

# COMPARATIVE STUDY ON MAIN SOLVENCY ASSESSMENT MODELS FOR INSURANCE FIELD

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## Abstract

During the recent financial crisis of insurance domain, there were imposed new aspects that have to be taken into account concerning the risks management and surveillance activity. The insurance societies could develop internal models in order to determine the minimum capital requirement imposed by the new regulations that are to be adopted on 1 January 2016.

In this respect, the purpose of this research paper is to offer a real presentation and comparing with the main solvency regulation systems used worldwide, the accent being on their common characteristics and current tendencies. Thereby, we would like to offer a better understanding of the similarities and differences between the existent solvency regimes in order to develop the best regime of solvency for Romania within the Solvency II project.

The study will show that there are clear differences between the existent Solvency I regime and the new approaches based on risk and will also point out the fact that even the key principles supporting the new solvency regimes are convergent, there are a lot of approaches for the application of these principles.

In this context, the question we would try to find the answer is "how could the global solvency models be useful for the financial surveillance authority of Romania for the implementation of general model and for the development of internal solvency models according to the requirements of Solvency II" and "which would be the requirements for the implementation of this type of approach?". This thing makes the analysis of solvency models an interesting exercise.

**Keywords:** International Financial Reporting Standards (IFRS), Minimum Capital Requirement (MCR), Solvency Capital Requirement (SCR), risk management, solvency II.

## 1. Introduction

The outbreak of the current global financial crisis pointed out eminently an increase of the vulnerabilities at the level of insurance systems. Many studies dedicated to the analysis of the current financial crisis underline the fact that one of the major cause that led to its outbreak was presented by the existence of certain weaknesses of the regulation and surveillance frame. So, there is an internationally consensus concerning the revision and rethinking of regulation and surveillance frame of insurance activity, materialized in the approach of the authorities to implement the *Solvency II regime* on 1 January 2016.

The insurance industry is characterized by an inversion of classical business cycle: the insurance companies receive extra pay, representing the remuneration for the services provided, before paying the settlement for damages, namely they are doing their work<sup>1</sup>. The insurance contracts are, basically, the money exchanges for different periods of time<sup>2</sup>. The certitude of the policyholders' contractual obligations, as well as, the incertitude of the frequency and severity of the future settlement requests are different

characteristics of the policies. The law of large numbers is applied in order to estimate this incertitude. As the number of the insured risks increases, the average loss comes closer to the estimated loss and the standard deviation becomes as lower as possible, coming closer to zero<sup>3</sup>.

When the insurance societies invest the raised funds, they are subject to the same risks as the other financial services institutions. Furthermore, they have to face some risks specific to their field of activity as the sub-quotations of extra pays, the wrong calculation of technical provisions, the unpredictable changes of damages' frequency, the improper reinsurance, etc. Finally, they could face up to a series of general risks, common with all types of business: the incompetent or without the honesty management or a defective administration of the development strategies.

The main function of the insurers is to face up to these risks and to administrate them as they could anytime (or at least in many cases) to fulfil correctly and completely their commitments to the policyholders. This capacity of the insurers to fulfil their commitments is known as **solvency**.

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<sup>2</sup> K.J. Arrow, *Essays in the theory of risk bearing*, North-Holland, Amsterdam, 1974.

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According to Merriam-Webster dictionary, **solvency** is the "state of being able to pay debts"<sup>4</sup>. The debts regarding the insurance contracts are the expected requests and the related expenditures. The current value of these commitments, calculated based on the actuarial methods, is only an estimated value in the end.

The basic problem of insurers' solvency could always be expressed by two essential questions: "would the insurer have the necessary financial resources to cover the damages the policyholder could suffer in the future?" and "If yes, would the insurer be able to pay?"<sup>5</sup>. In this context, the purpose of this research paper is to offer a real presentation and a comparison of the main solvency settlement systems widely used, the accent being on their common characteristics and current tendencies. Thereby, we would like to offer a better understanding of the similarities and differences between the existent solvency regimes in order to develop the best regime of solvency for Romania within the Solvency II project.

**2. Materials and method**

**Table1. Analysed models of solvency and types of insurance treated**

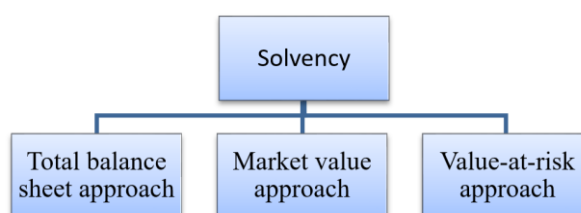
Analysed models of solvency	Types of insurance treated
Solvency I	Life Insurances General Insurances
Financial Services Authority of United Kingdom	Life Insurances With profit Non profit Unit linked Property and Casualty Insurances
Financial Assessment Framework of Netherlands	Life Insurances Unit linked Property and Casualty Insurances
MCCSR for Life Insurance Companies and MCT for Federally Regulated Property and Casualty Insurance Companies of Canada	Life Insurances Property and Casualty Insurances
Swiss Solvency Test	Life Insurances Property and Casualty Insurances Health insurances Reinsurance
	Life Insurances

National Association of Insurance Commissioners of SUA;	Property and Casualty Insurances
	Health insurances
	Reinsurance

**Source: personal overwork of the author**

Following research conducted revealed that there are at least three approaches for solvency determination: total balance sheet approach, market - value approach and Value-at-Risk approach (VAR) for the determination of capital necessity and at least three approaches concerning the solvency measure<sup>6</sup>: winding-up approach, going-concern approach and run-off approach.

**Fig.1 Approaches concerning the solvency determination**



**Source: personal overwork of the author**

The winding-up approach - an insurance society is solvent if the assets performance value is high enough to face up to the exigibility of debts.

The going-concern approach - the society is supposed to continue to subscribe policies in the near future and the solvency is regularly measured during that period;

The run-off approach - stops the insurance societies from subscribing policies for a short period of time (generally, for one or two years). In this case, the incapacity to maintain an excess of assets on debts does not mean that the society is in the impossibility to satisfy the future requests, but there are not enough resources to start a new business. The regulatory authorities often adopt run-off approaches when they evaluate the solvency of insurance societies because their main arm is to stop the societies to subscribe a new policy.

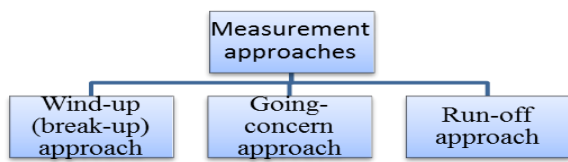
<sup>4</sup> A. Sandstrom, *Solvency II: An Integrated Risk Approach for European Insurer*, Boca Raton: Chapman and Hall/CRC, 2006

<sup>5</sup> J. Bannister, *Insurer solvency still problematic*, Insurance Economics nr.46, July 2002

<sup>6</sup> C.D. Daykin, G.D. Bernstein, S.M. Coutts, E.R.F. Devitt, G.B. Hey, D.I.W Reynolds, P.D. Smith, Assessing the solvency and financial strength of a general insurance company, Journal of the Institute of Actuaries, Nr. 114, 1987, p. 227-310

The glossary project of the Comité Européen des Assurances (CEA) and the Groupe Consultatif Actuariel Européen (Groupe Consultatif) [http://ec.europa.eu/internal\\_market/insurance/docs/solvency/impactassess/annex-c08d\\_en.pdf](http://ec.europa.eu/internal_market/insurance/docs/solvency/impactassess/annex-c08d_en.pdf)

Figure2. Measurement approaches on solvency



Source: personal overwork of the author

The criteria taken into account in the analysis of the solvency models are: the data are taken into account for the determination of capital requirements, the distinction made between (MCR) and (SCR), and the sensitivity of risk profile.

### 3. Result and discussions

In function of the data taken into account for the determination of capital requirements, the models could be classified in:

- static models, based on data from total balance sheet or profit and loss account and
- dynamic models, based on the estimation of future cash flows.

On static models for the determination of capital requirements, it is considered a fixed position, also called accounting base. The accounting base represents either certain positions of the balance sheet or certain positions of the profit and loss account or eventual "risk" positions as the total exposure to corporate assets with AAA rating. The dynamic models are based on estimations of future cash flows.

The static models are based on accounting and could be divided in:

- models based on simple factors and
- models based on risk factors.

The models based on simple factors are also called simple models because they take into consideration a small number of factors from the accounting positions in order to reach the capital requirements. The size of the factors is not necessary calibrated by a certain level of confidence. The current Solvency I regime is an example of simple model based on factors, because, for life insurances it is reaching to capital requirements by the multiplication of mathematical reserves with a factor of 4% (for the unit-linked insurances, the factor is reduced to 1%) plus a factor of 0,3% added to technical reserves in case of death).

The models based on risk factors are the most frequent in the insurance industry. They apply fixed rates to certain chosen accounting positions. The rates are frequently calibrated in order cover the risk assumed at a certain level of confidence.

As both static models apply well-defined factors, we make reference to them as being based on rules. There are clear rules about which positions should be occupied by the factors that are well-determined.

Similarly to static models, based on accounting, the *dynamic models*, based on the estimation of future cash flows, could be divided into *scenario-based models* and *principle-based models*. In the first category, the calculation methodology of solvency is based on the measurement, made by the insurance company, of the impact of some specific scenarios, on the net value of the goods by the estimation of future cash flows. In many cases, these scenarios are clearly defined by the surveillance organisms and, therefore, we make reference to them as a measurement a rules-based risk. Such example could be given by SST model where the insurance companies have to calculate the impact of a significant decrease in proprieties value over the position of net assets. The insurance companies have to quantify the impact of this re-evaluation both over the assets and over its own capitals and debts. The methodology necessary to reach the real/market values of the elements of the balance sheet is specified by the general principles of the assessment. Consequently, we would consider these models as being based on principles only regarding the assets and debts assessment.

In case of *principle-based models*, there were not established risk assessment and measurement rules but the insurance company has to reach, internal models-based, to its own point of view concerning the capital requirements, following certain calculation principles presented by the surveillance body. An example is the requirement provided by the UK-FSA model for the life insurance companies that have to reach individual capital assessment by help of internal models.

Please note that the sub-classification of the models is not exclusive. For example, it is possible that a model is scenario-based in theory and in practice is a static model, with the scenarios converted in fixed or multiplier factors.

Nevertheless, the analysed models of solvency assessment could be classified according to the above-mentioned rule if some of them have to be subdivided within this classification.

However, it is notable that the models of solvency assessment recently elaborated by the regulation and surveillance organisms, as those from Switzerland, Netherlands and Great Britain include the dynamic model, at least for a part of the underwriting risks, in other words they are flexible. The motivation of this fact could be related to the idea that the standards approach, that contains formulas to establish the minimum solvency requirement are difficult to apply, due to the lack of flexibility. For example, the current solvency regime of UK-FSA uses a risk factor based approach to assess the solvency of the activities of general and life non-profit insurance and a dynamic approach based on cash flows improvement to assess the solvency of life profit insurance. Moreover, UK-FSA requires to life insurance societies to develop their own internal models to assess the requirements regarding the capital.

The main disadvantage of dynamic approaches consists in the fact that they require to make serious implementation efforts.

*The models-based solvency adapted to the specific of every company* originate from United States and represent the most motivating approach from

**Table2. Classification of solvency assessment models in function of the data taken into account for the determination of capital requirements**

Analyzed models	Static models		Dynamic models	
	Models based on simple factors	Models based on risk factors	Scenario-based models	Principle-based models
European model	Solvency I			
Financial Services Authority of United Kingdom		UK-FSA – (non life and non profit life insurance)	UK-FSA (with profit life insurance– MCR)	UK-FSA (with profit life insurance - SCR)
Financial Assessment Framework of Netherlands		Netherlands - FTK (underwriting risks)	Netherlands - FTK (financial risks)	
MCCSR and MCT of Canada		Canada (life and P&C insurance)	Canada (life segregated funds and P&C – policy liabilities risks)	
Swiss Solvency Test			Switzerland - SST (asset risk scenarios)	Switzerland - SST (additional scenarios for non life insurance)
National Association of Insurance Commissioners of SUA:		US- NAIC	-US- NAIC (ALMrisks)	
	<b>Rules-based approach</b>		<b>Rules-based for risk measurement and principles based for valuation</b>	<b>Principles-based models</b>

Source: Comité Européen des Assurances (CEA)

In function of the difference made between MCR and SCR, the analysed models of solvency are classified into:

- the models that make the difference, as the NAIC model of United States, and
- the solvency models, recently developed, as: SST model of Switzerland, FTK model of Netherlands and FSA model of Great Britain, that are noticeable because they make this difference, but with different approaches.

The solvency assessment regimes of Great Britain, Switzerland and Netherlands encourage actively the companies to develop their model internal capacities of capital risk within their regime of solvency surveillance.

In SST model, the companies are required to define scenarios specific to the company that has to be investigated. In UK-FSA approach, the life insurance companies are required to develop internal models in order to reach the solvency capital requirement (SCR).

According to the sensitivity of risk profile, the models could be classified into:

- model-based adapted to the specific every company,
- risk-based models – risk based capital (RBC);
- models based on the system of the three pillars – Solvency I, Solvency II

theoretical point of view. According to this method, a few familiar to the European surveillance institutions, being used only in some Nord-American states, Canada, and Australia, the insurance companies have to do a test that simulate possible financial consequences, starting from the hypothesis of some modifications in the negative sense of the assets value, of the capital or of the society's debts. The difficulty, at the same time the major deficiency of this model consists, mainly, in the selection of the scenario of the test, the taken into account risk factors having to be selected and dimensioned with a special attention in order to obtain a precise view of the solvency of the tested company. The subjective nature of the selection of these work hypotheses, as of the choice of the testing period makes this model a few known.

*Risk - Based Capital (RBC)* model large-scale used in United States, was adopted by NAIC for life and health insurance industry for answering to a standard necessity concerning the suitability of the capital considering all risks that every insurer has to face up to during its (technical, investment, commercial, management ) activity. The moderate sum of the values appropriate to every risk represents the minimum capital required to the respective policyholder. New versions of this model are used in Canada and Japan.

Many objections raised by the utilization of this model are related to the difficulty and accuracy in calculation, as the lack of transparency in public that this generates.

*The model based on the system of the three pillars* (SOLVENCY I model) is used in almost all European countries. This system is based on an assembly of three requirements imposed on insurers: proper reserves and assets and minimum imposed margin of solvency. The limits of this approach originated from simplicity, its main quality. Many objections<sup>7</sup> refer to:

- lack of sensitivity to risk: fundamental risks, as credit risk, market risk or operational risk that are not properly taken into account by Solvency I provisions.
- perturbation of well functioning unique markets, and
- non-optimal rules concerning the prudential surveillance of groups: the provisions in force are more and more disconnected from the modality the which the groups are structured and organized in reality.

### 3. Conclusions

In this context, the next years will be neither easy for the insurance companies nor for the surveillance authorities, having into account the fact that clock is ticking to Solvency II nor the twelfth clock coincides with 1 January 2016.

For the efficient introduction of the future solvency model to insurance domain in Romania, there have made the first steps by approving the Strategy concerning the implementation of International Financial Reporting Standards (IFRS) for insurance domain. The IFRS application, by promoting a performing financial management and a corporate governance culture in insurance societies, represent an absolutely necessary premise for the implementation of the optimal conditions of Solvency II.

During the application process of Solvency II Directive, the insurers could choose between the implementation of the standard (general) model, an internal model or a combination between the two.

The standard model is easier to implement and will treat the risks presented by the specialized companies, this approach being more indicated in case of small-size societies. The assessments will be done on risk classes based on analysis, tests and scenarios,

the main risk categories being those resulted in market from the underwriting activity, the operational one or from the non-fulfilment of financial obligations. However, the standard model will not reflect the own characteristics of the company or of the jurisdiction in which this is registered.

However, the internal model involves the identification, measurement and modelling of key components of risk of the insurance companies, as the correlations between these. Giving a high possibility of the specialized companies to establish efficient solutions for risks diminution from costs point of view, will be facilitated the assessment of the capital level necessary to ensure the protection in case of various series of events.

So, the insurers, that have to apply this model, will have the possibility to run more efficiently a business by focusing on domains with high profitability, and will be invested with a high capacity to assess various effects that could not be so easily quantified with the standard model.

The internal models for determining the capital requirements offer a competitive advantage to proactive players that started the implementation of some coherent systems of risk management. The groups have the opportunity to access the efficiency reserves for capital utilization and to develop unitary platforms of solvency management.

The application of European Directive will influence all the operational processes of the insurance industry and by rapid correction of all solvency aspects, the general frame of insurance surveillance will be radically changed, the difficulty of regulation becoming a competitive advantage.

These being the premises, we could consider that Solvency II is the first major strategic project of European insurers and reinsurers.

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