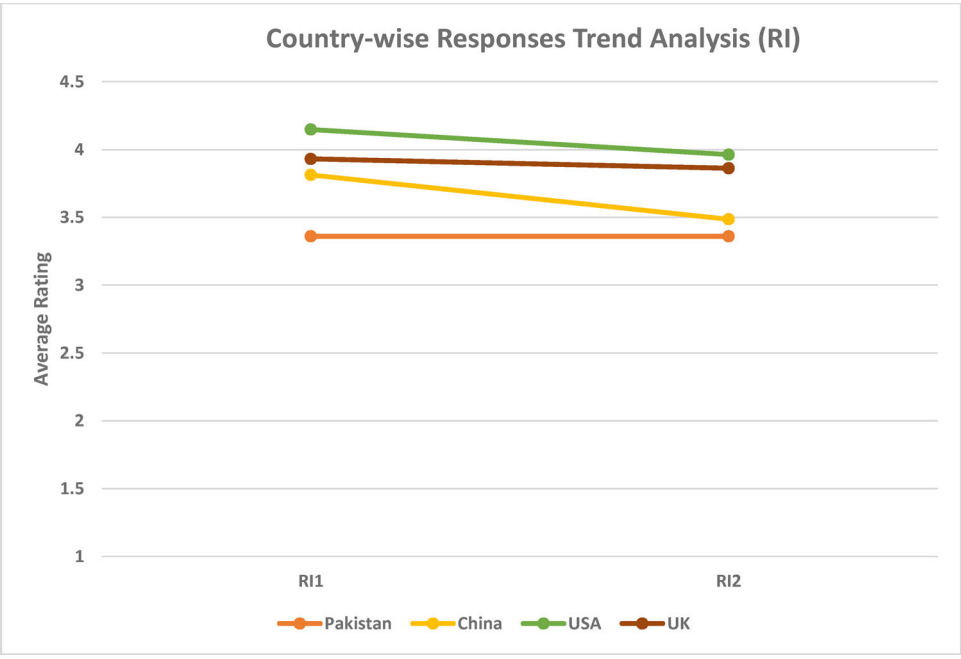

Figure 7. Country-wise responses trend analysis (RI).
Source: created by authors.

Table 4. Risk assessment and analysis.

Item	1	2	3	4	5	Hierarchical	Insurer type	Country
RAA1	0.4	8.5	23.7	**57.6**	9.8	**	***	***
RAA 2	0.4	7.6	25.0	**53.1**	13.8			***
RAA 3	2.2	7.1	37.1	**41.5**	12.1		***	***
RAA 4	0.4	6.3	18.8	**59.8**	14.7		***	***
RAA 5	0	3.6	30.8	**54.9**	10.7		**	*

The first five columns indicate the items' Likert scale (from strongly disagree to strongly agree) percentage distributions, with the highest ones highlighted in bold. The last two columns mentioned by ***, ** and * indicate the significance of the MANOVA F test for hierarchical, insurer type and country effects at the 1%, 5%, and 10% levels, respectively. The detailed hierarchical, insurer type and country-level ordered logit model results are represented in Appendix Tables B1, B2, and B3. The percentage distribution of responses by country and insurer type are given in Appendix Tables C1 and C2, respectively.
Source: created by authors.

treatment due to resource limitations. The beta coefficients for RAA 2, RAA 4 and RAA 5 are also insignificant for middle-level management. Additionally, the beta coefficients for RRAs 3 and 5 are insignificant for the executive level.

Insurer-type ordered logit model analysis shows that the beta coefficient is significant for all RAA items (see Appendix Table B2). It can be inferred that life insurers' RAA does not match that of nonlife insurers. Countrywise analysis of RAA items reported huge differences between countries, but RAA 2, RAA 4 and RAA 5 were nonsignificant for Chinese insurers. Our findings showed that Chinese insurers' RAA matches that of Pakistani insurers. The RAA item descriptive analysis showed no large differences between China and Pakistan. Furthermore, only 50% of respondents in Pakistan agreed that potential risks were quantified, versus 60% of respondents in China. In contrast, U.S. and UK insurers are comparatively stronger in RAA than the

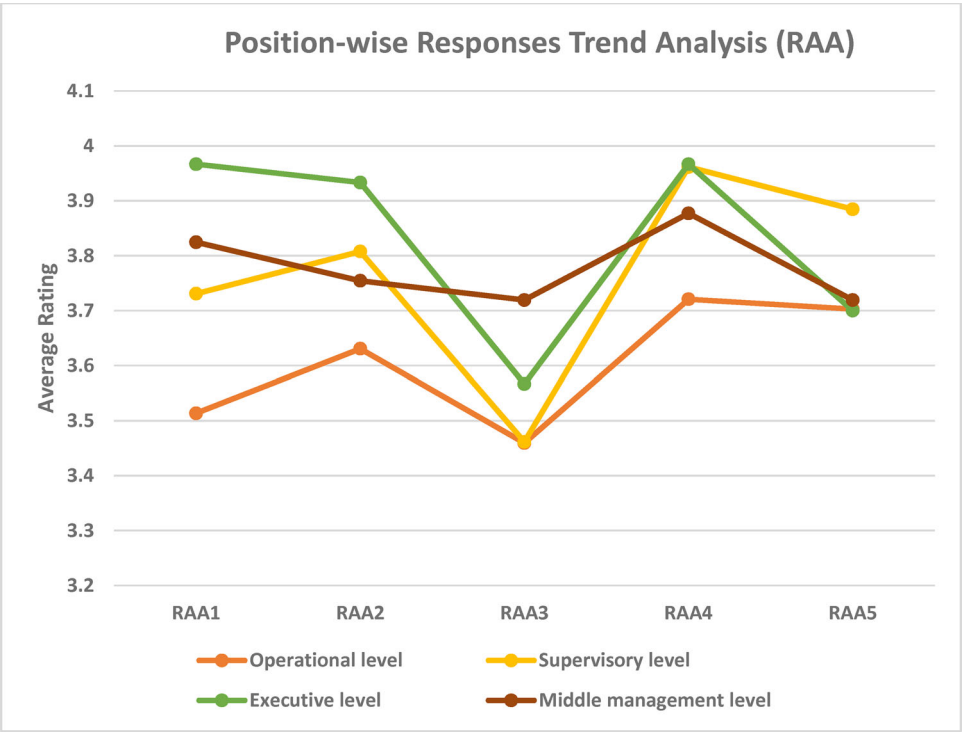

Figure 8. Position-wise responses trend analysis (RAA).
Source: created by authors.

Chinese and Pakistani markets. More than 90% of U.S. insurers agreed that they can quantify risks. However, fewer than 70% of UK insurers can quantify their risks. In addition, more than 70% of U.S. respondents also think that their employers estimated risk using qualitative methods; in contrast, 75% of UK respondents reported that their own risk and solvency assessment (ORSA) was conducted at least once a year compared to 55.5% in the U.S. Moreover, less than 50% of respondents showed that ORSA was conducted once a year by Chinese and Pakistani insurers.

Figures 8–10 shows the response trend analysis for the RAA construct. Positionwise trend analysis showed mixed trends for all hierarchical levels. However, the responses for both middle management and executive levels were higher than those for supervisory and operational levels (see Figure 9). From our findings, we can conclude that insurance personnel working at the executive and middle management levels have good knowledge of the effectiveness of their organizational risk assessment capability. Moreover, the insurer-typewise trend analysis reported a mixed trend for both insurer types. However, the average ratings for nonlife insurers were higher than those for life insurers (see Figure 9). We can infer that nonlife insurers' risk assessment practices are above those of life insurers. Countrywise response trend analysis showed mixed trends for all countries. However, average response ratings for insurers from developed markets were higher than emerging markets (see Figure 10). The findings imply that the risk assessment practices of insurers from developed markets are superior to those of insurers from emerging markets.

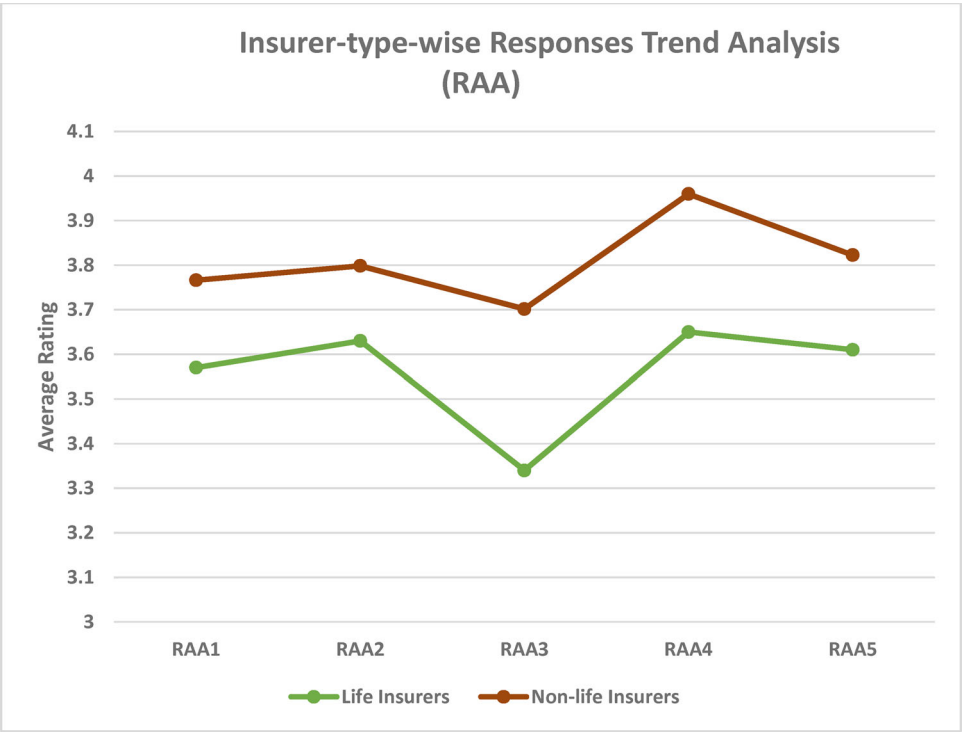

Figure 9. Insurer-type-wise responses trend analysis (RAA).
Source: created by authors.

5.4. Risk monitoring

Firms should continuously improve their business processes to sustain their competitiveness in a dynamic environment. The term continuous improvements (CI) refers to recursive improvement measures targeting future activities (Matthews & Marzec 2017). According to an operations management perspective, RMON can be viewed as insurers' efforts intended to make progressive (or continuous) improvements in the RM process.

The RMON is the component of the RM process involving internal controls and management information systems for controlling, monitoring and reporting risks. RMON aims to determine whether the risk exposures are in line with the desired level and are dealt with properly. Delbridge and Barton (2002) argued that proactive firms that recursively identify and resolve problems are involved in CI. Bessant and Francis (1999) argued that CI supports organizational learning, giving firms an opportunity to rediscover themselves.

FSA (2006) also found that only a few UK insurers had a comprehensive assessment of underlying risk trends. Leadbetter and Dibra (2008) highlighted that insurers should enhance their RMON capacity because suspicious figures arise some years before organizational failure. The ordered logit regression results demonstrated that the country effect significantly influenced RMON. Our results show that the effectiveness of RMON is monitored routinely by 70.6% of insurers. When asked whether their employer's RM framework was effective in satisfying

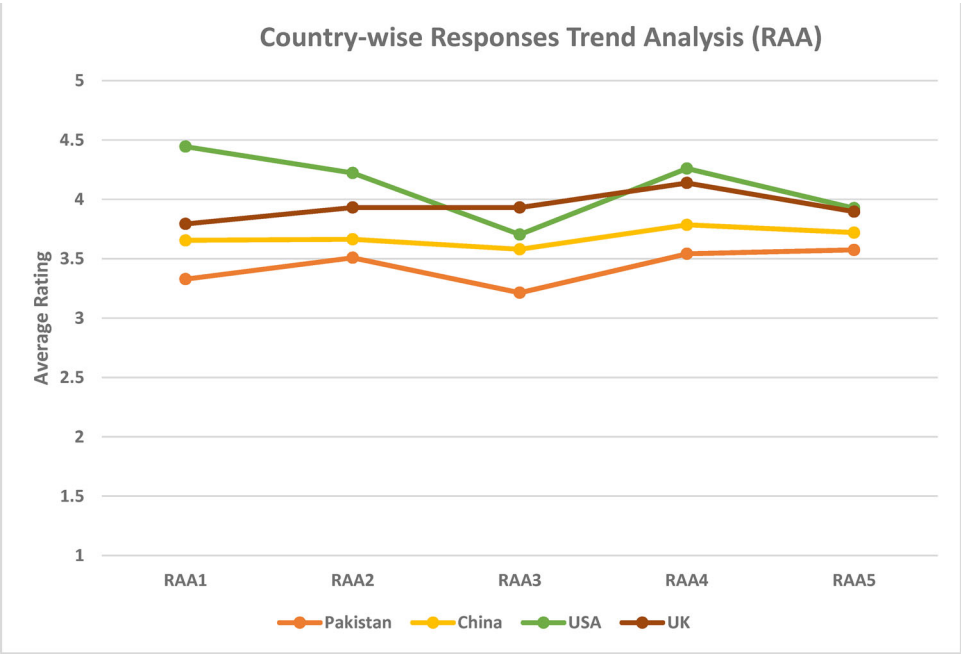

Figure 10. Country-wise responses trend analysis (RAA).
Source: created by authors.

Table 5. Risk monitoring.

Item	1	2	3	4	5	Hierarchical	Insurer type	Country
RMON1	0.9	7.1	21.4	**56.3**	14.3	***		*
RMON2	0.4	3.1	28.1	**52.7**	15.6	**		**
RMON3	0.4	3.6	24.6	**54.5**	17.0	**		***
RMON4	0.4	2.7	23.2	**58.0**	15.6	**	**	***

The first five columns indicate the items' Likert scale (from strongly disagree to strongly agree) percentage distributions, with the highest ones highlighted in bold. The last two columns mentioned by ***, ** and * indicate the significance of the MANOVA F test for hierarchical, insurer type and country effects at the 1%, 5%, and 10% levels, respectively. The detailed hierarchical, insurer type and country-level ordered logit model results are represented in Appendix Tables B1, B2, and B3. The percentage distribution of responses by country and insurer type are given in Appendix Tables C1 and C2, respectively.
Source: created by authors.

local regulatory requirements, approximately 68.3% of respondents gave a rating of 4 and above. In addition, 71.5% of respondents agreed that their employers followed detailed risk reporting. Furthermore, 73.6% of insurers assessed prevalent risk controls and risk responses. The MANOVA F test is significant for RMON 4, indicating that only item RMON 4 was different for insurer type. The results of the MANOVA F test of the RMON construct and its item percentage distributions are presented in Table 5.

Table 5 shows that MANOVA and the F statistics for RMON 1–4 were significant for both the hierarchical and country levels. However, the F-statistic for RMON4 was only significant for insurer type. However, ordered logit model analysis showed that the middle management level beta coefficient for RMON 2 item is significant. Furthermore, the beta coefficient for RMON 3 at the executive level is also significant. On the other hand, the beta coefficient for RMON 4 is also significant at all

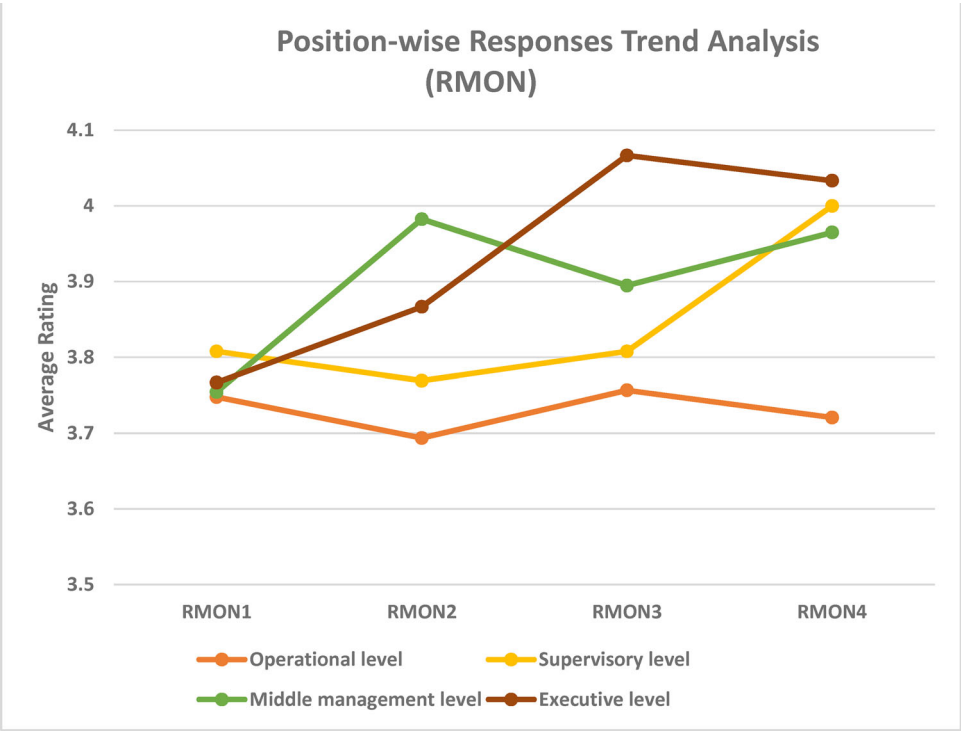

Figure 11. Position-wise responses trend analysis (RMON).
Source: created by authors.

hierarchical levels. Our results show that there are large differences between RMON items at all hierarchical levels.

Ordered logit analysis insurer type results report no large differences between RMON items (except RMON3). Similarly, industrywise percentage distributions also showed the nonlife sector to be more competitive in RMON. More than 70% of respondents in the nonlife sector rated all items four and above. Countrywise ordered logit model results for RMON items showed no large differences between China and Pakistan (except RMON3). On the other hand, the RMON items for the U.S. and UK were significantly different from those for Pakistan.

Figures 11–13 shows trend analysis for responses for the RMON items. The positionwise analysis showed increasing trends for all hierarchical levels. In addition, the average response rating for RMON items was higher for the executive and middle management levels than for supervisory and operational levels (see Figure 11). Hence, we can conclude that insurance personnel working at the executive and middle management levels have a good grasp on organizational risk monitoring processes. Insurer-typewise analysis showed that average responses for RMON items of nonlife insurers were higher than those of life insurers (see Figure 12), implying that nonlife insurers' risk monitoring processes are more competitive than those of life insurers. Similarly, countrywise responses for trend analysis showed that average responses for RMON items were higher for developed markets than for emerging markets (see Figure 13).

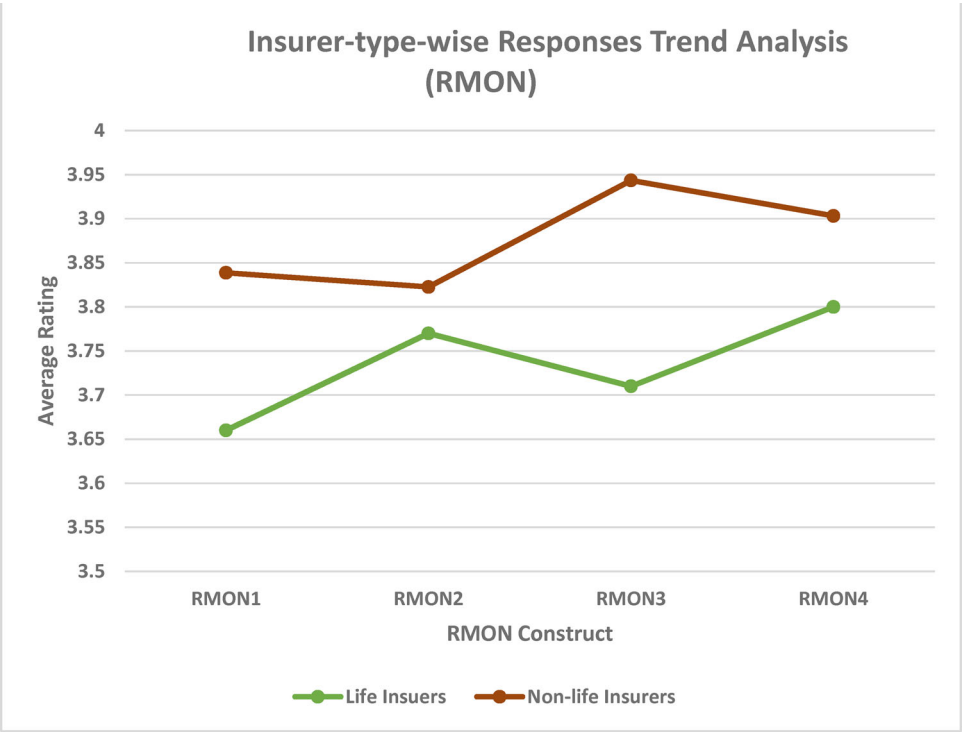

Figure 12. Insurer-type-wise responses trend analysis (RMON).
Source: created by authors.

5.5. Risk management practices

RMP construct analysis showed that MANOVA F tests for hierarchical and insurer type differences were significant for RMP3, while F statistic country-wise differences were significant for all items. When asked whether insurers' executive management routinely views business risk performance, three-fourths gave a rating of 4 and above. In addition, 68.3% of respondents also believed that their employers' RM practices are well documented and 71.4% of respondents agreed that their employers provide RM and business ethics-related training activities.

The ordered logit model hierarchical level analysis showed that responses for RMP1 were significantly different from those at the operational level (see Appendix Table B1). Moreover, the responses for RMP 2 were significantly different at the executive and supervisory levels. In addition, RMP3 responses at the supervisory level were significantly different from those at the operational level.

Ordered logit model analysis based on insurer type reports that items RMP1 and RMP3 for nonlife insurers were significantly different from those of life insurers. On the other hand, RMP2 was nonsignificant. Industrywise descriptive statistics showed that 79% of nonlife sector respondents agreed that their management routinely reviews their RM performance compared to 64% in the life sector. Moreover, 71% of nonlife respondents agreed that their RM program is well documented, compared to 65% in the life sector. In addition, 76% of respondents agreed that their employers provide RM training programs, in contrast to 62% in the life insurance sector.

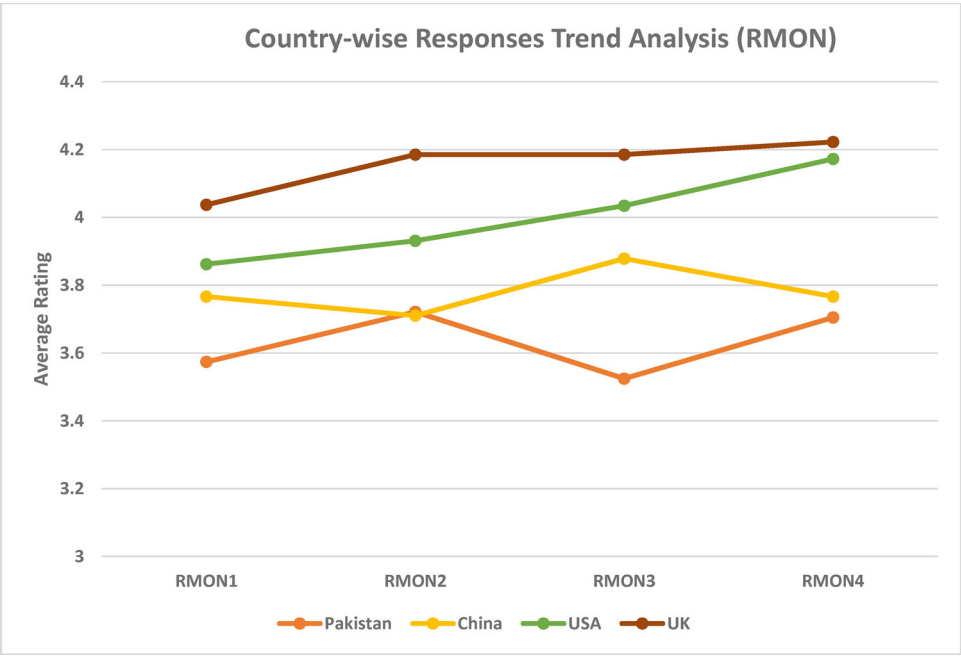

Figure 13. Country-wise responses trend analysis (RMON).
Source: created by authors.

Table 6. Risk management practices.

Item	1	2	3	4	5	Hierarchical	Insurer type	Country
RMP1	1.8	2.2	21.9	**55.4**	18.8			*
RMP2	1.3	10.7	19.6	**55.8**	12.5			**
RMP3	0.9	10.3	17.4	**53.1**	18.3	*	**	***

The first five columns indicate the items' Likert scale (from strongly disagree to strongly agree) percentage distributions, with the highest ones highlighted in bold. The last two columns mentioned by ***, ** and * indicate the significance of the MANOVA F test for hierarchical, insurer type and country effects at the 1%, 5%, and 10% levels, respectively. The detailed hierarchical, insurer type and country-level ordered logit model results are represented in Appendix Tables B1, B2, and B3. The percentage distribution of responses by country and insurer type are given in Appendix Tables C1 and C2, respectively.
Source: created by authors.

Countrywise analysis of RMP items showed that responses for RMP1 for UK insurers were significantly different from those for other countries (see table 6). In addition, responses to RMP2 for U.S. insurers are also significantly different from those for other countries. Moreover, the responses to RMP3 for UK and U.S. insurers are also significantly different from those for Chinese and Pakistani insurers. The countrywise percentage distribution showed that Pakistani insurers rated items RMP1–2 higher than Chinese insurers, and approximately 74% of Pakistani respondents agreed that their management regularly reviews RM performance (RMP1) compared to 64% of Chinese respondents. In addition, 68% of Pakistani respondents think that their RM program is well documented (RMP2) compared to 62% of Chinese respondents. However, 67% of Chinese respondents agreed that their employers provide RM-related training (RMP3), compared to 62% of Pakistani respondents. The developed insurance market was stronger in the RMP than the emerging market. In both developed countries (i.e., the UK and the U.S.), nearly 80%

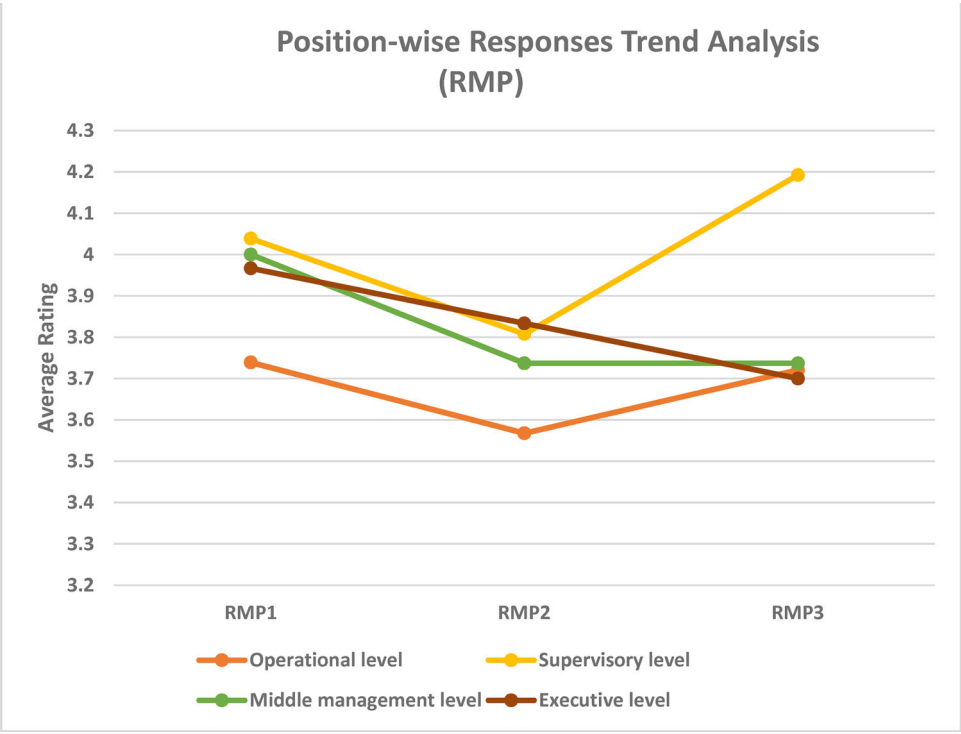

Figure 14. Position-wise responses trend analysis (RMP).
Source: created by authors.

of respondents agreed with all the RMP items. However, no notable differences were witnessed between these two economies.

We also asked insurance personnel to select which of the various RMP benchmark tools their employer adopted. The countrywise percentage distributions for various RI, RAA and RMON methods are presented in Appendix Table B4. The results demonstrated that many of these methods were less adopted in China and Pakistan.

Figures 14–16 shows the trend analysis for responses for RMP items. The position-wise analysis showed increasing trends for all hierarchical levels. In addition, the average response rating for RMP items was higher for the executive and middle management levels than for supervisory and operational levels. Hence, we can conclude that insurance personnel working at the executive and middle management levels have a good grasp of organizational risk management practices. Insurer-typewise analysis showed that average responses for RMP items for nonlife insurers were higher than those of life insurers, implying that nonlife insurers' risk monitoring processes are more competitive than those of life insurers. Similarly, countrywise responses for trend analysis showed that average responses for RMP items were higher for developed markets than for emerging markets.

6. Discussion

Our findings have two implications: 1) large differences exist in insurers' prevalent RM practices, and 2) insurance personnel have quite different understandings of their organizational RM practices.

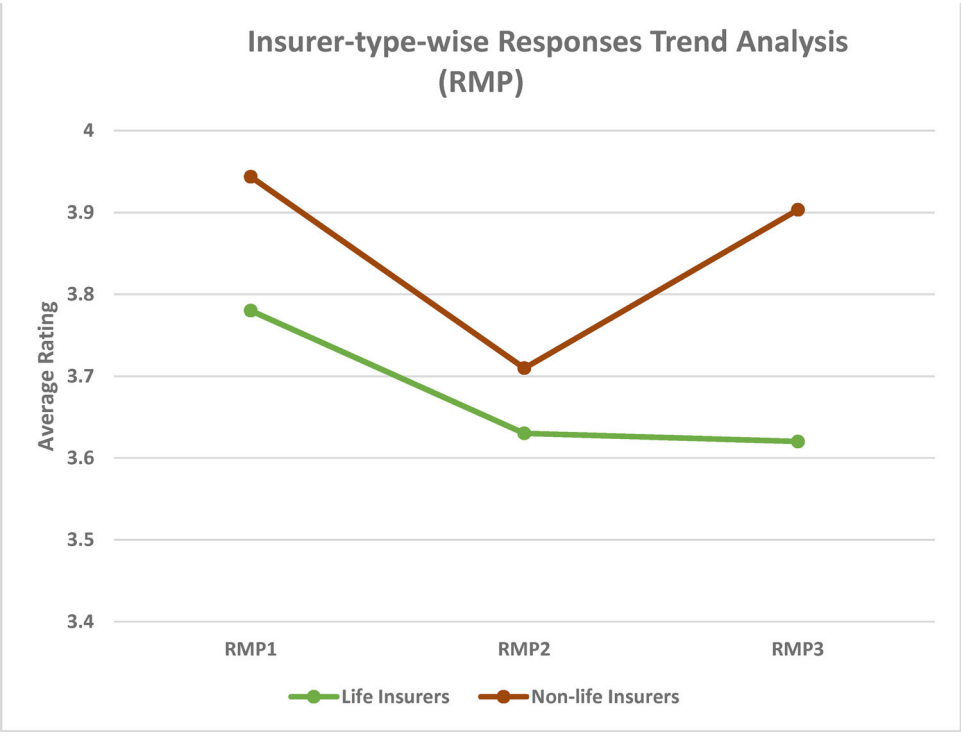

Figure 15. Insurer-type-wise responses trend analysis (RMP).
Source: created by authors.

Implications for hierarchical level differences: No large differences were observed in the URRM, RI and RAA items. However, we found large differences in survey responses regarding insurers' RMON practice at different hierarchical levels. Our ordered logit model results show that when asked whether their RM function is effective in meeting quantitative regulatory requirements, only insurance personnel at the middle management level have a higher rating. In addition, when asked about risk reporting, only the executive/director level rated the response higher. Our findings imply that insurance personnel at different hierarchical levels do not have the same knowledge about their employer's risk monitoring practice.

Implications for insurer type differences: Our results show large differences between life and nonlife insurers' RMF. Ordered logit model analysis showed that life insurance personnel rated all the survey items higher, implying that life insurers' RMFs are more competitive than those of nonlife insurers.

Implications for country-level differences: We also found large differences in American, British, Chinese, and Pakistani insurers' RMF. Our results could be attributed to the fact that each country's regulatory regime is significantly different from those of the others.

We propose that to achieve a sustained competitive advantage, an insurer's RM should minimize these differences. In contrast, many studies (e.g., Atluntas et al., 2011; Tillinghast, 2006) focusing on insurers' RM have adopted a 'particularist view' of particular risk exposure and exclude interrelated items. We argue that if insurers fail to take into consideration the heterogeneous effect of firm-level, industrial level,

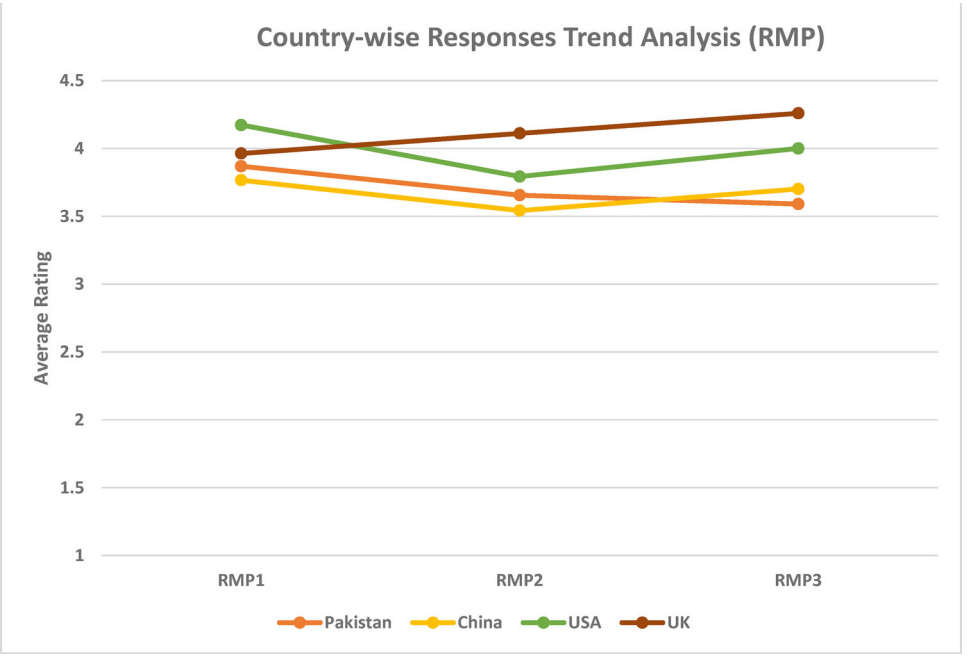

Figure 16. Country-wise Responses Trend Analysis (RMP)
Source: created by authors.

and external factors, they may engage in inadequate or excessive hedging to cover their exposures. Furthermore, corporate risk-taking based on simple assessment models (e.g., bivariate models) will lead to suboptimal RM. Insurers' RM should be flexible enough to cater to this interdependence.

7. Conclusion

This paper studied the RM of four major insurance markets. The insurers' RM was assessed by collecting feedback from insurance personnel assuming various organizational roles at different hierarchical levels. We found large differences in employee feedback at the hierarchical, insurer type and country levels. We analyzed 23 different RM-related processes or their characteristics. Our analysis revealed that large differences exist in each RM item at the hierarchical, insurer type, and country levels. This observation has important consequences for insurers' financial risk management practice.

We conclude that our factor of interest had heterogeneous effects on the same business process (each measured by items) within the RM. We argue that for RM to give a competitive advantage, insurers should eliminate these differences. Furthermore, insurance personnel also reported that traditional RM tools were more prevalent than sophisticated tools. U.S. and UK insurers' RM practices were found to be more competitive than those of China and Pakistan. In addition, Chinese insurers were more competitive than Pakistani insurers. We also found that ORSA is less common among insurers in the U.S., China, and Pakistan. Furthermore, most of the identified risks were assessed through quantified methods in the U.S. However, qualitative methods were more prevalent in the UK, China, and Pakistan.

The significance of our study is supported by its unique purpose. This study examined the RM practices of life and nonlife insurers in developed and emerging markets. The study highlighted various shortcomings in the existing RM framework among all the countries covered. From a regulatory perspective, our research findings will assist regulators in setting priority-based regulatory guidelines. From a practitioner's perspective, we provided deeper insights into the insurance workforce's understanding of prevalent RM practices and tools at different hierarchical levels. Our findings can be used by insurers to introduce RM-related training and development programs where needed. Lastly, our findings showed the disaggregate effect of hierarchy, industry, and regulation on the insurers' RM framework. This will give new perspective to the academic literature on risk management practices of the insurance industry.

The few limitations of this study are presented next. The questions asked in the survey were closed-ended, and respondents were required to choose among available options. They were not encouraged to provide their own personal feedback. Moreover, there may have been large differences between two adjacent ratings in the Likert scale (i.e., between agree and strongly agree). In the questionnaire-based study, the respondents are asked about their opinion, and the opinions provided might be very different from the prevalent practice. Chinese and Pakistani insurance personnel dominated the respondents. The statistical findings may have been tainted by this dominance.

Considering the study findings and limitations, as well as the scarce literature on insurers' RM practices, future research directions are abundant. Possible future directions could be an analysis of factors hurdling ORSA practice in the U.S. insurance market. The Pakistani insurance market was found to be more competitive than the Chinese market, and a comparative study of these markets could also be conducted. A secondary data analysis covering the past trends and financial shocks of the developed and emerging insurance markets to arrive at more objective findings is also recommended.

Notes

1. Refer to Grant (2012) for detailed discussion on social and economic value of insurance.
2. For example, Gasper (2002) argued that America's state-based insurance regulation system is inefficient and a single federal regulator will promote uniformity, avoid the burden of duplicative and overlapping regulations, and provide a single voice for insurance regulation.
3. Various newly implemented insurance laws such as EU solvency II and NAIC's solvency modernizations initiative guidelines focus more on solvency issues.
4. The banking sector is globally regulated by BASEL accords, which is formulated through the joint efforts of the central banks of different countries.
5. The model we have adopted has been used to assess banking sector risk management practices. See Al-Tamimi and Al-Mazrooei (2007), Hassan (2009) and Abu Hussain and Al-Ajmi (2012) for further details.
6. First, the authors incorporated the insurance literature into the questionnaire then, the questionnaire was sent to the industry experts such as CEO's, CFO's, Directors and CRO's of all the economies. They were asked to comment on the questionnaire based on their feedback the modifications were made, and the questionnaire was sent again, this process was repeated until the final draft. Afterward, a pilot study with a sample size of 100 was conducted. During the pilot study, a questionnaire was further amended based on respondents' feedback and CFA analysis. The details of the questionnaire modifications are presented in Appendix Table A1.

7. The numerous definitions of risk management process exits in the literature. This definition is the most comprehensive one. See Bogodistov and Wohlgemuth (2017) and Kumar (2021) for details.
8. We calculated market share as the sum of direct premiums written across all product lines by a particular insurer divided by the sum of direct premiums written in fire, allied, commercial multiple perils, and homeowners' lines by all insurers nation-wide.
9. It was noticed that survey responses for different hierarchical levels within a department were same. In such case only questionnaires from higher hierarchical levels were included. It was done because superiors have greater responsibility and accountability toward insurers RMPs. Similarly, different responses from different hierarchical levels within a department were also considered.
10. We only report significance of the MANOVA F test to conserve space. The results for Box's test, the Pillai trace test, Wilk's lambda and Levene's test are available request.
11. In 1960, FMECA was originally developed by National Aeronautics and Space Administration (NASA) to check system reliability. However, it has emerged as an effective risk management tool and become popular in various industries. See Koomsap & Charoenchokdilok, 2018 for further details.

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Data availability statement

The primary used in this paper is available on request from the corresponding author.

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Appendix

Table A1. Items modifications references (5-point Likert scale: 1-strongly disagree 5-strongly agree).

Item	Source	Item	Source
URRM1	AAA, 2013	RAA 2	IAA, 2008
URRM2	S&P 2005	RAA3	AAA, 2013 EU Solvency II
URRM3	S&P 2005	RAA4	Abu Hussain and Al-Ajmi (2012)
URRM4	IAA, 2008	RAA5	Abu Hussain and Al-Ajmi (2012)
URRM5	Abu Hussain and Al-Ajmi (2012)	RAA6	IAA, 2008 AAA, 2013 S&P 2005
URRM6	Abu Hussain and Al-Ajmi (2012)	RMON1	S&P, 2005
URRM7	AAA, 2013	RMON2	EU Solvency II Directive
URRM8	Abu Hussain and Al-Ajmi (2012)	RMON3	EU Solvency II Directive
URRM9	IAA, 2008	RMON4	Abu Hussain and Al-Ajmi (2012)
RI1	S&P, 2005 AAA, 2013	RMON5	S&P, 2005
RI2	EU Solvency II Directive	RMP1	S&P, 2005
RI3	AAA, 2013	RMP2	AAA, 2013
RAA1	IAA, 2008	RMP3	S&P, 2005
RAA2	IAA, 2008		

Source: created by authors.

Table A2. Items description.

Item	Description
URRM1	There is a common understanding of our company risk profile across the organization
URRM2	There is a common understanding of our company risk appetite across the organization
URRM3	There is a common understanding of our company risk tolerance across the organization
URRM4	Responsibility for risk management is clearly set out and understood throughout the company
URRM5	Accountability for risk management is clearly set out and understood throughout the company
URRM6	Our organization's techniques in risk management are in accordance with the international solvency requirements such as EU Solvency II Directive
URRM7	Stress testing output is understood by senior management and board
URRM8	Our organization has an effective risk management strategy in place
URRM9	My firm has an effective risk management framework (infrastructure, process, and policies) in place
RI1	This organization's risk identification procedure is comprehensive
RI2	Changes in risk are recognized and quantified by our organization's internal models
RAA1	Potential shocks (risks) to my organization business are assessed by using quantitative analysis methods
RAA2	Potential shocks (risks) to my organization business are assessed by using qualitative analysis methods (e. g high, moderate and low)
RAA3	In my organization own risk and solvency assessment (ORSA) is conducted at least once a year or/when there is a significant change in our risk profile (Solvency II Directive)
RAA4	My organization's response to analyzing risk includes identifying, prioritizing of risk and selecting those that need active management
RAA5	Our response to analyzing risks are hindered by resource constraints
RMON1	Monitoring the effectiveness of the risk management framework is an integral part of routine management reporting
RMON2	Risk management function is effective in meeting the quantitative regulatory requirements
RMON3	Risk related reporting by our organization includes the details of the risk facing them, capital adequacy and risk management
RMON4	Our response to risks includes an evaluation of the effectiveness of the existing controls and risk management responses
RMP1	Our organization's executive management regularly reviews the organization's performance in managing its business risks
RMP2	My organization's risk management procedures and processes are documented and provide guidance to staff about managing risks

Source: created by authors.

Table B1. Ordered logit model hierarchical levels effect results.

Item	β_E	β_M	β_S	LR_{MGM}	D_{MGM}	R^2_{MF}
URRM1	0.321(0.392)	0.487(0.313)	0.643(0.421)	58.564	8.802	0.007
URRM2	0.309(0.394)	0.280(0.312)	0.295(0.417)	52.954	5.962	0.002
URRM3	0.229(0.398)	−0.093(0.311)	−0.492(0.408)	52.491	4.044	0.004
URRM4	0.327(0.397)	0.070(0.312)	0.638(0.424)	48.196	3.470	0.005
URRM5	0.814(0.399)**	0.169(0.310)	0.012(0.412)	51.448	3.660	0.008
URRM6	0.678(0.378)*	0.110(0.296)	0.065(0.396)	69.488	18.036	0.005
URRM7	0.891(0.383)**	0.462(0.301)	0.249(0.401)	53.160	8.133	0.011
URRM8	0.892(0.402)**	0.194(0.314)	0.508(0.422)	49.241	5.089	0.011
URRM9	0.829(0.389) **	0.530(0.306)**	0.454(0.407)	55.850	9.029	0.011
RI1	0.919(0.397)**	0.328(0.308)	0.816(0.419)**	56.560**	9.552	0.014
RI2	0.299(0.391)	0.540(0.314)*	0.253(0.413)	53.333	6.014	0.006
RAA1	1.222(0.426)***	0.833(0.329)***	0.488(0.428)	46.496***	4.385	0.025
RAA2	0.932(0.403)**	0.423(0.312)	0.508(0.419)	56.033**	12.753	0.012
RAA3	0.187(0.382)	0.636(0.306)**	−0.027(0.404)	57.068	12.116	0.008
RAA4	0.723(0.413)*	0.535(0.325)	0.554(0.435)	51.809	10.753	0.010
RAA5	−0.113(0.395)	0.110(0.315)	0.470(0.428)	49.718	11.543**	0.003
RMON1	0.095(0.397)	0.143(0.314)	0.219(0.422)	61.254	17.959*	0.001
RMON2	0.416(0.395)	0.766(0.317) **	0.115(0.415)	46.243	5.797**	0.013
RMON3	0.880(0.402)**	0.442(0.315)	0.147(0.418)	49.478	7.453	0.011
RMON4	0.915(0.412)**	0.654(0.324)**	0.717(0.433) *	43.393**	4.089	0.017
RMP1	0.777(0.403) *	0.805(0.321)*	−0.746(0.426)**	56.069**	10.259	0.018
RMP2	0.726(0.405) **	0.416(0.315)	−0.709(0.429)*	55.588	9.238	0.010
RMP3	−0.036(0.389)	0.150(0.310)	1.080(0.424) ***	56.011**	10.172	0.013

The ordered logit model results for the construct items are presented above. The estimated model is given as $\text{logit}(P(Y \leq j)) = \alpha j - \beta_E D_D - \beta_M D_M - \beta_S D_S$, the dummy variables D_E, D_M, and D_S represents director/executive level, Middle management level and supervisory levels respectively. The estimated coefficients, standard errors (in parentheses), and significance according to the Wald test are mentioned in first four columns. The test statistics of the likelihood-ratio chi2-tests for the significance of the management level effect (MGM) are presented in column 5. The significance levels 1%, 5%, and 10% are represented by ***, **, and *, respectively. The residual deviance (D_{MGM}) is represented in column 6. The asterisks indicate the p-value for the test of the null hypothesis that the fitted model explains the data pretty well (i.e., no asterisks indicate that the model can explain the whole variation in the data). The last column contains the McFadden R-squared. The operational level results are not reported because they were treated as redundant (i-e reference values).
Source: created by authors.

Table B2. Ordered logit model insurer type results.

Item	β_T	LR_T	D_T	R^2_{MF}
URRM1	−0.686(0.259)***	35.523***	5.562	0.032
URRM2	0.672(0.305)***	34.672**	5.438	0.008
URRM3	−0.366(0.305)	34.001	2.958	0.004
URRM4	−0.370(0.259)	31.241	2.761	0.004
URRM5	−0.445(0.257)*	31.958*	0.690	0.005
URRM6	−0.722(0.249)***	35.069***	1.792	0.014
URRM7	−0.203(0.247)	37.101	8.435	0.001
URRM8	−0.553(0.261)**	30.700**	0.576	0.009
URRM9	−0.729(0.255)***	35.678***	4.529	0.014
RI1	−0.648(0.257)**	39.669**	8.349**	0.011
RI2	−0.195(0.254)	32.243	0.743	0.001
RAA1	−0.501(0.263)*	35.286*	7.553*	0.007
RAA2	−0.426(0.257)*	30.129*	1.968	0.005
RAA3	−0.782(0.255)***	41.042***	10.223**	0.017
RAA4	−0.847(0.273)***	31.642***	4.227	0.020
RAA5	−0.616(0.253)**	25.212**	0.606	0.012
RMON1	−0.324(0.260)	33.049	4.574	0.003
RMON2	−0.182(0.256)	28.480	1.539	0.001
RMON3	−0.520(0.260)**	32.869**	6.436*	0.008
RMON4	−0.28(0.263)	27.853	1.376	0.002
RMP1	−0.443(0.260)*	38.319	11.236***	0.006
RMP2	−0.267(0.258)	33.987	4.723	0.002
RMP3	−0.646(0.260)**	31.214**	0.693	0.011

The ordered logit model results for the construct items are presented above. The estimated model is given as $\text{logit}(P(Y \leq j)) = \alpha j - \beta_L D_L$, the dummy variable D_T represents life insurers. The estimated coefficients, standard errors (in parentheses), and significance according to the Wald test are mentioned in 2nd column. The test statistics of the likelihood-ratio chi2-tests for the significance of the type effect (T) are presented in 3rd column. The significance levels 1%, 5%, and 10% are represented by ***, **, and *, respectively. The residual deviance (D_T) is represented in column 4. The asterisks indicate the p-value for the test of the null hypothesis that the fitted model explains the data pretty well (i.e., no asterisks indicate that the model can explain the whole variation in the data). The last column contains the McFadden R-squared.
Source: created by authors.

Table B3. Ordered logit model country effect results.

Item	β_{US}	β_{UK}	β_{CN}	LR_C	D_C	R^2_{MF}
URRM1	1.733(0.46)***	1.342(0.442)***	0.827(0.304)***	66.216***	18.335**	0.032
URRM2	1.480(0.458)***	0.738(0.433)*	0.827(0.304)***	65.643**	22.204***	0.020
URRM3	1.290(0.455)***	0.776(0.430)*	0.916(0.306)***	72.288**	27.224***	0.021
URRM4	1.480(0.459)***	0.949(0.443)**	0.384(0.307)	52.672***	9.490	0.022
URRM5	0.632(0.444)	0.664(0.434)	0.068(0.303)	62.319	16.435*	0.007
URRM6	1.767(0.441)***	2.508(0.450)***	0.826(0.299)***	65.235***	13.712	0.059
URRM7	1.141(0.432)***	0.828(0.418)**	0.336(0.297)	48.974**	5.739	0.016
URRM8	1.625(0.460)***	1.492(0.448)***	0.643(0.310)**	64.053***	9.188**	0.032
URRM9	1.596(0.448)***	1.634(0.438)***	0.554(0.299)*	63.130***	20.402*	0.036
RI1	1.926(0.459)***	1.279(0.438)***	0.768(0.304)**	74.140***	26.985***	0.035
RI2	1.465(0.468)***	1.214(0.450)***	0.160(0.300)	61.995***	4.766*	0.029
RAA1	3.594(0.544)***	1.168(0.465)**	0.794(0.312)**	41.904***	3.577*	0.098
RAA2	2.111(0.472)***	0.918(0.442)**	0.298(0.302)	58.052***	16.793*	0.040
RAA3	1.056(0.437)**	1.608(0.436)***	0.649(0.302)**	64.878***	18.848**	0.027
RAA4	2.130(0.484)***	1.527(0.469)***	0.456(0.315)	54.197***	14.319	0.049
RAA5	1.080(0.456)**	0.800(0.442)*	0.336(0.309)	52.746*	14.876**	0.014
RMON1	1.254(0.460)***	0.822(0.443)*	0.334(0.308)	62.041**	16.646*	0.016
RMON2	1.516(0.458)***	0.719(0.438)	0.029(0.306)	59.447***	19.709**	0.026
RMON3	1.669(0.460)***	1.180(0.443)***	0.730(0.310)**	50.871***	12.935	0.031
RMON4	1.678(0.478)***	1.472(0.462)*	0.102(0.315)	50.052***	9.967	0.045
RMP1	0.541(0.450)	0.734(0.440)*	−0.290(0.310)	50.945**	9.063	0.017
RMP2	1.622(0.473)***	0.558(0.450)	−0.265(0.310)	60.098***	13.504	0.034
RMP3	2.004(0.466)***	0.867(0.440)**	0.195(0.304)	56.700***	13.364	0.039

The ordered logit model results for the construct items are presented above. The estimated model is given as $\text{logit}(P(Y \leq j)) = \alpha j - \beta_{US}D_{US} - \beta_{UK}D_{UK} - \beta_{CN}D_{CN}$, the dummy variables D_{US}, D_{UK}, and D_{CN} represents US insurers, UK insurers and Chinese insurers respectively. The estimated coefficients, standard errors (in parentheses), and significance according to the Wald test are mentioned in first four columns. The test statistics of the likelihood-ratio chi2-tests for the significance of the country effect (C are presented in column 4. The significance levels 1%, 5%, and 10% are represented by ***, **, and *, respectively. The residual deviance (D_R) is represented in column 5. The asterisks indicate the p-value for the test of the null hypothesis that the fitted model explains the data pretty well (i.e., no asterisks indicate that the model can explain the whole variation in the data). The last column contains the McFadden R-squared.

Source: created by authors.

Table B4. Risk management methods (%).

Item	US	UK	China	Pakistan
RI methods				
Inspection by staff	82.14	54.5	56.25	44.90
Audit & physical inspection	78.57	83.87	63.39	65.21
Financial statement analysis	75.00	70.96	69.64	72.46
Risk survey	57.14	87.09	64.28	47.82
Process analysis	53.57	67.74	45.53	39.13
SWOT analysis	50.00	41.93	31.25	40.57
Benchmarking	46.42	61.29	17.85	37.68
Scenario analysis	82.14	67.74	11.60	36.23
Internal communication	71.42	51.61	52.67	59.42
Risk assessment methods				
Stress Testing	89.28	77.41	58.92	52.17
Scenario testing	85.71	77.41	51.78	69.56
Economic capital assessment	82.14	54.83	55.35	31.88
Monte Carlo Simulation	64.28	19.35	43.75	10.14
Risk monitoring methods				
Underwriting	85.71	93.54	62.50	68.11
Reserving	82.14	80.64	44.64	52.17
Asset management	82.14	64.51	64.28	66.67
Liability management	78.57	83.87	59.82	57.97
Investment	85.71	70.96	58.92	68.11
Liquidity management	71.42	70.96	50.89	44.92
Concentration risk management	71.42	64.51	49.10	30.43
Operational risk management	82.14	90.32	65.17	50.72
Reinsurance	85.71	74.19	52.67	62.31

Source: created by authors.

Table C1. Percentage distribution by countries.

	US					UK					CHINA					PAKISTAN				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
URRM1	3.7	3.7	18.5	40.7	33.3	0	7.1	7.1	64.3	21.4	1.9	7.8	23.3	54.4	12.6	7.6	25.8	10.6	51.5	4.5
URRM2	3.7	11.1	14.8	37	33.3	3.6	14.3	0	75	7.1	1	10.7	18.4	54.4	15.5	4.5	22.7	18.2	48.5	6.1
URRM3	7.4	3.7	22.2	40.7	25.9	0	10.7	7.1	78.6	3.6	1	5.8	23.3	56.3	13.6	3	28.8	16.7	45.5	6.1
URRM4	0	18.5	3.7	40.7	37	0	7.1	7.1	67.9	17.9	1.9	12.6	14.6	57.3	13.6	1.5	25.8	12.1	47	13.6
URRM5	0	11.1	25.9	29.6	33.3	0	7.1	10.7	60.7	21.4	3.9	9.7	17.5	56.3	12.6		25.8	9.1	48.5	16.7
URRM6	3.7	7.4	22.2	25.9	40.7	3.6	3.6	14.3	28.6	50	4.9	3.9	37.9	41.7	11.7	7.6	21.2	36.4	28.8	6.1
URRM7	0	3.7	29.6	40.7	25.9	0	7.1	32.1	35.7	25	1.9	6.8	37.9	35.9	17.5		13.6	36.4	36.4	13.6
URRM8	0	3.7	22.2	33.3	40.7	3.6	3.6	7.1	46.4	39.3	1	3.9	15.5	66	13.6	3	19.7	15.2	53	9.1
URRM9	0	0	22.2	29.6	48.1	3.6	3.6	7.1	39.3	46.4	1	7.8	19.4	52.4	19.4	4.5	19.7	15.2	48.5	12.1
RI1	0	11.1	11.1	37	40.7	3.6	3.6	7.1	64.3	21.4	1.9	1.9	28.2	51.5	16.5	1.5	25.8	13.6	53	6.1
RI2	0	7.4	18.5	51.9	22.2	3.6	3.6	7.1	71.4	14.3	2.9	7.8	36.9	44.7	7.8	1.5	22.7	19.7	51.5	4.5
RAA1	0	0	3.7	48.1	48.1	3.6	3.6	25	57.1	10.7	1	6.8	23.3	64.1	4.9	3	16.7	30.3	48.5	1.5
RAA2	3.7	7.4	11.1	33.3	44.4	7.1	0	25	50	17.9	1.9	4.9	31.1	54.4	7.8	1.5	18.2	19.7	54.5	6.1
RAA3	3.7	7.4	33.3	33.3	22.2	3.6	0	21.4	53.6	21.4	0	4.9	44.7	39.8	10.7	4.5	16.7	30.3	42.4	6.1
RAA4	0	7.4	11.1	37	44.4	0	0	14.3	53.6	32.1	0	2.9	27.2	60.2	9.7	3	15.2	15.2	62.1	4.5
RAA5	0	11.1	22.2	37	29.6	0	3.6	28.6	46.4	21.4	0	1	34	56.3	8.7	3	4.5	31.8	57.6	3
RMON1	3.7	7.4	18.5	33.3	37	3.6	3.6	17.9	50	25	1	4.9	27.2	57.3	9.7	3	9.1	19.7	62.1	6.1
RMON2		7.4	22.2	25.9	44.4	3.6	3.6	21.4	46.4	25	0	4.9	28.2	57.3	9.7	1.5	3	33.3	53	9.1
RMON3			18.5	44.4	37	3.6	0	14.3	60.7	21.4	0	1	28.2	53.4	17.5	1.5	12.1	25.8	54.5	6.1
RMON4		3.7	14.8	40.7	40.7	0	7.1	7.1	50	35.7	1	3.9	27.2	56.3	11.7	1.5	4.5	24.2	63.6	6.1
RMP1	7.4		7.4	51.9	33.3	3.6	0	10.7	60.7	25	1.9	5.8	28.2	49.5	14.6	1.5	3	21.2	56.1	18.2
RMP2	3.7	11.1	3.7	40.7	40.7	3.6	3.6	10.7	64.3	17.9	1	10.7	26.2	55.3	6.8	3	10.6	18.2	56.1	12.1
RMP3	3.7	7.4		37	51.9	0	3.6	17.9	53.6	25	0	10.7	22.3	54.4	12.6	3	13.6	21.2	51.5	10.6

Note. This table illustrates the percentage distribution of answers by countries. Where 1, 2, 3, 4 and 5 represents 'strongly disagree', 'disagree', 'undecided', 'agree' and 'strongly agree', respectively.
Source: created by authors.

Table C2. Percentage distribution by insurer type.

	LIFE					NON-LIFE				
	1	2	3	4	5	1	2	3	4	5
URRM1	10.6	14.4	20.2	49	9.6	0.8	10.8	14.2	56.7	17.5
URRM2	4.8	18.3	21.2	44.2	11.5	0.8	11.7	10.8	60.8	15.8
URRM3	3.8	12.5	26.9	48.1	8.7	0.8	13.3	12.5	59.2	14.2
URRM4	1.9	19.2	15.4	49	14.4	0.8	14.2	8.3	57.5	19.2
URRM5	1.9	17.3	18.3	48.1	14.4	1.7	11.7	12.5	54.2	20
URRM6	7.7	11.5	39.4	28.8	12.5	3.3	7.5	26.7	39.2	23.3
URRM7	1	10.6	38.5	27.9	22.1	0.8	6.7	33.3	44.2	15
URRM8	2.9	11.5	18.3	52.9	14.4	0.8	5.8	12.5	58.3	22.5
URRM9	2.9	16.3	23.1	37.5	20.2	1.7	4.2	11.7	55	27.5
RI1	1.9	16.3	26	40.4	15.4	1.7	5	13.3	61.7	18.3
RI2	2.9	12.5	27.9	47.1	9.6	1.7	10.8	24.2	54.2	9.2
RAA1	1.9	12.5	28.8	45.2	11.5	1.7	5	18.3	66.7	8.3
RAA2	1.9	12.5	27.9	47.1	10.6	3.3	5	21.7	55	15
RAA3	2.9	14.4	38.5	30.8	13.5	1.7	2.5	34.2	50.8	10.8
RAA4	1	9.6	28.8	49	11.5	0.8	4.2	12.5	64.2	18.3
RAA5	1	5.8	38.5	46.2	8.7	0.8	1.7	25	59.2	13.3
RMON1	3.8	8.7	22.1	53.8	11.5	0.8	4.2	23.3	55.8	15.8
RMON2	1	6.7	29.8	49	13.5	0.8	2.5	26.7	52.5	17.5
RMON3	1.9	6.7	27.9	48.1	15.4	0	1.7	21.7	58.3	18.3
RMON4	1.9	4.8	25	53.8	14.4	18.3	4.2	20	57.5	18.3
RMP1	1.9	6.7	26.9	44.2	20.2	3.3	0.8	16.7	60.8	18.3
RMP2	0	12.5	22.1	52.9	12.5	4.2	7.5	16.7	56.7	15
RMP3	**1**	**12.5**	**24**	**49**	**13.5**	**1.7**	**8.3**	**14.2**	**53.3**	**22.5**

Note. This table illustrates the percentage distribution of answers by insurer type. Where 1, 2, 3, 4 and 5 represents 'strongly disagree', 'disagree', 'undecided', 'agree' and 'strongly agree', respectively.
Source: created by authors.

Table D1. Kendall's correlations URRM items.

	URRM1	URRM2	URRM3	URRM4	URRM5	URRM6	URRM7	URRM8	URRM9
URRM1	1	.650***	.512***	.558***	.537***	.374***	.389***	.445***	.455***
URRM2	.650***	1	.622***	.462***	.489***	.383***	.323***	.416***	.457***
URRM3	.512***	.622***	1	.479***	.429***	.319***	.317***	.470***	.499***
URRM4	.558***	.462***	.479***	1	.697***	.423***	.323***	.580***	.553***
URRM5	.537***	.489***	.429***	.697***	1	.451***	.305***	.503***	.493***
URRM6	.374***	.383***	.319***	.423***	.451***	1	.369***	.434***	.457***
URRM7	.389***	.323***	.317***	.323***	.305***	.369***	1	.442***	.461***
URRM8	.445***	.416***	.470***	.580***	.503***	.434***	.442***	1	.759***
URRM9	.455***	.457***	.499***	.553***	.493***	.457***	.461***	.759***	1

$^{***}p-$value < 0.01. $^{**}p-$value < 0.05. $^{*}p-$value < 0.1.
Source: created by authors.

Table D2. Kendall's correlations RI items.

	RI1	RI3
RI1	1	.478***
RI3	.478***	1

$^{***}p-$value < 0.01. $^{**}p-$value < 0.05. $^{*}p-$value < 0.1.
Source: created by authors.

Table D3. Kendall's correlations RAA items.

	RAA1	RAA2	RAA3	RAA4	RAA5
RAA1	1	.518***	.394***	.458***	.405***
RAA2	.518***	1	.335***	.500***	.476***
RAA3	.394***	.335***	1	.503***	.401***
RAA4	.458***	.500***	.503***	1	.656***
RAA5	.405***	.476***	.401***	.656***	1

$^{***}p-$value < 0.01. $^{**}p-$value < 0.05. $^{*}p-$value < 0.1.
Source: created by authors.

Table D4. Kendall's correlations RMON items.

	RMON1	RMON2	RMON3	RMON4
RMON1	1	.504***	.498***	.530***
RMON2	.504***	1	.486***	.515***
RMON3	.498***	.486***	1	.597***
RMON4	.530***	.515***	.597***	1

*** p −value < 0.01. ** p −value < 0.05. * p −value < 0.1.
Source: created by authors.

Table D5. Kendall's correlations RMP items.

	RMP1	RMP2	RMP3
RMP1	1	.463***	.424***
RMP2	.463***	1	.625***
RMP3	.424***	.625***	1

***p −value < 0.01. ** p−value < 0.05. * p −value < 0.1.
[1]The model we have adopted has been used to assess banking sector risk management practices. See Al-Tamimi and Al-Mazrooei (2007), Hassan (2009) and Abu Hussain and Al-Ajmi (2012) for further details.
[2]First, the authors incorporated the insurance literature into the questionnaire then, the questionnaire was sent to the industry experts such as CEO's, CFO's, Directors and CRO's of all the economies. They were asked to comment on the questionnaire based on their feedback the modifications were made, and the questionnaire was sent again, this process was repeated until the final draft. Afterward, a pilot study with a sample size of 100 was conducted. During the pilot study, a questionnaire was further amended based on respondents' feedback and CFA analysis. The details of the questionnaire modifications are presented in Appendix Table A1.
[3]The numerous definitions of risk management process exits in the literature. This definition is the most comprehensive one. See Bogodistov and Wohlgemuth (2017) and Kumar (2021) for details.
Source: created by authors.