

Article

Developing a Model of Insurance Securitisation in Iranian Environmental Conditions

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Abstract: As a growing industry in Iran, the insurance industry has dramatically grasped researchers' and managers' attention. Among the various issues in this industry, measuring and evaluating the efficiency and performance of its units and branches has always been considered by relevant experts because such evaluation can help us take adequate steps to improve this area. Through securitisation, insurance companies may mitigate the cost of their capital, increase the return on equity, and improve other metrics that affect their operating performance. Securitisation increases capital productivity in the insurance industry. Therefore, the present study was conducted in 2020 to review and develop a model of insurance securitisation in Iran. The present study is exploratory research. Thus, 13 experts and commentators in insurance securities were interviewed. Second, based on the theme analysis, the content of the interviews was analysed, and a proposed model was developed. Then, according to the obtained model, a questionnaire was designed and distributed among insurance industry experts. Two concepts of validity and reliability were used to validate the questionnaire. Based on the model, 10 main factors were identified as influencing insurance securitisation. Insurance securitisation, management of Iran's environmental conditions, the role of the capital market in insurance, financing, economic development, optimal risk management, risk transfer process in insurance securitisation, investment culture, support of regulatory bodies and facilities in the securities issuance process, utilisation of technical knowledge and specialised human resources are the factors identified in the research. The results showed that all these factors identified from the interviews were confirmed, and the model was sufficiently valid.

Keywords: insurance equipment; emerging economy; theme analysis; factor analysis

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1. Introduction

In early definitions, insurance-linked securities (ILS) are a necessary means for insurance risk transfer to capital markets, issued by industrial corporates and insurance/reinsurance firms (Poncet and Vaugirard 2002). To make it more apparent, ILS is considered a tool was enabling the former to rectify natural risks through custom-made properties, focus on their core occupational activities, and share their risk with other market practitioners. Typically, the insured (company) pays an insurance amount on the part of pre-specified coverage, in which investors buy an ILS for cash. The total amount (insurance amount plus cash proceeds) is turned into a custom-made fund, named a special-purpose vehicle (SPV). Subsequently, investors hold insurance-linked properties whose cash flows depend on the risk's occurrence. If the covered events happen during the risk-exposure period, the SPV compensates the company's loss and shares the remainder of the initial amount with the security holders. Otherwise, the company may receive nothing, and security holders might enjoy the Treasury bonds held by the fund. Canabarro et al. (2000) believe that ILS are innovative mechanisms developed in recent decades, stabilizing the price and coverage of

insurance by transferring risk, through a derivative of security form, to the much bigger range of investors available in the capital markets. As catastrophe risk (highly detrimental and low probable) is incorporated with financial markets, the ILS might have great potential to attract a wide range of investors. Thus, sharing the catastrophe risk among the reinsurers and capital market practitioners may benefit both parties, including insurers and investors, by proposing reinsurance coverage with a sensible and fixed price and offering investors attractive securities.

Recent definitions, similar to [Liu et al. \(2021\)](#), present that ILS include various financial instruments designed to cover life and non-life insurance risks, which can be traded in the capital markets. The securitisation process provides a mechanism by which contingent and predictable cash flow from transactions is a separate financial instrument. Securities increase liquidity in financial markets by replacing off-balance-sheet assets and liabilities off the balance sheet with tradable financial instruments. In other words, insurance securitisation is a way to transfer the risks of insurance companies' obligations to the capital markets through issuing financial securities.

According to the Insurance Research Institute (ARTEMIS), the various types of ILS have formed a significant market, with a substantial capital of USD 41 billion as of July 2020, according to the public relations department of the Insurance Research Institute (ARTEMIS). Many of them, such as catastrophe bonds (CATs) and industry loss warranties (ILW), are active. ILS trades operate more as insurance or reinsurance for the participating institution, and capital market investors operate as providers. However, they may differ in payment structure ([Liu et al. 2021](#)).

Securities provide a mechanism by which predictable and contingent liquidity flows from transactions can be traded as separate financial instruments subject to different investors ([Beer and Braun 2022](#)). Insurance securitisation can be defined as the transfer of risks of the underwriter to capital markets through the creation and issuance of financial securities. In particular, the securitisation process involves two main elements: (1) the transfer of cash flows of the underwriter to tradable financial securities, and (2) the transfer of risks of the underwriter to capital markets through the trading of these securities. The first element can be defined as "financial engineering", which shows the classification or non-classification of cash flows into different and new financial securities in capital markets. The second element of insurance securitisation includes the final recipient of transacted risks. Instead of transferring the underwriter's risk to the insurer in the insurance industry, the insurance company transfers the risk to foreign capital markets by trading financial instruments whose cash flows are subject to the underwriter's experience.

Insurance securitisation can help to solve problems related to reinsurance markets. Insurance risks and reinsurance markets may not be related to other economic risks. For example, the risk of natural disasters and property damage, such as hurricanes and earthquakes, leads to risk volatility in the reinsurance industry. Still, these risks are unrelated to the economic forces driving securities markets. Therefore, if these risks can be transferred directly to the securities markets, their volatility at maturity can be reduced. Low volatility and other investment risks can have a lot of contractual appeal for investors with diversification goals, leading to low-cost risk transfer to capital markets. Moreover, the equity capital of actual and potential insurers is negligible compared to the total volume of securities traded in the capital markets. Therefore, transferring these risks directly to the securities markets is better. Structured financial instruments and securitised securities can significantly reduce or eliminate the inherent credit risk in reinsurance policies ([Chen et al. 2019](#)).

Although insurance risk securities are similar to traditional forms, there are some innovative differences. First, if the risks are transferred from insurance companies, they will carry secondary risks. Second, underwriters have the risks of investors, not of insurance companies. Third, risks are passed on to investors through securities markets and the use of securities. Fourth, because payment is conditional on paying a mere premium, investors' credit risks are much lower than those of collateral or other liabilities. Failure to pay the deductible automatically removes the insurance obligations. Fifth, because the usufruct

must also cover the investors' risks, the calculation of the usufruct is essential for its security and accuracy and the investors' income. Insurance securities cover damages caused by natural events such as earthquakes and floods. Investing in risk coverage of such events is attractive to investors because these risks are not related to economic and business risks (Finken and Laux 2009). ILSs are among the most successful tools for transferring insurance risk to the capital market. Insurance securities are the link between the insurance market and the capital market and can be an effective tool to use the capacity of the capital market to finance and cover the risk of the insurance industry. The benefits of insurance securities will be for the insurance sector (to increase insurance capacity) and the stock market (more public participation in investments).

In catastrophic insurance bonds, the transaction begins with creating a reinsurer. This insurer issues bonds to investors. Revenues from this type of insurance are usually invested in secure short-term investments and held in a trustable account. In catastrophic bond transactions, there is a buying option that, in the case of an accident, the revenues from these bonds are released from the reinsurer (SPR) to help the insurer pay compensation (Barrieu and Albertini 2009).

A survey of studies conducted in Iran revealed that Iran is one of the ten most accident-prone countries globally (WHO 2018). The bill to establish a natural disaster fund is still in conflict between the government, parliament, and the Guardian Council. Insurance best uses the capital market capacity to transfer the risk of accidents. Conditions and natural disasters in Iran result from the specific climate and the region in which they occur, in small numbers and with very high intensity, making the insurance industry unable to afford the very high costs of these accidents. One of the financial solutions in different countries performed to cover the cost of catastrophic events is catastrophe bonds.

The present study discusses the macro-level natural disasters that have caused the loss of financial and human resources of individuals. It also discusses how the government faces financial problems in financing the reconstruction of areas affected by natural disasters. This study discusses the possibility of catastrophic insurance bonds, the better performance conditions of these insurances in Iran, and the pricing of these bonds. The importance of the present study lies in the high efficiency, which makes it catastrophic at the time of national events; financing is conducted efficiently, the currency is prevented from leaving the country and accepting difficult conditions, and high costs of foreign reinsurance are prevented. Furthermore, the present study identifies the barriers in insurance securities, which makes this market dynamic and eliminates dependence on foreign insurance. It also prevents the disclosure of national and corporate information and is very useful and practical in the current situation of the Iranian economy. Furthermore, providing a model of insurance securitisation can lead to the development of research theory to address the gaps in this regard and lead to the development of education in this industry. So far, no comprehensive research has been conducted on catastrophic insurance securities. Domestic research has generally been on expected returns on securities and other qualitative studies, and only the relationship between variables has been examined. The executive model in this field has not been presented. The present study is innovative in terms of research environment and presentation of the insurance securities model and tries to answer these questions:

- What is the pattern of insurance securitisation in Iran's environmental conditions?
- Which factors may potentially impact the process of using ILS?

Regarding the main questions of the current paper, the findings show that the mechanism of Islamic financial instruments plays a vital role in enhancing Islamic financial markets. In addition, the results propose that establishment of a jurisprudential committee in the Exchange and Securities Organization as the regulatory and supervisory body of the capital market, the establishment of the Central Asset Management Organization to regulate and supervise financial intermediaries, as well as disclosure of information and statistics related to the issuance of Sukuk in Iran and issuing notification of Sukuk can be a practical step towards the development of a structured financing market or securitisation.

2. Theoretical Foundations and Research Background

2.1. Stock Insurance Contract

The optimal pricing of the stock insurance contract is the most important stock insurance process. The expected damages to be paid are calculated, and the cost associated with the potential loss risk is estimated. In this regard, it is necessary to identify the risk properly and, in many similar situations, to calculate the damage frequency and expected amount. Optimal contracts and portfolio coverage tools are critical components of risk management, such as investment insurance and options (Assa and Okhrati 2018). Risk management contracts are essential in covering the risk of purchasing and maintaining a risky asset. Options, insurance contracts, futures contracts and swaps are among the most critical risk management contracts, and the pricing of such contracts is usually based on the Black-Scholes model. One of the most vital issues in this area is the proper design of an insurance contract. In addition, the presentation of optimal models in Attica insurance has been widely considered by insurance professionals in recent years (Assa 2015).

2.2. Risk into Securities

An innovation in the insurance industry called risk-to-securities conversion has been created and has specifically designed disaster insurance securities, which can be an excellent solution to this problem, especially in Iran (Barrieu and Albertini 2009). The use of securities in the insurance industry is an emerging method. After applying the conversion of assets to securities in the financial markets, it took about 20 years for the expectation of insurance securities to turn into a reality. Today, insurance companies face different risks depending on their proposing insurance services to investors. Hence, insurance companies seek ways to transfer their risk. For instance, Upreti and Adams (2015) propose that reinsurance services play an essential role.

2.3. Converting Risk into Securities

The asset securitisation process can be considered an economic tool for governments due to its significant impact. These include facilitating the process of creating and emerging markets for financial claims, diversifying existing financial assets, encouraging savings, reducing costs, diversifying risks, and focusing on the optimal use of resources rather than ownership, considering that no research has been done so far on designing a model of insurance securitisation in Iran's environmental conditions. Internal and external studies have examined the effect of some factors on insurance risk and insurance securities, some of which are listed below (Shao 2015).

MacMinn and Richter (2018) showed that indemnity insurance worsens the situation because it creates an additional cost. On the other hand, securities-based catastrophic event insurance is helpful in certain circumstances and prevails over indemnity strategies. This result showed that the current value of stocks with index-based insurance is higher for a low price than indemnity-based insurance.

Fischer et al. (2019) stated that securities for national catastrophic events as a saviour in two stages improve economic trends. The first stage is before the catastrophic events. Creating huge revenues will enhance the insurance situation and the part of the economy dependent on insurance. The second stage is the impact of catastrophic events, partly providing the costs and relieving the victims.

Bugler et al. (2021) showed that reinsurance enables sponsors to offer more accurate prices to borrowers. As a result, an EU-based tenant can reap significant capital benefits by reinsuring lifetime risk, market risk or both to an insurance sublimit.

Wu (2020) concluded that the failure of the catastrophic events insurance market is associated with citing many reasons or creating economic models.

Liu et al. (2022) developed an insurance-related securities model that generates a flow of payments related to both the insurance risk process (modelled by the multi-dimensional hybrid process) and a reference rate process (modelled by issuance). These insurance-related securities are traded in a financial market with multiple stocks at correlated prices

with risk-free rates. [Götze and Gürtler \(2020\)](#) claim whether the sponsors of catastrophes bonds with indemnity triggers are susceptible to ex-ante moral hazard and ex-post moral hazard, showing that the sponsors are only susceptible to ex-ante moral hazard and vertical loss retention has a positive effect on sponsors' incentives to contain losses. [Carter and Mainelli \(2018\)](#) show that cyber risks can also be transferred to the capital markets in ways similar to hurricane risk through ILS. With the help of smart ledgers, insurers and reinsurers can be certain that their clients are covered for anything.

[Raza et al. \(2020\)](#) concluded that perceived attitude, mental norms, and behavioural control strongly predict Islamic insurance acceptance in Pakistan. In addition, factors such as compatibility, comparative advantage, and awareness have significant positive effects on engagement. A negative but insignificant relationship was found between perceived risk and intention. [Zhao et al. \(2021\)](#) showed that reinsurance with tools offers a combination of securities solutions for risk management. Investigating the role of the Internet of Things (IoT) technology, [Liu et al. \(2022\)](#) show that IoT-based technologies have a positive impact on the insurer's decision-making process—risk assessment and pricing, business process performance—claim accuracy and efficiency, and the role of an IoT system's functionalities in improving drivers' attitude and behaviours. The findings of [Chege \(2021\)](#) reveal that service reliability, as a measure for insurance industry enhancers, may significantly influence customer satisfaction in the insurance industry in Kenya at the customer level but did not significantly influence the variations of customer satisfaction between the insurance companies. [Chege \(2021\)](#) also show that there is a positive and significant association between the level of societal trust and insurer risk-taking in a country. There is a negative and significant association between the risk avoidance level and insurer risk-taking ([Sun 2021](#)). [Farooq et al. \(2021\)](#) reveal that COVID-19 negatively affected stock returns.

2.4. Literature Review

[Cowley and Cummins \(2005\)](#) believe that securitization provides a mechanism whereby a transaction's contingent and predictable cash flow streams can be unbundled and traded as separate financial instruments that appeal to different investors.

According to the previous findings, high correlations between risks can increase required insurer capital and/or reduce the availability of insurance. [Doherty and Schlesinger \(2002\)](#) illustrate how insured losses might be decomposed into separate components highly correlated among insureds. Such a correlated component might conceivably be hedged directly by individuals but is more likely to be hedged by the insurer.

Regarding the catastrophe bonds as the insurance securitization vehicles that are supposed to transfer catastrophe-related underwriting risk from issuers to capital markets, [Hagendorff et al. \(2014\)](#) show that, firstly, firms issuing catastrophe bonds exhibit less risky underwriting portfolios with less exposure to catastrophe risks and overall less need to hedge catastrophe risk.

[Dragos et al. \(2020\)](#) reveal that specific behavioural factors and insurance knowledge are highly significant for the decision to buy, but not for the intention to buy, for both types of products.

[Fringuelli and Santos \(2021\)](#) argue that insurance companies have almost nonupled their investments in collateralized loan obligations (CLOs) post-crisis in 2019.

[Pourmansouri et al. \(2022\)](#) show that ownership concentration impairs the quality of CGS.

3. Research Methodology

The statistical population of this research consists of specialists and experts in insurance securities who have deep and wide knowledge about the studied research issue and its theoretical literature. This paper was conducted in the year 2020. A combination of non-random, judgmental and snowball methods were used to select experts and thinkers for interviews. The statistical sample in the first stage included the experts selected at the

discretion of the researchers (judgmental sampling), with whom an exploratory interview was conducted in 2020. Next, a statistical sample was selected for the main interviews by introducing the previous interviewees to the researchers (snowball method). At this stage, 13 interviews were conducted. The snowball sampling method introduced each participant to other individuals who could provide richer data to the researcher. In this method, those participants who are somehow related to each other are selected and guided by the researcher to other participants in the same community. Sampling will continue until no new concepts are discovered and the research reaches theoretical saturation. Theoretical saturation means no new data is obtained, and the relationships between categories are well-defined.

The research method is a regular process to find the answer to a question or the problem's solution. Selecting a research method depends on the purpose of the study, the nature of the problem under study, and its study methods. The present study combines basic and applied research in terms of research orientation. On the one hand, it seeks to design an insurance securitisation model in Iran's environmental conditions. On the other hand, the designed model guides the insurance organization and other legislative institutions to develop relevant laws and standards. Further, the present study is inductive-deductive in terms of implementation logic, qualitative in terms of approach, library-based and field-based in terms of environment, theme analysis in terms of research method and exploratory in terms of purpose. Furthermore, interviews were used to collect data. After preparing a long list of different codes in the data set, the codes were analysed on a larger scale in the next research stage. In this regard, the codes were placed in the relevant context. In order to reduce the data to a set of important acceptable, controllable themes, efforts were made to define sufficient, specific, distinct, non-repetitive and macro-level themes. In order to identify patterns of meanings and topics, the qualitative method of analysis was used. After creating the initial list of ideas from the data and acquiring the necessary points, the next step to creating the initial code of the data began. In a small part, the survey method was used.

Using Cochran's formula, a sample of 384 individuals was estimated. According to the outputs of the interviews, the research questionnaire was extracted through the finalised data in the form of themes. The validity and reliability of the questionnaire were evaluated and confirmed by the content approach and the internal consistency of the items using Cronbach's alpha coefficient, respectively.

Since it is mixed exploratory research, initially, the qualitative method is used, and then it is followed by the quantitative process. In order to present the model of insurance securities, having applied the thematic analysis, we determine what factors may play a significant role and what indicators may have a significant effect on securitization under the title of open codes. After that, a series of themes are observed through these open codes and themes, forming our model's main variables. To extract the code from the interviews, the MAXQDA software (Version 2R060307-G, VERBI GmbH, Berlin, Germany) is used. The final screening is implemented with fuzzy Delphi to obtain a set of main indicators, which can then be entered into the main model to be analysed qualitatively. Followingly, to apply the quantitative method, the confirmatory factor analysis approach is used; because of the thematic analysis application, exploratory factor analysis is not used. In this sense, the indicators that receive the optimal values of 0.4 and even 0.7 remain, and the indicators that do not receive the optimal values are removed from the model. Finally, to obtain the model, the Dimetal technique, as a multi-criteria decision-making technique, is used to show the cause-and-effect association between variables in the form of an exploratory model.

Since we use a qualitative analysis, we need to validate our qualitative results to see if all indicators are accepted or not; the fuzzy Delphi method is applied. Moreover, as we have no idea whether A has an effect on B or B has an effect on C, we use the Dimetal technique that reveals the causal relationships between the indicators, which are only effective for the main categories.

According to empirical investigations, variance-based structural equation modelling (VB-SEM) might be classified into two sub-categories, including partial least square structural equation modelling (PLS-SEM) and generalized structured component analysis (GSCA), in which the PLS-SEM is more prominent than GSCA. Historically, the analysis processes in PLS-SEM were first initiated by [Wold et al. \(1983\)](#) and were modified by [Chin \(1998\)](#) to enhance the potentialities of PLS-SEM in statistical inference. Prior investigations also propose that applying an SEM might be challenging, preferring covariance-based (CB-SEM) and variance-based partial least squares (PLS-SEM). Considering the proposed findings based on the previous literature, we employ the PLS-SEM in this study.

4. The Data Analysis

4.1. The Pattern of Insurance Securitisation in Iranian Environmental Conditions

After identifying the main categories and providing relationships to other categories, the designed model was refined, the categories were developed, and finally, the final research model was obtained. This model describes how the factors affecting insurance securities can be identified. This model was designed based on theme analysis and the fuzzy DEMATEL method.

The model obtained is shown in Figure 1. After finalisation, this model was provided to five experts in the insurance field, and according to them, the model had the necessary validity and was appropriate.

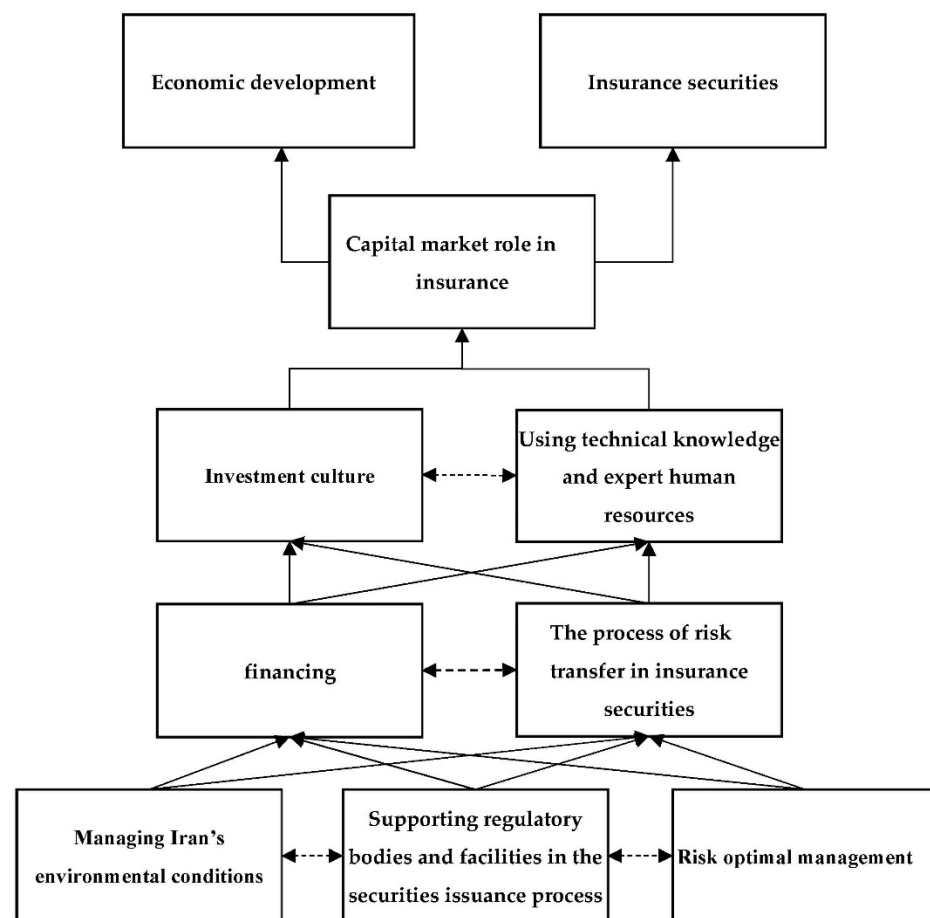


Figure 1. The pattern of insurance securities in Iranian environmental conditions. Source: research findings.

In this study, after coding the texts of the interview transcripts by removing the synonymous and repetitive criteria and finally by categorising and categorising the final criteria, 10 main categories and 51 sub-categories were obtained which shown in Appendix A.

The main categories include insurance securities, management of Iran's environmental conditions, the role of the capital market in insurance, financing, economic development, optimal risk management, risk transfer process in insurance securities, investment culture, support of regulators and facilities in the process of issuing papers, applying technical knowledge, and specialised manpower. The following are the main categories listed along with the relevant sub-categories:

Insurance securitization: insurance securities for financing, insurance securities for insurance, natural disaster securities, asset-backed securities, mortgage-backed securities, and Islamic securities (Sukuk).

Managing environmental conditions: isolating the assets pool meaning gradual value-depreciating, imposing international sanctions on insurance companies in industries such as the oil industry, creating arbitrage opportunities due to rents and lack of information transparency, problems with regulations, tax disputes and insurance laws, the illegality of securities and financial derivatives from the Islamic point of view, restrictions on attracting reliance portfolios abroad, high dependence of the insurance industry on the information, and technical resources of foreign institutions.

Capital market role in insurance: creating securities that can be bought and sold along with increasing liquidity, increasing insurance penetration, preventing the outflow of currency and large profits of securities, helping to develop technical knowledge in the field of insurance, reducing unresolved premium reserves, and helping the growth and development of the capital market.

Financing: increasing financial capacity (capital and reserves), providing sustainable financial resources, sponsoring financial structure, and creating and issuing financial securities.

Economic development: maximum profitability and achieving the desired results, improving the efficiency of financial markets, increasing the capital capacity of the country's insurance industry, and increasing the share of oil and energy in the portfolio of Iran's insurance industry.

Optimal risk management: reducing the risk of financial institutions, reducing the risk of sudden changes in interest rates and currencies, the need for capitalism to cover risks, converting risks into securities, transferring the risk of the reinsurance market through securities to the public, risk analysis and acceptance in the insurance industry.

Risk transfer process in insurance securitisation: institution (SPV) as an issuer of securities, insurance company or reinsurance as a sponsor, the contract between sponsor and SPV, sale of securities issued by SPV to an investor, a deposit of funds in a warranted account, and the party to the swap contract or the recipient bank of the deposit.

Investment culture: increasing the expected return on investment, creating attractiveness for venture capitalists, buying bonds by institutional investors.

The support of regulatory bodies and facilities in the process of issuing securities: establishing transparent rules regarding the regulations governing the issuance of securities, enacting transparent rules regarding the capital requirements of insurance companies, preparing instructions for issuing securities in cooperation with the Central Insurance and the Exchange Organization, not issuing unprofessional insurance policies, and use of strong software systems and market information.

Utilising technical knowledge and specialised human resources: increasing technical and professional capacity, empowering human resources, providing the necessary training to human resources, and improving the individual and team skills of specialists.

After forming a network of themes, as seen in Figure 1 in the last stage of the qualitative part of the research, the network of themes was analysed. At this stage, the proposed themes were defined and modified, and the data were analysed based on helping us gain a deeper understanding of the meanings of the texts and be able to describe the themes and identify their patterns.

4.2. The Descriptive Statistics

The demographic characteristics of the quantitative section are presented in the table below (Table 1):

Table 1. The demographic information.

Demographic Info		Frequency	Percentage
Gender	Male	245	64%
	Female	139	36%
Age	Below 35	76	20%
	35–45	198	52%
	Over 45	110	29%
Education	BA	196	51%
	MA	152	40%
	PhD	36	9%
Working experience	Below 10 years	75	20%
	10–15 years	134	35%
	15–20 years	94	24%
	over 20 years	81	21%
Total		384	100 %

Source: research findings.

Overall, out of 384 participants in this study, 245 (64%) are male, and 139 (36%) are female. Regarding their age, 76 (20%) participants are less than 35 years old, 198 individuals (52%) are between 35 and 45 years old, and 110 participants (29%) are 45 years old and older. Bachelor's degrees are held by 196 (51%) participants, 152 (40%) have a master's degree, and 36 (9%) have a PhD. Seventy-five (20%) participants have less than 10 years of working experience, 134 individuals (35%) are between 10 and 15 years, 94 (24%) participants are between 15 and 20 years and 81 (21%) participants have more than 20 years of working experience.

4.3. The Inferential Statistics

This section tested the proposed factor model by examining the suitability and optimal matching of factor structures for the data set. After implementing the structural equation model using the partial least squares method in SmartPLS software (Version 3, SmartPLS GmbH, Oststeinbek, Germany), the indices related to the measurement models were first examined and then the structural part of the model was examined.

The results show in Table 2 that all the factor loads obtained for the observed variables related to each of the latent structures are greater than 0.7, which indicates a suitable factor load in the reliability of the representatives. Examination of the findings of the t-test and their significance level also indicates that according to the values of t associated with each of the observed variables in the table, all of which are higher than 2.58 (at the error level of 0.01). It can be inferred that the explicit markers studied in the research model had the necessary accuracy to measure the latent structure or attribute.

Convergent validity in Table 3, is how a measure is positively correlated with alternative measures of the same construct. Convergent validity assessment is usually based on the average variance extracted (AVE). The minimum average variance explained equals 0.5 and indicates sufficient convergence validity; this means that a latent variable can, on average, explain more than half of the scatter of its representatives. According to the results in the above model, given that the average variance explained for each of the main constructs of the model is more than 0.5, the convergent validity of the research model is confirmed. According to the findings, Cronbach's alpha values for all measured constructs are greater than 0.7. Therefore, according to Cronbach's alpha criterion, the one-dimensionality of all constructs has been investigated and confirmed. Further, Table 4 shows the divergent validity of the variables.

Table 2. The Summary of the test results of the research hypotheses.

Independent Variable	Dependent Variable	Factor Load	T-Statistics	Result
Managing Iran's environmental conditions	Financing	0.335	3.328	Confirmed
Risk optimal management	Financing	0.320	3.689	Confirmed
The support of regulatory bodies and facilities in the securities issuance process	Financing	0.344	3.423	Confirmed
Managing Iran's environmental conditions	Risk transfer in insurance securitisation	0.273	2.882	Confirmed
Risk optimal management	Risk transfer in insurance securitisation	0.362	3.953	Confirmed
The support of regulatory bodies and facilities in the securities issuance process	Risk transfer in insurance securitisation	0.242	2.908	Confirmed
Financing	Investment culture	0.272	2.789	Confirmed
Financing	Utilising technical knowledge and expert human resources	0.336	3.430	Confirmed
Risk transfer in insurance securitisation	Investment culture	0.433	6.296	Confirmed
Risk transfer in insurance securitisation	Utilising technical knowledge and expert human resources	0.352	3.942	Confirmed
Utilising technical knowledge and expert human resources	Capital market Role in insurance	0.777	9.372	Confirmed
Investment culture	Capital market Role in insurance	0.334	3.749	Confirmed
Capital market role in insurance	Insurance securities	0.578	7.593	Confirmed
Capital market role in insurance	Economic development	0.608	8.486	Confirmed

Source: research findings.

Table 3. The external validity of research constructs.

Main Constructs	AVE	Combined Reliability	Cronbach's Alpha
Capital market role in insurance	0.515	0.863	0.810
Economic development	0.585	0.849	0.774
Securities insurance	0.515	0.845	0.779
Utilising technical knowledge and expert human resources	0.632	0.862	0.767
Financing	0.511	0.786	0.784
The support of supervisory bodies and facilities in the securities issuance process	0.577	0.869	0.806
Risk transfer process in insurance securities	0.524	0.841	0.771
Investment culture	0.765	0.907	0.847
Risk optimal management	0.530	0.871	0.823
Managing Iran's environmental conditions	0.532	0.871	0.829

Source: research findings.

Differential validity is how a construct is properly distinguished from other constructs by empirical criteria. A Fornell–Larcker criterion is an approach to measuring differential validity. This second root criterion compares the value of AVE with the correlation between latent variables. Specifically, the second root of each AVE construct must be greater than the highest correlation of that construct with other model structures. The logic of this

method is based on the assumption that a construct should share more variance with the corresponding representatives than other constructs. The above table results show that according to the Fornell–Larcker criterion, the second root of the AVE construct is higher than the highest correlation of that construct with other model constructs. The Fornell–Larcker criterion is shown at the intersection of each row and column of the variable. The variable correlation with other constructs is also given below the Fornell–Larcker value.

Table 4. The divergent validity matrix.

	1	2	3	4	5	6	7	8	9	10
Capital market role in insurance (1)	0.717									
Economic development (2)	0.217	0.765								
Insurance securitization (3)	0.630	0.297	0.718							
Utilising technical knowledge and expert human resources (4)	0.540	0.344	0.586	0.795						
Financing (5)	0.358	0.142	0.178	0.307	0.715					
The support of supervisory bodies and facilities in the securities issuance process (6)	0.429	0.317	0.391	0.671	0.618	0.759				
Risk transfer process in insurance securitization (7)	0.579	0.272	0.619	0.483	0.226	0.375	0.724			
Investment culture (8)	0.401	0.345	0.474	0.419	0.168	0.323	0.434	0.875		
Risk optimal management (9)	0.325	0.111	0.159	0.615	0.701	0.214	0.306	0.159	0.728	
Managing Iran's environmental conditions (10)	0.219	0.319	0.144	0.106	0.289	0.455	0.267	0.396	0.114	0.729

Source: research findings.

After ensuring the measurement models through reliability tests, convergent validity and divergent validity, the results of the external model can be presented. Finally, the fit of the external model is examined. Unlike measurement models, the structural part of the model does not deal with the questions and explicit variables. It only pays attention to the hidden variables and the relationships between them. There are several indicators to evaluate the degree of structural fit of the model, each of which has been examined, as shown in Table 5.

Table 5. The summary of the evaluation results of the model structure fit.

Main Constructs	Determination Coefficient	Q2	F2	GoF
Capital market role in insurance	0.846	0.152	0.126	0.566
Economic development	0.370	0.132	0.196	
Insurance securities	0.334	0.128	0.126	
Utilising technical knowledge and expert human resources	0.437	0.19	0.243	
Financing	0.876	0.376	0.122	
The support of supervisory bodies and facilities in the securities issuance process	-	0.312	0.188	
Risk transfer process in insurance securitisation	0.731	0.243	0.135	

Table 5. Cont.

Main Constructs	Determination Coefficient	Q2	F2	GoF
Investment culture	0.347	0.337	0.376	0.566
Risk optimal management	-	0.319	0.141	
Managing Iran's environmental conditions	-	0.442	0.143	

Source: research findings.

In the present study, the data were analysed using the inferential statistics method, and the structural equation modelling statistical technique was used. Since this study considers a confidence level of 0.95 or an error level of 0.05, the positive path coefficients with a value of t-statistic greater than 1.96 are considered significant, and the relationship between them is confirmed. The results are shown in Figure 2.

According to the reported results in Figure 2, it is indicated elements, including financial tools, governmental support for supply and demand mechanisms, jurisprudential legitimacy, and the bonds' types, are likely to form the financing method as a latent variable with a coefficient of 0.876. Moreover, the variable risk transfer management (with a coefficient of 0.731) might be elaborated with factors under the sanction conditions such as risk reinsurance mechanisms, demanding greater premiums, the incremental rate of asset values and the existence of new financing instruments. Further variables also show that financing and risk transfer management in the structural equation modelling affect the latent variable utilising technical knowledge. The investment culture, which might be explained by two other latent variables comprising financing and risk transfer management, is likely to be determined by improving insurance companies' capacity through developing insurance equipment such as suing reinsurance services. In addition, the latent variable capital market role is likely to be shaped by investment culture, utilizing technical knowledge, having cooperative behaviour with other sectors in the market, the potential risks of equipment such as losing the principal of invested funds, and the liquidity and insurance of the bond capacity. Moreover, the variable insurance security is also indicated by considering security insurance as an insurance tool and its growth rate, the role of security exchange in the business environment and its acceptance as a permissible financial tool jurisprudentially, the structure of funds contract with the investors. Finally, the latent variable economic development might be explained by the financial profitability of insurance equipment for insurance companies and their investors, the role of the capital market on insurance companies and the role of insurance companies in extending the capital markets.

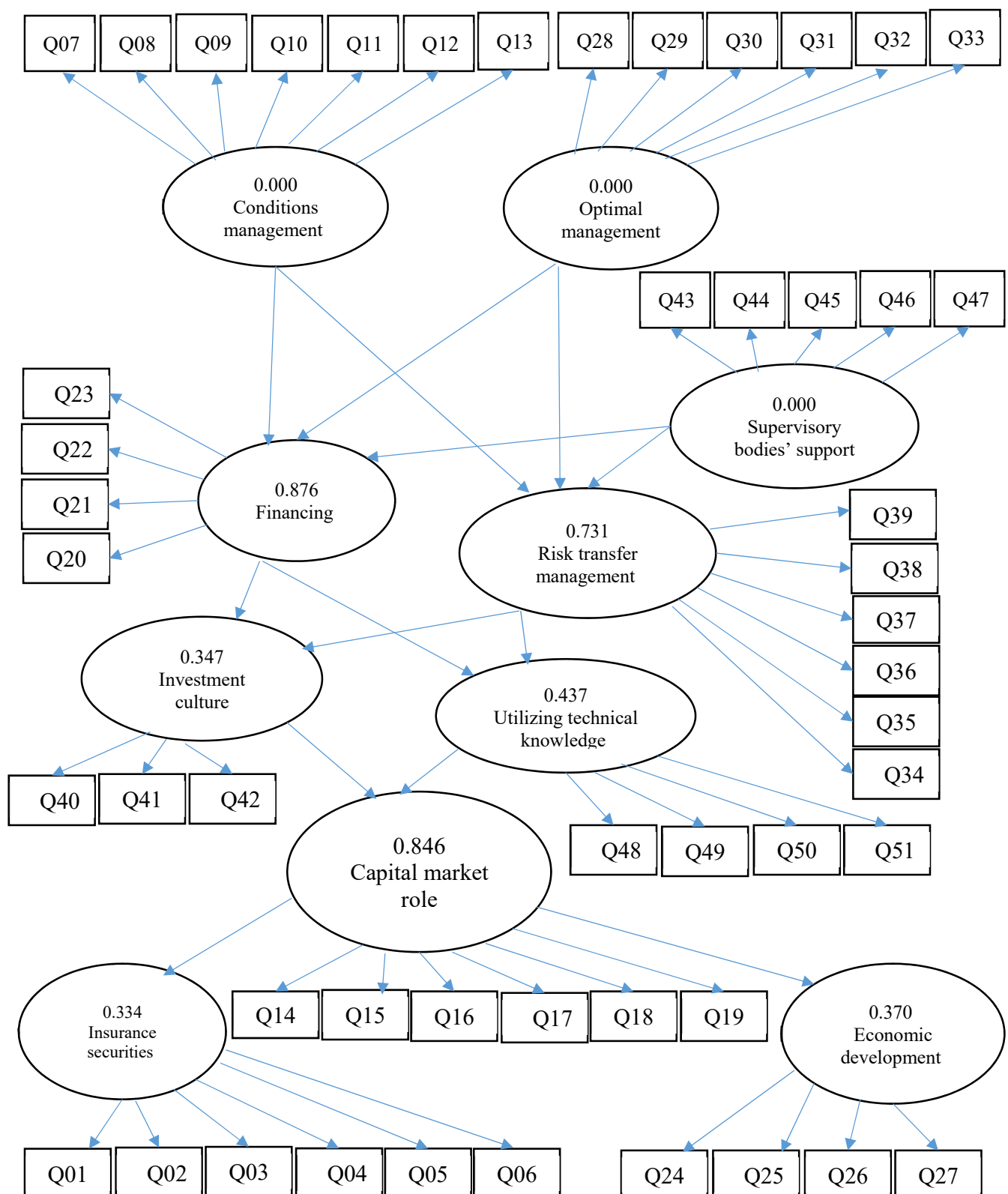


Figure 2. Model validation output with partial least squares method. Source: research findings.

5. Discussion and Conclusions

The present study aims to present a model of insurance securitisation in Iran's environmental conditions. Based on the obtained model, the ten main insurance security factors include managing Iran's environmental conditions. The role of the capital market in

insurance, financing, economic development, optimal risk management, risk transfer process in insurance securities, investment culture, support of regulatory bodies and facilities in the process of issuing securities, utilisation of technical knowledge, and expert human resources are the factors identified in the research.

The results showed that the mechanism of Islamic financial instruments and their similarity in legal relations and risk management with structured financing securitisation plays a vital role in Islamic financial markets. Iran has created a securities market by issuing Sukuk bonds with its overwhelming Muslim population over the past four years. Establishment of a jurisprudential committee in the Exchange and Securities Organization as the capital market regulatory and supervisory body of the capital market, the establishment of the Central Asset Management Organization to regulate and supervise financial intermediaries, as well as disclosure of information and statistics related to the issuance of Sukuk in Iran and issuing information of Sukuk can be effective steps towards the development of a structured financing market or securitisation. In addition, due to the lack of reinsurance capacity in Iran and the imposition of restrictions on access to foreign reinsurance from western countries, it seems that by considering Islamic discussions and designing an appropriate mechanism per the situation of Iran. The issuance of these securities can greatly expand the capacity of the country's insurance and, as a financial innovation in the capital market, add new instruments to the portfolio of market investors who suffer from a lack of variety of instruments available in the capital market.

Finally, the results demonstrate that conditions such as isolating the asset pool mean depreciation over time, imposing international sanctions on insurance companies such as the oil industry, creating arbitrage opportunities due to lack of information transparency and renting, problems arising from regulations, tax disputes and laws insurance, the illegality of securities and financial derivatives from the Islamic point of view, restrictions on attracting foreign reliance portfolios and the high dependence of the insurance industry on information and technical resources of foreign institutions all have negative effects on the process of insurance securitisation.

5.1. Implications

The current paper proposes several implications for policymakers, investors, market practitioners, and society. Policymakers may significantly improve the insurance market in Iran's business environment by removing market impediments, such as international sanctions, low financial transparency, inefficient laws and regulations, and localizing international information according to national needs and necessities. Moreover, market practitioners may reduce investment risk by forming effective portfolios and issuing financial instruments such as Sukuk to overcome domestic limitations such as national insurance capacities and lack of international insurance services. Finally, the society of Iran may benefit from the findings of this paper by paying sufficient attention to the importance of insurance services in their financial investment, in which their further demand for insurance services from the market may motivate local government and insurance companies to open the Iran market against international insurance providers. Firstly and secondly, building the necessary infrastructures to expand the domestic market capabilities to compensate for the potential deficiencies related to insurance services will likely enhance Iran's financial market efficiency significantly. For example, since the permissible maintenance capacity and permissible acceptance of reliance in Iran's insurance industry is extremely low, as well as being an accident-prone country, it seems that making effective insurance contracts between institutions (SPV) and security issuers, including the sale of securities issued by the SPV to the investor, the deposit of funds in a warranted account, and the swap party or the recipient bank of the deposit, can be a kind of innovation in designing new financial instruments in the insurance industry.

5.2. Further to the Study

Considering the findings of the current paper, designing and launching financial instruments based on natural disaster insurance can pave the way for the entry of actuarial expertise, which is currently the missing link in Iran's insurance industry. This instrument has two main special functions: first, it transfers risks from insurance and reinsurance companies to capital market investors, and second, it is a way to finance insurance companies and compensate for their lack of capital reserves.

Because of Iran's economy's international sanctions, one of the most critical problems is money transfers and sanctions on banking services. Another problem is providing the currency needed to pay for reinsurance services. In this regard, using the Insurance Mutual Fund may quickly solve these problems and help insurance companies to use reinsurance services at a much lower cost than the traditional reinsurance solution. Thus, insurance centres and the government are recommended to examine these factors.

Finally, future research may extend the insurance literature, particularly that of emerging markets, by measuring the value added by insurance companies against macro-economic indicators such as GDP growth rate, employment changes, and foreign direct investment capabilities, since previous findings show that microeconomic measures may have an active role in determining the national accounts (Salehi et al. 2020).

5.3. Limitations

Similar to many other studies, this study has faced some limitations. The lack of sufficient scientific support and localised knowledge about the pattern of insurance securities in Iran's environmental conditions and the novelty of this topic has created limitations. Another major limitation is the lack of operational experience and accurate statistics in providing a model of insurance securities in Iran's environmental conditions. Further, due to the prevalence of the insurance securitisation model in Iran's environmental conditions, the lack of access to managers and experts was one of the most critical limitations of the present study. The difficulty of planning and physical interviews with managers due to the unfavourable conditions of the Covid-19 virus, the distributed and expanded nature of relevant studies in developing a pattern for insurance securitisation in Iran's environmental conditions and the limited number of conducted studies in Iran were among other research limitations.

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Appendix A

Appendix A.1. The Presented Questions to the Expert Respondents

Occupational background:

Educational level:

1. Please introduce yourself and give some explanations about your work experience and background.
2. Please tell us about your experience in the insurance industry.
3. With insurance securities, please explain what factors and indicators can effectively use this method.
4. What do you think of pool isolation or rights in the insurance securities process?
5. How do you evaluate arbitrage opportunities in the insurance securities process?
6. What is the risk transfer process in insurance securities makers?
7. Is there any expertise and experience in your country that can do insurance securities?
8. What environment is it necessary to implement this method?

Appendix A.2. The Distributed Questionnaire among the Respondents

In this stage, three groups of experts have been interviewed to determine the possibility of using the results of this research in Iran's insurance industry:

1. Insurance industry experts
2. Experts in financial instruments and derivatives
3. Capital market experts

No.	The Questions	No	Indifference	Yes
1	Are securities instruments can be considered insurance?			
2	Will insurance securities generally grow?			
3	Can securities exchanges be replaced or complement traditional exchanges?			
4	Is the structure of insurance securities acceptable, jurisprudentially?			
5	How must the fund's contract structure with the insurer be to entrust the insurance contract?			
6	How must the structure of funds deal with investors?			
7	Is there a need for legal authority to remove the affiliations?			
8	Is there a legal distance between the stock exchange, insurance and the bank?			
9	Might the existence of ranking institutions be fruitful?			
10	Are there any ways to establish a close relationship between the three exchange institutions, insurance and bank?			
11	Does the insurance security act as a reinsurance supplement or alternative?			
12	Does the insurance security meet the needs of insurers in light of sanctions?			
13	Will capital market practitioners invest in insurance security according to its newness?			
14	Is it possible to cooperate with different capital market sectors with insurance companies?			
15	Are there risks based on insurance security?			
16	Is there a possibility of losing the principal of invested funds?			
17	How is the liquidity of the insurance security?			
18	Can culturalization be implanted by stimulating public enthusiasm?			
19	Does insurance security create insurance capability?			
20	Can insurance security be considered a way to counter sanctions?			
21	Is there any need for governmental support, or can the market continue with the supply and demand mechanism independently?			
22	Does insurance security have jurisprudential legitimacy?			
23	Does the insurance security have the ability to be fixed or variable?			

No.	The Questions	No	Indifference	Yes
24	Will insurance security make insurance companies more profitable?			
25	Will the insurance security give investors more returns?			
26	Is the return of the insurance security dependent on the capital market?			
27	Does the insurance security expand the insurance market and localize it?			
28	Considering the limitations of reliance in the event of catastrophic accidents, what will be the fate of small- and medium-sized insurance companies?			
29	Are high-power insurance companies likely to accept remarkable insurance policies?			
30	Does the acceptance of remarkable insurance policies by insurance companies lead to the growth of their profitability and the growth of the capital market?			
31	Does insurance security help the dynamics of the insurance industry and facilitate its activities?			
32	Are the liquidity and secondary market useful in the development of insurance security?			
33	Given the existing sanctions, can we expect an increase in the capacity of insurers to accept new risks and develop the insurance market?			
34	Have the conditions of accepting insurance security been limited under the current circumstances, increased exchange rates, and imposition of new sanctions?			
35	Do the insurers apply for higher premiums in the current situation?			
36	Has the recent increase in the value of assets under insurance for insurers and domestic reliance on insurers led to problems?			
37	Does new insurance security in the financial market lead to improved risk management and portfolio management?			
38	Does new insurance security in the capital market lead to the development and increase of capital market efficiency?			
39	Is the cost of insurance security different compared to other types of security?			
40	Does using insurance security help insurance companies prevent damages?			
41	Does using insurance security increase the capacity of reinsuring by increasing indirect capital?			

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