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IMPACT OF RISK FACTORS ON BUSINESS RESULTS OF LIFE INSURANCE PRODUCTS IN INSURANCE COMPANIES IN HUE CITY

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Abstract: On the basis of the leveraging Monte Carlo simulation method and @Risk – a risk analysis software, this study aims to identify and analyse the impacts of the potential risk factors on business results of life insurance products in the insurance companies in Hue city. Both the qualitative and quantitative method is applied. Data were collected from interviewing the leaders, financial managers and senior consultants at four most representative life insurance companies in the area, namely Bao Viet life insurance, Prudential, AIA, and PCI Sun Life using the DELPHI technique. The following findings are found. Firstly, besides the identified events, 10 other types of risks could affect the business results of life insurers. Secondly, these types of risks have varied frequencies and levels of impact on the three studied variables of the simulation model. Finally, the risk of rumours and the risk of new competitors appear to be the most significant dangers to the expected profits of life insurance companies.

Keywords: Monte Carlo simulation, @Risk, Delphi technique, life insurance

1 Introduction

In Vietnam, the insurance industry has started since 1993. However, according to the Department of Insurance Supervisory and Authority, approximately 9.7% of the Vietnamese population has bought life insurance so far [3]. Along with the huge market development opportunities and the rapid growth of the economy in the coming time, Vietnam is recognised as one of the most lucrative markets for life insurers in the South East Asian region [5]. In terms of domestic enterprises, to exploit this opportunity, they need to make breakthrough changes. In fact, 62.5% of the market share in Vietnam's life insurance industry is occupied by foreign insurers (such as AIA and Prudential). This is rooted in the weaknesses of domestic enterprises in risk management activities [17]. Weak ability to control business risks leads to severe impacts on company reputation, customer relationship, and profitability [12].

Regarding the academic aspect, the topic of assessing risk factors that affect business outcomes has attracted great attention of researchers worldwide [5]. Much research has been implemented to develop the evaluation scale of identified and unidentified risk events [1, 12, 13]. Some authors are interested in clarifying the consequences of risks on business activities in the insurance companies [4, 14]. Despite the increase in the number of related

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works, there are still gaps in the knowledge base. There is still a lack of efficient quantitative models to measure the level of identified and unidentified risk events. Further, the relationship between these events and financial results of life insurers has not clearly been quantified yet. Besides, although numerous scholars in risk management have developed a quantitative scale to assess the business risks in developed countries [4], the evaluation scale of these identified risks was not thoroughly tested in the practice of a developing country, such as Vietnam [13].

Stemming from these urgent problems, the authors carried out this study to analyse the risks that affect the selling process of life insurance products in some typical insurance companies in Hue city. They also propose feasible solutions to help life insurers in Hue city identify, mitigate and overcome the risks.

2 Literature review

One of the first definitions of risk is attributed to Bernoulli, who in 1738 proposed measuring risk with the geometric mean and minimizing risk by spreading it across a set of independent events [21]. Accordingly, the traditional definition of risk is measured by two combined variables: a) frequency of occurrence (probability) of the "risky" event, i.e., the number of times the risky event is repeated in a predetermined period, and b) extent of the consequences (magnitude) that the event generates, i.e., all the results of its occurrence [15].

According to Verbano and Venturini, a risk is the possibility of an abnormal event with consequential consequences or results that are not expected. A risk may comprise positive and negative consequences of an event. Risk has four basic characteristics: randomness, objectivity, uncertainty (or unpredictable), and duality [20].

In business, risk can be caused by external factors such as risk arising from the macro environment (such as economic status, political situation, social features, and science and technology), micro-environments (such as competitors, customers, suppliers, and alternative products), or may also come from internal factors (such as risk related to personnel issues, strategies, products, and company policies) [20].

The International Organization for Standardization (ISO 31000) identifies the following principles of risk management that should create value, be an integral part of the organizational processes, be part of decision making that explicitly addresses uncertainty, be systematic and structured, be based on the best available information, be tailored, take into account human factors, be transparent and inclusive, be dynamic, iterative and responsive to change, and be capable of continual improvement and enhancement.

The adoption of a risk management methodology can lead firms to reduce the uncertainty in enterprise's management, to ensure continuity in production and trading in the market, to decrease the risk of failure, and to promote the enterprise's external and internal

image. Therefore, risk management creates business value, maximizing business profits by minimizing costs [10].

Regarding the studies on business risks for life insurers and insurance companies in general, most of the studies only look at the risk identification [6], trace the source of risk [14] or analyze the financial consequences when risks occur [2]. These studies have not considered the use of risk measurement tools, either compared the random effects of business risks. This study thus will utilise the Monte Carlo simulation method to create a relatively distinct research platform.

The Monte Carlo simulation method is a broad class of computational algorithms that rely on repeated random sampling (using pseudo-random numbers) to obtain numerical results. Its essential idea is using randomness to solve problems that might be deterministic in principle. The result of this method is more accurate (asymptotic in the right result) when the number of iterations increases [3]. It is mainly used in three problem classes: optimization, numerical integration, and generating draws from a probability distribution [7].

In this study, on the basis of using @Risk – a risk analysis software, the Monte Carlo method is leveraged to evaluate the impact of defined variables (caused by negative causes) and undefined variables (caused by difficult-to-identify causes) to measurement and targeted variables. By this way, the fluctuation of these variables, under the impact of different types of risks, could be analysed and evaluated clearly.

3 Methods

In this study, the authors utilized both qualitative and quantitative data. Namely, the secondary data were collected from the Department of Insurance Supervisory and Authority, Thua Thien Hue Statistical Office, and Association of Hue enterprises. These data sources provide an overview of business activities on life insurers in Hue city, general assessments on their performance, and the financial results of these enterprises.

Primary data were then collected by using the DELPHI technique. This is a structured communication technique, derived from symmetric prediction methods and interactive forecasts based on panel answers of experts' questions [16].

The sample size consists of 2 interviewed groups (more than 3 people/group) and 12 individuals from 4 most typical selected life insurance companies in Hue city. Within a country, the consumer culture and other elements of the business environment are quite similar. Therefore, studying the Hue case could partially generalise for the whole of Vietnam.

The interview sequence for collecting quantitative data goes through 3 steps:

Step 1: Personal interview with 4 accountants from 4 selected companies. These

interviewees provide the financial reports, detailed information about the financial impacts of risks, and the variability of cost, revenue, profit over the research time.

Step 2: Personal interview with 8 people (leaders, managers of the sales department and senior consultants from 4 selected companies). These interviewees help to verify and add explanations on the provided data in step 1. They also help to estimate the changes in cost, revenue, and profit when risks occur.

Step 3: Interview 2 research groups from 4 selected companies. These groups help to review the analytic results and figure out the feasible solutions for solving the negative impacts of risks.

During this process, in each step, the interviewees receive a summary of all predictions from the prior interviewees and the interpretation of these predictions. The interview contents from the previous step thus were evaluated in the following steps. Similarly, the results from the following steps are also considered by the members in the previous step. This process enables to have a high consensus before the final result are obtained.

After revising the collected data and building the simulation model, we used @Risk to analyze the risks in the selling process of life insurance products at selected insurance companies in Hue city. This tool helps to show virtually all possible outcomes when risks happen, and it also tells us how likely these risks are to occur.

4 Research findings

4.1 Building simulation model

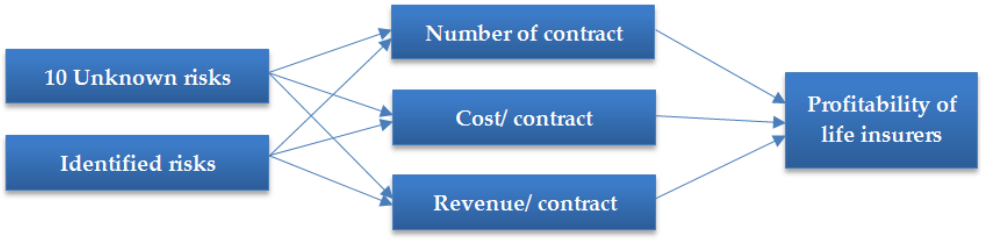

Figure 1. Framework of Monte-Carlo simulation model in this study

As a prerequisite for risk analysis based on the Monte Carlo simulation method (Figure 1), the authors conducted qualitative surveys. The personal interviews with 4 accountants from 4 selected companies provide detailed information about the financial impacts of risks over the studied period. This information is then verified in the second interview step, which is described in section 3. The interviewees propose three most important measurement variables representing for the business results at Hue life insurers, including the number of life insurance contracts, average price, and average revenue. Besides, 10 unknown events are listed and

analysed (Table 1). These risks do not include defined events, which occur regularly (such as the frequent fluctuation in human resource and seasonality in business) and are not the main targeted objects in this study.

Table 1. Simulation model (including 10 unknown risks only)

Unknown events	Number of contract		Cost/ contract		Revenue/ contract	
	Frequency	% impact	Frequency	% impact	Frequency	% impact
Risk of organizing unsuccessful workshops (finding customers)	0.15	–0.05	0.17	0.04	–	–
Risk of unsuccessful cold canvassing	0.18	–0.05	0.25	0.05	–	–
Risk of appearing new competitors	0.12	–0.06	0.16	0.05	0.11	–0.11
Risk of rumors	0.20	–0.11	–	–	0.16	–0.10
Risk of changing insurance policies	0.11	0.04	0.12	0.03	–	–
Risk of losing key personnel	0.10	–0.12	–	–	–	–
Risk of sudden increase in the number of compensated contracts	–	–	0.52	0.04	–	–
Risks of canceling a large number of contracts	0.13	–0.04	0.26	–0.04	0.04	–0.04
Risk of temporary invalidation of a series of contracts	0.11	–0.14	–	–	0.06	–0.06
Risk of suddenly adjusting a large number of contracts	–	–	–	–	0.06	–0.07

"–": Risks affect negligibly to measurement variable

4.2 Analyze the impact of risks on measurement variables

After building simulation models for the studied year and the base year, we evaluated the risks affecting the business results of life insurance products in 4 following aspects, which are the number of life insurance contracts, the cost of a life insurance contract, the revenue of a life insurance contract, and the profitability of life insurers. The evaluation was conducted by randomly iterating the simulation model 10,000 times.

Analyse risks affecting the number of sold life insurance contracts

The analysis results show that the identified events cause differences in the number of contracts every year. This number ranges from about 325 to 1357 contracts. These identified events relate to changes in the market demand, competitors, insurance companies' strategies and policies, skills of the consulting staff, sales staff, etc (table 2). Besides, the number of life insurance contracts is also affected by 8 different types of unknown risks. The risk of rumours is the most significant impact on this studied variable (regression coefficient –23,580, correlation coefficient –0.12).

The risk of temporary invalidation of a series of contracts creates the widest range of impact level that varies from 683.82 to 801.34 contracts/year. This means that this risk is the most difficult to control and prospect among the risks affecting the number of contracts.

Table 2. Results of comparative analysis between researched year and base year

Unit: contract per year

Criteria	Studied year	Base year	Criteria	Studied Year	Base year
Minimum value	270.741	325.370	Standard deviation	209.666	213.116
Mean value	781.569	840.500	Median	476.425	840.471
Maximum value	1,401.248	1,356.619	Mode	436.958	837.883

Analyse risks affecting the cost of a life insurance contract

The analysis results show that the cost of a life insurance contract is possibly affected by 6 unknown risk events: unsuccessful cold canvassing, a sudden increase in the number of compensated contracts, cancelling a large number of contracts, new competitors, unsuccessful workshops, and change in the insurance policy. With the impacts of these risks, the fluctuation range of cost per life insurance contract changes. The lowest is from 1.589 to 1.692 million VND/contract/year, and the highest is from 18.707 to 19.398 million VND/contract/year.

Besides, the risk of a sudden increase in the number of compensated contracts (regression coefficient –0.289, correlation coefficient 0.04) and risk of unsuccessful cold canvassing (regression coefficient 0.288, correlation coefficient 0.03) are two factors creating the greatest impact on this studied variable (figure 2).

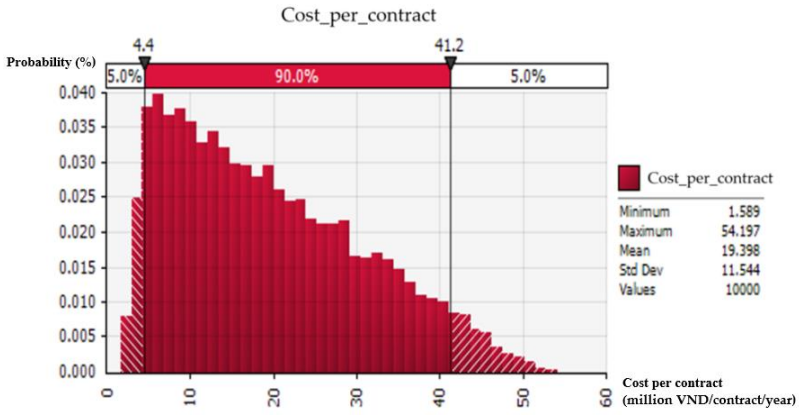

Figure 2. Approximate range of value of the studied variable: cost per contract in 10,000 iterations

Analyse risks affecting the revenue of a life insurance contract

There are 5 unknown events that affect the studied variable – revenue per life insurance contract. The risk of rumours (regression coefficient –0.887, correlation coefficient –0.05) and the risk of new competitors (regression coefficients –0.769, correlation coefficient –0.03) have the greatest impacts. On the other hand, the cumulative effects of the 5 events also change the fluctuation range of revenue per life insurance contract. The lowest is from 2.812 to 3.313 million VND/contract/year, and the highest is from 111.651 to 111.744 million VND/contract/year.

90% of 10,000 random iterations has a revenue per contract ranging from about 8.9 to 86.0 million VND.

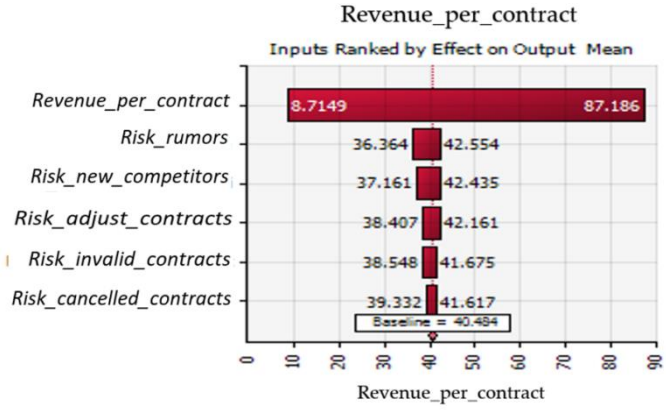

Figure 3. The impact range of each risk to the revenue per contract

Analyse risks affecting the profitability of life insurers

The profit is considered as the targeted variable of the study. This variable is calculated on the basis of the variability of the three studied variables in the simulation model. Without the identified events, the analysis results of the impact of 10 unknown events on the variability of profits reveal that the risk of rumor (regression coefficient –1,111.49, correlation coefficient –0.06), risk of new competitors (regression coefficients –996,84, correlation coefficient –0.03), and risk of temporary invalidation of a series of contracts (regression coefficient –601.94, correlation coefficient –0.04) have the greatest impact on the targeted variable – profit.

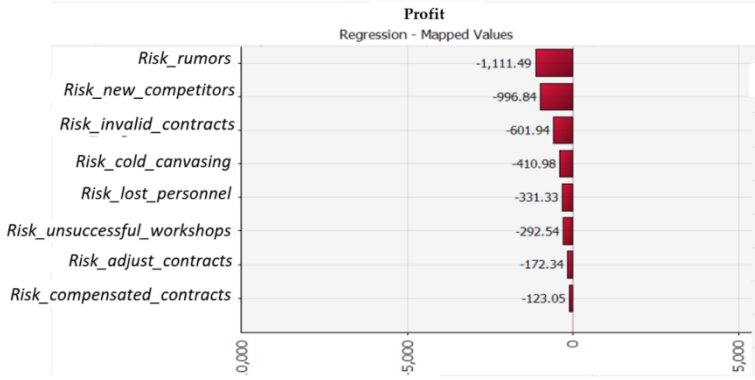

Figure 4. Regression coefficient on the impact level of different risks to profit

Another statistic shows that with the negative and positive impacts of 10 unidentified risks, the average profit (mean) of the life insurers has declined from 19,463.49 million VND/year in the base year (assume that unknown events do not appear) to 16,494.96 million VND/year in the studied year. The average loss is 2,968.53 million VND/year.

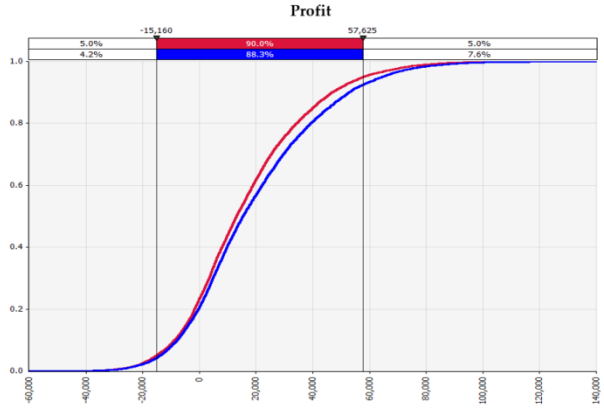

Figure 5. Comparison of the approximate range of profit between the studied year and the base year

5 Discussion and conclusion

The identification and management of risk factors that affect business performance are always the greatest concern of business leaders and academic scholars around the world, not only in insurance but also in many other sectors. In this study, the authors develop and analyse the simulated model on the basis of the Monte Carlo method to evaluate the impact of defined and undefined variables to the studied variables.

The findings have supplemented the knowledge about risks in the life insurance business. The qualitative research step has figured out 4 major groups of risk that affects the business results of the life insurance companies in Hue city. They are the risk group related to accessing customers (including unsuccessful cold canvassing and organizing unsuccessful workshops), the risk group related to the market (including new competitors and rumors), the risk group related to the internal issues (including changing the insurance policies and losing key personnel), and the risk group related to the customers' problems (including the sudden increase in the number of compensated contracts, canceling a large number of contracts, temporarily invalidating a series of contracts, and the sudden adjustment of a large number of contracts). These findings help to clarify the research results of Baranoff and Sager, which mentioned asset risk, product risk, and capital in the life insurance industry.

Another finding is the number and impact level of unknown events on the three studied variables of the simulation model. Namely, there are 8 unknown risks that affect the number of contracts, 6 risks affecting the cost per each contract, and 5 risks affecting the revenue per each life insurance contract. This is supported by the research of Gründl et al. and Grosen et al. [9, 10]. This finding helps life insurers arrange the priority order of the controlled and prevented measures to the mentioned risks.

Referring to the targeted variable – the profitability of life insurers, the study found that the risk of rumours, the risk of new competitors, and the risk of cancelling a large number of contracts have the greatest impact on the expected profits of life insurance companies. This finding is partially supported by Cummins and Santomero [2].

On the basis of the analysis results and group discussion among risk management experts, the study offers 4 groups of solutions to limit the negative effects of unknown events on the business outcomes of insurance companies in the locality, specifically:

- Screening the invited customers to the workshops, understanding their needs thoroughly, and enhancing customer service networks.
- Simplifying transaction procedures, checking the truthfulness of information declared on the contract more strictly.

- Providing the information on insurance packages clearly and transparently and reducing internal costs.
- Creating training opportunities, improving knowledge and professional capacity for employees, expanding diversification of agent channels, as well as considering changes in product packages.

In summary, on the basis of risk theories in general and risks in the life insurance business in particular, this study helps life insurers identify and analyse the impact features of traditional risks and unknown risks in their business process. Regarding the limitation of this study, due to the shortage of financial resources and time constraint, the research scope of this study just focuses on the Hue market. In order to give conclusions for the whole Vietnam case, we need a bigger project. Additionally, the collected data have certain shortcomings. This is rooted in the relative evaluation criteria and subjective opinions of interviewees. Therefore, in the future, there should be further research with more focused research objects and data collected for a longer time (such as supervising throughout the process of occurred risks). Moreover, there should be new studies focusing on clarifying the effectiveness of risk prevention methods currently used by life insurers.

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