

# Prudential Regulation of the Moroccan Insurance Market

Lakhdar Karima

Department of Management - Faculty of Juridical, Economical and Social Sciences, University of Mohamed V, Rabat, Morocco  
E- mail: [lakhdarkarima@gmail.com](mailto:lakhdarkarima@gmail.com)

**Abstract:** *This research work seeks to highlight the role of the existence of insurance regulation which in almost all economies, the insurance sector is highly regulated, but the aggravation of risks and the emergence of new risks have prompted almost all developed economies to thoroughly review their regulatory system in terms of insurance solvency supervision by focusing on risk - based regulation. In this sense, the Moroccan regulator has embarked on a new project via the implementation of a new regulatory standard, Solvency based on risk, in order to comply with international requirements in terms of control and regulation of insurance companies and to allow a better identification and control of the various risks that these companies are facing.*

**Keywords:** insurance, regulation, insurance companie, riskq, insurance regulation

## 1. Introduction

In order to better protect the interests of policyholders, and given its economic and social contribution, the insurance business must be regulated to correct market imperfections, externalities and incomplete information.

The main objective of prudential regulation is to ensure that insurance companies carry out their activities efficiently, to ensure their solvency and to approve the contracts they have underwritten. In this sense, prudential standards must ensure the protection of policyholders against fraud and insolvency, improve the quality of insurance services and encourage the insurance sector to play its role in the economy.

Solvency must therefore be studied within the framework of an integrated model of the insurance company, and the assessment of the solvency of an insurance company is made on the basis of compliance with three basic principles (Lustman, F. et al 2001).

According to De Mori, B. (1965), the main role of the regulatory authorities is to ensure the solvency of the insurance companies by ascertaining the congruence of the mathematical reserves, the premium reserves and the reserves for claims, the existence in the balance sheet of the activities that can represent the reserves, and the actual existence of the specific activities, corresponding to the mathematical reserves of the life branch or to special guarantees, or to certain amounts established by laws or regulations for non - life insurance.

Tapiero, C. S. et al, (1978) consider that solvency could be the result of a compromise between a minimum regulated capital requirement and some sort of penalty payment system in case of non - compliance with regulatory standards.

In virtually all economies, the insurance sector is highly regulated, but the increase in risk and the emergence of new risks have prompted virtually all developed economies to substantially revise their regulatory systems for insurance solvency supervision by emphasizing risk - based regulation.

As far as the Moroccan insurance market is concerned, since the 90s, it has experienced the implementation of preventive measures in terms of solvency margin constitution which has allowed to reinforce the preventive control of this sector, and consequently to reinforce its resilience. These various measures were taken following the dissolution of five insurance companies.

However, despite the measures undertaken, and given the complexity of this sector as well as its role in the economic impetus, the Moroccan regulator has embarked on a new project via the implementation of a new regulatory standard, risk - based Solvency, in order to comply with international requirements in terms of control and regulation of insurance companies and to allow for a better identification and control of the various risks that these companies face.

In this article, we will first present the theoretical framework of insurance regulation, then expose the international experiences in terms of insurance solvency, and this by presenting three international experiences, namely the American, European, and Swiss regimes, while proceeding to a comparison between these three systems. Finally, we will present the current state of the Moroccan insurance market and clarify the various shortcomings of the current regulatory framework, thus requiring a reform of this sector.

## 2. Theoretical Framework for Insurance Solvency or Review of the Insurance Solvency Literature

The economic and social need for the existence of insurance regulation has been classified by economists into two categories (Klein, R.1995). These are the "general interest theory"<sup>1</sup>, as well as the "economic theory"<sup>2</sup>. The need for the

<sup>1</sup> According to this theory, the need for regulation stems from information asymmetries and that information gathering is expensive. According to this theory, the absence of regulation, information asymmetries and agency problems would result in an increase in corporate insolvency.

existence of regulatory norms was analyzed by Stigler G. j., (1971), Peltzman, S. (1976), Munch, P. and Smallwood, D. (1980), Cummins, D. et al (1994), Klein, R. et al (1998).

Plantin and Rochet (2007) consider that insurance regulation gives public authorities significantly important control rights over the strategic and financial decisions of insurers. In this sense, the regulator intervenes in the strategy and financial management of insurance companies through three channels:

- Tariff restrictions;
- Restrictions on entry and mergers;
- Prudential regulation (including insurance regimes that protect against business failure).

Although there is a trend toward liberalization of financial services today, there is also a general consensus that insurance supervision is a fundamental condition for the development of the sector. Insurance regulation, according to Klein, R. (2012), can be divided into two main categories: the first category is related to solvency regulation that aims to protect society from the risk that some insurance companies become insolvent. While the second is related to market regulation, which is related to the economic efficiency of the insurance market.

As for Carmichael J., (2002), he defends the idea that the asymmetry of information between the insured and the insurer could lead to market failure and requires the existence of prudential norms, in order to alleviate the problems of moral hazard<sup>3</sup> and adverse selection<sup>4</sup>.

The need for prudential regulation of insurance also lies in the insurance panic that can occur in the situation where all policyholders decide to liquidate their contract with the deadline (Morison, A., 2002). In the same way, the systematic risk that can be caused by the failure of an insurance company can cause a certain disruption of the markets if it was sufficiently important (Carmichael J., 2002)

Kimball S. L., (1969) divided the objectives of insurance industry regulation into two groups of objectives. The first group includes internal objectives relating to the solvency of insurers and the fairness of insurance operations, hence the need for all contracts to be licensed by regulators until they expire. The second group includes external objectives relating to local protectionism, to protect the interests of domiciled companies, the pooling of claims costs and the pooling of capital in the interest of the national economy.

Tapiero, C. S, (1985, 1986) argues that there is an interdependence between solvency and a large number of internal and external parameters of the company, thus ensuring a balance of interests of the various stakeholders, namely policyholders, insurers, regulators, shareholders,

potential policyholders, insurers and investors, etc. For Klein W. R, (2012) optimal regulation is based on an ideal set of policies that attempt to replicate competitive market conditions and maximize social welfare.

Therefore, it seems obvious that the prudential regulation of insurance must, therefore, ensure the existence of an optimal management of the funds deposited by the insured and at the same time allow the insurance sector to perform its macroeconomic role. Gollier, C. (2006).

### 3. Overview of international regulatory Standards

In the following we will try to highlight the main regulatory frameworks that exist while trying to elucidate the bridges of divergence and convergence between them.

#### a) The American standard: Risk Based Capital

The National Association of Insurance Commissioners (NAIC)<sup>5</sup> introduced the American Risk Based Capital (RBC) standard in 1994, the main objective of which is to harmonize the rules of supervision between the States, while essentially aiming to integrate the size and risk profiles of insurers in the determination of capital requirements, which are a function not only of a single risk factor, but of all the risks to which insurance companies may be exposed, taking into account the correlation between risks.

This new regulation is based on the fact that each risk is associated with a capital requirement in order to ultimately associate all capital requirements with a consideration of the correlation criteria between the risks in order to obtain a minimum regulatory capital called the Total Adjusted Capital (TAC). The RBC standard has two main components, the first is a RBC formula that consists of determining a minimum capital requirement that will be compared to the actual level of capital. This component is generally consistent across states and provides a capital adequacy standard related to the principal risks of U. S. insurance companies and requires them to build a cushion. The second component is an RBC model law that automatically gives the state insurance regulator the right to take certain actions based on the level of impairment of the firm (NAIC 2005). On the other hand, the aggregation of risk categories assumes that they are either independent or fully dependent. The calculation of the RBC is done through the use of standard models or internal models that are increasingly used today by American insurance companies<sup>6</sup>.

The American Risk - Based - Capital standard is based on:

- The establishment of a map of the risks to which the insurance company is exposed;
- The evaluation of these risks;

<sup>2</sup> Economic theory considers that regulation is motivated by the desire of firms and individuals to serve their own interests, thus favoring private economic interests over the public interest.

<sup>3</sup> This is the risk that the liable party will change its attitude when it no longer bears the full financial consequences of the loss.

<sup>4</sup> It appears in the situation where the insureds have more information than the insurers on the real state of the risk.

<sup>5</sup> The National Association of Insurance Commissioners (NAIC) is a private, non-profit association of the chief insurance regulators of the 50 states, the District of Columbia and the five U.S. territories. It was formed in 1871 to coordinate the oversight of multi-state companies within a state regulatory framework, with a focus on the financial condition of insurers.

<sup>6</sup> Examples include interest rate modeling using fixed annuities, or stochastic modeling for variable annuities with guaranteed benefits.

- The determination of a minimum capital requirement associated with each risk category;
- The combination of the risk categories in a single Risk - Based - Capital while taking into account the principle of correlation between risks;
- The comparison of the RBC with the available capital.

Similarly, the RBC standard allows for risk - based capital adequacy, an increase in the safety net for insurers, and provides regulatory authority for timely action (see NAIC 2009), with the existence of a separate RBC formula for each of the major types of insurance via the use of a "generic formula" approach rather than a deterministic or stochastic modeling approach.

From the table above, it can be seen that under the RBC standard:

- Insurance risk is not correlated with any other risk, business risk is correlated with other risks, and interest rate risk and investment risk are fully correlated.
- For non - life insurance, the calculation of the RBC is similar to that of life insurance, but depends on two main categories of risk. These are asset risks, which are essentially investment risks, credit risk, and risks related to the business of insurance, i. e., the risk of insufficient technical reserves or incorrect premium estimates.

#### b) The European standard: Solvency II

Solvency II is a "Lamfalussy - style"<sup>7</sup> framework directive. It focuses primarily on specifying the principles underlying the solvency system, as it is based on principles that allow insurance companies the opportunity to convince regulators of its financial soundness using an individualized internal model, rather than having the same system or ratios applied to all insurers regardless of their characteristics (Cummins J. D 2009).

The main objective of the Solvency II standard is to harmonize the regulation of insurance companies within the European Union. It is a principle - based standard in which insurance company risks must be assessed using economic criteria, i. e., appropriate to the risks and consistent with the market, placing policyholder protection at the center of the regulators' concerns, while using a three - pillar approach similar to, but not identical with, the Basel II Accord.

#### c) The Swiss model: the Swiss Solvency Test

The Swiss regulatory standard, called the Swiss Solvency Test (SST), was developed in 2006<sup>8</sup> by the Federal Office of Private Insurance (FOPI), in close cooperation with Swiss insurance companies and academic researchers in the field of insurance. The Swiss Solvency Test has adopted the same

major objective of the European standard, Solvency II, which is to protect the interests of policyholders by ensuring more transparency in the insurance sector. As, it is a stochastic model based on principles encompassing insurance risks which are subdivided into life, non - life and health insurance<sup>9</sup>, market risks and credit risks (Cummins, D., Philips, R.2009), as well as the implementation of the SST report. It consists in determining the target capital of the SST following a two - tiered approach, similar to Solvency II. The first tier of target capital, which is the highest, is based on a market - based valuation. While the second tier is the minimum allowed solvency. For the determination of these thresholds, the SST uses standard, internal or combined models and scenario analyses<sup>10</sup>.

Under the Swiss Test, insurers are required to analyze solvency using a set of standard scenarios defined by the Supervisory Authority, as well as insurer - specific "internal" scenarios that are designed to cover the effects of events such as financial market crashes, natural catastrophes, pandemics and reinsurer failures. The results of the risk modeling exercise and scenario analysis are integrated through a prescribed aggregation method that takes into account the correlation between risks with the exception of operational risks which are not modeled quantitatively, but are considered on a qualitative basis.

#### d) Comparison of International Standards

After providing an overview of the three most important regulatory standards for solvency, we will proceed to an evaluation of these three standards by determining the advantages and disadvantages of each.

The different points of convergence and divergence were identified by Cummins, D. et al (1994) who characterized the different criteria for evaluating solvency standards. According to them, a solvency system is effective to the extent that it must encourage insurance companies to prevent moral hazard, and to take into account their exposure to risk by setting up a flexible model, in terms of its general concept and its parameters allowing the determination of the necessary capital, while taking into account all the risk typologies that insurers may face with the determination of correlations and appropriate weights between the different categories of risk, and requiring insurers to manage essentially quantitative risks efficiently. They consider that the regulations must anticipate the taking into account of systematic risk and take into account the risks related to the management of the insurer (especially operational risks) and that for the evaluation of the solvency capital, it is necessary to estimate the liabilities and assets of the balance sheet of insurers at their economic value. They add that solvency regulations should require insurers to manage risks, primarily quantitatively, as well as to have sound risk management. For his part, Holzmüller I. (2009) added

<sup>7</sup> The Lamfalussy-type process is named after Alexandre Lamfalussy, an economist and European central banker. Lamfalussy chaired an EU committee that adopted a "four-level" approach to financial services regulation in 2001. Level 1 involves establishing fundamental principles for financial law, Level 2 is the establishment of specific technical rules, Level 3 is harmonization between countries, and Level 4 is compliance and enforcement.

<sup>8</sup> Filipovic, D. and Vogelpoth, N. (2008), A note on the Swiss Solvency test risk measure, Insurance: Mathematics and Economics 42 (3), page 899.

<sup>9</sup> Life insurance includes seven risk factors such as mortality, lapse rate, exercise of product options and costs. Non-life insurance is divided into three groups: small claims, large claims and reserve change, while health insurance considers three lines: nursing care, individual daily benefit and group daily benefit.

<sup>10</sup> Flamée, M. (2008) 'IFRS and Solvency II: Global exposure and interaction: The work of the IAIS', Geneva Papers on Risk and Insurance: Issues and Practice 33 (1), page 56.



further criteria for evaluating regulatory systems, citing adequacy for economic crises and anticipation of systematic crises.

#### - Economic approach based on principles and risks

For the calculation of the Solvency Capital Requirement, Solvency II takes into account all quantifiable risk categories that may have a potential impact on the insurance undertaking. A standard formula or an internal model is used to evaluate the impact of these risk categories. The aggregation process in the standard formula takes into account the dependencies between the sub - classes of each risk category, but also the dependencies between the risk categories at the higher level of aggregation using a covariance approach. The internal model can use more complex methods to capture potential dependencies, such as tail correlations or copulas.

Regarding the U. S. RBC model, it consists of different factor - based models for life, health and non - life insurers. The non - life formula, for example, covers asset risk, underwriting risk (although catastrophe risk is not included in this model), credit risk, and business risk, which includes operational risk. Dependencies between the different risk categories are only considered at the top level of aggregation, assuming either total dependence or independence. The current form of the U. S. RBC model cannot be classified as fully risk - based, as it does not cover all the major risks to which companies may be exposed.

The U. S. RBC standard is a non - stochastic, factor - based approach, with a precisely defined solvency formula without built - in flexibility to handle individual situations (Klein, R. and Wang, S.2007). This approach simplifies supervision, but does not allow for the assessment of the wide range of insurance risk profiles. While Solvency II and the Swiss Solvency Test are principle - based approaches using Value - at - Risk and Tail VAR respectively, thus allowing the insurer to integrate regulatory requirements into its own risk management processes (Eling, M. and Holzmüller, I.2008). On the other hand, the regulatory models used in practice can be classified as static factor - based or dynamic cash flow - based models (Eling, M. and Holzmüller, I.2008). The US standard uses static factor - based models applying a certain factor to a static accounting situation, whereas Solvency II and the SST are risk - based factor models combined with scenarios, allowing the use of dynamic cash flow models.

With regard to the valuation of balance sheet items, under Solvency II, insurance companies are required to prepare their balance sheet according to an economic approach<sup>11</sup> where technical provisions are determined on the basis of a market approach. This means that insurance companies must present a risk margin in their economic balance sheet, in addition to the discounted best estimate. This risk margin should enable the company, in case of difficulties or

<sup>11</sup> An economic approach is characterized by the presentation of all assets and liabilities measured at their current or fair value. This eliminates all hidden reserves and smoothing elements, and shows the economic equity as a true reflection of the financial position of the company.

insolvency, to attract a third party to take over the portfolio. As far as the SST is concerned, it is based on a market valuation of the assets and liabilities, and the assets must represent the market value, if necessary an appropriate model must be applied to estimate the current value of the asset. Liabilities should be valued according to the best estimate principle. The valuation of balance sheet items is done in the American standard at their book value.

Concerning the use of internal models for the determination of the required solvency capital, Solvency II and the Swiss standard have given insurance companies the choice to use internal model approaches, for all or part of their risks, provided that this model is approved by the supervisory authority. The use of internal models is guaranteed by a comprehensive approval process. In contrast, the U. S. standard does not provide for this measure.

#### - Risk governance and public disclosure requirements

With regard to the implementation of a governance system, and as part of Pillar 2 of the Solvency II Directive, European insurance undertakings are required to set up risk management, compliance, internal audit and actuarial functions, as well as conduct, to be required by insurance undertakings to carry out a self - assessment of risk and solvency (ORSA). This measure has also been provided for in the Swiss standard, including the rules of good governance, risk control and the establishment of internal risk assessment processes<sup>12</sup>. In the US model, there is no requirement for internal risk assessment or risk management. The requirement for market transparency and public disclosure of the solvency and financial condition of insurers has been addressed in Pillar III of Solvency II, which requires insurance companies to publish an annual public report on their solvency and financial condition. In contrast, there are no disclosure requirements in the SST or the U. S. RBC standards. The three regulatory systems can be summarized in the table below.

**Table 1:** Comparison of the three international standards

	Solvency II	Swiss Solvency Test	Risk - based - capital
Country of application	European Union	Switzerland	United States of America
Year of introduction	2016	2006	1994
Typology of the model	Principle - based model	Principle - based model	Rule - based model
Risk measure	VAR with 99.5% confidence level	Tail - VAR with 99% confidence level	No risk measure
Operational risk	Considered quantitatively	Considered quantitatively	Not considered
Catastrophic risk	Considered	Considered	Not considered
Using internal models	Authorized after approval by the regulator	Authorized	Not authorized
Valuation of balance sheet items	At market value	At market value	At carrying value

<sup>12</sup> For more details, see Swiss Federal Office of Private Insurance (2007).

Consideration of off - balance sheet items	Yes	Yes	No
Risk governance	The need to implement the ORSA	Planned, but its implementation is complicated	Not planned
Public disclosure obligation	Promote market transparency by requiring public disclosures under the third pillar	Does not require public disclosure	RBC is confidential, but summary statements are published annually
Intervention	3 levels of intervention	3 levels of intervention	5 levels of intervention

Source: Developed by ourselves

From the above, it appears that there are fundamental differences between the solvency standards. The major difference is that Solvency II and SST are principles - based and the RBC is rules - based. The systems also differ in the consideration of operational risk, catastrophe risk. Solvency provides for a quantitative charge for operational risk, whereas SST considers operational risk on a qualitative basis. Concerning solvency risk, in Solvency II it is part of the underwriting risk, while for the SST it is taken into account within the framework of its scenario testing module. On the other hand, corporate governance is integrated in both Solvency II and the SST, but is not taken into account in RBC. Finally, only Solvency II actively encourages public disclosure under Pillar 3.

#### 4. The Moroccan insurance market

##### a) State of the art

The Moroccan insurance market has experienced significant growth over the past two decades. In 2019, Moroccan insurance companies have underwritten about 44.7 billion dollars, with an increase of 8.6% compared to the year 2018<sup>13</sup>. According to the financial stability report BAM ACAPS AMMC, 2019, non - life insurance occupies 60% of premiums written, while life insurance accounts for 40%.

According to the report of the Insurance Supervisory Authority and Social Security on the situation of insurance and reinsurance in 2019, the Moroccan market includes twenty - four insurance companies, including twenty private companies and four mutuals. The distribution of market shares among the 24 Moroccan insurance companies is represented in the graph below, which shows that 69% of the market shares are held by the first five insurance companies.

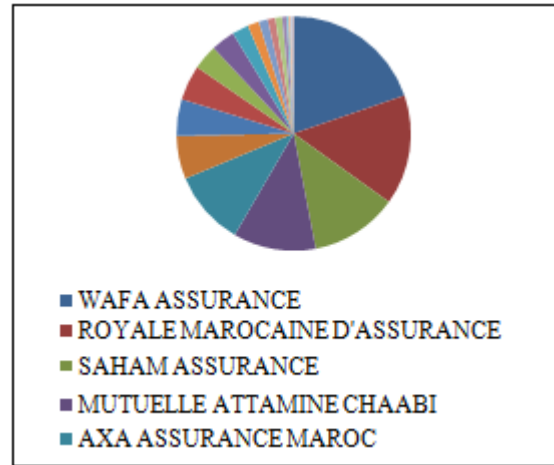


Figure 1: Market share distribution of the Moroccan insurance sector

Source: Insurance Industry Report, ACAPS, 2019.

Following the various failures that this market experienced during the 90s, which caused the liquidation of five insurance companies due<sup>14</sup>, mainly, to management faults, including undervaluation of technical provisions, non - payment of premiums, fraud, etc. In order to face this situation, the Moroccan regulator has adopted, through the publication of the ministerial decree n°18 of March 29, 1996, a preventive approach by setting up a strict regulation regarding the constitution of the solvency margin, the technical provisions and the investments. This standard has undergone several changes allowing the reinforcement of the preventive control of this sector by the Authority of Control of Insurance of Social Security (ACAPS). This body was created in 2016, replacing the Directorate of Insurance and Social Security, which was under the Ministry of Economy and Finance. In this sense, the current regulation of the Moroccan insurance sector provides for the respect of a number of requirements, which will be detailed below.

##### - Constitution of a minimum share capital by insurance companies

Article 171 of the Insurance Code stipulates that "insurance and reinsurance companies must justify a share capital of at least fifty million (50, 000, 000) dirhams. However, in consideration of the operations that the insurance and reinsurance company intends to carry out and of the forecasts of its commitments, the Authority may require the constitution of a share capital higher than the above - mentioned minimum. Upon subscription, the aforementioned share capital must be fully paid up in cash. All shares are registered. They may not be converted into bearer form during the life of the company" and that any transfer of more than 10% or any change of control beyond 30% must have the prior authorization of the administration<sup>15</sup>.

##### - Constitution of sufficient technical provisions

Insurance companies are obliged to set up on the liabilities side of their balance sheet the technical reserves<sup>16</sup> necessary

<sup>13</sup> Data collected from the ACAPS Insurance and Reinsurance Sector Report, Status 2019.

<sup>14</sup> Capital endowment of non-life insurers: finding the right balance between security and profitability, Swiss Re, Sigma n°1/2000

<sup>15</sup> Article 172 of Law 17-99 on the Insurance Code.

<sup>16</sup> They are defined by article 1 of the insurance code as "savings account accumulated by the insurance and reinsurance company to

for the total settlement of commitments to policyholders and/or beneficiaries of contracts, as well as those relating to reinsurance acceptances. They are calculated without deduction of reinsurance ceded (Article 238 of the Insurance Code). These provisions are constituted, according to the order of the Minister of Finance and Privatization n° 1548 - 05 of Ramadan 6, 1426 (October 10, 2005).

**- Technical provisions for life insurance**

This is essentially the mathematical reserve, which is defined by article 15 of the decree of October 10, 2005 relating to insurance and reinsurance companies as "the difference between the current values of the commitments respectively made by the insurer and the insured. This provision, which is determined according to the tariff bases, cannot be less than the amount calculated according to the interest rates used to establish the tariffs and, if they include a life component, according to the mortality tables TV 88 - 90 for life insurance and TD 88 - 90 for death insurance.

**- Technical reserves for non - life insurance**

These consist mainly of the provision for claims payable and correspond to the estimated value of reported and unreported claims calculated using the file - by - file method<sup>17</sup>.

**- Constitution of prudential technical reserves**

We also find the obligation by the regulator, via the decree of October 10, 2005, of the constitution of prudential technical reserves, as mentioned in the table below<sup>18</sup>.

**Table 2:** Prudential technical provisions provided for in Moroccan regulations

Prudential provision	Purpose
The provision for permanent depreciation (PDD)	Allows to compensate for the permanent depreciation of investments. It is assessed individually for each investment security over a period of three months and is established only when the rate of depreciation exceeds 25%.
Provision for Liability Risks (PLR)	Intended to cover liabilities in the event of a loss in value of assets
Provision for claims fluctuation (PFS)	Established to compensate for the probable technical loss that appears at the end of the year
Capitalization allowance	To cover the depreciation of fixed - rate debt securities
Provision for financial contingencies (PAF)	Intended to compensate for a decrease in the return on assets in relation to guaranteed interest rate commitments on life contracts, other than those in units of account and special annuity management
Management reserve	Intended to cover future management expenses not otherwise covered

Source: Developed by ourselves

meet its commitments to the insured and beneficiaries of insurance contracts".

<sup>17</sup> This method consists of evaluating each file according to the elements contained in it. For the valuation of technical provisions, there is also the settlement rate method and the average cost method which are detailed in article 15 of the decree of October 10, 2005.

<sup>18</sup> There are other technical provisions that companies are required to set up, for more details please refer to the decree of October 10, 2005

**- Investment requirements:**

The regulator requires, in Article 238 of the Insurance Code, that the technical reserves constituted on the liabilities side of the balance sheet be represented on the assets side of the balance sheet in safe and liquid investments, while obeying the rules of dispersion, as determined in Article 32 of the Order of October 10, 2005, including the holding of a maximum of 10% depending on the type of the asset. Insurance companies are also required to comply with the conditions of diversification and limitation as determined in article 33 of the same decree. These assets are divided into four types (as mentioned in article 27 of the same decree). These are debt securities, equity securities, real estate assets and investments representing unit - linked contracts. The assets are valued at historical cost, except for investments relating to unit - linked contracts.

**- Establishment of a solvency margin:**

Under Article 239 of the Insurance Code, "Insurance and reinsurance companies must, in addition to the technical provisions, justify, at all times, the existence of a solvency margin intended to cover the operating risks inherent in the random nature of insurance operations. In this sense, for the constitution of the solvency margin, the Moroccan regulator adopted an approach by fixed ratios constituted by two parameters. the approach adopted by the current Moroccan regulation, concerning the solvency margin, is similar to solvency I which was in use in the European Union before the adoption of the Solvency II standard.

**Table 3:** Components of the solvency margin

Share capital or establishment fund
+La one - half of the unpaid portion of the share capital or of the remaining portion to be repaid of the establishment loan
+R Regulatory or free reserves not corresponding to commitments
+ Deferred profits
+ PI Unrealized capital gains
Losses
-The remaining amortization of commissions, formation expenses and other intangible assets

Source: Developed from the SBR project

According to the table above, the minimum solvency margin is obtained by adding the minimum solvency margin requirements for life insurance, non - life insurance, workers' compensation and acceptance. It is important to note that this calculation method does not provide for correlation between risks.

**- Solvency reporting requirements**

Regarding the preparation of a solvency report, Article 239 - 1 stipulates that "At the close of each financial year, the board of directors or the management board shall draw up a report on the solvency of the company in accordance with the procedures laid down by the administration. The solvency report must contain an analysis of the conditions under which the company is able to meet all its commitments. This report is communicated to the administration and to the statutory auditors.

**- Obligation to set up an internal control system**

The regulator has put in place the circular note n° DAPS/EA/08/11 of August 26, 2008 relating to the internal control of insurance and reinsurance companies, by which it

obliges insurance companies to set up an internal control system and an audit structure that reports to the board of directors or supervisory board. This measure was taken in order to allow insurers to identify, evaluate, control and monitor all the risks that insurance companies are confronted with, namely risks related to commitments and IT and legal risks<sup>19</sup>, on the one hand, and on the other hand, to put in place the necessary means specific to each insurance company.

The presentation of the current framework of the solvency regime in Morocco, and of the quantitative requirements regulating the determination of the minimum level of equity, technical provisions as well as the evaluation of investments, has allowed us to draw up the advantages and the shortcomings of this regime which is similar to the former European prudential standard, Solvency 1. Indeed, the present regime considers that the solvency of an insurance company is ensured by the determination of the solvency margin, which takes into consideration only the insurance risks, i. e. the underwriting risks, including the premium risks and the technical reserve risks, in addition to the constitution of additional technical reserves. However, there are no quantitative requirements for market risk, counterparty risk or operational risk. Only qualitative measures have been determined for market risk, through compliance with the dispersion and limitation rules.

On the other hand, the calculation of the solvency margin is very simple and inexpensive for insurers, in terms of human and material capital, allowing for easy detection of results, but it is not sensitive to all the risks that insurers face; for example, an insurance company that is prudent will invest in risk - free assets, which will reduce its profit, hence the need to plan for the implementation of rigorous investment management, as the existence of a not insignificant number of rules and constraints on investments hinders insurers from adopting effective asset/liability management.

One of the strong points of this regime is the obligation for insurance companies to put in place an internal control system that allows for the qualitative control of operational risk, to which is added the obligation to publish a solvency report that allows the public to have an idea of the solvency of the insurance company in the short and long term. However, one of the shortcomings of this regime is that the calculation of the solvency margin is done retrospectively, without taking into account future risks, based solely on balance sheet items, without the existence of any requirement for additional capital to be built up to deal with any worsening of risks or the appearance of new risks.

<sup>19</sup> Underwriting and commitment risk, as mentioned in article 23 of the same circular, corresponds to the risk of financial loss resulting from the selection and acceptance of risks to be insured, the processing of claims and the management of contractual and other options attached to the products. The IT risk, as noted in article 30 of the same circular, is understood as the risk of malfunction or breakdown in the functioning of the information processing system, attributable to hardware failures or to errors, manipulations or other reasons (viruses) affecting the execution programs. The legal risk is understood to be the risk of disputes arising that may engage the liability of the insurance and reinsurance company due to inaccuracies, gaps or inadequacies in the contracts and other legal acts binding it to third parties (article 35 of the same circular).

From the above, and aware of these shortcomings, the Moroccan regulator is in the process of developing a new solvency standard to cope with the evolution of the insurance market and the complexity of insurance products, with the emergence of new insurance risks, thus enabling the Moroccan insurance market to comply with international standards.

#### b) The Risk - Based Solvency Project

The Moroccan regulator is committed to implementing a new solvency standard inspired by the European Solvency II Directive, but which takes into account the specificities of the Moroccan insurance market, in order to strengthen the resilience of the insurance sector to the different risks that are increasing to allow for the protection of policyholders in an unstable environment, on the one hand, and to strengthen the culture of risk management and good governance, in accordance with international standards, on the other hand. The new regulation to be introduced by ACAPS Risk - based Solvency is based on three pillars.

#### - Pillar 1: Quantitative requirements

Under the first pillar of the draft regulation, insurance companies will have to establish a prudential balance sheet that will allow companies to value the various balance sheet items at their economic values and not at their book values, as shown below.

**Table 4:** Prudential balance sheet

Assets	Liabilities
Fixed Assets	Permanent Financing
Fixed assets in non value	Shareholders' equity
Intangible assets	Reconciliation reserves
Tangible fixed assets	Shareholders' equity
Financial assets	Financing liabilities
Investments allocated to insurance operations	Non - current provisions for risks and charges
Conversion differences - Assets	Gross prudential technical provisions
	Translation differences - Liabilities
Current Assets	Current Liabilities
Best estimate of assigned liabilities	Payables for cash remitted by transferees
Receivables from current assets	Current liabilities
Investments not allocated to insurance operations	Other provisions for liabilities and charges
Translation differences - Assets	Translation differences - Liabilities
Cash Assets	Cash Liabilities
Cash - Assets	Cash - Liabilities
Deferred tax assets	Deferred tax liabilities

Source: Developed from SBR project data

From this prudential balance sheet, we note, mainly, the creation of new items, namely the deferred tax assets and liabilities and the reconciliation reserve, and the substitution of gross technical reserves and ceded technical reserves with their prudential valuations. In this sense, the prudential technical reserves, as provided for in article 12 of the ACAPS project, will be valued gross of reinsurance and will relate to all contracts whose commitment is outstanding at the inventory date, by adding the following elements



- The best estimate of liabilities: which is the probabilistic and discounted value of the outstanding liabilities according to the nature of the insurance operation<sup>20</sup>.
- The best estimate of management expenses: this is the probabilistic and discounted value of the management expenses of the current contracts according to the nature of the insurance operation.
- The risk margin: this is the cost of locking in the solvency capital required for the guaranteed commitments.

Similar to Solvency II, the Risk - Based Solvency project provides for the calculation of the Solvency Capital Requirement (SCR), which includes the SCRs of each risk module and represents the minimum solvency capital that can be used to deal with the various risks that may arise. This capital makes up for the shortcomings of the current prudential framework, and takes into consideration all the risks that insurers may face. It is calculated by adding up the SCR of each branch of risk with the existence of a perfect correlation between these branches:

- The Solvency Capital Requirement relating to market risk, it results from the volatility of the prices of financial instruments and includes the equity risk, real estate risk, interest rate risk, spread risk and foreign exchange risk, according to the following method:

$$SCR_{market} = \sqrt{SCR_{stock}^2 + SCR_{rates}^2 + SCR_{real\ estate}^2 + SCR_{spread}^2 + SCR_{change}^2}$$

It is necessary to note, that the new project foresees an absence of correlation between these risks, as shown in the table below.

**Table 5:** Correlation between market risk sub - modules under the new Moroccan standard

	Stock	Rates	Real estate	Spread	Change
Stock	1	-	-	-	-
Rates	-	1	-	-	-
Real estate	-	-	1	-	-
Spread	-	-	-	1	-
Change	-	-	-	-	1

Source: Developed from SBR project

- The Solvency Capital Requirement for counterparty risk is the sum of the Solvency Capital Requirement for assignee counterparty risk, policyholder counterparty risk, and mortgage counterparty risk.
- Concentration Risk Solvency Capital Requirement is, as stipulated in Article 47 of the draft ACAPS Circular, related to the loss of capital that would result from the decline in assets associated with a set of issuers belonging to the same group.
- The Solvency Capital Requirement for life underwriting risk includes, according to article 48 of the aforementioned draft, the capital requirements for mortality and longevity risk, surrender risk, management

expense risk and catastrophe risk<sup>21</sup>, with a perfect correlation between these risks.

- The Solvency Capital Requirement relating to the non - life underwriting risk is determined according to the following method, in accordance with the provisions of article 53 of the aforementioned project, with the existence of a perfect correlation between these risks.

$$SCR_{Non-life} = SCR_{primes} + SCR_{provisions} + SCR_{CAT\ Non-life}$$

- Pillar 2: Qualitative requirements

Following the example of the European standard, the Moroccan regulator has provided in its new draft regulation of the insurance market a pillar dedicated to qualitative requirements, in terms of setting up a governance system, which clearly defines the decision - making process to be validated by the board of directors or supervisory board, with the obligation to regularly assess the effectiveness of the governance system established by the insurer, as well as the need to implement an internal control and risk management system, as well as a risk and solvency self - assessment (ORSA) to be integrated into the organization's strategy.

In this sense, the insurance company must have an organizational and operational structure in line with its strategic objectives, while integrating in its structure four key functions:

- The risk management function which must, generally, monitor the risk management system, identify and evaluate new risks and give an opinion on the adequacy of the technical reserves established by the insurer.
- The internal audit function will be required to develop an internal audit plan based on a risk - based approach, as well as an annual report on actions taken, deficiencies identified and corrective actions to be undertaken.
- The actuarial function will have as its main mission to monitor the calculation of prudential technical reserves, while assessing the risk associated with the estimates made.
- The compliance function will have the primary role of assisting management in complying with regulatory, legislative and administrative provisions, and identifying and assessing the risk of non - compliance.

- Pillar 3: Information requirements

Pillar 3 encompasses the information elements that must be published by insurance companies to the Insurance and

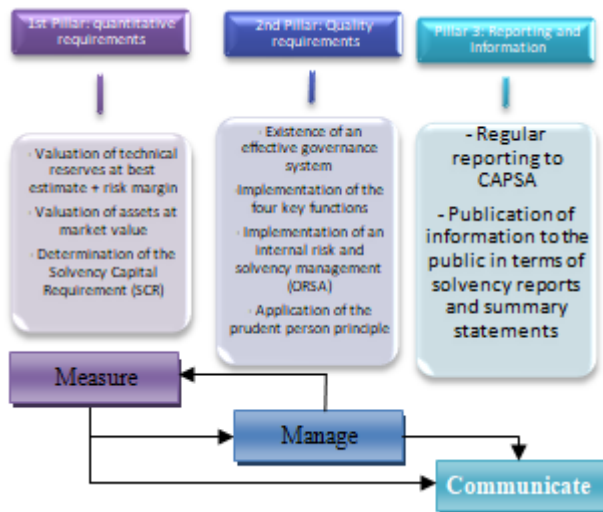
<sup>21</sup> The new draft defines the capital requirement relating to mortality and longevity risk as the maximum loss of equity that would result from applying downward or upward coefficients to the mortality rate used in the calculation of prudential technical reserves. The surrender risk requirement, on the other hand, corresponds to the maximum loss of equity that would result from the application of upward and downward coefficients to the surrender tables in numbered amounts used for the calculation of prudential technical provisions. While the management expense risk requirement is defined as the loss of capital that would result from applying an upward percentage to the management expense amounts used in determining the best estimate of management expenses. And the capital requirement for life catastrophe risk is defined as the application of a coefficient to the amounts of capital at risk under death benefits.

<sup>20</sup> The new regulations provide for discounting based on a rate curve calculated and communicated by ACAPS



Social Security Supervisory Authority, as well as those that must be made available to the public.

As a result, the structure of this new regulation, consisting of three interdependent pillars, as summarized in the chart below, has some points of divergence with the European standard, in terms of correlation between the different risk branches, to which is added the consideration of concentration risk as a risk module in its own right, not integrated into market risk.



**Figure 2:** Risk - Based Solvency Structure

Source: Developed by ourselves

## 5. Conclusion

The main purpose of the insurance industry is to protect individuals against the potential damage to which they are exposed, or in more general terms, against any possible risk that may arise. Characterized by the inversion of its production cycle, the insurance sector constitutes a catalyst for economic and social development by transferring risk, mobilizing savings, and reinforcing financial stability. This sector has experienced in recent decades, a very important growth with the advent of financial globalization, the growth of financial flows that have greatly affected the insurance sector, and its development has accelerated.

Given its socio - economic role, the public authorities in all countries have considered introducing prudential regulations to protect the insured against the risk of insolvency of the insurer by ensuring that insurance companies manage the panoply of risks they accept efficiently, and this, by constituting sufficient reserves that will serve to compensate the insurers, in case of realization of a loss and by ensuring that they are invested in safe assets.

The insurance regulatory regime differs from one country to another, the exposure of the American, European and Swiss model has allowed us to draw various points of convergence and divergence between them, including mainly the observation that the European and Swiss standards are based on principles using stochastic methods and a market valuation of balance sheet items, unlike the American standard which is based on rules relying on factors with the valuation of the balance sheet at its book value

As far as the Moroccan case is concerned, it is important to specify that the insurance sector has experienced a significant development in recent years, allowing it to acquire a prominent place in the African market and in the Arab world. Except that, taking into account the failures of the current regulatory framework, mainly the taking into account only of the underwriting risk, the regulator is in the process of preparing a new regulatory regime, which will allow the insurance sector to follow the international referentials as regards the solvency of insurance.

## References

- [1] Lustman Florence, Le Vallois, Franck, Leflaive, Viviane, Péqueux, Olivier, « Contrôle prudentiel et situation de crise », *Revue Risques*, 48, 2001
- [2] De Mori, B. (1965). Possibilité d'établir des bases techniques acceptables pour le calcul d'une marge minimum de solvabilité des entreprises d'assurances contre les dommages. *ASTIN Bulletin*, (3), 286 - 313.
- [3] Tapiero, C. S. [1985]. "A dynamic stock insurance firm model and dividend optimization", *Journal of Large Scale Systems*.
- [4] Klein, R. W. (1995). Insurance regulation in transition. *The Journal of Risk and Insurance*, 62 (3), 363 - 404. <http://dx.doi.org/10.2307/253816>
- [5] Stigler, G. J., "The Theory of Economic Regulation", *Bell Journal of Economics and Management Science*, vol.2, 1971
- [6] Peltzman, S., "Towards a More General Theory of Regulation," *Journal of Law and Economics*, vol.19, 1976.
- [7] Munch, P. and Smallwood, D. E. (1980) Solvency regulation in the property - liability insurance industry: Empirical evidence. *Bell Journal of Economics* 11 (1): 261-279
- [8] Tax management and investment strategies of property - liability insurers, J. David Cummins et Elizabeth Grace, *Journal of Banking and Finance* 18 (1994) 43 - 72. North - Holland
- [9] KLEIN, R. W., SKIPPER, H. D. and GRACE, M. F., 1998, "Restructuring Regulation for Developing Insurance Markets", Centre for Risk Management and Insurance, Georgia State University
- [10] Guillaume Plantin et Jean - Charles Rochet, *When Insurers Go Bust An Economic Analysis of the Role and Design of Prudential Regulation* Princeton University Press Princeton and Oxford, 2007
- [11] Carmichael, Jeffrey (2002). "The Development and Regulation of Non - Bank Financial Institutions". Washington, DC, USA: World Bank, 2002.243.
- [12] Kimball, S. L. and H. S. Denenberg, *Insurance, Government and Social Policy*, Homewood, Illinois: Richard D. Irwin, Inc., 1969
- [13] Tapiero, C. S. [1985]. "A dynamic stock insurance firm model and dividend optimization", *Journal of Large Scale Systems*.
- [14] Tapiero, C. S. [1986]. "The systems approach to insurance company management", in C. Carraro, and D. Sartore, Dordrecht, Nighoff (eds.), *Developments of Control Theory for Economic Analysis* (forthcoming).
- [15] Gollier, Christian, « Comment évaluer les risques à l'actif ? », *Revue Risques*, 66, 160 - 164, 2006

- [16] Cummins David. J et Philips Richard. D (2009), Capital Adequacy and Insurance Risk - Based Capital Systems, National Association of Insurance Commissioners 2009.
- [17] Cummins, J. D., Harrington, S. and Niehaus, G. (1994) 'An economic overview of risk - based capital requirements for the property-liability insurance industry', Journal of Insurance Regulation 11 (4): 427-447.
- [18] Holzmüller, Ines, 2009. "The United States RBC Standards, Solvency II and the Swiss Solvency Test: A Comparative Assessment," The Geneva Papers 34: 56 - 77.
- [19] Klein, R. W. and Wang, S. (2007) 'Catastrophe risk financing in the US and the EU: A comparative analysis of alternative regulatory approaches', Journal of Risk and Insurance, forthcoming, 2009.
- [20] Martin Eling, Ines Holzmüller, An Overview And Comparison Of Risk - Based Capital Standards, Working Papers On Risk Management And Insurance No.57 , Edited By Hato Schmeiser Chair For Risk Management And Insurance, June 2008.