TECHNICAL NEWSLETTER
#53 - March 2021

IFRS 17
THE NEW VALUE OF (RE)INSURANCE

IFRS 17 is the international financial reporting standard that will replace IFRS 4 on accounting for insurance contracts in 2023. Maybe the most fundamental change introduced by IFRS 17 is the way insurance liabilities will be assessed on a balance sheet, moving closer to their "fair value" while also considering the company's own views on the risk involved.

Because the outcome of an insurance contract is uncertain, its fair value is not the present value of future cash flows ("best estimate") – there is also an adjustment for risk.

Game theory has been researching the value of contracts with uncertain outcomes for decades. The concept of a "utility function" makes it possible to assess an adjustment for risk by modeling the behavior of investors and measuring a 'cost' for the uncertainty involved that reflects their intrinsic risk aversion. Modern computational capabilities can derive operational applications for trading and accounting from this research.

The main impact of IFRS 17 – aside from the tremendous IT developments and process reviews requested from insurance companies – is that it provides a new definition of an insurance contract's profitability, considering the adjustment for risk. Rather than looking purely at the combined ratio, IFRS 17 will change the way we measure the performance of insurance contracts, notably including elements relating to the economic environment and the risk framework defined by the company.

This restricts the scope of profitable contracts. And contracts that don't meet the targets will be deemed "onerous". The new standard will require issuers of onerous contracts to report large loss components on their profit and loss statement (P&L).

This Technical Newsletter examines some of the main issues linked to the new IFRS 17 accounting standard, including the importance of risk adjustment, which influences the perceived profitability of insurance contracts. It also highlights the value of reinsurance, not just to mitigate the consequences of a stress on cash flows and P&L, but also to reduce the cost of uncertainty for the reinsured.

FOREWORD: RISK AVERSION IN GAME THEORY

When exposed to uncertainty, people tend to choose the preservation of their capital over the potential for a higher return. This behavior is called risk aversion.

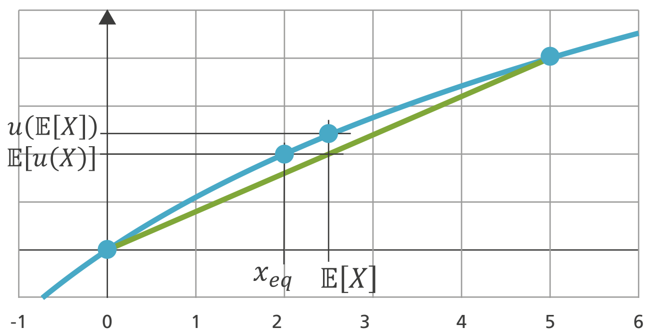
Let's toss a coin. Heads or tails? If you guess correctly, you win €5. You can only play the game once, and the upfront cost is €1 - would you agree to play? Obviously, most people would take their chances, since they can expect to make a positive gain ($E[X] = 1/2 \cdot €5 + 1/2 \cdot €0 = €2.5$, which is higher than the €1 premium)[1].

1. Notation: X is the outcome of the game or contract, $E[X]$ is the mathematical expectation of the outcome under the natural or historical probability distribution p, $E^*[X]$ introduced below is the expected outcome under the risk neutral probability distribution p^*

Yet this reasoning, based on expected outcome, does not take volatility into account. There is indeed a risk that the gambler might lose some money. To highlight this phenomenon, let's consider the same game with a prize of €5,000 and a premium of €1,000. This time, the expectation would be just as positive, but the one-in-two chance of losing an amount equivalent to several months of savings would probably deter many of us from taking the risk.

In game theory, economists have introduced the concept of "expected utility" to model this behavior. In simple terms, it is assumed that, in uncertain environments, people base their choices not on the amount they could expect to receive, but on the wellbeing (or "utility") that this amount would bring them. In game theory, this utility function must be increasing (the higher the better) and concave (working on the principle that a bird in the hand is worth two in the bush).

GAME 1: ONE IN TWO CHANCE OF WINNING €5



GAME 2: ONE IN TWO CHANCE OF WINNING €5,000

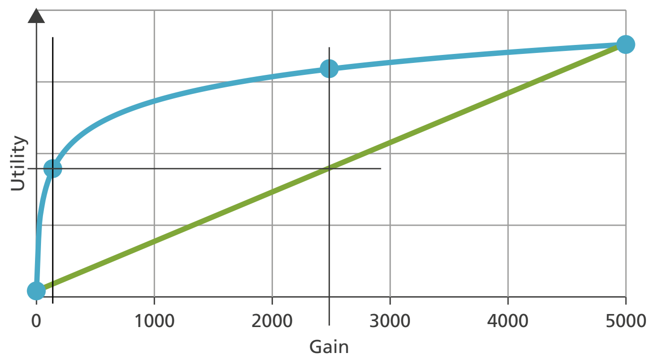


Illustration: : $u(x) = \log(\alpha \cdot x+\beta)\cdot\gamma$, with $\alpha = 1/4$, $\beta = 1$, $\gamma = 1/\log(3/2)$, so that $u(0) = 0$, $u(2) = 1$ and $u(5) = 2$

The value of Game 1 is €2 and the value of Game 2 is €137.

The player of Game 2 is very risk-adverse, which is illustrated by a rather "flat" utility function

FIGURE 1: ASSESSING THE VALUE OF THE GAME BASED ON THE "UTILITY" FUNCTION

Under this model, the value for the player of the game is based not on expected gain, but on expected utility; the value of entering into the game will not be E[X] but the equivalent[2] gain x_{eq} where $u(x_{eq}) = E[u(X)]$. Since the utility function u is concave, $E[u(X)] < u(E[X])$. Therefore, as the function increases, this means that $x_{eq} < E[X]$.

2. Notation: x_{eq} is the equivalent outcome of the contract. At this amount, the player is neutral between playing and not playing. This is the value of the contract for this player.

Financial markets consider risk aversion by overestimating the likelihood of adverse outcomes

Obviously, everyone has their own preferences, and attitudes toward uncertain situations can vary dramatically from one person to another. Yet there is room for convergence. For example, when it comes to valuing widely traded financial contracts with uncertain future payouts, market prices do emerge, and are accepted by most players. The mathematical models behind the valuation of complex assets are based on the assumption that there is an implicit but consistent market utility function for this class of assets at this point in time, which can be derived by observing market prices for a set of basic contracts and can be turned into a so-called "risk-neutral probability" p^*, solving $x_{eq} = u^{-1}(E[u(X)]) = E^*[X]$.

Risk-neutral probability allows you to value an asset as the expected value of future cash flows, with a shift in the probability distribution to increase the likelihood of adverse events or reduce the chance of favorable outcomes. Nevertheless, this theoretical approach has fairly strong limitations (it presupposes that markets are complete, with no arbitrage opportunities or transaction costs; it assumes that investors are rational and fully informed, that asset classes and events can be defined, and so on).

GAME 1: ONE IN TWO CHANCE OF WINNING €5

Outcome x_1	€0	€5
p_1	50%	50%
u_1	0	2
$x_{eq} = u^{-1}(E[u(X)]) = u^{-1}(50\%\cdot 0 + 50\%\cdot 2) = u^{-1}(1) = €2$		
Outcome x_1	€0	€5
p_1^*	60%	40%
$x_{eq} = E^*[X] = 60\%\cdot €0 + 40\%\cdot €5 = €2$		

GAME 2: ONE IN TWO CHANCE OF WINNING €5,000

Outcome x_2	€0	€5,000
p_2	50%	50%
u_2	0	17.6
$x_{eq} = u^{-1}(E[u(X)]) = u^{-1}(50\%\cdot 0 + 50\%\cdot 17{,}6) = u^{-1}(8{,}79) = €137$		
Outcome x_2	€0	€5,000
p_2^*	97.3%	2.7%
$x_{eq} = E^*[X] = 97.3\%\cdot €0 + 2.7\%\cdot €5{,}000 = €137$		

Illustration: risk-neutral probability increases the odds of adverse outcomes according to the perceived risk-aversion of the market (the two games illustrated are two independent contracts on two independent markets).

FIGURE 2: PRICING A CONTRACT WITH "RISK NEUTRAL" PROBABILITY

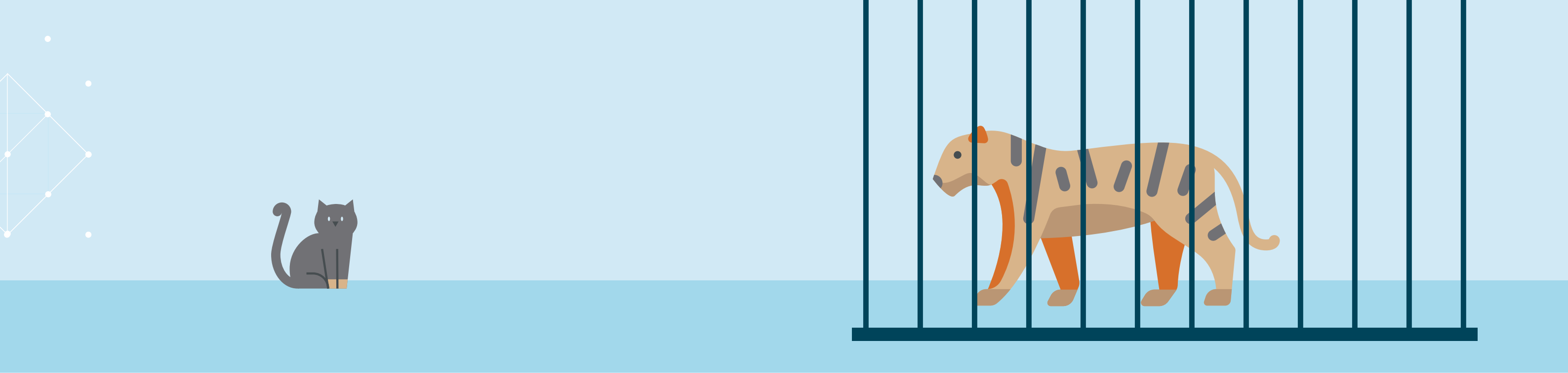
Insurance companies consider risk aversion by booking a "virtual cost"

Insurance contracts are also characterized by uncertainty, and the valuation of insurance liabilities has become an issue with the advent of the fair value concept.

There is no complete market for insurance liabilities, so there is no chance of inferring a "fair" value from observable market data. Instead, the general approach for assessing the value of an insurance liability consists in modeling a virtual cost, a monetary consideration for the risk, which is recorded as a liability to adjust for that risk.

Under Solvency II (fair value balance sheet), insurance liabilities include an adjustment for risk called the "risk margin". This is equal to the discounted value of the cost of capital that the hypothetical transferee company is required to hold until the expiration of the insurance commitments.

IFRS 17 is not exactly a fair value model. The adjustment for risk is based on the principle that insurance companies fulfil insurance contracts directly over time by providing services to policyholders, rather than by transferring the contracts to a third party. As such, the risk adjustment includes elements specific to each company, starting with their own risk framework.



THE IFRS 17 RISK ADJUSTMENT

IFRS 17 requests insurance companies to model a risk adjustment component (RA) reflecting the compensation required to bear the uncertainty present in their insurance contracts in terms of the amount and timing of cash flows.

The value of the contract is then the expected value of the contractual cash flows minus this risk adjustment, $x_{eq} = E[X] - RA$.

Insurance companies familiar with Solvency II might opt for an RA model based on the cost of capital

Insurance companies are regulated, they must hold sufficient capital to face any foreseeable adverse events. In most risk-based capital regulations, this capital requirement (SCR) depends on the premium volume (V) and the volatility ($\sigma_{div} = \delta \cdot \sigma$) of the portfolio, including a diversification benefit (δ): $SCR = 3 \cdot \sigma_{div} \cdot V$.

Many companies prefer to have a capital adequacy ratio (CAR) higher than 100%. The capital must be held until the risk expires (weighted duration τ), and must be remunerated (remuneration depends on the nature of the capital; for equity shares it can be measured as a return on investment target (CoC) above the risk-free interest rate r_0 and tax tx).

So, under such a model[3], $RA = 3 \cdot \sigma_{div} \cdot V \times CAR \times \tau \times [(CoC + r_0)/(1 - tx)]$.

ILLUSTRATIVE CASE STUDY

An insurance company sells a homeowner policy for €100. The profitability of the policy depends on the occurrence of a severe claim (such as a fire, windstorm, etc.) Let's assume there is a one in two chance for the insurer to make a €20 profit and a one in two chance to make a €10 loss, before costs and margin.

- Expected cash flow profit $E[X] = 50\% \cdot €20 - 50\% \cdot €10 = €5$

If $\sigma = 8\%$ (standard formula), $\delta = 50\%$ (group diversification benefit), $CAR = 200\%$ (European benchmark), $\tau = 1.2$ year (short tail), $CoC = 8\%$ per year, $r_0 = 0$ and $tx = 30\%$:

- Capital requirement $SCR = 3 \cdot \sigma_{div} \cdot V = 3 \times 4\% \times €100 = €12$
- Risk adjustment $RA = €12 \times 200\% \times 1.2 \times (8\%/70\%) = €3.3$
- Value for the risk taker $x_{eq} = E[X] - RA = €5 - €3.3 = €1.7$

Under this model, some parameters are based on external data (e.g. market expectations for the capital, capital regime, tax regime, etc.). Other critical parameters are set by the company, based on their actual portfolio and their own analysis of the risk (e.g. internal model), as well as their own preferences, risk appetite and objectives.

3. Since calibration of σ is usually based on loss distributions, companies might opt for an RA model as a percentage of expected future loss for remaining periods ($RA_u = \rho_u \cdot E[X]$, pricing risk for "uncovered loss") and a percentage of outstanding loss reserves (OLR) for incurred claims ($RA_i = \rho_i \cdot OLR$, reserving risk on outstanding loss reserves), instead of a model based on premium volumes.

PROFITABILITY AND P&L OF AN INSURANCE CONTRACT

IFRS 17 identifies a category of contracts that are onerous despite positive result expectations

The risk adjustment amount (*RA*) introduced by IFRS 17 is tantamount to a cost attached to a contract. This changes the usual benchmarks of profitability analysis by creating a category of contracts that are considered onerous despite a positive expected future cash flow result.

Indeed, a contract is profitable only if its cash flow result (the present value of the future cash flows *PVFCF*, also taking into account the time value of money[4]) is greater than its *RA*. If so, the difference is called the contractual service margin (*CSM*). Otherwise, the contract is onerous, and the difference is called the day-one loss (*DOL*).

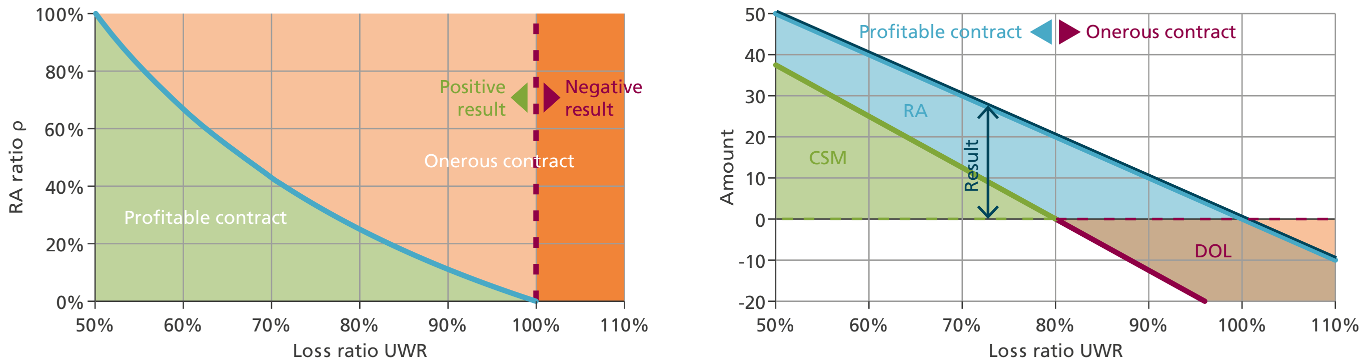


Illustration: when $RA = \rho \cdot E[X]$, a contract is profitable if the expected underwriting ratio $UWR \leq 1/(1+\rho)$ (left graph).
With $\rho = 25\%$ (right graph), a contract is profitable if the expected underwriting ratio $UWR \leq 80\%$.
For a premium of €100, if *UWR* = 60%, result = €40, *RA* = €15 hence *CSM* = €25.
If *UWR* = 92%, result = €8, *RA* = €23 hence DOL = €15

FIGURE 3: PROFITABILITY OF AN INSURANCE CONTRACT

Future profits are reserved, future losses are released immediately

When the contract is profitable, the CSM is locked on the balance sheet as a liability, instead of being recognized as a profit, and released during the coverage period[5]. In this case, and by comparison with current accounting standards, IFRS 17 will affect the P&L release sequence only moderately.

The slight difference is due to the need for an RA for incurred claims, reflecting the risk of adverse development as long as the claims have not been fully settled.

4. For simplicity, the illustrations in this newsletter are based on the assumption that there are no costs, no discounting structure and no other expense or income. As such, loss ratio, underwriting ratio and combined ratio are identically noted *UWR*, which is equal to the expected loss E[X] divided by the premium.
5. We assume the company produces quarterly accounts

When the contract is onerous, the day-one loss is reported immediately, even before the inception of the policy. This is a major source of P&L volatility.

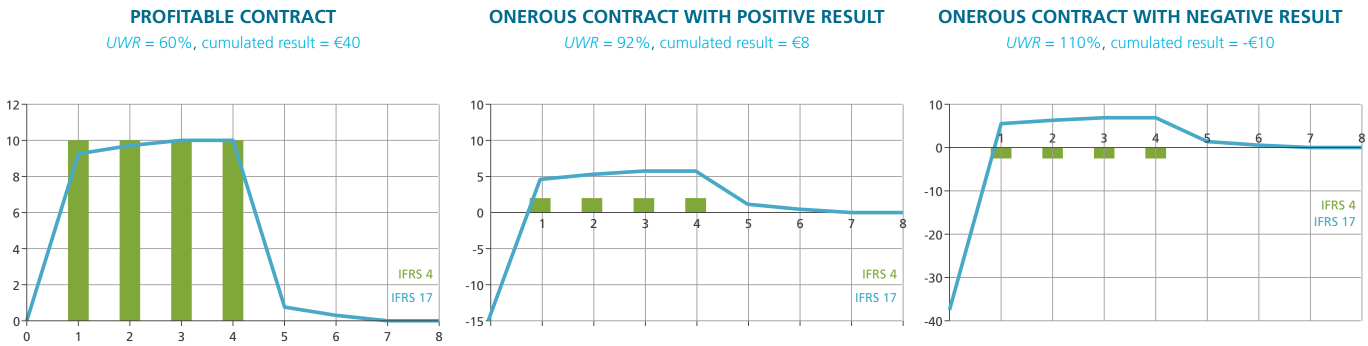


Illustration: comparison of the quarterly P&L for a contract
(RA_u = 25%·E[X], date 0 is initial recognition date, dates 1 to 4 are the four coverage periods of a 1-year policy with quarterly accounting, some cash flow settlements of claims still occur at dates 5 and following, incurred are subject to an RA_i)

FIGURE 4: P&L SEQUENCE OF AN INSURANCE CONTRACT

AVERAGE VALUES AND MICRO-DECISIONS

The IFRS 17 profitability analysis should be handled with care for individual contracts

Operational considerations make it difficult to model the risk of an insurance portfolio with too high a granularity. Contracts will be grouped into model points (unit of accounts), and parameters calibrated out of average values.

The *RA* is a fair appreciation of the risk at this level. Yet the model might not be relevant to assess the value of specific single contracts at a more granular level.

Indeed the σ parameter reflecting the deviation of the loss distribution – or any other "risk" parameter modeling the risk aversion of the company – can be highly sensitive to the terms and conditions of the contract (e.g. the risk transfer layer).

The following case study illustrates how using the same parameter within the *RA* model for different yet similar contracts could lead to unwanted consequences. When the *RA* is based on the average non-proportional (NP) contract, shifting up the coverage layer will make the contract look profitable (the actual risk is higher than the average risk, therefore the premium margin is higher than the *RA*). Conversely, coverages for lower layers will look onerous.

ACTUAL RISK MEASURE FOR NP TRANSACTION

Let's consider a log-normally distributed risk, where the expected loss is €3 and the standard deviation is €2.

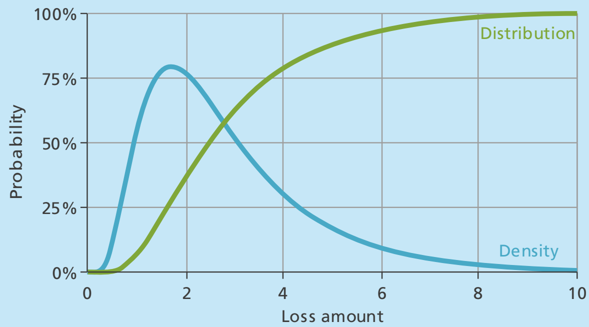
Risk measures are traditionally based on the coefficient of variation (*CV* or σ), the value at risk (*VaR*) or the tail value at risk (*TVaR*) at different quantiles. In the Solvency II regime for instance, the financial requirements would amount to €11.9 ($VaR_{99.5\%}$), including a best estimate of claims of €3 and capital requirement of €8.9.

Let's further introduce a deductible or franchise of €1 in the contract. This results basically in a translation of the probability curve to the left, reducing the tail values by €1 and the expected loss by almost €1, but not changing the standard deviation of the distribution, because the deductible amount is within the working layer of this risk.

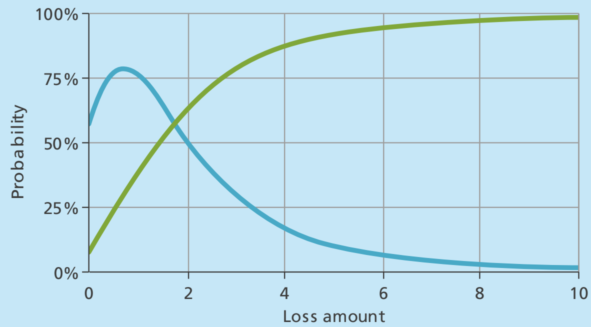
Introducing this feature significantly increases the coefficient of variation σ – from 67% to 98% – and any of the "tail ratio" (e.g. $TVaR_{98\%}/E[X]$ increases from 370% to 502%). Those ratios explode for higher deductibles (see numerical analysis with a deductible of €6).

This phenomenon, well known to (re)insurance companies, explains why they usually tend to avoid risk layers that are too remote, where the uncertainty is too high.

RISK



LOSS AFTER DEDUCTIBLE OF 1



	Risk (≥€0)	≥€1	≥€6
E[X]	3.00	2.01	0.16
Stddev	2.00	1.98	0.85
CV σ	67%	98%	541%
VaR			
50%	2.5	1.5	0
75%	3.7	2.7	0
98%	8.7	7.7	2.7
99.5%	11.9	10.9	5.9
99.9%	16.2	15.2	10.2
TVaR			
50%	4.4	3.4	0.3
75%	5.7	4.7	0.6
98%	11.1	10.1	5.1
99.5%	14.7	13.7	8.7
99.9%	19.5	18.5	13.5

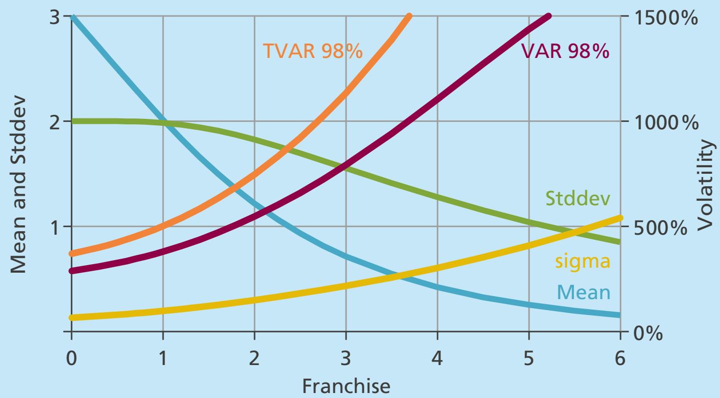
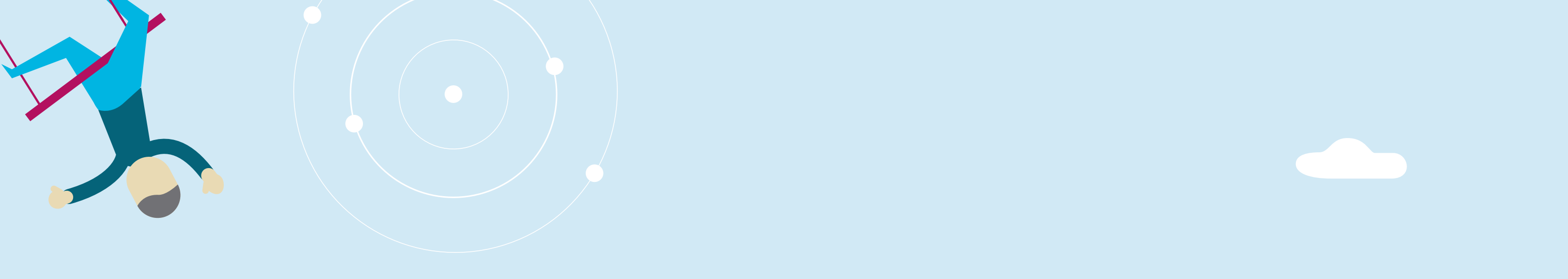


Illustration: the standard deviations, *VaR* and *TVaR*, when expressed as a ratio of the expected loss, are not at all constant for any deductible. The higher the risk layer, the higher the volatility or risk of the contract.

While the top-down approach has limitations that should be borne in mind, considering a full bottom-up approach would unfortunately raise too many operational issues (number of model points, availability of data, timing, and so on).



ROLE OF PRICING ASSUMPTIONS

Pricing models are given a central role by IFRS 17, to initially assess the profitability of an insurance contract and to drive the P&L release sequence.

The IFRS 17 profitability of a contract is assessed at the initial recognition date (T_0), based on initial pricing assumptions. If onerous, the contract results in a negative P&L contribution at T_0. If profitable, the first actual profit is released at the end of the first period (T_1).

Profit for a period is calculated based on prior expectations, actual incurred and also on corrections due to changes in hypothesis for future periods. At any reporting date, assumptions for remaining periods can be updated, which impacts the *RA* for uncovered periods and the *CSM*.

This explains why the IFRS 17 P&L sequence can materially differ, depending on pricing assumptions and their updating policy. By comparison, the IFRS 4 result of a period is simply the difference between the earned premium and the actual losses[6] incurred over the period.

ILLUSTRATIVE CASE STUDY : ROLE OF PRICING ASSUMPTIONS

The graph below illustrates the P&L release over four quarters of an insurance contract with an annual premium of €100, when quarterly incurred losses represent 85% of the quarterly premium. The IFRS4 result is four times €3.75, i.e. €15, regardless of pricing assumptions. Under IFRS 17, the cumulated result is also always €15. However:

- If the initial pricing is 85%, the contract is onerous, a day-one-loss hits the T_0 P&L;
- If the initial pricing is 75%, the contract is deemed profitable. If there is at T_1 an update in assumptions for periods 2 to 4 (expected loss ratio increased to 85%), the P&L will be hit by a "day-two loss" at T_1;
- If the initial pricing is 75%, actual experience over each period is 85% but this does not lead to a change in assumptions for future periods, P&L will show a small profit every time.

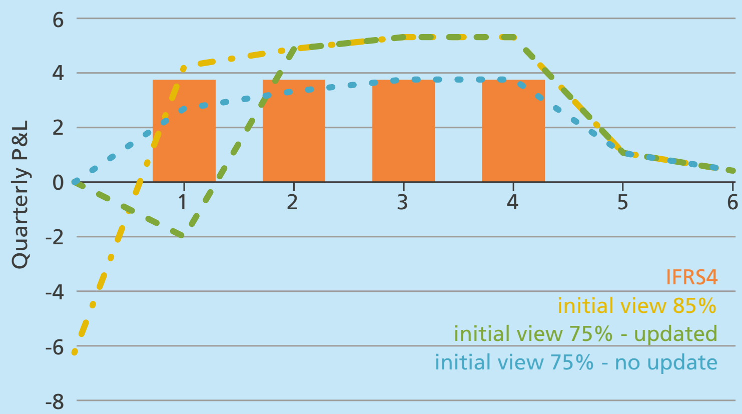


FIGURE 5: P&L SEQUENCE OF AN INSURANCE CONTRACT

Illustration: *RA* = 25% of uncovered loss + 10% of OLRes:

6. Including changes in reserves of claims related to previous periods

IFRS 17 AND REINSURANCE

Regardless of *RA*, *CSM* and *DOL*, the ultimate cumulative result of a transaction will always match the cash flow result. From this point of view, reinsurance still does the job of reducing risk exposure and protecting against adverse scenarios.

The value of reinsurance is also recognized in the quarterly IFRS 17 balance sheets and income statements.

IFRS 17 values the protection provided by reinsurance with RA assets

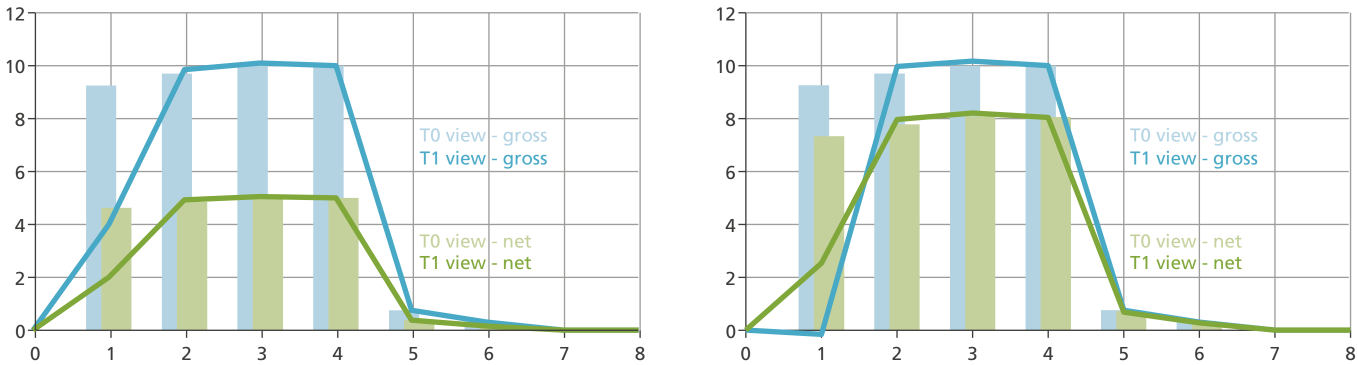
A major difference between insurance contracts issued (written business) and reinsurance contracts held (protection bought) is that the former create volatility whereas the latter reduce volatility. Issued contracts generate *RA* liability whereas held contracts generate *RA* assets.

The benefit of reinsurance on the P&L remains unchanged despite the change of standard

The figure below illustrates the P&L releases of a profitable policy, based on an initial pricing view (T_0), before and after reinsurance.

In each case, the P&L pattern after reinsurance is similar to the pattern gross of reinsurance. The pattern in each case is also quite similar to the IFRS 4 pattern.

Furthermore, reinsurance remains efficient when it comes to mitigating the consequences of a stress. E.g. the 50% QS absorbs 50% of the loss incurred over the adverse first period, and so will most NP treaties.



Left graph: T_0: *UWR* = 60%, T_1: UWR_1 = 80%, Reinsurance: 50% quota-share
Right graph: T_0: *UWR* = 60%, T_1: +10 large loss over Q1, Reinsurance: 50 *XS* 5 per event *XOL*

FIGURE 6: P&L SEQUENCE OF AN INSURANCE CONTRACT

The conclusions are the same if the initial portfolio is onerous. The loss component recorded at the initial recognition date is also mitigated by reinsurance, the latest update of IFRS 17 in June 2020 having reduced the reinsurance asymmetry.

IMPACT ON THE TOP LINE

The key notion of premium disappears from the financial statements

IFRS 17 distinguishes the contractual cash flow, providing an insurance or risk transfer service from other contractual cash flows. In fact, the premium amount does not even appear on IFRS 17 income statements. Instead, the top line is the "insurance revenue", which remunerates the insurance company for their "insurance service".

The best example to help understand this is probably the reinsurance commission. In the event of a flat reinsurance commission on a reinsurance treaty, the IFRS 17 revenue will not be the ceded premium but the ceded premium net of this commission. More generally, the economy of a contract must be considered as a whole. Therefore, cash flows such as additional premium, reinstatement premium conditional to loss, commission variable with experience, and so on, may not actually provide an insurance service.

Some of the main KPIs currently used by companies will be affected. For reinsurers, the "top line" will be materially reduced. For protection buyers, a decrease in ceded revenue could lead to a deterioration in profitability ratios, such as the loss ratio or the combined ratio.

	IFRS 4			IFRS 17		
		Gross			Gross	
Reinsurance company	Premium	€30.0		Revenue	€25.5	
	Result	€4.5		Result	€4.5	
	UW Ratio	85.0%		Ratio	82.4%	
					Revenue reduced by 15%	
		Gross	Net		Gross	Net
Insurance company	Premium	€100.0	€70.0	Revenue	€100.0	€74.5
	Result	€15.0	€10.5	Result	€15.0	€10.5
	UW Ratio	85.0%	85.0%	Ratio	85.0%	85.9%
					Combined ratio deteriorated	

Illustration: premium = €100, combined ratio = 85%, ceded via a 30% quota share stipulating a 15% reinsurance commission

FIGURE 7: MAIN KPIS FOR AN INSURANCE PORTFOLIO

FURTHER IMPACTS ON STRUCTURED REINSURANCE PROGRAMS

The impacts of IFRS 17 on traditional reinsurance programs should be minimal. When it comes to alternative reinsurance, the impact is being studied on a case-by-case basis. It looks like the benefit of these structures can most often be recognized under the new standard, provided that actuarial analysis of the modeling choices is formalized as supporting evidence for the auditors. However, some of these transactions might not be eligible for the "PAA" simplified approach of IFRS 17.

For retrospective reinsurance, the main concerns are the definition of the service and the coverage period. For multiyear reinsurance, specific extension or commutation features raise the question of the contract boundaries, which define the temporal scope of the cash flows to consider. With regard to aggregate reinsurance, which is commonly used to manage the lower layers, the challenge lies in identifying their contribution to mitigating the risk, so as to determine their *RA* amount for each period and their capacity to absorb the day-one loss for each of the covered units of accounts.

So far it looks like only some more advanced multiyear volatility management solutions will become less efficient, due to the unbundling of their investment component. Our SCOR Alternative Solutions team is already working on new designs addressing the issues relating to this financial component and to the contract boundaries specific to multiyear transactions.

CONCLUSION: THE CONFIRMED VALUE OF REINSURANCE

The impact of IFRS 17 on reinsurance programs should be minimal. Reinsurance treaties will continue to mitigate risk in the same way as under current accounting rules. Moreover, most reinsurance treaties should be eligible for IFRS 17's simplified "PAA" approach, which is likely to be followed by most insurance companies.

Furthermore, IFRS 17 recognizes upfront the value of the protection provided to the reinsured as a risk adjusting asset. And since its latest update in summer 2020, the standard also recognizes the benefits of reinsurance for onerous contracts.

SCOR
The Art & Science of Risk

This article is written by :

JACKY MOCHEL
Chief Technical Officer
P&C Alternative Solutions

jmochel@scor.com

For more information, please contact our teams:

SCOR P&C Alternative Solutions

Eric Le Mercier, Chief Underwriting Officer
elemercier@scor.com

Brice Deplante, Deputy Chief Underwriting Officer - Reinsurance
bdeplante@scor.com

Julien Galzy, Reinsurance - APAC
jgalzy@scor.com

Thomas Renggli, Reinsurance - DACH, NCEE, ME & Africa and Lloyd's Capital
trenggli@scor.com

Leonid Rousniak, Reinsurance - Western/Southern Europe
lrousniak@scor.com

Stève Udriot, Reinsurance - Parametrics & Specialty
sudriot@scor.com

SCOR P&C Finance

Elise Lheureux, IFRS 17 Business Lead
elheureux@scor.com

Pierre-Axel Virepinte, IFRS 17 Deputy Business Lead
pvirepinte@scor.com

PLEASE FEEL FREE TO VISIT US AT SCOR.COM

SCOR SE
5, avenue Kléber - 75795 Paris Cedex 16
France
scorglobalpc@scor.com

SCOR
The Art & Science of Risk

TO GET THE FULL RANGE OF TECHNICAL NEWSLETTERS, PLEASE CONTACT SCORGLOBALPC@SCOR.COM

Editor: SCOR SE
ISSN: 1967-2136