The Reality of the Application of Solvency 2 in Algerian Insurance Companies

واقع تطبيق الملاءة 2 في شركات التأمين الجزائرية

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Received: 19/06/2023 *Accepted: 31/01/2024* *Published: 03/03/2024*

Abstract:

This study aims to shed light on the reality of the Solvency 2 system's application in Algerian insurance companies by highlighting the extent of knowledge of the Solvency 2 requirements of insurance companies operating in Algeria, as well as assessing the level of compliance and responsiveness to the application of the requirements of this system as the most important developments of the precautionary regulations and rules in force internationally. To accomplish this, a questionnaire was designed and distributed to 26 insurance companies operating in the Algerian insurance market, and the data were analyzed using the statistical package for social sciences (SPSS V26). According to the study findings, Algerian insurance companies' awareness of the Solvency 2 application requirements is below the required level, with a disparity in the degree of their responsiveness to Solvency 2 in terms of its three requirements.

Keywords: Solvency, Solvency 2, Risk-based Capital, Insurance Companies.

ملخص

تهدف هذه الدراسة إلى تسليط الضوء على واقع تطبيق نظام الملاءة 2 في شركات التأمين الجزائرية، من خلال إبراز مدى معرفة شركات التأمين العاملة بالجزائر بمتطلبات الملاءة 2، وكذلك تقييم مستوى مواكبتها واستجابتها لتطبيق متطلبات هذا النظام، باعتباره أهم مستجدات النظم والقواعد الاحترازية المعمول بها دوليا، ولتحقيق ذلك تم تصميم استبانة وجهت إلى كافة شركات التأمين العاملة بسوق التأمين الجزائري والبالغ عددها 26 شركة، وتحليلها باستخدام برنامج الرزمة الإحصائية للعلوم الاجتماعية (SPSS. V26). وقد خلصت الدراسة في الأخير إلى مجموعة من النتائج، أهمها أن إدراك شركات التأمين الجزائرية لمتطلبات تطبيق الملاءة 2 لا يرقى إلى المستوى المطلوب، مع وجود تفاوت في درجة استجابتها للملاءة 2 من حيث متطلباتها الثلاث.

الكلمات المفتاحية: الملاءة المالية، الملاءة 2، رأس المال المبني على المخاطر، شركات التأمين.

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1. Introduction

The financial solvency of insurance companies has received significant attention from the sector's trustees as a pivotal factor in ensuring the performance and function of insurance companies. Maintaining it is considered the primary goal of insurance sector supervision for raising financial performance and increasing insured confidence in insurance companies.

In parallel with the changes in the insurance industry environment and the growing volume of risks threatening solvency, the EU countries have deliberately included several changes at the preventive level that are at the level of these developments and changes, which were embodied in the trend towards adopting a new regulatory framework for insurance companies in 2009, known as Solvency 2, which was considered as an important step towards the radical change of solvency 1 and to complement what came after its inability to keep pace with the changes taking place in the sector.

Algeria, like other countries of the world, is striving to keep up with the various developments of precautionary rules through its work to issue several laws, through which the regulatory bodies of the insurance sector introduced a new solvency system in 2013, based on the formation of codified obligations by insurance companies and their representation with suitable assets, in addition to the formation of a minimum solvency margin to protect both the insured and the insured, thus building a reliable insurance market characterized by financial stability.

Problematic: Based on all the above, the problematic nature of the study can be formulated as follows:

What is the reality of applying Solvency 2 requirements to Algerian insurance companies?

To address this problem, it is necessary to answer the following questions:

- How do Algerian insurance companies know about solvency 2 requirements?
-To what extent are Algerian insurance companies aware of the importance of applying Solvency 2 requirements?
- To what extent do Algerian insurance companies respond to the requirements of the Solvency 2 application?

Hypotheses: In light of the present study's main question and sub-questions, the following hypotheses were constructed:

Algerian insurance companies apply solvency 2 requirements.

From this main hypothesis, a set of sub-hypotheses are posed as follows:

- Algerian insurance companies have an average knowledge of solvency 2 requirements.
- To an average degree, Algerian insurance companies know the importance of applying Solvency 2 requirements.
- Algerian insurance companies respond to the requirements of the Solvency 2 application with a regular degree.

Objectives of the study: This study aims to:

- Highlight Solvency 2 as one of the international systems aimed at reforming the global insurance sector;
- Assess the level of knowledge of the insurance companies operating in the Algerian insurance market on the requirements of the Solvency 2 application;

- Disclose the extent to which the solvency system in Algerian insurance companies meets the solvency 2 requirements.

Significance of the study: The present study derives its significance from the need to respond to the rapid changes in the insurance industry environment and the impact of these changes on the performance of companies. It also derives its importance from the increasing attention paid to solvency 2 requirements as international regulatory standards that contribute to the stability of the insurance sector and enhance its ability to manage the risks associated with the activity of insurance companies.

Limitations of the study: The study spanned from January 2023 to April of the same year, focusing on a survey distributed among insurance companies operating in Algeria.

Study Methodology: Descriptive and Analytical methods are used to describe and analyze data related to the investigated problem in order to achieve the study's objectives.

Previous studies: Several studies have defined the European Union's Solvency II system, notable for their contemporary perspectives.

- Among these, Shenafi Kafia's doctoral thesis titled "***The Impact of Implementing Solvency II Directives on Insurance Companies in European Union Countries and the Possibility of Their Application to the Insurance Sector in Algeria,***" was conducted at Farhat Abbas University - Setif in 2016. In this thesis, the researcher sought to explore and delineate the potential impacts of implementing Solvency II requirements on insurance companies in EU countries. Additionally, the study aimed to highlight the challenges faced by these companies within this framework. Furthermore, it aimed to assess the feasibility of applying Solvency II requirements to the Algerian insurance sector by examining and analyzing the solvency regulations governing Algerian insurance companies and comparing them with their counterparts in the EU.

The findings of this study indicate that the primary effect of Solvency II requirements is to enhance and refine risk management practices within insurance companies, leading to improved alignment between risks and capital requirements. Additionally, the study suggests that the current state of the insurance sector in Algeria is not conducive to the implementation of the Solvency II system. This conclusion is based on the unique characteristics and nature of the Algerian insurance sector, the organizational performance levels of insurance companies, and their management methodologies, which primarily adhere to traditional financial solvency requirements.

- In their article titled ***"Solvency 2: What is the Importance of Applying it to Insurance Companies in Algeria?"*** published in the Journal of Contemporary Business Research, Issue 01, 2017, Khalouf Yassin and Hassani Housine aimed to assess the necessity of implementing the Solvency 2 system and its potential impact on the Algerian insurance sector. Through a comparative analysis of the requirements of Solvency II in the European Union and the existing solvency framework within Algerian insurance companies, the researchers sought to evaluate the extent of compliance with financial solvency standards mandated by legislation. Their objective was to ascertain the sector's capacity to maintain continuity and meet its obligations effectively.

The two researchers concluded several significant findings, foremost among them being that insurance companies in Algeria exhibit a high level of solvency. This was evidenced by their consistent adherence to the requirements concerning the minimum solvency margin, often exceeding them by multiple times. As a result, the researchers inferred that there is limited necessity for reforming the solvency system in Algeria to align with the precautionary advancements outlined in Solvency 2.

- In her study titled ***"Solvency II Impact on the Romanian Insurance Industry,"*** published in the "Ovidius" University Annals, Economic Sciences Series, Romania, Issue 2, 2019, Aurora Elena Dina conducted a quantitative evaluation of the financial status of Romanian insurance companies. The primary objective of the study was to assess the influence of Solvency II on the Romanian insurance market three years after its implementation. The assessment focused on key precautionary indicators within insurance companies, specifically the Solvency Required Capital (SCR) and Minimum Solvency Capital (MCR), both before and after the adoption of Solvency II. The analysis was based on statistical reports from both the Romanian and European Supervisory Authority, providing a comprehensive overview of the sector's financial landscape.

The study ultimately found that all Romanian insurance companies met the capital requirements outlined by Solvency 2, with rates exceeding 100%. Furthermore, it concluded that the implementation of the Solvency 2 system had a favorable effect on the solvency status of the Romanian insurance sector at the individual level three years post-enactment. This was evidenced by a notable enhancement in the level of capitalization among insurance companies and a high-quality capital base composed of eligible private funds capable of covering capital requirements. These findings suggest that Romanian insurance companies possess sufficient capacity to absorb potential losses, indicating a robust solvency position within the sector.

- The research Serjak Noureddine conducted a doctoral thesis which is titled ***"Governance of Insurance Companies under the Solvency 2 System as Applied to Algerian Insurance Companies,"*** at Hassiba Ben Bou Ali University - Chlef in 2021, in which he investigated the implementation of Solvency 2 system requirements regarding governance within the Algerian insurance industry. The researcher examined the various principles and mechanisms introduced by Solvency II for governance in insurance companies and evaluated their application in Algerian insurance companies through a field study involving 12 insurance firms operating in Algeria.

The study concluded several findings, with the most notable being that Algerian insurance companies effectively adopt the general governance requirements outlined in the Solvency 2 system. Specifically, the study highlighted the effective role played by the Board of Directors in governance and the adherence to regulations on reputation and efficiency within these companies.

- The study conducted by Nora Gavira-Durón, Daniel Mayorga-Serna, and Alberto Bagatella-Osorio, titled "***The Financial Impact of the Implementation of Solvency II on the Mexican Insurance Sector,"*** published in The Geneva Papers on Risk and Insurance - Issues and Practice, Issue 2, 2022, aimed to examine the effects of prudential changes implemented in the Mexican insurance sector. The study analyzed these effects by aligning them with the requirements of the European Union's Solvency II framework and employed variance analysis to illustrate the impact of these changes on risk levels and performance of foreign insurance companies compared to their local counterparts in Mexico.

The study ultimately concluded that foreign insurance companies operating in Mexico enhanced their risk management practices regarding default obligations following compliance with these changes. Conversely, local insurance companies experienced negative outcomes within stability levels. Additionally, the study found that the precautionary changes implemented in the Mexican insurance market did not significantly affect the performance levels of both foreign and local insurance companies.

In the context of the previous presentation of various studies, it is evident that the majority of these studies have centered on examining the nature and requirements of Solvency 2 as regulatory standards for insurance companies, as well as the implications of their implementation on these companies. These studies have approached the topic from diverse perspectives, particularly emphasizing qualitative aspects. This parallels with the current study, which similarly focuses on presenting and analyzing the requirements of Solvency 2 within insurance companies.
Furthermore, local studies have specifically addressed the evaluation of Solvency 2 application in Algerian insurance companies and explored the feasibility of its implementation in this context. However, these evaluations have been relatively straightforward, typically involving a comparative analysis between the regulations of the Algerian solvency system and those of Solvency 2. For example, the study conducted by Sanjak Noureddine concentrated on assessing the application level of specific Solvency 2 requirements, particularly focusing on governance practices.
In contrast, the present study expands upon these evaluations by comprehensively assessing the application level of all Solvency 2 requirements and pillars without exceptions. Moreover, it conducts a field study involving all insurance companies operating in Algeria, providing a thorough examination of Solvency 2 implementation across the Algerian insurance sector.

2. The theoretical framework of the study

2.1. The concept and objectives of solvency

As a result of the significant developments and changes witnessed by the insurance sector in the EU countries, a new precautionary framework to replace Solvency-1 has become an imperative necessity to keep up with these changes, which is reflected in the adoption of the European Parliament's Solvency Project 2 of 2009 was based on more risk-sensitive and sophisticated requirements than they were**.**

2.1.1. The Concept of Solvency 2

Solvency 2 is a European project launched and approved by the European Parliament in 2009 to develop traditional risk management requirements by insurance and reinsurance companies in line with the Basel 2 Convention on the banking sector (Mazzanti, 2012, p. 17) **.** The British Financial Services Authority has defined Solvency 2 as" a capital adequacy determination for the European insurance industry, aimed at establishing a set of capital requirements and standards related to risk management at the EU level to replace the established solvency requirements" (Financial Services Authority, 2011, p. 08)**.**

2.1.2. Solvency 2 Objectives

The main objective of Solvency 2 is to protect insurance companies and policyholders from various risks to which they may be exposed, and this is through its work to update all regulatory and precautionary rules in the European insurance industry.in general, it can be said that Solvency 2 came to achieve the following goals (Commission of The European Communities, 2007, pp. 14-15), (Grazia Starita & Malafronte, 2014, p. 02):

- Strengthening and ensuring the protection of policyholders in the European Union, as well as working to reduce the losses that they may suffer in the event of insolvency of insurance companies and their inability to fulfill their obligations to them;
- Providing appropriate mechanisms for insurance companies to monitor various risks and better management tools, including the development of internal capital models and increasing the use of appropriate tools to mitigate or transfer risks;
- Strengthening integration in the European insurance market by achieving a coordinated and unified approach to the supervision of insurance companies in all EU markets, which would help to ensure a level playing field for all insurance companies; - Increasing competition in insurance markets, upgrading the competitiveness of insurance companies within the EU, removing unnecessary regulatory restrictions, providing customers with more options, and enabling European insurance companies to compete more in global insurance markets;
- Developing a risk-based approach to supervision and control of insurance companies that takes into account the size of the company, whether big or small;
- Providing early warning indicators for regulatory authorities to conduct an effective intervention in order to enhance the confidence and stability of the insurance industry; - Providing the regulatory and supervisory bodies with sufficient information and transparency in order to facilitate the process of monitoring insurance companies.

2.2. Solvency 2 Substrates

Solvency 2 is based on three main pillars, which are largely inspired by the Basel II decisions for the banking sector. The first pillar is the quantitative requirements for capital and technical allocations, the second is the qualitative requirements related to risk management and internal control systems to be provided in insurance companies, and the third pillar is a set of requirements for disclosure and transparency in the dissemination of information.

2.2.1. Quantitative requirements

The first pillar of Solvency 2 includes a set of quantitative and standard requirements, through which it reviews a set of standards and rules for the valuation of assets and technical provisions in insurance companies, as well as providing capital requirements ~~in order~~ to cope with any shake in the financial position of the company.

- Valuation of the assets of insurance companies: solvency 2 rules and requirements are based on the principle of Risk-Based capital, where financial assets consisting mostly of bonds, shares, and movable assets are valued at their economic value, which is considered the basis for the development of a capital-based regulatory system, taking various risks into account.

The value of assets held by insurance companies is measured by market value, and in the absence of which an alternative method of valuation must be developed, in some cases there are products with the same characteristics as assets, so the market value of these products is used for comparison, but in the absence of a market price and products for comparison, assets are priced through mathematical models (Kaekenbeeck & Miller, 2009, p. 166).

- Assessment of technical provisions: Solvency2 requirements intentionally revised and changed several points related to the technical aspect of insurance companies, among which the bases for assessing technical provisions in these companies, where restricted or outdated assumptions were replaced by regularly updated current assumptions shown by the sum of the optimal estimate and the risk margin (Chauveau, 2013, p. 10):

- **Optimal Estimation:** The Optimal Estimate expresses the probabilistically weighted average of future cash flows, taking into account the time value of money (the potential present value of future cash flows), and is estimated based on a risk-free yield curve.
- **Risk Margin:** The Risk Margin is considered a complementary provision to the optimal estimate in such a way as to ensure that the technical provisions are equivalent to the amount that the insurance company will need to meet its future obligations.

- Capital Requirements: Capital Requirements are the fundamental aspect of the first pillar of Solvency 2, as they focus on determining quantitative criteria for calculating the solvency needs of insurance companies, ~~and~~ according to Solvency 2, these requirements are achieved by providing the following:

- **Solvency Capital Requirement (SCR):** Is the minimum amount of resources that an insurance company must maintain to be well-solvent and to ensure the greatest protection for policyholders. The SCR is equivalent to the Risk value (VAR) of 99.5, with an estimated probability of bankruptcy of 0.5 per year, that is, an average of once every 200 years (Frezal, 2016, p. 18).
- **Management Check Report (MCR):** (MCR) represents the minimum level of the company's capital that should not be lowered, and in case of non-compliance with this, regulatory bodies can withdraw accreditation from the insurance company (Derien, 2010, p. 38).

2.2.2. Qualitative Requirements

The second pillar of Solvency 2 implies a set of qualitative requirements that serve to structure and study the expected impact of risks on the solvency of insurance companies. These requirements are mainly the following:

- Internal control: Solvency 2 obliged insurance companies to provide a permanent system of internal control, which includes a set of appropriate administrative and accounting procedures for various information at all levels. The company also obliged these companies to establish an internal control function that is independent of the rest of the functions (Aurélien, 2011, p. 57).

- Risk Management: Solvency2 requirements, insurance companies must commit to developing an effective risk management system, which includes the strategies, processes, and procedures necessary to identify, measure, control, and manage risks, as well as develop their own reports to determine the extent of risk exposure and interconnection among them (européenne, 2009, p. 34).

- Actuarial Function: according to Solvency 2, the actuarial function is considered one of the four basic functions of an insurance company and is exercised by persons with sufficient knowledge of actuarial and financial techniques as well as the appropriate experience to measure the nature of the breadth and composition of the risks of insurance companies (européenne, 2009, p. 38) .

- Corporate governance: according to Solvency 2, insurance companies are required to develop an effective system of governance that corresponds to the nature and complexity of their operations and ensures proper and rational management of their activity. This system includes several requirements, the most important of which is the need for an effective system of information transfer that is adequately documented and regularly reviewed in order to provide the necessary information and use measurement indicators, as well as evaluation and reporting (Aurélien, 2011, p. 41).

- Own Risk and Solvency Assessment (ORSA): Operations (ORSA) are one of the most important requirements imposed on insurance companies under Solvency 2, which is a set of internal operations and part of strategic decisions aimed at assessing the ongoing and expected solvency needs associated with risks (Mouloud BELAID & BELHOUCHAT, 2014, p. 09).

2.2.3. Requirements for Disclosure and Dissemination of Information

The third pillar of Solvency 2 deals with the requirements and procedures for the dissemination of information by insurance companies to both regulatory authorities and the insured public, these requirements are as follows:

- Regulatory Reporting Requirements: the third pillar in this section defines the requirements related to the submission of financial reports of a quantitative and qualitative nature for both regulators and the insured public and includes the following:

- **Solvency and Financial Condition Report (SFCR):** it is a general report that is sent annually to both regulatory authorities and the insured public.
- **Regional Sales Representative (RSR):** This report deals with the same topics as the SFCR report, but it contains more detail and depth, in addition to providing forward-looking information regarding the strategy and objectives of the companies.
- **Quality Report Tool (QRT):** is used to prepare general and supervisory reports, which are sent quarterly or annually to regulatory authorities with some items of a general nature that include information on the calculation of solvency margin requirements, technical allocations, assets, and own capital (Heep-Altiner & Others, 2018, p. 10).

- Insurance Market Discipline Requirements: solvency 2 through these requirements imposes a set of obligations related to better insurance market discipline, by monitoring and controlling policyholders, shareholders, and regulators those who can monitor the risks faced by insurance companies and control the managers directly and indirectly, thereby influencing their actions and decisions.

The Constituent pillars of Solvency 2 and the quantitative and qualitative requirements it contains can be clarified by the following table:

Table 1. General Structure of Solvency 2

The first substrate	The second substrate	The third substrate
Quantitative requirements	**Qualitative Requirements**	**Disclosure and Dissemination Requirements**
1-Economic budget and coordinated assessment of assets. 2-Technical allocations and risk margin. 3-two capital requirements: the required solvency capital requirements and the minimum solvency capital requirements.	1- Strengthen the internal control and risk management system. 2- the effectiveness of the governance system. 3 - internal financial solvency assessment (ORSA).	1-preparation of supervisory reports (RSR) and (QRT). 2- Public disclosure of the solvency report and the general situation. 3- The principle of transparency to enhance the discipline of the insurance market.

Source: *(CLIPICI, 2012, p. 114).*

3. The practical part of the study

3.1. Methodological Framework of the Study

This part deals with a description of the method and procedures of the field study in terms of the population and sample of the study, the study instrument, and the statistical methods used in analyzing the results and testing hypotheses.

3.1.1. Study Population

The study population consists of 26 insurance companies operating in the Algerian insurance market, and the method of a comprehensive inventory of the study community was adopted due to its limitations, where (100) questionnaires were distributed to the senior staff working in the general directorates of these companies located in Algiers, and (80) questionnaires were recovered, all valid for analysis; that is, with a response rate of 80%, a good percentage in the survey is sufficient to use their data as a basis of the study analysis.

3.1.2. Research Tools

A questionnaire was distributed to Senior Staff working in the general directorates of Algerian insurance companies, to assess their level of knowledge of solvency 2 requirements and to reveal the extent to which Algerian insurance companies respond to these requirements. It was based on what was stated in the theoretical aspect of the study, with the adaptation of some statements to suit the direction of the current study and its society.

The questionnaire was divided into two main parts: the first part included personal data, while the second part included the parts of the questionnaire represented by:

- The first part: the extent of knowledge of Algerian insurance companies about solvency 2 requirements, and includes (13) statements.
- The second part: the extent to which Algerian insurance companies are aware of the importance of applying solvency requirements 2 and includes ten (10) statements.

- The third part: the responsiveness of Algerian insurance companies to the requirements of the Solvency 2 application, which includes (19) statements.

The closed-ended form was adopted in the preparation of the questionnaire questions that identify the possible options for each paragraph by adopting the five-point Likert scale, and by distributing the grades according to the five-point Likert scale ~~are~~ as shown in Table (02).

Table 2. Degrees of the five-point Likert scale

Clasification	**Strongly agree**	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Degree	5	4	3	2	1

***Source**: designed by the two researchers.*

To determine the values of the arithmetic mean based on the five–point Likert scale, the length of the range is calculated by subtracting the minimum category from the upper limit of the category, so it is: 5-1 = 4, and then dividing the range by the number of categories, so it is: 4/5 = 0,8, then add 0.8 to the minimum scale in order to determine these categories, table (03) is used in interpreting the values of averages and approval scores in the opinions of the study sample.

Table 3. Distribution of Arithmetic mean values according to the five-point Likert scale

Arithmetic mean value medium	**from 1 to 1,80**	**from 1,81 to 2,60**	**from 2,61 to 3,40**	**from 3,41 to 4,20**	**from 4,21 to 5**
Direction	Strongly disagree	Disagree	neutral	agree	Strongly agree
Trend Degree Evel	Very low	low	medium	high	Very high

***Source**: designed by the two researchers.*

3.1.3. Statistical methods used

A variety of statistical methods from the SPSS program were used. The following were represented in V 26 to analyze the responses of the study sample and test hypotheses:

- Cronbach's Alpha stability coefficient used to find out the stability of the study instrument;
- Repetitions and percentages of the description of the study sample;
- Arithmetic mean and standard deviation to determine the relative weight and dispersion of the opinions of the respondents;
- Test t for a single sample (One Sample T-test) to test the hypotheses of the study.

- Stability of the study instrument: the stability of the resolution was confirmed using (Cronbach's Alpha coefficient), as the results are shown in Table (04).

Table 4. Cronbach's Alpha coefficient for questionnaire parts

Parts	Number of statements	the value of Cronbach's Alpha
The extent to which Algerian insurance companies are aware of solvency2 requirements	13	0,957
The extent to which Algerian insurance companies are aware of the importance of applying solvency2 requirements	10	0,952
The extent to which Algerian insurance companies respond to solvency 2 requirements	19	0,897
Total stability of the resolution	42	0,906

Source: *designed by the two researchers based on the outputs of the SPSS program V 26.*

Table (04) reveals that the values of the stability coefficient for all parts of the questionnaire exceeded the minimum acceptable (70%), ranging between 0,897 for the third part and 0,957 for the first part, while the total value of the coefficient itself, which was estimated at 0,906 was high, approaching the correct one, and this indicates the honesty and stability of the study tool and its representation of the studied sample.

3.2. analysis and discussion of the results

The purpose of finding out the reality of Solvency 2 in Algerian insurance companies and revealing the extent to which they respond to the solvency 2 requirements, this part deals with a description of the various characteristics of the study sample and a presentation and analysis of the various results grasped by the field study.

3.2.1. Description of the Study Population

The following table represents a description of the study sample and its various specifications:

Table 5. description of the study sample

Variable	Category	Repetition	Percentage %
Company Type	General	30	37,5
	Private	25	31,3
	Mixed	12	15,0
	Cooperative	10	12,5
	Reinsurance	3	3,8
Educational level	Secondary/less	-	-
	University	61	76,3
	Other	19	23,8
Career status	Director	5	6,3
	Deputy director	11	13,8
	Central manager	22	27,5
	Head of Department	26	32,5
	Other	16	20,0
Years of experience	Less than10 years	13	16,3
	From 11 to 20 years	22	27,5
	More than 20 years	45	56,3

Source: *designed by the two researchers based on the results of the SPSS program V 26.*

from table (05) ze observed that most of the respondents hold positions in insurance companies with public and private ownership at 37.5% and 31.3 %, respectively, followed by mixed insurance companies at 15 %, then Cooperative Insurance Companies at an estimated 12,5 %, while 3.8 % of the respondents represent reinsurance companies, which is the least considering that there is a single reinsurance company in the Algerian insurance market.

The sample members are also distributed by educational level among holders of university degrees and various other qualifications at 76,3 % and 28,3 %, respectively, while there is no secondary level and less than the sample of the study because the latter does not meet the requirements of senior management of companies.

The same table clarifies that the head of the department occupied the highest percentage in the distribution of respondents by job position, amounting to 32,5 %, followed by the position of Central manager and various other positions and deputy director at 27,5 %, 20%, and 13,8 %, respectively, while the remaining and lowest percentage was for the position of manager, which amounted to 6,3 %.

Concerning years of experience, it is clear that 45 of the respondents have the necessary experience for the company's senior management (more than 20 years) with an estimated percentage of 56,3 %, followed by individuals with experience ranging from 11 to 20 years with 27,5 %, equivalent to 22 individuals, while the rest of the respondents have experienced less than 10 years with an estimated 16,3 % (most of them hold other jobs).

3.2.2. Analysis of the results

This part deals with a description and analysis of various data provided by the questionnaire, in which arithmetic averages and standard deviations were calculated to examine the degree of approval and determine the relative importance of each part, which helps to test hypotheses, the results came as follows:

- The extent to which Algerian insurance companies know the solvency 2 requirements: table (06) shows the arithmetic mean, standard deviation, and rank of respondents ' answers about the extent to which they know the solvency requirements 2, which was measured based on (13) statements as follows:

Table 6. The extent to which insurance companies are familiar with solvency2 requirements

N	statements	Arithmetic mean	Standard deviation	Level of direction degree	Ranking
01	The management company is interested in research and consulting related to New precautionary standards.	3,8625	0,5898	High	1
02	The management company is familiar with the precautionary regulations in force internationally in the insurance sector.	3,7875	0,7061	High	2
03	The management company is sufficiently familiar with the rules and requirements of the solvency System 1.	3,1375	1,0994	Average	6
04	The management company has a clear vision of solvency 2 concept and System.	3,1125	1,1022	Average	8
05	Training courses were held within the company on solvency 2 System.	2,3500	0,8434	Low	13
06	The management company has an overview of the rules necessary to activate the Solvency 2 system in insurance companies.	3,3000	0,8328	Average	4
07	The management company has sufficient knowledge about the rules for measuring financial solvency according to the Solvency 2 system.	3,3500	0,8128	Average	3
08	The management company has knowledge of the rules for evaluating technical allocations according to Solvency 2.	3,1750	0,7758	Average	5
09	The management company knows the	3,0375	0,7368	Average	10

	internal control requirements of the Solvency 2 system.				
10	The management company knows the Solvency 2 Risk Management Guidelines.	3,1250	0,7692	Average	7
11	The management company knows the requirements of the governance of insurance companies according to the Solvency 2 system.	3,1000	0,8359	Average	9
12	The management company knows the tasks of the actuary per the Solvency 2 system.	2,8250	0,8385	Average	12
13	The management 13 company is aware of the disclosure and dissemination requirements of the information contained in the Solvency 2 system.	2,9750	0,9409	Average	11
The total average of all Axis statements		**3,1644**	**0,6903**	**Average**	/

Source: *designed by the two researchers based on the outputs of the SPSS program V 26.*

It is clear from Table (06) that most of the statements of the axis came in a neutral direction with a total arithmetic mean of 3,1644 and a standard deviation of 0,6903, which indicates that the respondents have an average knowledge of solvency 2 requirements, and the statements No. (01) and (02) received a high degree of approval from respondents' points of view, where the arithmetic averages were estimated at 3,8625 and 3,7875 and with a standard deviation of, 0,5898, 0,7061 respectively, indicating that the respondents are informed and have sufficient knowledge about the internationally applicable precautionary standards, while statement No. 05 was recorded Related to the holding of training courses in Algerian insurance companies on Solvency 2 a weak degree of response by respondents with an arithmetic mean of 2,3500 and a standard deviation, of 0,8434.

- To what extent the Algerian insurance companies are aware of the importance of applying Solvency 2 requirements: table (07) shows the arithmetic mean, standard deviation, and rank of respondents' answers about the extent to which they are aware of the importance of applying Solvency 2 requirements, which was measured based on (10) statements as follows:

Table 7. The extent of the Algerian insurance companies' awareness of the importance of applying Solvency 2 requirements.

N	statements	Arithmetic mean	Standard deviation	Level of direction degree	Ranking
01	The application of Solvency 2 requirement to improve the level of risk in the management company.	3,5750	0,6319	High	3
02	Solvency 2 provides advanced technical	3,5875	0,0609	High	2

	systems that support the company management risk.				
03	Amendments to the design of insurance products per Solvency 2 increase the competitive ability of the company.	3,2375	0,8304	Average	6
04	The Solvency 2 application contributes to the diversification of the company portfolio components investment.	3,0625	1,0230	Average	10
05	The Solvency 2 application allows for minimizing and moderating investment risks.	3,5250	0,5948	High	4
06	Solvency 2 helps the determination of the exact responsibilities and tasks within the company.	3,2250	0,7626	Average	7
07	The application of Solvency 2 requirement promotes good practices within the company.	3,3000	0,7360	Average	5
08	Solvency 2 promotes and improves the management efficiency of the company.	3,1500	0,7811	Average	9
09	Solvency 2 contributes to enhancing the disclosure of information to various parties related to the company.	3,1750	0,7919	Average	8
10	Solvency 2 contributes to high stability in the financial performance of the company.	3,6250	0,5366	High	1
The total average of all Axis statements		**3,3463**	**0,6199**	**Average**	**/**

Source: *designed by the two researchers based on the outputs of the SPSS program V 26.*

Table (07) presents that the level of awareness of the respondents for the importance of applying solvency 2 requirements is average, which is reflected by the total arithmetic mean of the statements of this axis, which amounted to 3,3463 with a standard deviation of 0,6199, in statement number (10) and the last recorded the highest approval score by the respondents with an arithmetic average of 3,6250 and a standard deviation of 0,5366, which indicates a sufficient awareness of the importance of applying Solvency 2 in achieving greater stability in financial performance by the statement on the contribution of Solvency 2 to the diversification of the components of the company portfolio investment ranked last in terms of the respondents ' with an arithmetic mean of 3,0625 and a standard deviation of 1,0230, which reflects the varying opinions of respondents about this statement, the perception of some companies of the importance of applying Solvency 2 in diversifying the investment portfolio is not up to the required level.

- The extent to which the Algerian insurance companies respond to the requirements of applying Solvency 2: table (08) shows the arithmetic mean, standard deviation, and rank of the respondents ' answers about the extent to which the Algerian insurance companies respond to the requirements of applying Solvency 2, which was measured based on (19) statements as follows:

Table 8. The extent of the Algerian insurance companies' response to the solvency2 requirements application

N	statements	Arithmetic mean	Standard deviation	Level of direction degree	Ranking
01	The company is committed to assessing the solvency margin based on the principle of risk-based capital (RBC).	1,9375	0,5590	low	15
02	The necessary capital for solvency (SCR) is determined based on all the risks faced by the company.	1,8000	0,4025	Very low	19
03	The company assessment relies on the standard model of (SCR).	1,8500	0,4799	low	17
04	The company relies on the internal model for evaluation (SCR).	1,8375	0,4623	Low	18
05	The company's technical allotments are valued according to market value.	1,8750	0,5125	low	16
06	The company has complete freedom in making its investment decisions.	1,9750	0,6359	low	14
07	The majority of the company's investments are directed towards assets and instruments with measurable, controllable, and manageable risks.	3,7000	0,4611	High	8
08	The company has a permanent and detailed system of internal control.	3,7000	0,5131	High	9
09	The company conducts a periodic review of the levels of compliance with internal and external laws and controls.	3,5250	0,6930	High	10
10	The company has a special risk management department that is independent of other functions.	3,0875	0,9304	Average	11
11	The company follows an effective and permanent system for measuring and managing the risks it faces.	3,7500	0,4357	High	6
12	The company's risk management system covers underwriting risks,	2,7875	0,9506	Average	13

	investment risks, and operating risks.				
13	The company has an integrated Charter of governance that corresponds to the activity and nature of its operations.	3,7250	0,4493	High	7
14	The company is based on an organizational structure that smoothly defines the responsibilities and tasks of each employee within the company.	3,8375	0,3712	High	1
15	The internal auditor of the company has the necessary competence to ensure the proper functioning of the company.	3,8125	0,3927	High	3
16	The company employs an actuary who is independent of management and other functions.	2,8500	0,9559	Average	12
17	The actuary works to measure the nature and composition of the company's risks.	3,7750	0,4202	High	5
18	The company regularly submits financial reports to both regulatory authorities and the insured public.	3,8000	0,4025	High	4
19	The company discloses financial data and information with a high level of accuracy and transparency.	3,8375	0,3712	High	2
The total average of all Axis statements		**3,0243**	**0,3430**	**Average**	**/**

Source: *designed by the two researchers based on the results of the SPSS program V 26.*

Table (08) shows that the general trend of the total statements of the axis is neutral with an arithmetic average of 3,0243 and a standard deviation of 0,3430, which indicates the existence of an application and an average response to solvency 2 requirements in Algerian insurance companies, however ,referring to the details, we record a discrepancy in the degree of response of Algerian insurance companies to Solvency 2 in terms of their 1,8000 and 1,9750, with standard deviations also ranking between, 0,4025 and, 0,6359, that is, opinions tend to have a high disagreement about the first six statements with a homogeneous response of individuals This indicates a non-existent degree of adoption of quantitative requirements for Solvency 2 by Algerian insurance companies, and we also note a high degree of responsiveness in most statements related to qualitative requirements for Solvency 2 - from statement (07) to statement (17)- With arithmetic averages ranging from 3,8375 to 2,7875 and standard deviations ranging from 0,3712 to 0,9506 ,both statement (14) and (15) recorded the highest approval score within the qualitative requirements of Solvency 2 with an arithmetic average of 3,8375 and 3,8125 and a standard deviation of 0,3712 and 0,3927 respectively, this indicates the existence of a organizational structure within the company with a clear separation of responsibilities; as well as the existence of an internal audit function that ensures the proper functioning of the activity of Algerian insurance companies, while statement numbers (12) and (16) recorded the lowest response score by respondents with an arithmetic average of 2,7875 and 2,8500 respectively and with a fairly high standard deviation for both, which indicates a discrepancy in the answers of respondents, because Some companies do not adopt a risk management system. Some of them adopt an old system that does not take into account all risks in measuring financial solvency, as shown in the statement (16). the discrepancy in the answers is due to the fact that some companies do not give importance to the actuarial function, being small or modern companies in the insurance market, as well as to the actuary following the risk management function, if any, or one of the other administrative functions. As for the statements related to disclosure and transparency requirements, they registered a high approval score with an average of 3,8000 and 3,8375 and a standard deviation of 0,4025 and 0,3712 respectively, which indicates an acceptable application and a good response to the disclosure and transparency requirements by Algerian insurance companies.

3.3. Testing the study hypotheses

This part deals with testing the study hypotheses, where the parametric test (t-test) was used for one sample, to test the significant differences between the arithmetic averages of the respondents ' answers about the axes of the study using a standard value set at (3), which represents the average of the Likert ladder scores, and the decision rule loyal to testing hypotheses was relied on: The Null Hypothesis (H^0)is accepted if the value of the morale level is greater than (0,05) and vice versa.

3.3.1. Testing the first hypothesis

- The first hypothesis: Algerian insurance companies have an average knowledge of solvency 2 requirements.

- Null hypothesis (H^0): Algerian insurance companies do not know solvency2 requirements.
- Alternative hypothesis (H1): Algerian insurance companies have an average knowledge of solvency requirements 2.

Table 9. Results of the Arithmetic Mean Test of the extent to which Algerian insurance companies know about solvency 2 requirements.

The first hypothesis	Arithmetic mean	Standard deviation	Calculated T	Sig
	3,1644	0,69038	2,130	0,036
Tabular T: 1,664, Semantic level 0,05, and Degree of freedom df= 79				

Source: *designed by the two researchers based on the results of the SPSS program V 26.*

According to the results shown in Table (09), the total arithmetic mean of respondents' opinions on the extent the Algerian insurance companies' knowledge about solvency 2 requirements is higher than the hypothetical value (3), it reached 3,1644 with a standard deviation of 0,69038, the calculated "t" value reached 2,130, which is greater than the tabular value of 1,664, and statistically at a level below 0,05, which means that the respondents' responses in this axis came positive to an average degree, and therefore we reject the Null hypothesis (H^0): **we accept the alternative hypothesis** that Algerian insurance companies have an average knowledge of solvency 2 requirements.

3.3.2. Testing the Second Hypothesis

- The second hypothesis: Algerian insurance companies are aware of the importance of applying Solvency 2 requirements to an average degree.

- Null hypothesis (H^0): Algerian insurance companies do not realize the importance of applying solvency requirements 2.
- Alternative hypothesis (H1): Algerian insurance companies recognize the importance of applying Solvency 2 requirements to an average degree.

Table 10. Results of the Arithmetic Mean Test of the Algerian insurance companies' awareness of the importance of applying Solvency 2 requirements.

The second hypothesis	Arithmetic mean	Standard deviation	Calculated T	Sig
	3,3463	0,61991	4,996	0,000
Tabular T: 1,664, Semantic level 0,05, and Degree of freedom df= 79				

Source: *designed by the two researchers based on the results of the SPSS program V 26.*

Agreeing to the results shown in Table (10), the total arithmetic mean of respondents ' opinions on the extent of the Algerian insurance companies recognize the importance of applying solvency requirements 2 is higher than the hypothetical value (3), it reached 3,3463 with a standard deviation, 0,61991, the calculated "t" value reached 4,996, which is greater than the tabular value of 1,664, and statistically at a level lower than 0,05, which means that the respondents ' responses in this axis are biased in a positive direction at an average level, and According to the results shown in Table (09), the total arithmetic mean of respondents' opinions on the extent the Algerian insurance companies' knowledge about solvency 2 requirements is higher than the hypothetical value (3), it reached 3,1644 with a standard deviation of 0,69038, the calculated "t" value reached 2,130, which is greater than the tabular value of 1,664, and statistically at a level below 0,05, which means that the respondents' responses in this axis came positive to an average degree, and therefore we reject the Null hypothesis (H^0): **we accept the alternative hypothesis** that Algerian insurance companies have an average knowledge of solvency 2 requirements.

3.3.3. Testing the Third Hypothesis

- The Third Hypothesis: Algerian insurance companies respond to the requirements of the Solvency 2 application with an average degree.

- Null hypothesis (H^0): Algerian insurance companies do not respond to the Solvency 2 application requirements.
- Alternative hypothesis (H1): Algerian insurance companies respond to the requirements of the Solvency 2 application with an average degree.

Table 11. Results of the Arithmetic Mean Test of the awareness of the Algerian insurance companies to solvency2 requirements.

The Third Hypothesis	Arithmetic mean	Standard deviation	Calculated T	Sig
	3,0243	0,34303	0,635	0,527
Tabular T: 1,664, Semantic level 0,05, and Degree of freedom df= 79				

Source: *designed by the two researchers based on the results of the SPSS program V 26.*

Through the results shown in Table (11), it is clear that there is a small difference between the total arithmetic mean of respondents ' opinions on the Algerian insurance companies' extent response to solvency requirements 2 and the hypothetical value (3), as the arithmetic mean reached 3,0243 with a standard deviation, 0,34303, and the calculated "t" value reached 0,635, which is lower than the tabular value of 1,664, and is statistically non-functional at a level less than 0,05, which means that the answers of respondents in this axis. Therefore, **we accept the Null hypothesis** that "Algerian insurance companies do not meet the Solvency 2 application requirements", and reject the Alternative Hypothesis.

4. Conclusion

The study dealt with the reality of Solvency 2 in Algerian insurance companies, as the latest international regulations aimed at reforming the global insurance sector, and based on data analysis and hypothesis testing, the study concluded with a set of results, the most important are follows:

- Algerian insurance companies have sufficient knowledge about the internationally applicable precautionary standards;
- Some Algerian insurance companies are aware of the requirements of the Solvency 2 application are not up to the required level;
- Most Algerian insurance companies agree on the importance of applying Solvency 2 in achieving greater stability in the financial performance of the company;
- There is a discrepancy in the degree of response of Algerian insurance companies to Solvency 2 in terms of their three pillars or requirements, as they do not adopt quantitative requirements, while there is an acceptable adoption of some of the qualitative requirements and a good response to disclosure and transparency requirements;
- Algerian insurance companies do not rely on market values in the evaluation of technical allocations, which increases the possibility of errors in the evaluation of financially troubled companies;
- Most Algerian insurance companies agree that they do not have the freedom to make their investment decisions in front of the formulas they wish, while agreeing to invest in safer formulas for the asset portfolio;
- The risk management system of Algerian insurance companies does not take into account all the real risks faced by the company, because some companies do not adopt a risk management system;
- Most Algerian insurance companies agree on the existence of an organizational structure within the company with a clear separation of responsibilities, as well as the existence of a functional internal audit to ensure the proper conduct of the activity of these companies;

- Most Algerian insurance companies agree that the actuarial function is not independent of the rest of the other functions, because some companies do not give importance to this function because they are small or modern companies in the insurance market;
- Most Algerian insurance companies agree to regularly disclose financial data and information with a high level of accuracy and transparency.

In the light of the results obtained, some suggestions pretended:

-The need for the Algerian insurance sector to the development of the field of precautionary rules, through the involvement of insurance companies in determining the appropriate solvency rules.
- The need to benefit from the leading international experiences in the field of precautionary rules to reach a practical solution for the development of regulatory and precautionary systems in the insurance sector in Algeria.

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6. Appendix:

Appendix 1. The extent to which insurance companies are familiar with solvency2 requirements

N	statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
01	The management company is interested in research and consulting related to New precautionary standards.					
02	The management company is familiar with the precautionary regulations in force internationally in the insurance sector.					
03	The management company is sufficiently familiar with the rules and requirements of the solvency System 1.					
04	The management company has a clear vision of solvency 2 concept and System.					
05	Training courses were held within the company on solvency 2 System.					
06	The management company has an overview of the rules necessary to activate the Solvency 2 system in insurance companies.					
07	The management company has sufficient knowledge about the rules for measuring financial solvency according to the Solvency 2 system.					
08	The management company has knowledge of the rules for evaluating technical allocations according to Solvency 2.					
09	The management company knows the internal control requirements of the Solvency 2 system.					
10	The management company knows the Solvency 2 Risk Management Guidelines.					
11	The management company knows the requirements of the governance of insurance companies according to the Solvency 2 system.					
12	The management company knows the tasks of the actuary per the Solvency 2 system.					
13	The management 13 company is aware of the disclosure and dissemination requirements of the information contained in the Solvency 2 system.					

Appendix 2. The extent of the Algerian insurance companies' awareness of the importance of applying Solvency 2 requirements.

N	statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
01	The application of Solvency 2 requirement to improve the level of risk in the management company.					
02	Solvency 2 provides advanced technical systems that support the company management risk.					
03	Amendments to the design of insurance products per Solvency 2					

	increase the competitive ability of the company.					
04	The Solvency 2 application contributes to the diversification of the company portfolio components investment.					
05	The Solvency 2 application allows for minimizing and moderating investment risks.					
06	Solvency 2 helps the determination of the exact responsibilities and tasks within the company.					
07	The application of Solvency 2 requirement promotes good practices within the company.					
08	Solvency 2 promotes and improves the management efficiency of the company.					
09	Solvency 2 contributes to enhancing the disclosure of information to various parties related to the company.					
10	Solvency 2 contributes to high stability in the financial performance of the company.					

Appendix 3. The extent of the Algerian insurance companies' response to the solvency2 requirements application.

N	statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
01	The company is committed to assessing the solvency margin based on the principle of risk-based capital (RBC).					
02	The necessary capital for solvency (SCR) is determined based on all the risks faced by the company.					
03	The company assessment relies on the standard model of (SCR).					
04	The company relies on the internal model for evaluation (SCR).					
05	The company's technical allotments are valued according to market value.					
06	The company has complete freedom in making its investment decisions.					
07	The majority of the company's investments are directed towards assets and instruments with measurable, controllable, and manageable risks.					
08	The company has a permanent and detailed system of internal control.					
09	The company conducts a periodic review of the levels of compliance with internal and external laws and controls.					
10	The company has a special risk management department that is independent of other functions.					
11	The company follows an effective and permanent system for measuring and managing the risks it faces.					
12	The company's risk management system covers underwriting risks,					

	investment risks, and operating risks.	
13	The company has an integrated Charter of governance that corresponds to the activity and nature of its operations.	
14	The company is based on an organizational structure that smoothly defines the responsibilities and tasks of each employee within the company.	
15	The internal auditor of the company has the necessary competence to ensure the proper functioning of the company.	
16	The company employs an actuary who is independent of management and other functions.	
17	The actuary works to measure the nature and composition of the company's risks.	
18	The company regularly submits financial reports to both regulatory authorities and the insured public.	
19	The company discloses financial data and information with a high level of accuracy and transparency.	