

The valuation of insurance liabilities under Solvency 2

Introduction

Insurance liabilities being the core part of an insurer's balance sheet, the reliability of their valuation is the very basis to assess the solvency position of an insurance company. This is true under the current Solvency 1 regime, but may deserve even more attention in the future Solvency 2 regime. Reasons for this are at least twofold:

- First, the whole balance sheet approach implies that own funds eligible to cover the capital requirements are obtained by deducing insurance liabilities from the value of assets - valued at market value. Every single change in the valuation of insurance liabilities will therefore directly impact the level of eligible own funds, and therefore the solvency position of a company;
- Second, one of the very first purposes of Solvency 2 is to encourage insurance and reinsurance entities to reach a better knowledge of their risks and liabilities. To meet the requirements set by the new solvency framework, many entities will therefore have to upgrade their technical skills and resort to more sophisticated methods as far as the valuation of insurance liabilities is concerned. The corresponding assumptions and the relevancy of the methods used in this purpose will have to be considered very carefully in the supervising process, especially during the transition period.

1. Overall principles on technical provisions valuation

The current directive text states that all “liabilities shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.” (Art 74)

In particular, concerning insurance liabilities, three main valuation principles are set (Art 75):

- “The (...) value of technical provisions shall (...) correspond to the current amount insurance and reinsurance undertakings would have to pay if they were to transfer their insurance and reinsurance obligations immediately to another insurance or reinsurance undertaking” ;
- “The calculation of technical provisions shall make use of and be consistent with information provided by the financial markets and generally available data on

- insurance and reinsurance technical risks” – namely the market consistency principle;
- “Technical provisions shall be calculated in a prudent, reliable and objective manner.”

The theoretical framework for the valuation of technical provisions is therefore the Transfer Value Approach between knowledgeable and willing parties. Once this overall scheme is set, the level 1 directive becomes more specific in prescribing the technical basis for the valuation of technical provisions.

The underlying idea is that insurance liabilities have to reflect both the mean expected value of payments to policyholders and the uncertainty attached to it. These two elements will constitute the two parts of technical provisions, namely the Best Estimate in the one hand and the Risk Margin in the other hand.

2. Overall principles on best estimate valuation

The Best Estimate is the core part of technical provisions. Its definition is given by the directive text : “The best estimate shall be equal to the probability-weighted average of future cash-flows, taking account of the time value of money (expected present value of future cash-flows), using the relevant risk-free interest rate term structure” (Art 76).

As far as granularity is concerned for this calculation, “insurance and reinsurance undertakings shall segment their insurance and reinsurance obligations into homogeneous risk groups, and as a minimum by lines of business, when calculating their technical provisions” (Art 79). The lines of business which are referred to here are defined in the level 1 text. Insurance companies do however have there some flexibility in their calculation as homogeneous risk groups are not explicitly defined and will probably have to be considered on a case by case basis for each insurance company.

Firstly, the best estimate definition implies that every insurance of reinsurance company should be able to project all cash flows required to settle the insurance obligations over the lifetime thereof. A projection horizon which is long enough to capture all material cash flows arising from the contract or groups of contracts being valued should therefore be used. However, if the projection horizon does not extend to the term of the last policy or claim payment, the use of a shorter projection horizon is possible, as far as the firm ensures that this

does not significantly affect the results.

These expected cash-flows should be based on assumptions that are deemed to be realistic for the book of business in question, i.e. each element sampled from a distribution believed to be reasonable and realistic with regard to all information available. Assumptions should be based on a participant's experience for the probability distributions for each risk factor, but taking into consideration market or industry data if its own experience is limited or not sufficiently credible.

Two key elements will therefore be needed to properly value technical provisions under the Solvency 2 framework: adequate methods of course but also adequate data. The example of life participating business clearly illustrates this. Although simple to enunciate, the "all cash flows projection" principle may indeed prove not straightforward to implement for this type of contracts. The new valuation framework may require the use of stochastic methods and/or full internal models to calculate technical provisions. Where needed, the implementation of these techniques is likely to be challenging both for insurers – who will have to implement appropriate statistical methods – and for supervisors, who will have to audit them. For these same contracts, the data issue emerges when it comes to model lapses for instance: which company can pretend to have lapse data which would be adequate to most market conditions? These issues will be dealt with more precisely when considering in the next section which cash flows will have to be included in the Best Estimate.

The second part of the Best Estimate definition implies that all projected cash flows will have to be discounted using a risk free curve. Discounting liabilities will be a cultural shift for many entities, especially in non-life business. A technical – though important – question also remains here, being the definition of the adequate risk free curve. This issue will have to be set by the implementing measures of the directive text. Ideally, the risk free rate curve will have to guarantee a level playing field among entities of all currencies and should be objective, so as not to raise any technical issues when implemented.

As far as technical provisions are concerned, the solvency 2 balance sheet is driven by a key principle. The level 1 directive text requires the Best Estimate to be calculated gross of reinsurance, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles. The whole insurance liabilities towards policyholders will therefore

have to be reported on the liabilities side of the Solvency 2 balance sheet. The expected recoverables will be reported separately on the assets side. Another novelty appears here in the solvency balance sheet as recoverables will have to be adjusted to take account of expected losses due to default of the counterparty. Practically speaking, this adjustment is required to “be based on an assessment of the probability of default of the counterparty and the average loss resulting therefrom (loss-given-default)”. (Art 80)

The calculation of recoverables within the principle set above appears to be quite a challenging area for companies in the valuation of technical provisions, on a technical point of view. Non-proportional reinsurance cash flows may indeed be quite difficult to single out in some cases. This issue will deserve special attention for both insurance entities and supervisors.

3. Which cash flows will the Best Estimate have to take into account?

The Best Estimate will firstly have to include all payments to policyholders and beneficiaries which insurance and reinsurance undertakings expect to make, **whether or not these payments are contractually guaranteed**. In particular, in life business, these expected payments shall include all future discretionary benefits the insurer expects to pay to policyholders, which is probably one of the main changes with respect to the content of technical provisions, from Solvency 1 to Solvency 2.

The valuation of future discretionary benefits also proves to be one of the most challenging parts of the best estimate calculation, as it is directly linked to the expected return on investments in the following years. Moreover, financial options are most often embedded in policyholders’ benefits, through contractual or legal minima. In this respect, it is explicitly required that “when calculating technical provisions, insurance and reinsurance undertakings shall take account of the value of financial guarantees and any contractual options included in insurance and reinsurance policies” (art 78). In life business, these options will have to be valued taking into account policyholders’ discretionary choice to surrender, which are themselves often linked to market conditions...

Apart from these valuation issues, the calculation of discretionary benefits is also an area where consistency is likely to be quite challenging to achieve between insurance companies

from different jurisdictions and even within a single country. This area will therefore deserve specific care and guidance from supervisors to ensure reliability of life technical provisions and level playing field between insurers. Assumptions made by companies on investment returns and policyholders' behaviour will be two key issues in this respect.

Once all expected cash flows between the insurance company and policyholders have been modelled and valued, "all expenses that will be incurred in servicing insurance and reinsurance obligations" (art 77) will then have to be included in the best estimate. In that perspective, all future administrative costs, including investment management, commissions, claims expenses and an appropriate amount of overheads (costs not readily traceable to specific segmentation, function or process) should be considered.

When estimating all these future cash-flows, best estimate will finally have to take into account inflation. Companies will basically have to consider three layers of inflation: economic inflation expectations first, their own expenses inflation then and lastly claims inflation. This last component, which may stem from moves of jurisprudence – this would often be the case in disability compensation for instance – will deserve specific attention as best estimate may be quite sensitive to the corresponding assumptions.

Lastly, the question of which cash-in flows – i.e. future premiums linked to existing contracts – are to be taken into account in the best estimate calculation is to be considered, and is still open at the moment. This area deserves very careful attention from supervisors as including future premiums in the balance sheet – and of course the corresponding liabilities – is bound to decrease in most cases the amounts of technical provisions, and conversely increase available own funds. This own funds increase would basically be equal to the value of expected margins on these future premiums. Precise criteria will therefore have to be set in the implementing measures to define which future premiums should be included in the solvency balance sheet and which ones should not.

4. Market consistency and replicability

As said before, the default method to calculate technical provisions is to value separately a best estimate and a risk margin. In some specific cases however, this separate valuation may not be required. This would be the case when future insurance cash flows can be replicated

using financial instruments for which a reliable market value is observable. The value of technical provisions associated to these cash flows would then be the value of those financial instruments. The principle behind this valuation method is market consistency, which implies here that the value of insurance cash flows that could be perfectly replicable with a portfolio of traded financial instruments, taking into account the uncertainty in amount and timing of the payments, should not be different from the market value of this portfolio.

Such insurance cash flows, also referred to as hedgeable cash flows, are however bound to be quite rare as most contracts do contain an insurance risk which is currently not traded on deep and liquid markets. All other cash flows –the vast majority of them – will be considered not replicable as far as they contain non hedgeable financial or non-financial risks. Non hedgeable financial risks include, for instance, embedded financial options and guarantees in life insurance contracts that are not traded on a financial market, risks where the duration exceeds a reasonable extrapolation from durations traded on the financial market, traded financial instruments that are not available in sufficient quantities etc.

For all these non replicable insurance portfolios, a risk margin calculation will have to be computed.

5. The Risk Margin

As mentioned previously, the main idea driving the calculation of a Risk Margin above the Best Estimate is to allow for the uncertainty contained in the valuation of this Best Estimate. Technical provisions will in the end be the sum of these two components: Best Estimate plus Risk Margin.

Consistently with the transfer value approach set for the valuation of all liabilities, the directive text states that “the risk margin shall be such as to ensure that the value of the technical provisions is equivalent to the amount insurance and reinsurance undertakings would be expected to require in order to take over and meet the insurance and reinsurance obligations.” (Art 76)

Though several approaches have been considered to compute the calculation of the risk margin, like the percentile method for instance, the method chosen in the end is the Cost of

Capital approach. The risk margin is therefore defined as follows : “the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the Solvency Capital Requirement necessary to support the insurance and reinsurance obligations over the lifetime thereof.” (Art 76)

Another way to consider this is the following: insurer A transfers part or all of its insurance obligations to another insurer B and compensates B with assets. The value of these assets equals the technical provisions for the transferred obligations, *i.e.* the sum of best estimate and risk margin. The part of the assets which corresponds to the risk margin is used by the undertaking B to finance an amount of own funds that covers the capital requirement (SCR) for the transferred obligations.

Practically speaking, to calculate the risk margin for a given line of business, a company will have to compute the following steps:

- 1° Calculate the solvency capital requirement (SCR) for this line of business at the valuation date, but also, in a run-off perspective, for all the following years;
- 2° Multiply each of the amounts obtained in step 1 by a Cost of Capital factor, which is an estimation of the cost to raise new capital. This factor is currently set at 6 % above the risk free rate. If this absolute figure might not be set forever, it is however requested to be the same for all insurance and reinsurance companies across Europe;
- 3° Discount all the amounts obtained in step 2 using the risk free term structure;
- 4° Sum the amounts obtained at step 3.

The implementation of this is in reality slightly more complex as the capital requirements projected in the first step are not exactly equal to the SCR which would be requested for the line of business using the standard SCR formula. Some risk factors may indeed be reconsidered to avoid double counting between the best estimate and the risk margin. In particular market risk has been excluded from the Cost of capital risk margin in the last quantitative impact study (QIS4), as it has been considered that the cost of financial options and guarantees would be valued twice, in the best estimate and then in the risk margin.

Independently of these technical issues, one noticeable innovation in the Cost of Capital Risk Margin is that it directly links the level of technical provisions of a given insurance portfolio with the level of capital (SCR) required for the corresponding activity. From a supervisor

point of view, it means that it won't be possible to assess the sufficiency of technical provisions independently of the solvency capital requirement calculation. This emphasizes the need for a reliable SCR standard formula, which structure, set in the Level 1 directive text, will also be detailed in the Level 2 and Level 3 implementing measures.

Lastly, as insurance portfolios can be transferred separately, a risk margin has to be calculated for each lines of business. No diversification effect between lines of business is recognised in this perspective.

6. Statistical methods and data

Even if most insurance companies currently rely on statistical methods to value their technical provisions in most lines of business under Solvency 1, the legal starting point to value technical provisions often remains case by case approach valuation.

Solvency 2 appears to reverse priorities here, stating that the statistical approach is the default method to value technical provisions. This valuation will have to make use of and being consistent with all information provided by the financial markets and generally available data on insurance and reinsurance technical risks – requirements which aim to ensure the market consistency of technical provisions.

As a fallback option, it is acknowledged that “where, in specific circumstances, insurance and reinsurance undertakings have insufficient data of appropriate quality to apply a reliable actuarial method to a set or subset of their insurance and reinsurance obligations, [...] appropriate approximations, including (...) case-by-case approaches, may be (...) used in the calculation of the best estimate.” (Art 81).

Supervisors are there explicitly entitled by the level 1 directive text to ensure that insurance and reinsurance undertakings have internal processes and procedures in place to guarantee the quality and appropriateness of the data used in the calculation of their technical provisions.

7. Proportionality principle and simplifications

As seen before, the valuation of technical provisions under the Solvency 2 framework will

have to be based on adequate actuarial methods and statistical methodologies, which are in fact in many cases currently applied by the companies under the Solvency 1 regime, but which may also appear out of hand of some companies, especially the smallest ones.

If Solvency 2 aims at increasing the quality of risk management and the level of technical skills in the insurance companies, this shift may take some time. One risk here would be to impose too heavy a burden – both financial and time consuming – on companies for which it would not be justified.

The current directive level 1 text therefore allows simplified methods to be used to calculate both technical provisions and solvency capital requirement. These methods will have to be detailed in the implementing measures (level 2 and 3 text), along the Proportionality Principle. In substance, this principle states that: “where necessary, simplified methods and techniques to calculate technical provisions, in order to ensure the actuarial and statistical methodologies [...] are proportionate to the nature, scale and complexity of the risks supported by insurance and reinsurance undertakings.” (Art 85)

In a technical provisions valuation perspective, distinct simplifications will be allowed to be used for the best estimate calculation and for the risk margin. Practically speaking, a continuum of methods will be proposed ranging from low to high complexity.

As far as the Cost of Capital Risk Margin is concerned, the next session will most probably show that its calculation, designed to be risk sensitive, is not always straightforward. This is true at the valuation date (year 0), but even more for the following years, the whole balance sheet having indeed to be projected all along the run off period to achieve this. As a consequence, the Cost of Capital Risk Margin calculation proves to be quite challenging for many companies at the moment. This is one area where it is felt that simplified methods, even if not always perfectly accurate on a theoretical point of view, are most needed.

As seen before, the use of simplifications mainly refers to the complexity of the underlying risks and should therefore not be restricted to the smallest entities, even if these companies will probably most benefit of them.

Another situation where simplifications are to be allowed is the case where all requested data

are not available to have a proper calculation of technical provisions. This might be the case for insurance companies operating on a new market, or simply when a new insurance business appears (risks linked to the Internet for instance). Such simplifications are commonly referred to as “proxies”, which can be regarded as special types of simplified methods positioned at the lower end of continuum of valuation methods that could be applied.

Conclusion

Covering the whole technical provisions valuation principles, the following principle is probably the most important: “Technical provisions shall be calculated in a prudent, reliable and objective manner.” (Art 75)

From a legal perspective, it is clearly reaffirmed that “to the extent that the calculation of technical provisions of insurance and reinsurance undertakings does not comply with [the principles set in the directive text], the supervisory authorities may require insurance and reinsurance undertakings to increase the amount of technical provisions so that they correspond to the level determined pursuant to those Articles.” (Art 84)

In this regard, the role of supervisors in assessing the sufficiency and reliability of technical provisions will certainly not be reduced shifting from Solvency 1 to Solvency 2. Insurance companies will more than ever have to demonstrate the appropriateness of the level of their technical provisions, considering both statistical methods and data used. This is bound to require an even increased involvement of supervisors in the technical provisions valuation process, especially where firms will use internal model to assess their insurance liabilities and capital requirements.