Critical analysis of the European Union solvency model for "non-life" insurance companies: the Portuguese case

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ABSTRACT

This study presents a critical analysis of the current solvency system of the European Union for non-life insurance undertakings and, in particular, the Portuguese case. This model, based on some ratios, presents some weaknesses such as: to modify the obtained result, the insurance companies can lower the solvency margin requirements by changing the numerator or the denominator of the "solvency margin ratio". This paper deals with the manipulation of the denominator, namely through processes of under-rating or under-reserving. This paper discusses some techniques that, theoretically, could be used and put in risk the most important objective of the financial guaranties: the protection of policyholders.

Keywords: non-life insurance, insurance supervision, solvency, technical provisions.

1 – Introduction

In the insurance sector, the production cycle is inverted: the premiums precede the pay-outs, that is to say, the premiums received by the insurance undertaking are previous to the payments of an eventual claim, which are intently transferred to that entity. Due to the inversed productive cycle, a greater need of financial control is necessary, comparing with, for instance, another company in the industrial sector, where the costs precede the profits.

Due to this inversion, the financial control of the insurance companies is primordial relevant to those who transferred their risks or have deposited their savings, in particular long term savings, with retirement intentions. In this fashion, the supervision authorities are preoccupied with the financial solvency of insurances companies in order to protect the policyholders and other creditors.

When we are talking about solvency, we are forced to think on the financial "health" of each undertaking, regardless if it is a bank, an insurance undertaking or an investment firm. Both banks and insurance companies are obliged to report levels of capital in a regular base, depending on each sector. However, the cost of capital is regarded as a superior cost than debt, due to the components that it involves – taxes, asymmetric information, agency costs. This way, entities tend to understand the capital regulation that they are obliged to, which is largely beyond a market discipline, as a regulamentar tax, as Donahoo and Shaffer (1991) refer.

In case of banks, Jones (2000) mentions that to overcome this situation, one could recur to "capital arbitrage regulation", to lower the requirements imposed by the Risk Based Capital (RBC).

This paper intends to identify some procedures that insurance companies apply to diminish the obliged level of solvency, not through capital arbitrage regulation procedures, but by using certain basis of solvency calculation. Even though these issues are being studied in professional bodies (European Commission, international actuarial associations, insurances associations), we cannot find a significant number of academic studies on the subject, as it occurs for the banking industry.

However, some authors have been studying the insurance's solvency theme for large number of years, with a variety of perspectives: Pentikainen et al. (1989), Cummins (1995) or Sutherland-Wong (2004).

Companies in the insurance business are forced to certain risks: technical risks, (different mortality than expected, catastrophic risks, etc.), investment risk (drop in interest, usage of derivatives, etc.), non-technical risks (inadequate management, business risk, etc.) as well as other risks that will occur, in occurrence with a fast pace world changes. Solvency margin, as we understand it nowadays, tries to face some of those risks – if we have no doubt about the inclusion of technical risks in the current system, the same can not be said about investment risk.

With the intention to protect the insurance creditors, insurance's regulators as well as other entities in the insurance business – such as actuarial associations – are studying alternative systems for the solvency problems in insurance undertakings: this project is well known as "Solvency II". A brief reference is made of this new project in this paper: however, this is not the focus of our analysis, but to criticise the current system.

2 – Historical Perspective

The insurance's creditors protection – policyholders and beneficiaries – represent the principal concerns of the authorities of this sector across the world. Taking this in consideration, and with the intent to create one global European market, the European Community issued in the 70´s a directive regarding the activity of the non-life sector, known as "1st directive". Other directives followed, that complemented or modified the first steps on the creation of this market.

With the establishment of every "non-life" directive, surges automatically a "life" directive for the "life" sector. In this paper, we will focus only on the "non-life" insurance undertakings, in other words, we will not emphasize in the "life" directives.

In 1973, the denominated 1st Directive for non-life insurance undertakings came out, in order to eliminate certain divergences among the implemented legislation within member States: up to that date, the creation of a global market in other areas has been already under work, but in the insurance business little has been developed – the only approved directive, concerning the access and exercise of the insurance activity, referred to a concrete situation – the reinsurance – where, in practical terms, the situation was already established.

The mentioned above divergences would have to be eliminated without affecting, in all member States, "the adequate protection of policyholders and beneficiaries". To this effect it was necessary to coordinate the exigencies related to financial guaranties of the insurance undertakings. The first directive expresses in its article 16st that each member State should demand from insurance undertakings with home office in their territory "*to constitute a sufficient solvency margin involving the entire spectrum of its activities"*.

Further more, each insurance undertaking should create sufficient technical reserves, represented by equivalent and congruent assets.

In the 1st non-life directive, the basis of the actual solvency determination system for a non-life insurance undertaking were already incorporated in the "financial guaranties" that included not only the "solvency margin" but technical provisions (previous technical reserves) and a guarantee fund, subject to a legal minimum.

Various other directives modified this directive; however, regarding the composition of the solvency margin, the amendments were not significant, and were limited to the introduction of new elements considered insurance companies capital for effects of the solvency margin. Already in the new millennium, certain threshold amounts were actualised, to face inflation in the last thirty years.

The 1st directive was changed in 1992, through the 3rd non-life directive. Those alterations were related with susceptible elements to be used in the composition of solvency margin already demanded in the 1st directive (by completion of element's list). This directive also included the rules for diversification, localisation and congruency of the technical provisions assets. These provisions have been the object of a certain harmonisation through the Directive 91/674/CEE related to individual and consolidated insurance companies accounts.

Already in 2002, the expected cap values of the margin calculation were actualised to face inflation, as well as the minimum amount of the guarantee fund. To avoid substantial and abrupt increases in the minimum guarantee fund in the future, a mechanism was established to preset an increase according to the consumers' price index in the European Union. Some rules were also introduced to anticipate an intervention of supervision authority in specific cases, where the policyholders could be under threatens.

3 – The European Union's solvency margin model

The current European Union solvency model contemplates three dimensions:

1 – Technical provisions (*PT*) covered with adequate assets (*InvPT*)

2 – Required Solvency Margin (*RSM*) covered by equity capital and other equitable elements (*ASM*)

3 – Guarantee fund (*FG*), subject to legal minimums, covered by equity capital (*CP*)

If

$$\sum \mathrm{PT} \leq \sum \mathrm{InvPT}$$

$$\mathrm{RSM} \leq \mathrm{ASM}$$

and

$$CP \geq \max \begin{cases} FG \geq \frac{1}{3} \max\left(RSM, ASM\right) \\ 3\,000\,000 \text{ €} \text{ for classes 10 to 15} \\ 2\,000\,000 \text{ €} \text{ for other classes} \end{cases}$$

then, the insurance undertaking comply with all three requirements and can affirm, within a certain level of confidence, that the undertaking is financial healthy.

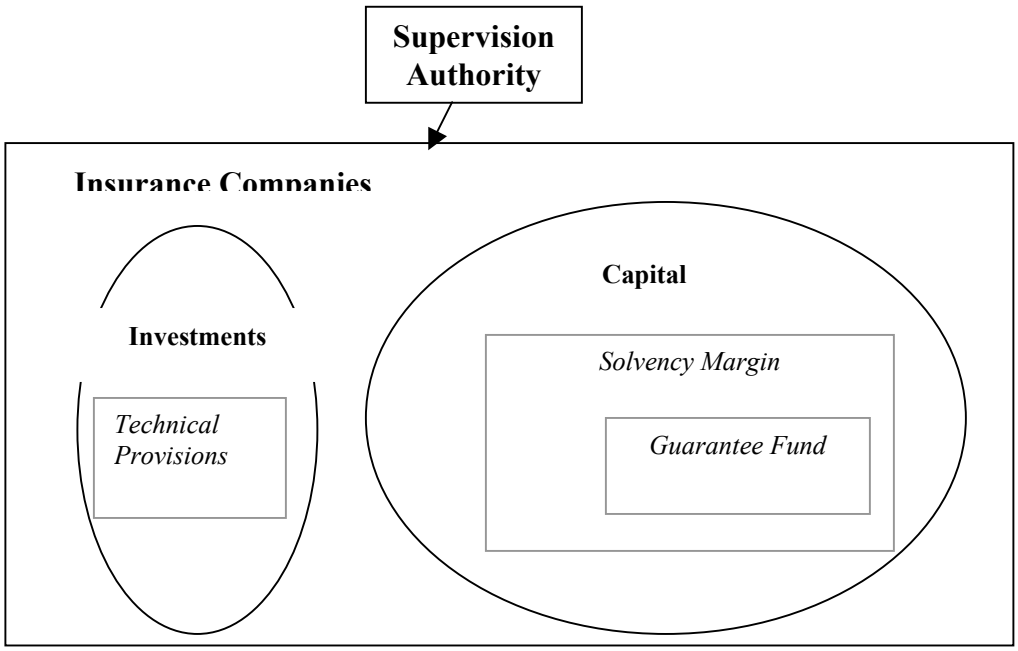


Figure 1- European Union supervision model (*insurance companies individually considered)*

Rewriting the same conditions mentioned above in a ratios format, we would have:

Ratio 1) – Technical provisions ratio

$$\frac{\sum InvPT}{\sum PT} \geq 100\%$$

Ratio 2) – <u>Solvency margin ratio</u>

$$\frac{ASM}{RSM} \geq 100\%$$

Ratio 3) – Guarantee fund ratio

Sectors 10 a 15	Other sectors
$\frac{CP}{\max(\frac{1}{3}MS, 3.000.000€)}$	$\frac{CP}{\max(\frac{1}{3}MS, 2.000.000€)}$

Technical provisions are calculated according to methods and techniques described in the Directive related with the insurance companies' individual and consolidated accounts already referred above. These provisions shall, at any time, be sufficient to cover any occurring compromise with the insurance´ polices within reasonable expectancy.

These provisions should be correctly covered with sufficient and congruent assets, from legal nature and subject to some limits. Insurance companies should also have a sufficient solvency margin related with their entire business. At last, we have the guarantee fund, as an integrated part of the solvency margin, corresponding to one third of its value, subject to minimum limits. If insurance companies do no comply with the legal impositions, they will be subject to some measures (recuperation plans, …), imposed by the supervision authority of the respective member State. If insurance companies do not comply with these measures, the consequences can extend to authority suspension to explore new classes of insurance and, eventuality, the cancellation of the entire activity.

Besides the determination of the individual insurance undertaking's solvency level, if the undertaking is part of an insurance group, it is automatically subjected to further supervision to insert levels of solvency as a group, regardless to its individual supervision, as companies without individual supervision control (reinsurers, assistance firms, insurance undertakings located in third countries) can be part of those groups.

Not only in the European Union, but also worldwide, we can observe undertaking's merges and other liaisons, not only in the insurance business but also in the bank and other financial business that provide complementary services – the well known financial conglomerates. Also in these situations, we shall proceed to a complementary analysis for the conglomerate solvency, in order to avoid double or multiple gearing situations or to control certain intra-group operations that can put in danger the group's financial health.

3.1 - The Portuguese case

The European directives lay down minimum standards for non-life insurance undertakings solvency margin requirements. European Union State-members are able to lay down stricter rules for undertakings authorised by their own competent authorities. In Portugal, the supervisory authority for the insurance sector is the Instituto de Seguros de Portugal (ISP). The model set up in the directives is closely followed, reason for which it is possible to specify with the Portuguese case. According to the Portuguese legislation, the insurance undertakings shall present the following financial guaranties in order to pursue the business activity:

- Technical provisions
- Solvency margin
- Guarantee fund

ISP supervises the activity of insurance undertakings with head offices within Portugal and branches established in Portugal with head offices outside the European Union, giving special relevance to the supervision of financial guaranties. It also supervises pension funds and insurances brokers.

3.1.1 - Required and available solvency margin

Every insurance undertaking whose head office is in Portugal is required to have an adequate solvency margin in respect to its entire business at all times. We can distinguish two different concepts:

- required solvency margin (RSM)
- available solvency margin (ASM)

The required solvency margin is related with the activity of the undertaking and it is determined on the basis of either the annual amount of premiums or contributions, or the average burden of claims for the past three financial years.

According to the Portuguese legislation, the calculation of the required solvency margin for non-life insurance undertakings is described in the following model:

<u>1st method</u>

$$P = \max \{PBE, PABR)$$

$$\text{if } P < 50.000.000 \text{ €} \quad MSr0 = P \times 18\%$$

$$\text{if } P \geq 50.000.000 \text{ € we shall have}$$

$$MSr0 = 50.000.000 \text{ €} \times 18\% + (P - 50.000.000 \text{ €}) \times 16\%$$

$$MS1 = MSr0 \times RRess$$

$$\text{where } RRess = (CSinBru - CSinLiq) / CsinBru$$

$$RRess \geq 50\%$$

Note: Regarding classes 11 – Aircraft Responsibility, 12 – Maritime Liability (sea, lake and river and canal vessels) and 13 - General Liability, PBE and PABR will be increased by 50%. With the approval of the ISP, statistical methods may be used to allocate premiums or contributions to these classes.

2nd method

$$CS = (CS_{t-2}, CS_{t-1}, CS_{t}) / 3$$

or

$$CS = (CS_{t-6}, CS_{t-5}, \ldots, CS_{t}) / 7 ,$$

(in case of underwrite of catastrophic policies, risk of credit, storm, hail or frost)

$$\text{if } CS < 35.000.000 \text{ €}, \quad MSr1 = CS \times 26\%$$

$$\text{if } CS \geq 35.000.000 \text{ €, we shall have}$$

$$MSr1 = 35.000.000 \times 26\% + (CS - 35.000.000 \text{ €}) \times 23\%$$

$$MS2 = MSr1 \times RRess$$

$$RRess \geq 50\%$$

Note: In respect of classes 11 – Aircraft Responsibility, 12 – Maritime Liability (sea, lake and river and canal vessels) and 13 - General Liability, PBE and PABR will be increased by 50%. With the approval of the ISP, statistical methods may be used to allocate premiums or contributions to these classes.

Legend:

PBE – gross written premiums
PABR – gross earned premiums
P - considered premiums for solvency margin calculation
MSr0 - solvency margin obtained using the premiums method, without any reinsurance deduction
MS1 - solvency margin obtained using the 1st method
MSr1 - solvency margin obtained using the claims method, without any reinsurance deduction
MS2 - solvency margin obtained using the 2nd method
RRess - reinsurance ratio
CSBru – gross claims incurred
CSLiq – claims incurred, net of reinsurance
CS - claims to consider in margin calculation
CS_t – claims incurred of the exercise t
PS – provision for claims outstanding, net of reinsurance

The amount of the required solvency margin for non-life insurance undertakings in year t ($RSMNL_t$) shall be

$$RSMNL_t = \max (MS1, MS2)$$

if $RSMNL_t < RSMNL_{t-1}$

then the required solvency margin will be:

$$RSMNL_{t-1} \times RPSin$$

where

$$RPSin < 1$$

and

$$RPSin = \frac{PS_{finalt-1}}{PS_{beginningt-1}}$$

where

$PS_{final\ t-1}$ – amount of technical provisions for outstanding claims at the end of the last financial year

$PS_{beginning\ t-1}$ - amount of technical provisions for outstanding claims at the beginning of the last financial year

The available solvency margin corresponds to the assets of the insurance undertaking free of any foreseeable liabilities, less any intangible items. These assets are allocated to three different categories:

Table 1

Assets considered in the available solvency margin

Categories	Elements	Restrictions
1st category	a)paid-up equity capital b) reserves c) profit or loss brought forward after deduction of any dividend to be paid	*The ASM shall be reduced by the amount of own shares directly hold by the insurance undertaking*
2nd category	a) cumulative preferential equity capital and subordinated loan capital b) securities with no specified maturity date and other instruments	*up to 50% of min{ASM, RSM}*
3rd category	a) one half of the unpaid equity capital b) hidden net reserves arising out of asset valuation of assets	*subject to approval by the ISP*

As it was previously referred, the required solvency margin shall be properly covered by the elements considered for the available solvency margin's calculation, obeying to the solvency margin ratio

$$\frac{ASM}{RSM} \geq 100\%$$

It should be noticed that, for most Portuguese non life insurance undertakings, this ratio is far above one hundred per cent, as shown in table 2.

Table 2
Solvency margin ratio

millions of euros

	RSM	ASM	Ratio
	(1)	*(2)*	*(3) = (2) / (1)*
1999	210	600	280%
2000	207	490	224%
2001	250	420	170%
2002	190	490	168%

3.1.2 - Technical provisions

The Portuguese non-life insurance undertakings shall provide and maintain the following technical provisions:

- Provision for unearned premiums
- Provision for unexpired risks
- Provision for outstanding claims
- Equalization provision
- Provision for bonuses and rebates

The provision for outstanding claims is, as it was previously referred, the basis for

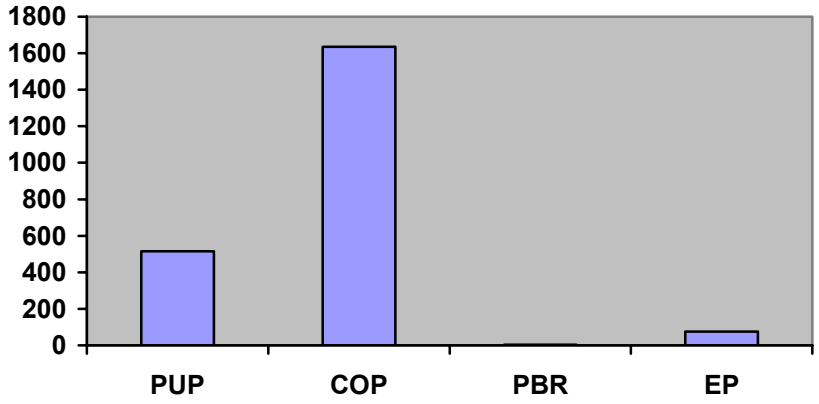
the calculation of the required solvency margin. It corresponds to the total estimated costs for settling all arising claims from any event which have occurred up to the end of a particular financial year, whether reported or not, less the amount already paid respecting those claims. The provision shall, in principle, be computed separately for each claim.

However, the ISP may use statistical methods, subject to prior approval. This provision includes the incurred but not reported (IBNR) claims up to the balance sheet's date. Claim settlements' costs are included in the provision's calculation.

The provision for outstanding claims is the largest in the global amount of Non-Life insurance undertakings technical provisions.

Chart 2

Technical provisions of Portuguese non-life insurance undertakings - 2002



Legend:

PUP - Provision for unearned premiums
COP - Provision for outstanding claims
EP - Equalization provision
PBR - Provision for bonuses and rebates

Matching assets shall cover technical provisions. They shall take in account the type

of business carried by the insurance undertaking as well as to provide assurance, yields and marketability of its investments. The insurance undertaking shall assure that investments are diversified and adequately spread, in accordance to ISP rules.

Law and enforced rules by the ISP establish the assets categories in which technical provisions can be applied. Each category is subjected to some constraints, according to the risk it may represent to the portfolio of an insurance undertaking (for instance, an insurance undertaking shall not place its investments in more than 10% of its total gross technical provisions in any one piece of land or building).

In Portugal, bonds and debt securities constitute the main assets covering the technical provisions. Equity represents only 6% of the portfolio of non-free assets.

Table 3
Assets covering the technical provisions
Non-life insurance undertakings - 2002

Debt securities	27 %
Bonds and commercial paper	23 %
Land and buildings	16 %
Shares and other variable yield participations	6 %
Other assets	28 %

These assets are valued on a market value basis. Derivative instruments, such as options, futures or swaps may only be used, so far as they contribute to a reduction of the investment risk or to facilitate portfolio management efficiency.

3.1.3 – Guarantee fund

The guarantee fund is constituted by one-third of the required solvency margin. However, it cannot be less than two million euro and, if risks are involved in classes 10 to

15 (liabilities), it shall be minimum three million euro. One cannot use unpaid equity capital to cover the guarantee fund.

4 - Critical analysis of the model

As it was already referred, the model focuses on three fundamental issues:

1 - technical provisions covered by matching assets

2 – required solvency margin covered by available solvency margin

3 – guarantee fund covered by some constringency of the available solvency margin

The solvency ratio shall present a result equal or superior to 100%, so that the undertaking is considered solvent. To modify the obtained value, the insurance undertaking can try to manipulate either the numerator's ratio, by increasing the considered elements for the available solvency margin or to manipulate the denominator's ratio, by reducing the value of the required solvency margin. We will concentrate ourselves with the second option, the denominator.

Several situations can be identified. Without being exhaustive, we will illustrate some of them:

- calculation rules for technical provisions
- representation of technical provisions
- basis of calculation for the required solvency margin
- reinsurance deduction

1st issue:

The rules of calculation for technical provisions in the European Union are not completely harmonized. The provision for outstanding claims, included in the item "claims incurred ", which is the basis for the required solvency margin calculation (2nd method), is calculated based on the estimated costs of claim settling. This situation can lead to different claim cost's evaluation, which will be the basis of the solvency margin calculation. A most careful insurance undertaking will be predisposed to over-evaluate its responsibilities, where a hidden reserve can even be created. For those insurance undertakings that want to present a greater level of profits, they will have a propensity to establish less rigid rules for this provision calculation (under-reserving).

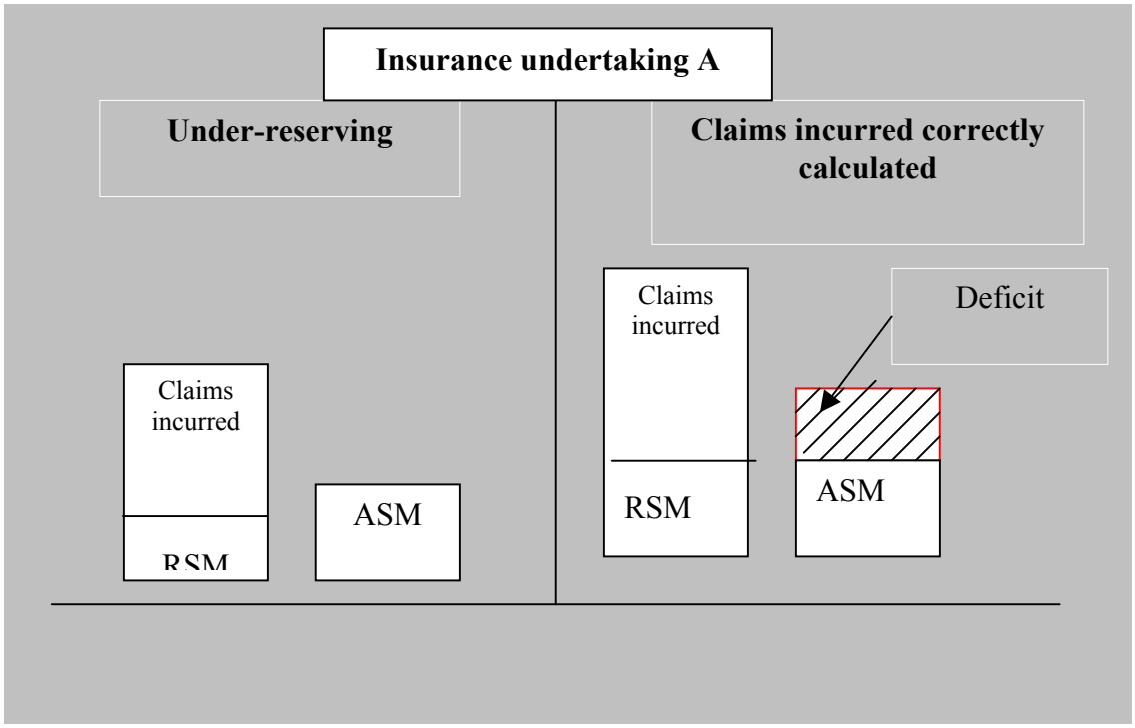


Figure 2 - Under-reserving

An example: the over-passage for peasants of a certain national road fell down,

provoking several injuries, destruction of vehicles and sifters of the public road. Which will be the amount of the provision for outstanding claims resulting from this accident? Several classes of insurance are involved: accidents (injury to passengers), civil liability of the engineers that have projected the over-passage, automobile insurance, and so on!

Provisions are estimated values, they will depend on the internal rules of each of insurance undertaking and on the own perception of the involved experts! Let us multiply this case for 1000, 1.000.000, for several millions of insurance policies. The provision for outstanding claims of the insurance undertaking A, with similar risks to the undertaking B, can assume values well differentiated! It is not to understate the fact that the provision for outstanding claims assumes the largest relevant responsibility of a non-life insurance undertaking, as it was previously demonstrated.

2nd issue

The technical provisions shall be properly covered by assets, diversified and adequately spread according to the law. Related with the first issue, the following situation takes place: the insurance undertakings A and B present, in their balance sheet, the same level of liabilities. However, if the undertaking B is in a under-reserving situation, it will need, according to prudential rules, the same amount of assets to cover the technical provisions than the undertaking A, which is in this case more prudent. Here we have another paradoxical situation!

Despite the fact that, in both cases, the ratio "Investments / technical provisions" is superior to 100%, the assets of the insurance undertaking B wont be enough to cover the technical provisions, since they do not represent the real liabilities of the undertaking.

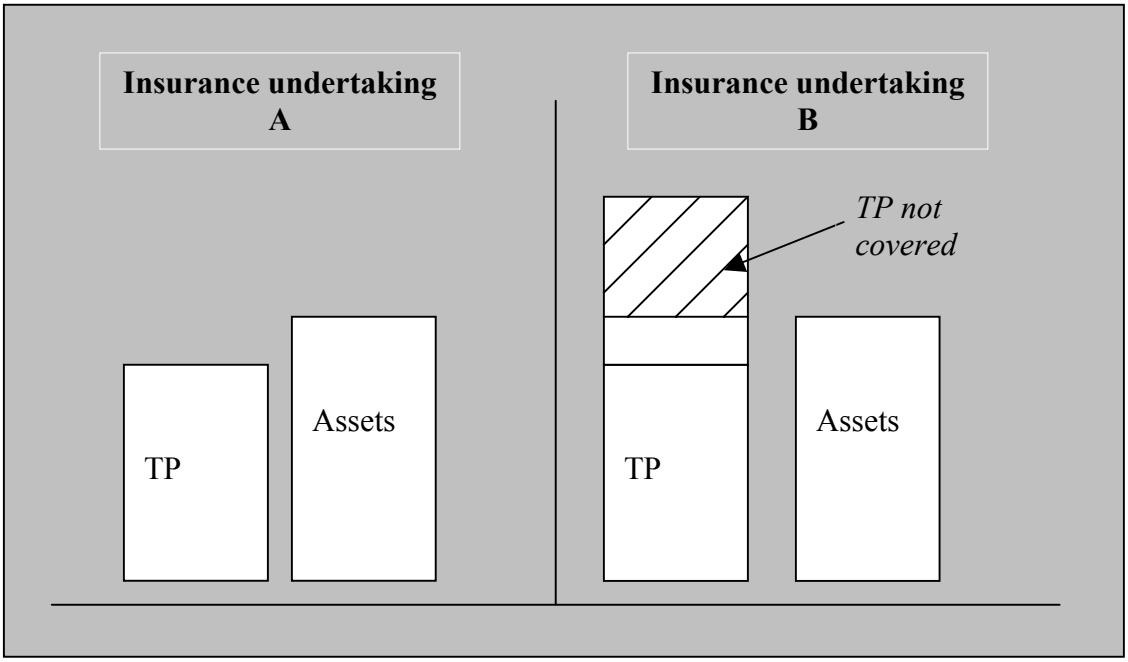


Figure 3 – insufficient assets

Legend:
TP – technical provisions
Assets – assets covering TP

3rd issue:

According to the first method, the solvency margin is calculated based on premiums. Here, the problem is alike the one presented in 1st issue: if the undertaking A presents prices below the expected cost (under-rating), it will present the same required solvency margin as undertaking B, whose tariffs are correctly calculated and applied. It is obvious that the claim's risk of undertakings A and B are not the same.

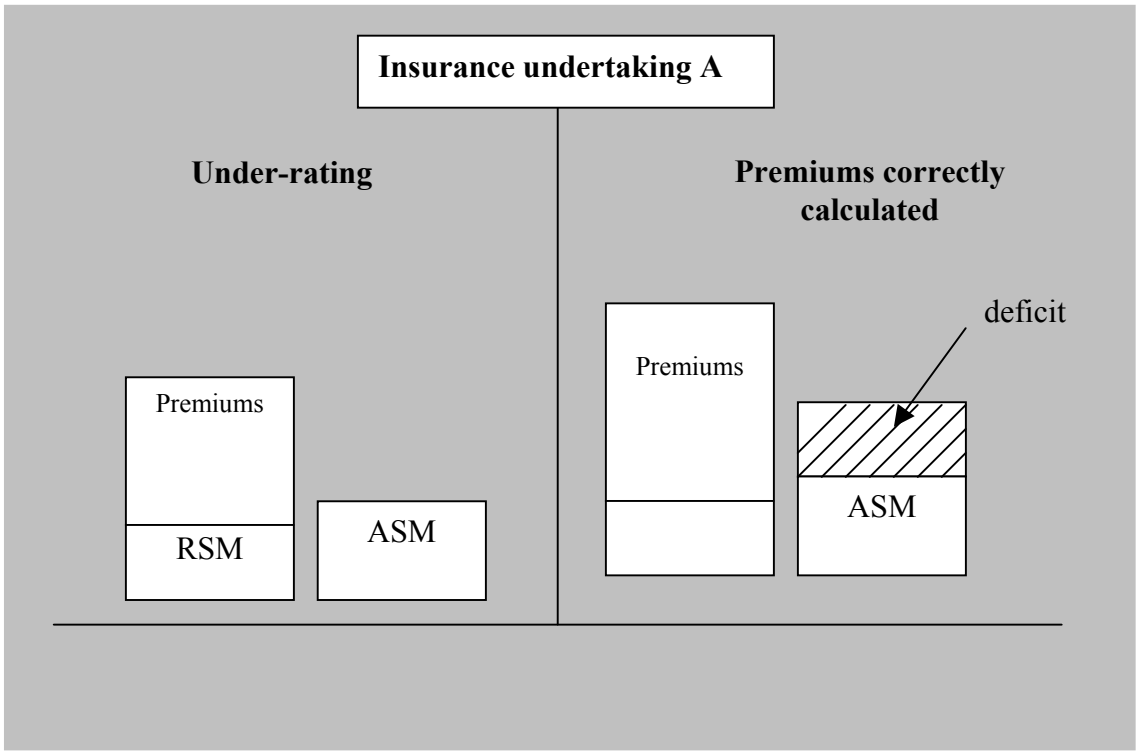


Figure 4 - Under-rating

4th issue:

Non-life insurance undertakings can reduce their solvency margin - 50% maximum deduction – based on reinsurance. The undertakings reinsurance programs are not equal. The quality and type of reinsurers, for which the risk will be transferred, shall be checked, to verify if an accurate transfer of the risk took place. Will it be the case, for example, for financial reinsurance?

However, this problem was considered in the amendments of the 1st and 3rd directives, in 2002, by introducing a clause that allows the intervention of the supervision authorities, to impose alteration (decreasing) in the reduction of the reinsurance ratio, when the nature of the reinsurance contracts have been altered substantially from one exercise to one other or if the transfer of risk is inexistent or insignificant.

5 - Solvency II

The solvency margin, as it is actually enforced in the European Union, does not take in account all the identified risks. This situation has been concerning the experts for several years. The rules of solvency margin calculation have brought positive results up to now, with relatively low number of insolvencies in the insurer sector all over Europe. However, the context has suffered relevant changes and the need to verify if these rules should continue to respond in the future became an imminent subject. Experts have felt that it should be necessary to adapt them and to create new ways to deal with certain risks that were not contemplated in the old system.

In May 2001, a new task field was initiated, the so-called "Solvency II" project, which brings up a fundamental review of insurance's regulation. The main objectives of this project are (a) to formulate a more up-to-date picture of the risks that European firms have been facing and (b) evaluate how supervisors might respond to these risks.

"Solvency II" presents a fundamental and wide-ranging review of the current regime in the insurance developed environment, risk management, finance techniques, financial reporting, etc. One of the key objectives of "Solvency II" is to establish a solvency system that better matches the true risks of an insurance undertaking. As well as in the banking industry (Basel Accord), insurance undertakings will have a "three pillar" approach (IAA, 2003):

1st pillar – minimum financial requirements

2nd pillar – supervision review process

3rd pillar – measures to foster market discipline

A three pillar approach is justified by the complexity of the insurance system. The first pillar comprehends:

a) appropriate technical provisions

b) appropriate assets supporting for obligations

c) a minimum capital amount

The second pillar appears in addition to the first pillar, because not all types of risk can be adequately assessed through solely quantitative measures. It encourages insurers to develop and to better use risk management techniques. The third pillar strengthens market's discipline by introducing disclosures requirements.

6 - Conclusions

This paper presents some weak points of the European Union solvency system for non-life insurance undertakings. We think it can contribute to the current discussion on solvency of insurance undertakings, as we highlight some forms of changing the required solvency margin perceived by supervisors and others interested in this matter as well, namely through under-rating or under-reserving processes.

This solution is possible, assuming the calculation of the required solvency margin, which is based on ratios and too much prescriptive, allows the undertakings to "shape" the system. Subsequently, it can be defended that the composition of the solvency margin should be based on principles and not on ratios previously defined – however, we are facing the risk of moving away from an undergoing harmonization of a composed 25 countries' Europe, since May 1, 2004, and with the option of future adhesions.

The European system for the composition of the solvency margin for non-life insurance undertakings was projected more than thirty years ago, in 1973, with the so-

called “first directive”. In 1992, with the “third directive”, the rules remain almost the same. Only in 2002, a directive regarding the solvency margin requirements for non-life insurance undertakings made some substantial changes (for example, increasing the minimum guarantee fund and the calculation’s thresholds to take in consideration the ongoing inflation).

Besides these changes, however, a new project come into sight – the “Solvency II” project, with the intention of establishing a new solvency system for better suiting the risks that insurance undertakings are faced with.

Any solvency system, which is now being studied or that will appear in the future, shall take in account, above all, *the protection of the policyholders and promote a safe and efficient market*.

As future research, we propose the study of internal models that can be applied to any insurance undertaking, especially for those who are not so well prepared to develop their own internal models, and the study of copulas, to take in account the dependencies between risks.

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