Aymeric Kalife
With Ludovic Goudenège, Xiaolu Tan, Saad Mouti and Mounir Bellmane

Sustainable Life Insurance

Managing Risk Appetite for Insurance Savings and Retirement Products

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Introduction

After the dramatic developments of the last few years in terms of daunting macroeconomic, demographic and customer challenges, fierce competition and ongoing tech-driven disruption, insurers have had to undertake large-scale change, by investing more than ever to transform their business models and seize subtly different sustainable growth opportunities around the world.

Overall, despite recent slow growth in revenues and intense profit pressures, rising customer expectations, interest rates and ageing populations are expected to drive demand for life insurance products, while ongoing investments in innovations and risk management are the driving factors to meet their appetites in a sustainable way.

Among the biggest challenges is meeting the rapidly changing needs and expectations of consumers within ageing societies; Covid-19 demonstrated why the insurance industry is essential, notably in terms of sustainable financial wellness within the context of savings and retirement. There is an increased demand for more affordable, transparent and customized insurance that better suits evolving needs, and risk appetites that translate into increasingly efficient behaviour.

In this respect, increasingly selective customer risk appetites have been observed since the 1980s, across four risk appetite axes (yields/flexibility/financial guarantees/cost), which can be illustrated through the development of flexible and cheaper savings and retirement policies offered to customers with lower risk tolerance. Life insurers must further expand their value propositions and product sets to address all aspects of financial wellness, which requires, on the one hand, enhancing customers' experience through better advice and, on the other hand, cheap, flexible, performant and capital-light savings and retirement instruments (as illustrated by the rising use of constant proportion portfolio insurance [CPPI] strategies, structured annuities and hybrid general accounts).

Meeting customers' risk appetites has also been developed by centring customer experiences and streamlining their journey as a priority, around flexibility, personalization and relevance.

In this respect, innovations including digital technologies are a key factor in terms of optimizing costs, boosting innovation and driving agility in a sustainable way, shifting the focus from the products to the customers, which reversed the bargaining power between the customer and the asset manager in favour of the former. Such a new paradigm requires switching from a top-down to a bottom-up approach. Being customer-centric is no longer an alternative or a "plus"; it is a requirement for survival. Reputational risk has become the key, with success in the past no guarantee for the future.

The current landscape is also notable for its fragmentation, convergence and intense competition, including from a mix of non-traditional players, which thus requires strong partnerships with asset management, investment banking (for the financial guarantees) and digital tech companies, opening the way to new life insurance archetypes.

These significant changes have strengthened within the context of declining and persistently low interest rates over the past decade, while new regulatory prudential frameworks have increased long-term safety but

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also short-term costs. In this respect, life insurers have started to improve the sustainability of both their risk management practices and their business.

As a result, insurers have to be there for their customers and undertake large-scale change quickly so as to make sure that they can serve people in need in a sustainable way, in line with both customers' and insurers' risk appetites, in terms of liabilities and assets alike.

As a result, in order to build sustainable savings and retirement instruments that meet customers' and insurers' risk appetites, Chapter 1 assesses the transformation of the insurance business within the context of increasingly efficient customer behaviours and recurrent equity market crashes, within which specific innovations offer a historic opportunity to grow profitability and resilience, through both new business and in-force management. It then focuses on securing long-term sustainable business growth, from governance to operational risk management, consistent with rising capital prudential regulation, by means of sustainable product approval processes and risk appetite frameworks.

Chapter 2 assesses the drastic changes inherent in the increasingly selective customer risk appetite, in favour of flexible, lower-risk and cheaper guarantees. It then focuses on aligning customers' and insurers' risk appetites through enhanced advisory offerings and product ranges, leveraging digital technologies and banking/asset management skills through long-term partnerships.

Chapter 3 focuses on the measurement of risk appetite, as a sustainable savings and retirement stance requires the evaluation of liabilities to policyholders at their current execution value, consistent with market observations, taking into account every contractual option and financial guarantee included in the contract, notably through the stochastic modelling of both customers behaviour and market volatility, with material impact across the four dimensions of the risk appetite framework; value-wise, it allows the calculation of a best estimate valuation consistent with the market, while, capital-wise, it enables the computation of the solvency capital requirement (SCR) and earnings potential, allowing the insurer to better direct his asset and liability management and be able to set up hedging strategies against these rate variations. Chapter 3 also deals with the computational challenges of the Monte Carlo (MC) simulations involved in such an economic scenario generator (ESG), and proposes some efficient solutions through the use of randomized quasi-Monte Carlo and graphics processing unit (GPU) technology.

Chapter 4 explores ways to screen sustainable savings and retirement liabilities balancing shareholders' against customers' risk appetites, through capital intensity and customer-centric metrics, while innovative liabilities designs can improve the solvency internal rate of return (IRR), mitigate customer behaviour risk and enhance the customer experience. Regarding the asset side, key sustainable innovations reconciling insurer and customer risk appetites lie in the improved risk management of fund management, outperformance in asset selection and allocation while meeting growing demand for ESG assets, and an optimized portfolio rebalancing allowing for a lowering of both transaction costs and financial risks.

Finally, Chapter 5 focuses on the sustainability of hedging, which is apprehended through the decomposition of the hedging profit and loss (P&L) into the sensitivities to the market risk drivers ("Greeks"), the potential control of which is illustrated through sustainable mitigating techniques that capitalize on both structuring expertise and hedging experience: risk measurements (duration/convexity, break-even and par volatilities, hedge effectiveness and cost of carry, performance drag versus tail risk protection measures), mathematical modelling (e.g. optimal control theory, Lévy processes, nonlinear partial differential equations [PDEs] and associated backward stochastic differential equations [BSDEs]), product design innovations and the use of specific hedge instruments, mostly aligned with the customer's risk appetite.

The Transformation of the Risk Appetite for Sustainable Savings and Retirement Policies

After the dramatic developments of the last few years in terms of significant and daunting macroeconomic, demographic and customers challenges, fierce competition and ongoing tech-driven disruption, insurers have to undertake large-scale change at an ever faster pace, by investing more than ever to transform their business models and seize subtly different sustainable growth opportunities around the world.

Among the biggest challenges has been meeting the rapidly changing needs and expectations of consumers within ageing societies; Covid-19 demonstrated why the insurance industry is essential, notably in terms of sustainable financial wellness within the context of savings and retirement. There is increased demand for more affordable, transparent and customized insurance that better suits evolving conditions and can be easily adjusted as the needs change. Insurers have to be there for customers and undertake large-scale change quickly so as to make sure they can serve people in need in a sustainable way.

The new needs and expectations regarding customers' financial wellness have induced drastic and rapid shifts in risk appetite, translating into (i) corresponding suitable and sustainable behaviour in the use of their savings and retirement products (surrender, withdrawals or annuitization), becoming more "efficient" throughout a "multi-stage" life; and into (ii) a demand for more sustainable investments in assets, as illustrated by the significant growth in their ESG (environmental, social and governance) scores.

As a result, life insurers must further expand their value propositions and product sets to address all aspects of financial wellness, centring customer experiences and streamlining their journey as a priority. In this respect, innovations including digital technologies are a key lever to optimize costs, boost innovation and drive agility in a sustainable way.

The current landscape is also notable for its fragmentation; convergence and intense competition, including from a mix of non-traditional players; and widespread collaboration. Carriers will look to partner with or acquire the most promising insurtechs, and banks and asset managers will offer more protection products and seek to differentiate on holistic financial wellness value propositions, forcing insurers to choose between collaboration and competition.

These drastic changes have further strengthened within the context of (i) declining and persistently low interest rates over the past decade, driven by the jump in central banks' balance sheets; and (ii) new regulatory prudential required capital frameworks, which tended to increase long-term safety but also short-term costs. In this respect, life insurers have started to improve the sustainability of both their risk management practices and their business (through lower richness and cost of capital, and in-force initiatives: buyouts, reinsurance, operational cost savings).

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Overall, despite recent slow growth in revenues and intense profit pressures, rising customer expectations, interest rates and ageing populations are expected to drive demand for life insurance products, while ongoing investments in innovations and risk management are the driving factors to meet customer appetites in a sustainable way.

As a result, in order to build sustainable savings and retirement policies that meet customers' and insurers' risk appetites, section 1 assesses the transformation of the insurance business within the context of increasingly efficient customer behaviours and recurrent equity market crashes, combined with a persistent and drastic decline in interest rates, within which specific innovations offer a historic opportunity to grow profitability and resilience, through both new business and in-force management. Section 2 then focuses on securing long-term sustainable business growth, from governance to operational risk management, consistent with rising capital prudential regulation (e.g. the European Union's 2009 Solvency II Directive, which codifies and harmonizes EU insurance regulation), by capitalizing on sustainable product approval processes and risk appetite frameworks.

1.1 THE TRANSFORMATION OF THE INSURANCE BUSINESS OVER THE PAST DECADE

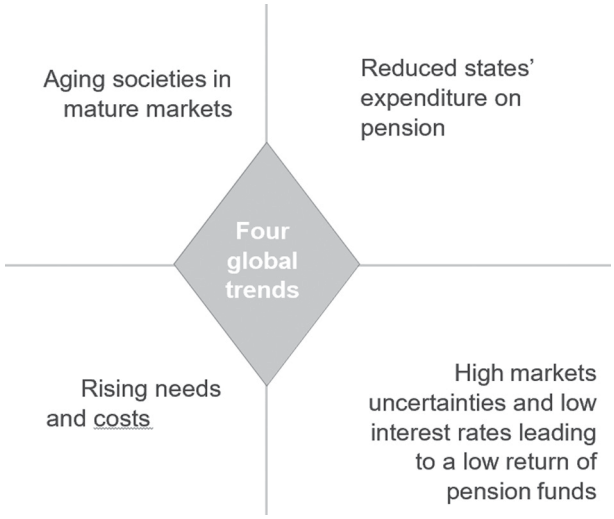


FIGURE 1.1 Four major trends will impact the retirement landscape

1.1.1 Medium- to Long-Term Shifts in Customers' Longevity, Risk Appetites and Behaviours Create Opportunities and Challenges for Insurers, while Decreasing Tax Benefit Calls for Innovations

1.1.1.1 The Demographic Dividend within Ageing Societies

Driven by falling lower birth rates, shrinking workforces and longer life expectancy, the world's older population is growing rapidly, with already more older people than children, and more people of extreme old age than ever before.

Today, 91 out of 195 nations have fertility rates below the replacement level of 2.11. At the same time, all age cohorts in developed countries, from "baby boomers" to "generation Z", can expect, on average, to live to 90 or beyond.

As a consequence, there was a substantial increase of 48% (from 607 to 901 million) of people aged 60 or over between 2000 and 2015, which might reach nearly 2.1 billion by 2050. There are now more people aged over 65 than under 52, accounting for more than 20% of the population within 15 "super aged" countries (including Germany, Italy, France and Japan), and w ithin 44 nations by 2030 and 61 by 2050. Moreover, the "oldest old" (aged 80 or over) population accounted for 14% of old population (aged 60 or over) in 2015, and is expected to triple 2015's value by 2050.

These demographic changes are making today's retirees face an entirely new set of risks and experiences, resulting in new needs and expectations on the part of clients for their pension plans.

For example, in 1939, before America entered World War II, life expectancy was just over 59 for men and slightly above 63 for women. This meant that, when social security was implemented with an eligibility age of 65, the average American would not live long enough to access the benefit. Today, for a married couple aged 65, a 50% chance exists that at least one of the two will reach age 89; a 25% chance exists that one will survive to age 94. In other words, that couple faces a one-in-four chance that one of them will be in retirement for three decades or longer.

And this in a context where costs continue to rise far more rapidly (~ four times) than inflation, putting significant pressure on public social security systems. As noted previously, when social security was created in the 1930s, the average person was not even expected to reach the full retirement age of 65. Today public expenditure on long-term care by 2050, considering only a pure demographic effect, is expected to grow by 1.2 percentage points in relation to gross domestic product (GDP), from the equivalent of 1.1% of GDP now to 2.3% (according to the Organisation for Economic Co-operation and Development). States are increasingly underfunded, leading governments to freeze public pensions despite the rising longevity, with a common trend towards the development of voluntary schemes, offered by private players, in order to ensure clients have a similar standard of living after retiring.

The issue of ageing used to be largely viewed in terms of its economic burden to society, as it tends to focus on the final stages of life. Even so, the benefits of this demographic shift could still outweigh the costs, provided the needs of an ageing population are properly managed.

- Genuinely longer working lives: globally, labour force participation growth is expected to slow from 1.8% per annum (p.a.) over the past 50 years to 0.3% p.a. in the next 50. Improving healthy life expectancy could justify delaying the retirement age across many economies. Employees are working more years of their lives than ever before. Employee preference was the most commonly cited reason that employees continue working while they are eligible to retire. This represents a shift in the mindset of individuals, but also the changing nature of work, which is less physically demanding, the improved health of those age 65 or older and the rise of alternative workforce opportunities.
- Moreover, this demographic shift may go hand in hand with increased consumption: increasing preventive health spending by 0.1 percentage points has been associated with a 9% increase in annual consumption by people aged 60 and over. Given this growing economic power of the elderly, the in-retirement market will be the focus in coming years, with the in-retirement population accounting for nearly a half of total income. Decumulation and income solutions will be the mainstay of retirement business.
- Finally, productivity gains are also expected: rising life expectancy correlates to increased output, thanks to the skills that older workers have accumulated.

Such opportunities open the door to moving towards a multi-stage cycle, with a variety of careers with breaks and transitions. This has the potential to provide societies with more choice and flexibility, and a better balance between work, leisure, family, finances and health.

1.1.1.2 Customers' Risk Appetite and Behaviours Have Become More "Efficient" with respect to Increasingly Defined Needs and Rising Costs versus Reduced State Expenditures on Pensions

As a result of this longer life expectancy and multi-stage cycle, implying increasing lifestyle and health care costs, the idea that individuals and households need to plan for their own retirement is gaining a great deal of attention.

For example, in the United States the sense of insecurity also comes from the worrisome state of the government retirement system, which reached an unsettling milestone in 2010. For the first time since 1983, social security payouts exceeded the amount paid in by workers. Individuals are also coming to terms with the decline of the defined benefit (DB) plan, a once common source of guaranteed lifetime

income (with 28% coverage rate across employers in 1980). During the last 30 years it appears that most employers have determined that a defined benefit plan is too costly and carried too much long-term financial risk for the company (translating into a 3.5% coverage rate in 2006). They moved instead to tax-advantaged defined contribution (DC) savings plans (e.g. 401(k) plans in the United States) for their workers (31% coverage rate in 2006 versus 8% in 1980), thereby shifting the responsibility for retirement security and longevity risk from corporations to their employees. Unfortunately, most Americans have not yet truly comprehended this new risk that they now own. Perhaps even more worrisome is the fact that the percentage of Americans who are not covered by either a DB or a DC plan has remained constant at around 50%.

Those in the Americas are saving the least (14.5%), followed by Europeans (14.9%). People in Asia are saving the most, with an average of 15.9%. At a regional level, Russians are saving the least (11.1%), followed closely by Spaniards (11.2%). People in Austria and Switzerland are saving the highest proportion of their income (21.6% and 21.3% respectively).

In fact, although people are overly optimistic about how long their retirement savings will last (considering that they will be able to take out each year 10% without running out of money), they are still worried about outliving their money at retirement (90% in Spain and Japan, 80% in France, 70% in the United States, Germany and the United Kingdom), and their concerns about retirement risks have significantly increased since the 2008 financial crisis (for reasons such as market fluctuations, low interest rates, lack of guaranteed income, lack of social security benefits, paying down existing debt, lack of emergency savings, inability to meet monthly payments).

In this new context individuals are wishing to save more for their pension (75% to 90% across France, Germany, Italy and the United States), with millennials (18- to 37-year-olds) leading the way (16% of their current income, versus 13% for the "baby boomers"). Yet savings amounts are still low (only 50% to 66% actually save for retirement), while few among those who do save believe in the sufficiency of their savings (less than 15 to 30% of them in the United States, Europe and Japan).

As a result, private pension plans penetration is still too limited, mainly due to these factors.

- Current products and services are not adapted to clients' needs, notably in terms of simplicity, security and flexibility. A third (34%) of people take less risk with their retirement savings than with their personal savings. Insurers and pensions do not provide enough advice for the clients to invest efficiently for their pensions. The most important criterion by which clients choose retirement solution providers is by their quality of advice, followed by expertise and reputation.
    - For example, despite this being a top concern of employees entering the workforce, and total student debt outstanding eclipsing $1.5 trillion in the United States, only 1% of plan sponsors offer student debt repayment and refinance programmes integrated with their defined contribution plans. However, 38% of plan sponsors report considering this integration, and, even when it is offered, use of these programmes is low (6.3% and 2.0% respectively).
    - Even so, surveys show that significant efforts in terms of caring have been made by defined contribution plan sponsors (with respect to electing a deferral percentage that works best for them, choosing their investments and, ultimately, the portability of their retirement savings).
- Clients lack awareness: the majority of individuals over 45 do not feel financially well prepared for retirement, and do not know the extent to which they need to save for retirement, while most individuals have other savings priorities than retirement (which is ranked only fifth in the United States), such as day-to-day living expenses, their childrens' education, health insurance (30 to 40% in France, Germany and Switzerland), protecting the family in the event of death or paying their own debt. And many cannot afford to invest for their pension (e.g. 50 to 60% in France, Germany and Switzerland). Almost all

non-retired people think that access to information about how much money they need for their desired lifestyle and their likely living costs in retirement, or visualizing how life might be once they have retired, could persuade them to save more for retirement.

- The complexity of products: 80% of US consumers, for example, feel under-informed, and nearly a half do not understand the different pension options.

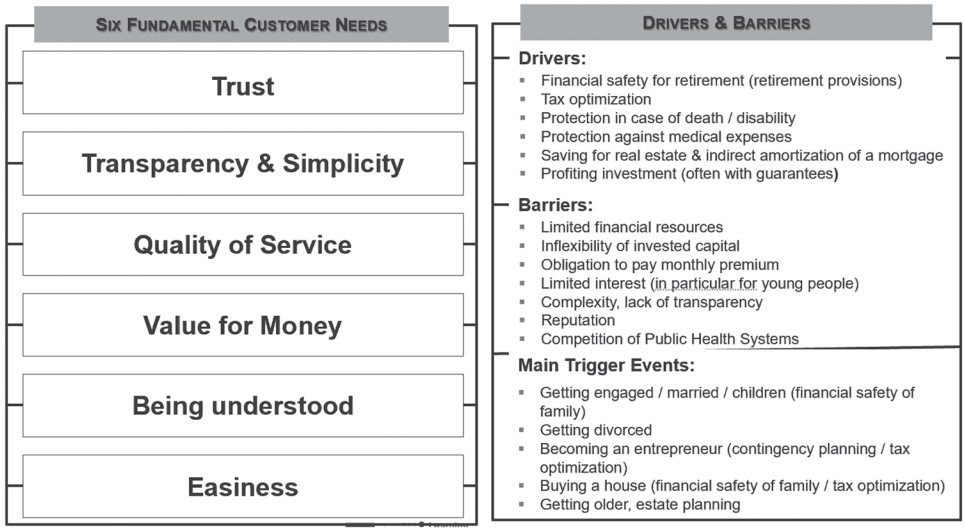


FIGURE 1.2 Customers' needs, drivers and barriers

As a result, insurers and pension providers need to help customers convert their financial worries into actions. In order to better apprehend the changes in customers' risk appetite, and thus their behaviour, let us focus on the individual life insurance products in the United States, with two major kinds of products: so-called "life products" (term life/whole life/universal life); and then "annuity products":

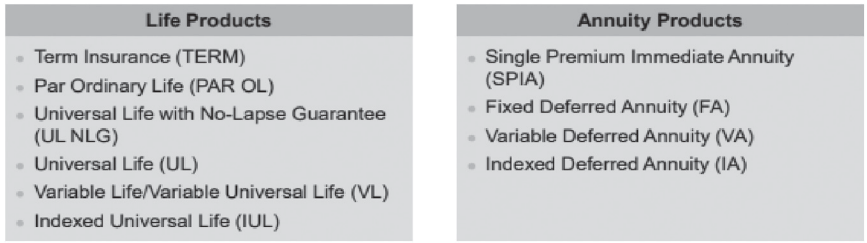


FIGURE 1.3 Major US savings and retirement products

Let us first review the generic structure of term life/whole life/universal life insurance policies.

- Term policies (massively developed in the context of high interest rates during the 1970s and 1980s) are issued for a given period, such as ten, 20 or 30 years. Their sole purpose is to provide financial protection (a death benefit) for your dependants in the event of your death. But, if you do not die during the term, the policy will expire when the term ends, and no benefits will be paid. One of the biggest benefits of term life insurance is that premiums remain the same throughout the term ("level premium period") of the policy (although they are reset at each renewal), which provides cost certainty, and it is usually much less expensive than whole/universal life if it is bought at a young age. The biggest drawback is that, if you

do not die during the term of the policy, neither you nor your beneficiaries will receive any benefit. As a result, it is usually smart to choose a term that will cover the years when you are young and working, and your beneficiaries will need income if you pass away.

- Unlike a term insurance policy, a whole life/universal life insurance policy has value other than the death benefit, and lasts for your whole life. With this extended period, premiums are considerably more expensive, but with the major benefit that the premiums can grow (tax-deferred) as a guaranteed cash value (expressed as a percentage of the policy's face value) and be accessed over the life of the policy. And, if you do not touch this cash prior to passing away, it is disbursed to your beneficiaries in addition to the face value of the policy. These excess whole life premiums are invested at the insurance company's discretion. Most people will be better served by purchasing this product at a younger age (~ 20) to secure lower premiums.
- Universal life insurance (launched in the early 1980s) adds flexibility to whole life: you can make premium payments at any time you wish and in any amount you wish; and excess premium payments can be anything from stocks to bonds to mutual funds/annuities (albeit potentially restricted by the insurance company), thus with higher market risk exposure.

The following points can be made with regard to lapse behaviour.

- After the 2008 financial crisis the overall annual policy lapse rate (policy cancellation rate) decreased 4.0% annually (6.2% for term life, 4.3% for universal life, 2.9% for whole life), down from 4.5%, 4.2% and 4.9% in the 2007–2009, 2005–2007 and 2001–2002 studies. This applied across all three product lines and all policy years, although decreases occurred most significantly in the first three policy years, stemming from the economic downturn.
- Whole life lapse rates were noticeably higher in the early policy years relative to the other study years, caused by the recessionary economic conditions. It also appears that younger issue ages were more likely to react to the economic conditions than older issue ages.
- However, the aggregated average lapse rates across product lines increased in absolute levels in policy years 11 to 20 after the financial crisis, due to a change in the mix of business, with more exposure to term, which has higher lapse rates than other product lines in those policy years, and in particular a lapse shock (30 to 60%) at the end of the guarantee premium period, which often coincides with a premium increase (whether ten-year, 15-year or 20-year, and growing with the premium increase), and this across issue age cohorts (although at lower levels for younger ones).

Second, let us review the generic structure of annuities with living benefits.

- The policyholder receives at maturity a lump sum or an income (lifetime or fixed term) stream, after a "waiting"/"deferral" period during which savings are invested in financial assets (70 to 80% equities for variable annuities [VAs], mostly fixed income for fixed annuities [FAs] and fixed indexed annuities [FIAs], though also some equity-indexed annuities [EIAs]), and benefits from a minimum "guaranteed" rate (a 1 to 2% so-called "fixed credited rate" in FAs, a "credited rate linked to an index, up to a monthly cap that is reset on a yearly basis" in FIAs, a 4 to 6% "roll-up" rate in VAs).
- During the waiting/deferral period the insured is still allowed to withdraw up to a certain percentage of the guarantee on a yearly basis (with a penalty if larger than the guarantee times the roll-up rate), although she is usually incentivized with a "deferral" bonus to delay such withdrawals (usually by ten years), while potential surrender is penalized during a "surrender charge" period (usually seven years).

- In addition, if the contract contains a death benefit, then a certain amount is paid to the beneficiaries in case the policyholder dies during the term of the contract. Naturally, this death benefit is offered only if the income stream has *not* been activated.

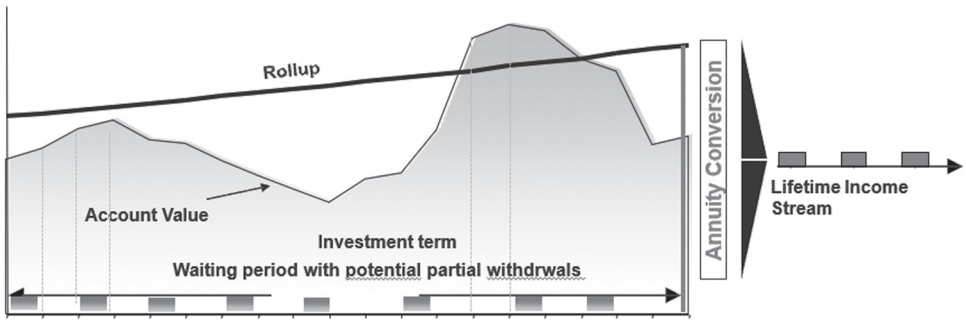


FIGURE 1.4 Retirement savings annuities mechanisms

As a result, behaviour risks mainly lie in three areas – surrender (or lapse) risk, withdrawal risk and annuitization risk (annuity election) – each of which is concentrated within specific phases of contract life: the withdrawal risk timing mostly occurs in the early stages, during the "ten-year withdrawal deferral bonus period"; the lapse risk timing is mostly concentrated after the "seven-year surrender charge period"; and the annuitization risk usually occurs far later.

Regarding policyholders' behaviours, there are still some key structural patterns, for instance regarding surrender behaviour.

- The surrender experience involves three regimes.
  - Maximum levels occur at the shock duration – the year following the end of the surrender charge period (mostly seven years: the "shock lapse"); although this stood at 30% at the onset of the 2008 economic crisis, shock rates below 10% were observed during 2016, and otherwise a post-crisis regime has prevailed, with shock rates in the range of 12 to 16% from 2009 through mid-2015 and in 2017/18. The 2016 dip is believed to be the result of uncertainty surrounding the US Department of Labor's proposed fiduciary rule and other political factors.
  - Lapse rates fall significantly in the quarter just after the shock lapse, and then decline gradually thereafter. In the quarter immediately after the shock lapse, lapse rates decrease by over 50%. In the five years following the shock lapse, rates fall by approximately 30% from the highs experienced in the first quarter after the shock lapse.
  - Surrender behaviour decreases with living benefits, and falls even lower with income utilization, and when guarantees are more valuable (e.g. with higher credited rates for FIAs, or with higher "in-the-moneyness" [ITM] for living benefits.

ITM is defined as follows.

- Nominal "in-the-moneyness" = current guarantee level/account value – 1.
- Actuarial "in-the-moneyness" = discounted future guaranteed income over the life of the product/account value – 1. Such an actuarial measure incorporates mortality and discounting effects.

- Although "out-of-the-money" (OTM) contracts experience surrender rates three times higher than ITM contracts under both measures, the "in-the-moneyness" is very much wider for the nominal measure than for the actuarial measure (80% versus 12% for the guaranteed lifetime withdrawal benefit [GLWB]).

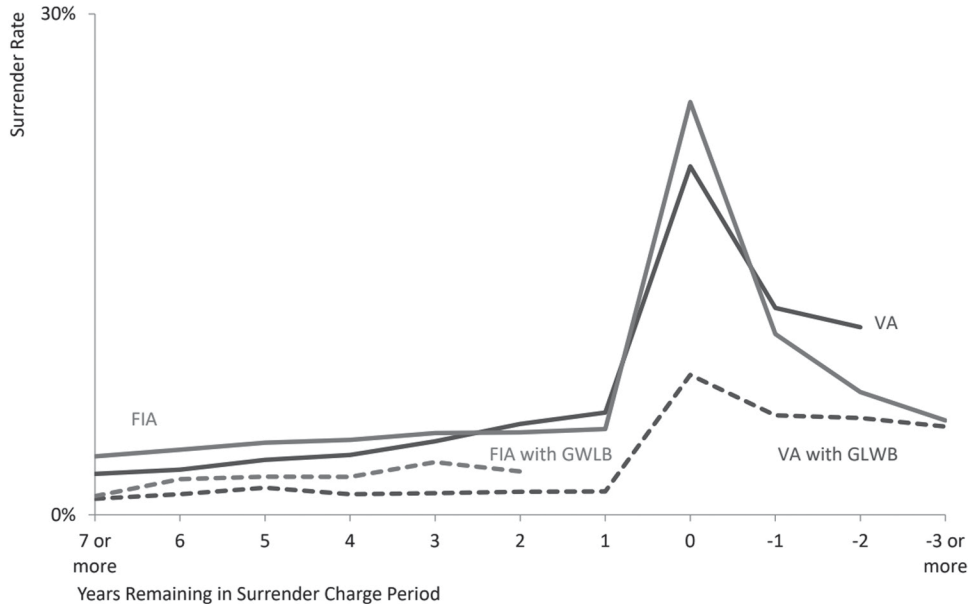


FIGURE 1.5 US pattern of customers' surrender rates

The following points can be made regarding customers' withdrawal trends.

- Withdrawals vary in terms of tax qualification status (a notable portion of nonqualified policies will not withdraw, whereas all qualified policies will withdraw by some ultimate duration) and by tax regime, with large withdrawals occurring just after some tax penalties disappear (59.5 years of age in the United States) or appear (71.5).
- Withdrawals increase with age, and this in an accelerated way.

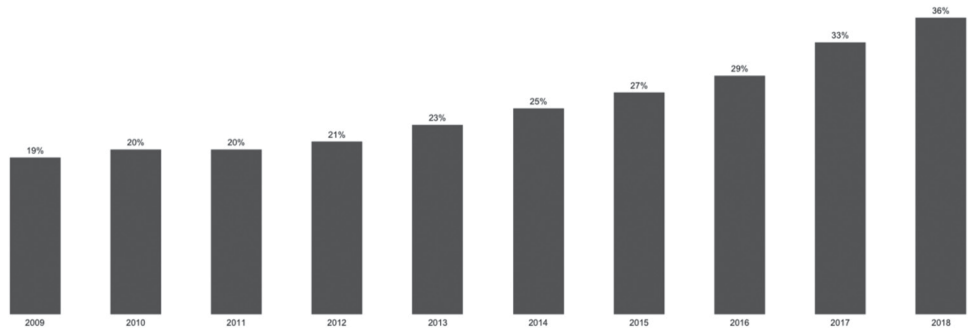


FIGURE 1.6 US pattern of withdrawals behaviour

Regarding annuitization rates (within the guaranteed minimum income benefit [GMIB]), they are de-incentivized by tax penalties before the policyholder is 59.5 years old, then jump before the 71-year-old required minimum distribution (RMD) tax penalty, but still stay low. The annuitization rate then increases until the last eligible year to annuitize. Part of the persistently low albeit rising annuitization rate lies in the

usually associated guaranteed minimum death benefit (GMDB) to the GMIB, which is activated at death only if the annuity has *not* been activated. Many GMIB holders indeed consider this GMDB as sufficiently lucrative to justify buying the combo GMIB/GMDB.

Yet the dynamic sensitivity of lapsing, withdrawals and annuitization has grown over the past decade, becoming increasingly "efficient" in terms of the income utilization of the economic value (induced by the "moneyness", the ratio of income present value [PV] to annuitization PV or the roll-up product feature) for the policyholder, as illustrated by the following.

- Lower lapses, decreasing with the actuarial "in-the-moneyness" of policies after the surrender charge period.
- Income utilization has increased and become more efficient (with 65% at the maximum allowed for the GLWB), with withdrawals highest at issue and after bonuses expire after the guaranteed base roll-ups end (usually year 10 for both VAs and FIAs, specifically since 2008 with the so-called 200% ten-year deferral bonus, with a five-point uptick in the 11th contract year, lower before the 11th year [6 to 7%] and afterwards [9%]). The withdrawals frequency is then dynamic, increasing with age and with the "in-the-moneyness" of the policy for both FIAs and VAs (more than tripling, up to a 30% rate, for the GLWB).
- The annuitization rate also depends on the economic value of other benefits, such as continued income utilization, and so decreases as the ratio of income PV to annuitization PV increases.

In addition, there has been the emergence of some significant increasing connections between lapse and past withdrawal behaviours, as a contract's prior partial withdrawal history influences its persistence.

First, policyholders who withdraw more or less than they are contractually allowed show a higher tendency to lapse.

- Those who consistently withdraw moderately *more* than the maximum allowed withdrawal amount are about three times as likely to lapse in the subsequent year as policyholders withdrawing amounts equal to the maximum (i.e. efficiently).
- In contrast, those taking moderately *less* than the maximum allowed are about 1.25 times as likely to lapse as those withdrawing efficiently.
- Furthermore, if that same policyholder were to take extreme excess withdrawals in the year before the end of the surrender charge period, reducing the benefit base by at least 70%, then she tends to lapse at a rate more than six times higher than those withdrawing efficiently. A policyholder who continues large excess withdrawals during the last surrender charge ultimate year is more than ten times as likely to lapse.

Second, in contrast, policyholders with longer withdrawals are associated with a lower lapse rate.

- Policyholders who take systematic withdrawals on lifetime benefit riders experience very low surrenders in the first systematic withdrawal year, increasing thereafter.
- A policyholder who has been withdrawing efficiently for five years (ten years) tends to lapse at a rate equal to about 80% (70%) of that of an otherwise identical policyholder who has been withdrawing for just one year.
- These effects are diminished if the policyholder has a recent history of inefficient utilization – i.e. either under- or over-withdrawing the maximum amount. At the shortest end of the withdrawal history spectrum, a policyholder who is still deferring (by definition, withdrawing efficiently for zero years) is more likely to lapse than a policyholder who has been withdrawing efficiently for any positive length of time.

- The effects of inefficient prior utilization on lapse behaviour dissipate once a policyholder begins to take efficient withdrawals: policyholders who moderately over- or underutilized in prior years, and then subsequently began to take efficient withdrawals (withdrawals equal to the maximum allowable amount), exhibit very similar lapse behaviour as exclusively efficient policyholders

Overall, there is evidence of a rising anti-selection feature within customers' behaviour, with the emergence of three types of savings use behaviour patterns, characterized by the frequency and amounts of withdrawals, and strongly influenced by age.

- Before the age of 60: one-off withdrawals of heterogeneous sizes, very often massive (greater than 200% of the annual guaranteed withdrawal); illustrative of the consumption of expensive durable goods, real estate purchases, financing of education and vocational training, children's studies, the management of periods of unemployment, etc.
- From 60 to 70 years of age: regular withdrawals, of moderate and homogeneous sizes, during retirement; illustrative of the entry into annuity.
- After 70 years of age: mostly the entry into annuity, with regular, moderate and homogeneous withdrawals; but also some excess withdrawals (for tax reasons or donation).

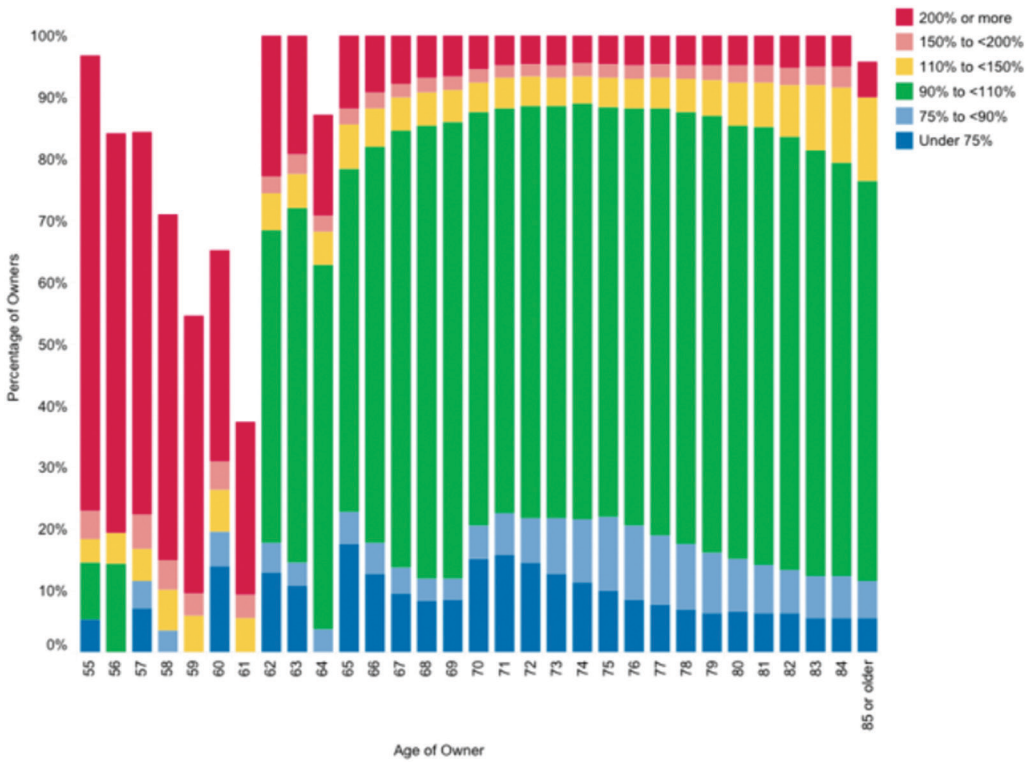


FIGURE 1.7 US withdrawals pattern

This segmentation of customer profiles reflects strong differentiation in terms of saving behaviours, which calls for an optimization of the product design tailored to its uses for an enriched customer experience.

For this multi-stage life cycle to be realized, insurance will need to design innovative products and services so as to address older-age appetites, at key events throughout their lives (e.g. marriage, divorce, new house, setting up of new business, retirement). And there will also be increased demand for more affordable, flexible,

transparent and customized insurance that better suits such evolving conditions and can be easily adjusted as the needs change.

The customer experience has thus become companies' prime focus, with consumers now aware of their demands and rights more than ever. Consequently, insurers have had to raise the level of their offerings in order to engage customers.

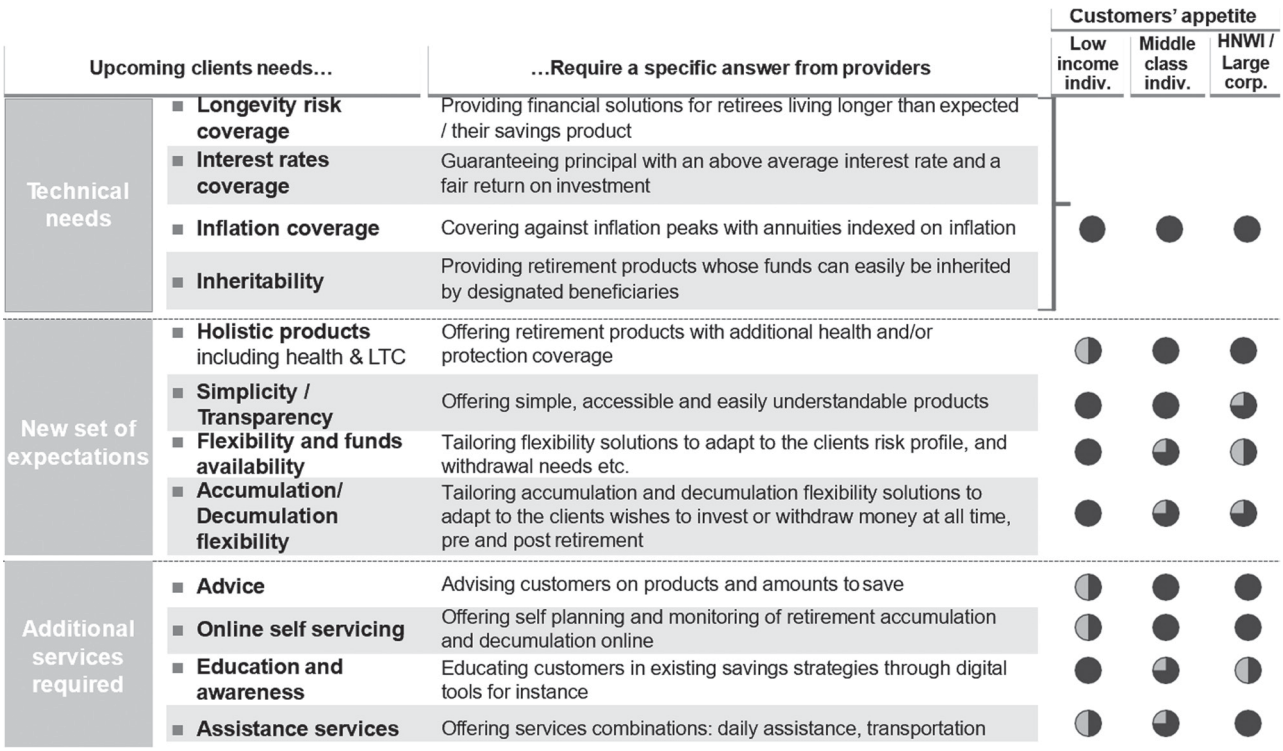


FIGURE 1.8 New clients' needs and expectations for their pension plans

Notes: HNWI = high-net-worth individual; LTC = long-term care.

Within such a context, there is a lot of room for improvement in the use of data and digital technologies by insurance enterprises. Insurers that commit to gathering and analysing data for effective customer profiling and targeting will find themselves better equipped across the full value chain: differentiating their offerings (e.g. underwriting), strengthening their customer relationship management (e.g. claim management) and improving risk management and fraud prevention (through pattern identification). Moreover, the access to data has been drastically improved: whereas customer behaviour had formerly been centred on a reluctance to share data, and heightened concerns about the safety of such data, freely shared data from consumers has become widespread with data capture cookies being phased out on digital platforms.

1.1.1.3 Sustainability Offers a Historic Opportunity to Lead, Innovate and Grow Purposefully

Climate change and sustainability have re-emerged atop board and C-suite agendas as the direct impacts of the Covid-19 pandemic have receded. Previous discussions about sustainability were largely theoretical and centred on making public pledges of support. However, today leading insurers are taking tangible steps and adopting hard metrics to address the full range of environmental, social and governance issues and opportunities.

In fact, ESG ratings aim to measure a company's resilience to long-term relevant risks, through good sustainability practices within the company. Looking at the ESG factors one by one, the following points emerge.

- The "E" factors refer to the company's behaviour on environmental issues such as resource depletion, climate change, pollution.
- The "S" factors relate to the company's treatment of people, workers and local communities, including health and safety aspects.
- The "G" factors refer to corporate policies and governance, including tax strategies, corruption, the company structure and remuneration.

As a result, companies that score well should benefit from improved terms across lines of insurance – the liability of employers, directors and officers, product liability, public liability – given their focus on mitigating risk factors that cause reputational harm.

A high ESG score is thus likely to help a company to (i) attract more investors, (ii) lower the cost of capital and (iii) result in better operational performance, thus stock performance.

FIGURE 1.9 ESG issues in insurance

Note: SDGs = the United Nations' Sustainable Development Goals.

For most insurers, the focus is, first, on the "E" in ESG, as climate change will have the biggest and most immediate impact on the industry's financial performance. But, over the long term, this will also affect the health of the population, and therefore have an impact on the cost of health and sickness benefits and, ultimately, the value and cost of annuity policies, translating into a growing focus on the "S" in ESG.

The "S" is key, as insurers offer intangible (as opposed to physical) products that address the important social functions of a safety net: retirement savings and protection from financial losses. Properly designed and marketed insurance products are meant to incentivize socially desirable behaviours such as "financial wellness" or "retirement preparedness" for life insurance customers. Besides, negative publicity around "S" considerations may restrict a firm's ability to attract and retain talent if there is a "social stigma" associated with the firm, while compliance may boost employee motivation and attract talent through social credibility.

Another driver of the "S" screening is that insurance companies and pensions have been committed to responsible investing for years, dedicated to a long-term view. Investment strategies range from disciplined asset liability management to impact investing to diversity inclusion and investing to mitigate climate change. Based on polls, ESG is also a significant consideration for 80% of the companies in risk transfer, reinsurance and insurance-linked securities (ILS), though where they factor in their underwriting deliberations is less clear.

Therefore, the ESG score is becoming an increasingly key factor in companies' portfolio asset allocation, within the context of not only growing customer demand but also regulatory requirements. As a matter of fact, the value of ESG assets under management (AuM) is expected to reach some $50 trillion by 2025 – a third of global AuM.

Finally, the focus on the "G" factor translates into different governance and policies across the various departments (risk and cybersecurity, notably).

Many insurers produce regular ESG/sustainability reports and/or corporate responsibility filings, which typically discuss their approach to ESG, their accomplishments and their overall strategy in addressing the issue. Conversely, other firms seem to produce far less in the way of materials on the matter, and do not discuss the topic in calls and presentations with investors.

A number of companies produce in-depth materials or have dedicated websites on their ESG efforts, which highlight targets for emissions, their overall environmental impact and diversity and mobility opportunities within their workforce, and have committees and standards for their corporate governance structure. Conversely, some firms simply produce a standard code of conduct, with very limited mention of ESG in public forums or comprehensive ESG-related reports from Brighthouse Financial or Equitable Holdings.

However, it is difficult to determine the extent to which ESG is incorporated into most insurers' business practices. To be able to accurately benchmark, track and measure results of ESG business transformation efforts, insurers must identify the right key performance indicators (KPIs). Among the key axes are these:

- define clear and short-term objectives;
- clearly articulate what you want to achieve;
- work out how to measure progress, so establish a baseline to start from;
- identify KPIs to act on to improve performance;
- report on results at regular intervals; and
- be discerning and select solutions that are scalable, adaptable and capable of helping you achieve your outline goals.

Insurers can take many meaningful steps in the near term to help advance the transition to a greener economy. Mapping action plans to specific targets and establishing quantifiable performance metrics relative to sustainability are two ways that insurers can live their purpose. Within a broader ESG strategy, insurers must identify priority focus areas, clarify why they are allocating resources to them and determine the benefits they expect to achieve.

A clear road map must also reflect the impacts on different parts of the business and how ESG strategies will be executed. In tracking performance against sustainability targets, insurers should monitor risk exposures, value creation and progress towards specific goals. As reporting and disclosures become standardized, the most transparent companies will benefit from easier access to capital, increased customer loyalty and better share price performance.

1.1.2 Key Lessons from the 2008 Financial Crisis and the Persistently Low Interest Rates Environment regarding Sustainability

1.1.2.1 The 2008 Financial Crisis Was a Stress Test

We lived through a stress test in the financial crisis (–51% over 17 months), above the 99.5% percentile – a crash in equity markets, an increase in volatility, a drop in interest rates, a perfect storm in financial markets – beyond previous market crashes (–43% in 1973/74, –41% in 2000–03).

With the onset of the financial crisis some of the most successful players skidded into trouble. For example, between October 2007 and March 2009 six of the ten largest publicly listed VA issuers in the United States lost about 90% of their market capitalization, 50% of their sales and 25% in their AuM. Most products became unprofitable in economic terms, while the hedging strategies proved insufficient, leading to write-offs and capital injections. The industry's profitability sagged under rising guarantee values, the collapse of earnings from mutual fund fees, negative hedging results and exploding hedging costs. As a result, many companies' credit ratings were downgraded by the rating agencies. VA sales, having reached a pre-crisis high of $184 billion, have decreased by a half since then.

> AXA Group announced a US$3bn capital injection into its US subsidiary AXA Financial to bolster its solvency. One factor in this decision was variable annuity hedging losses projected at between €350 and €450 million for the fourth quarter of 2008 …
>
> In its report for the quarter ending September 30 2008, Dutch insurer AEGON announced a €48 million loss on US VA earnings.
>
> OLD MUTUAL
> *August 2008, investor Q&A*

Hartford first suspended sales in the United Kingdom, exited the VA business in the United States and Japan, then sold its new business capabilities to a strategic buyer. Mitsui halted sales of VAs in Japan. ING stopped selling VAs and variable whole life policies in Japan. MetLife divested Brighthouse in 2016. ING, which had $12.3 billion in sales in 2008, ranking fourth among sellers, exited the VA business and separated its legacy policies in fixed and variable annuities from its ongoing business – now VOYA – which it sold to Apollo Capital in 2016. Ameriprise discontinued wholesale sales at the end of 2010.

The best-in-class players managed to navigate relatively well through the crisis thanks to higher diversification, the focus on their core businesses, disciplined and timely monitoring of all asset class exposure (full reporting on "toxic" exposures, temporary measures on investment, stringent derivatives policies with daily or weekly margin calls) and active risk management (a dynamic hedging programme aligned with risk appetite, and a liquidity emergency plan).

The market turmoil of 2008 and early 2009, followed by the persistent decline in interest rates over the past decade, cemented a deep-seated crisis of confidence about how to truly create retirement security. What has occurred is nothing short of a decisive shift in the financial mindset for all Americans, but especially for those in or near retirement.

1.1.2.2 High Market Uncertainties and Persistently Low Interest Rates Have Had a Drastically Negative Impact on the Sustainability of Savings and Retirement Products

Since the 1990s recurrent unexpected severe volatility spikes (as illustrated by recurrent crashes: 1994 bond crash; 1997 Asian crisis; 1998 Russian crisis; 2001/02 Internet bubble crash; 2008 crash; 2010, 2012, 2014 European sovereign debt mini-crashes; August 2011 mini-crash; 2016 Brexit mini-crash; February and October–December 1998 mini-crashes; 2020 Covid-19 crash), combined with persistently low interest rates, have made most savings products less attractive and sustainable, translating into earnings losses for the insurance companies and lower yields for policyholders.

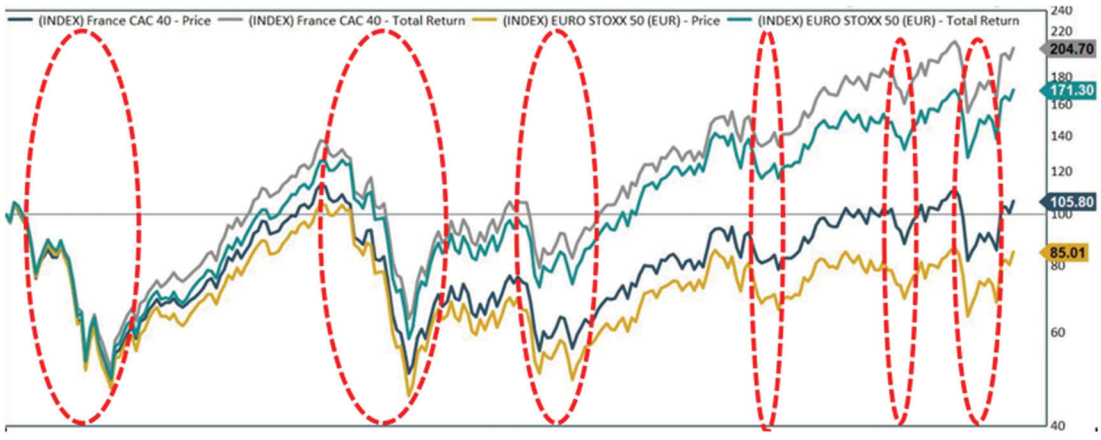


FIGURE 1.10 Recurrent equity market crashes and volatility spikes over the past 20 years

Market volatility certainly had a strong impact on returns sustainability, as illustrated by the extent to which the sequence of returns affects a portfolio: despite an average 8% return of the S&P 500 over the past 30 years,

the range has varied dramatically from 37% in 1995 to –37% in 2008. Of course, this is not an issue for consumers focused on accumulation who do not draw down on their investments, and so weather the volatile times and ultimately achieve the average return for any given holding period, assuming the dollars stay invested. But, for those drawing down assets or taking income from their holdings, the variability of performance can have a huge impact, as illustrated below.

Let us consider the case of a retired couple with a $1 million nest egg and plans to withdraw 5% per year ($50,000), adjusted for inflation (3.5%) each year.

- If the portfolio generates a steady annualized return of 6% per year, the couple could count on their distributions lasting for 30 years.
- What happens if the portfolio moves up and down every year, while keeping the same 6% average return over 30 years and withdrawing $50,000 per year until the value hits zero? It then depends on the sequence of returns.
  - Four distinct rate-of-return values cycling every four years would translate the portfolio earnings into 27% in year 1, 9% in year 2, 7% in year 3 and –15% in year 4.
  - Consider the reverse-sequence rotation of the above, starting with –15%, then 7%, 9% and 27%: the different sequencing of returns represents a 13-year difference in how long the money will last.
  - In fact, the money could run out much more quickly than anticipated, or could be extended if investments perform better in the early years. As a result, avoiding early losses is key for performance; as any potential future gains would now accrue off a smaller base, you may not have ample time to benefit from a market recovery, particularly if you need to make additional withdrawals from your retirement account.

The problem is the unpredictability of variable investments in the short run, when it is already hard enough to accurately project an average annual return over an extended period. No matter how accurate you may be in projecting an "average" return, it provides little assurance that retirement income goals will be met if the sequence of returns happens to work in an unfavourable way.

It may seem that a simple solution for reducing a retiree's sequence of returns risk would be for you to reduce your equity holdings in your portfolio in favour of fixed-income investments. However, this approach compromises the portfolio's upside potential and may lead to a quicker – and premature – reduction of your long-term savings.

The severity of the financial crisis and the longer-than-usual time needed to benefit from a market recovery (2009–13) have undermined people's once steady faith in the equity markets as a solution to their retirement problems, forcing the next generation of retirees to look for solutions different from those that worked for their parents: among the entire baby boomer group, a desire to lock in guarantees, in lieu of higher returns, has emerged, with 80% preferring an investment with a 4% return and a guarantee against losses compared to one that pays 8% interest but is subject to market downturns. In short, the new buzzwords for ageing baby boomers are "lifetime income" and "guarantees".

Actually, whether you're in your 40s or 50s, and looking for upside investment potential or some guaranteed returns, annuity solutions can address a range of long-term retirement planning needs. Income annuities are a useful hedge against sequence-of-returns risk for two main reasons: (i) they provide a guaranteed source of lifetime income that is not correlated to market ups and downs or interest rate fluctuations; and (ii) the annuity regular income lowers the withdrawals that you might need to take to cover expenses. This is particularly good news should the market perform poorly in the early years of one's retirement, because these solutions can help retirees avoid selling at the bottom.

However, the cost of those annuities guarantees has significantly jumped, not only with the rising equity volatility but, even more, with the declining interest rate environment throughout the last decade, triggered and driven by the rise in central banks' balance sheets since the 2008 financial credit crisis (in the United States

$4.6 trillion in 2019, then $9 trillion after the Covid-19 crash). Persistently low interest rates have indeed been the major driving factor behind the lower sustainability of savings and retirement products.

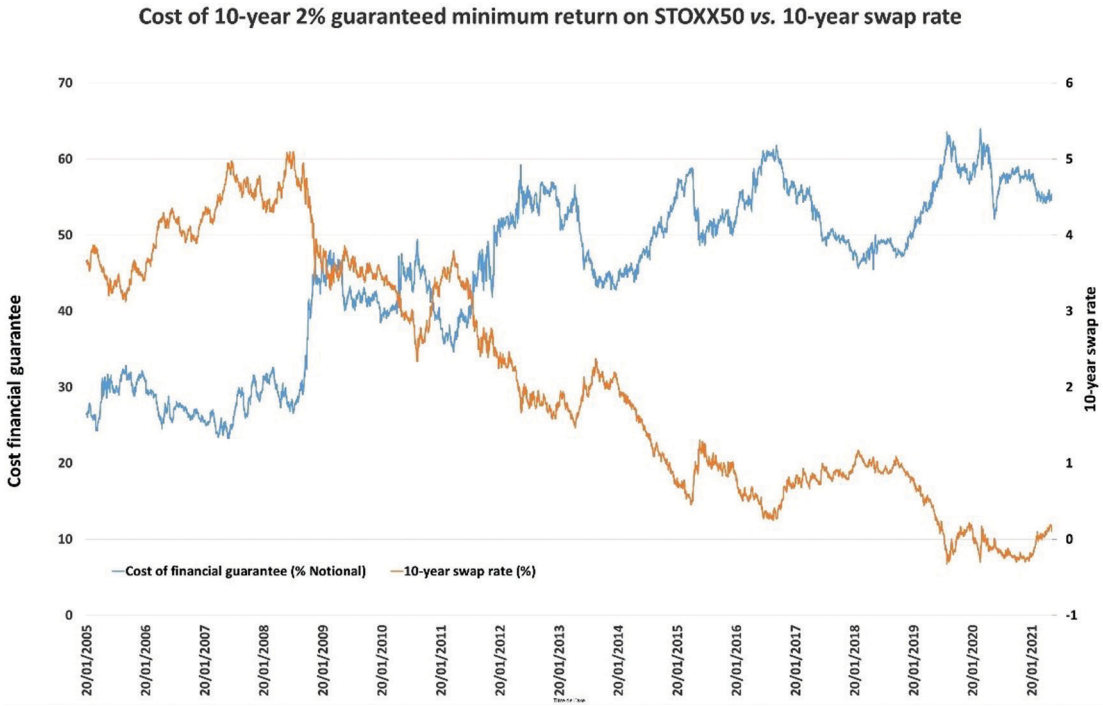


FIGURE 1.11 The cost of guarantees has jumped in line with declining interest rates

Despite some attempts by the Fed to reduce temporarily the balance sheet by $600 billion and a few interest rates hikes from 2017 to 2019 and the recent jump in consumer inflation (up to 7% annually in 2021/22), interest rates have not recovered to pre-financial crisis levels. The normalization from artificially low levels is unlikely before a few years given the huge remaining balance sheets of central banks.

Such a historically persistent low interest rate environment has contributed to a drastic increase in both premium levels and the risks inherent in major savings and retirement products, translating into a significant sales drop. Although large fixed-income allocations and greater amounts of hedging have helped reduce volatility, it has become extremely challenging for assets to grow at guaranteed rates in a prolonged low-rate environment.

- On the one hand, lower interest rates increase reserves (using lower discount rates, resulting in a higher present value of expected convex claims – in contrast with usual linear fees, which are hardly impacted), capital requirements (which are related to regulatory shocks as a percentage of those higher reserves) and the cost of hedging (through higher options prices induced by lower discount rates).
- On the other hand, lower interest rates, and thus yields, increase difficulties in supporting minimum guaranteed rates, both in equities for VAs (due to higher costs of guarantees) and in fixed income for FA/FIA/term and whole life and universal life and general accounts (lower credited rates due to credit spread compression), and decrease return on equity (ROE) due to lower net income from higher reserves levels.

Unfortunately, excessively early expectations after 2009 that interest rates would rise again have pushed most writers to consider growing further and developing products that are still generous, and thus risky, at the same price, as illustrated by high minimum guaranteed rates and withdrawals (e.g. 5 to 7% roll-up and

guaranteed withdrawal rates, annual/quarterly/daily ratchets within US variable annuities by Jackson, Metlife and Prudential).

Even so, premiums were increased (e.g. a rise in hedge fees from 0.80% to 1.15 to 1.35% p.a.), while the implicit technical rates embedded within the guaranteed income were drastically reduced, indirectly, through much less generous mortality tables (i.e. by discounting the official mortality tables by a significant factor, which implied significantly higher premiums).

Such combined de-risking, through offering lower product richness while raising fees, has also impacted policyholders' behaviour into lower lapse levels, as new savings and retirement products became less and less attractive, with surrenders at the shock duration going down from 30% in 2008 to 10% in 2016 and 12 to 16% in 2018.

In contrast with the situation prior to the 2008 financial crisis, when the vast majority of annuity guarantees were in-the-money, as interest rates have remained persistently low and volatile while policies have aged within a slow market recovery (from 2009 to 2013), a greater percentage of the book went ITM with rising cumulated fees, which implied lower lapses that accounted for the major part of the earnings loss arising from customers' behaviour, while partial withdrawals went down in line with rising past durations.

Estimates of the lapse response to the "moneyness" of guarantees vary widely, as insurers are making very different assumptions with regard to behaviours in their annuity books. For business that is 30% in the money – as with much of the business in force today – estimates of the reduction in lapse propensity due to the "moneyness" vary hugely, from 20 to 75%, thus dropping down to less than 1%. This led to the so-called "double trouble": the most expensive policyholders (those with "in-the-money" contracts in which the benefit base is larger than the assets) are lapsing at a lower-than-expected rate while more profitable policyholders (those with "out-of-the-money" contracts) are lapsing at a higher-than-expected rate. The impact can be especially costly to insurers, as more benefits will be paid out than priced for, while margins are compressed – at a time when hedging costs are increasingly expensive because of low/volatile equity market returns and low interest rates.

Behavioural risk, and in particular lapse risk, has one similarity to market risk: the magnitude of its potential impact on balance sheets, which translates into significant rising reserves, capital increase and earnings losses. But, in contrast to market risks, policyholder behaviour risk is virtually impossible to hedge for, and can be transferred only through reinsurance; this is why a company that has misestimated policyholder behaviour may have little choice other than to recognize the adverse experience in its financials.

As a result, additional fundamental de-risking measures were implemented by most life insurers from 2013 to 2016.

- Reserves were strengthened to reflect updated policyholder behaviour assumptions, to (i) lower lapse (level and floors) for ITM policies, while (ii) higher for OTM policies; withdrawals assumptions were reduced beyond a certain policy past duration or whenever the long-term interest rates go below a certain interest rate level; lower lapse levels were assumed for remaining policies after a buyout, with a lengthened time for full lapse recovery. Reserve charges of several billion dollars have been incurred, notably by AXA Equitable Life Insurance, Metlife and ING US's life insurance companies, while John Hancock, Sun Life Assurance Company of Canada (US) and Prudential Insurance Company of America took lesser charges.
- Buyout initiatives were launched targeting the richest policies to lapse or convert into alternative insurance policies (e.g. offering between 35 and 70% of International Financial Reporting Standards [IFRS] value in cash, floored at two years of premiums; in the form of an increase in annuity account value in the base contract in exchange for terminating the riders, clients then being able to withdraw the cash or remain in the contract with no benefits). From customers' perspective, they could be interested in monetizing part of their account value/benefit base in the form of an accelerated guaranteed surrender value to, potentially, subsequently reinvest their proceeds in higher-return products (the Buoni del Tesoro Poliennali five-year yield stood at 2.9% in Italy in 2013). From the insurer's perspective, the buyout offers

the opportunity to redeploy capital to less capital-intensive products or increase dividend, achieving a positive P&L by not fully paying out the IFRS guarantee reserve.

- Product designs were amended to incorporate de-risking and lower richness:
  - higher fees (monitoring and evaluation [M&E] and riders); possibility for the insurer to increase fees at his discretion;
  - age restrictions (higher withdrawals at higher attained ages);
  - lower benefits/guarantees (lower credited rates in FAs and FIAs, lower with-profit crediting and bonus in general accounts, lower guaranteed rates for term/whole life and universal life policies;
  - lower roll-up rates (cut from 7 to 4%) or floating roll-up rates in line with long-term Treasury rates; lower guaranteed withdrawal rates; lower frequency of ratchets; limiting maximum annual growth on resets/bonus features;
  - stricter asset allocation limits (higher mandatory minimum allocations to fixed/balanced accounts); restrictions on the number of equity funds (focusing on large indices such as S&P 500 with lower volatility); increased use of "tracker" funds; stricter governance in product approval process;
  - restrictions in the ability of policyholders to "time the market";
  - premium suspension (no additional contributions into legacy); and
  - increased hedge coverage.
- Most life insurers have also improved their risk management practices by increased use of volatility hedging, adding macro hedges to protect against steep interest rate drops.

Even so, despite the generous buyouts to lapse rich old policies and significant incentives to convert into new ones (equipped with the 200% ten-year deferral bonus), and the improved risk management techniques and culture, all these initiatives still could not fully mitigate the impact of the persistently low interest rate environment with lower lapses, the higher cost of hedging and lower credited rates within FAs, FIAs and general accounts (due to credit spread compression).

With the introduction in the European Union of quantitative easing in 2015, followed by the Brexit referendum in 2016, interest rates have persistently declined. Despite reducing guarantees on new business and taking action over asset liability management (ALM), low yields have created a hostile environment for the traditional life insurance industry.

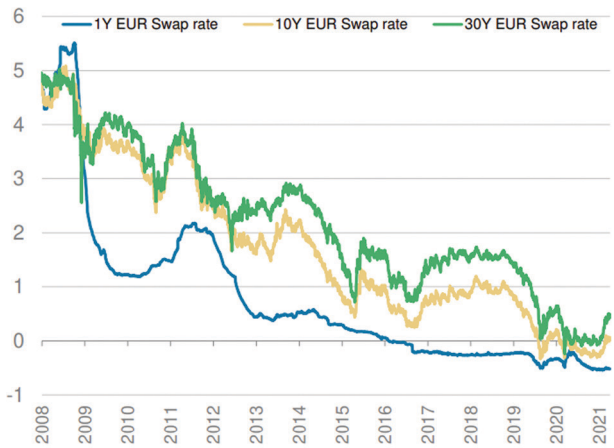


FIGURE 1.12 Interest rates declined over the 2010s

In Europe, German life is the most exposed, with yields falling more sharply than new business guarantee rates, translating into duration. In this way, a disconnect between the proportion of capital allocated and the earnings – and, crucially, cash – was generated.

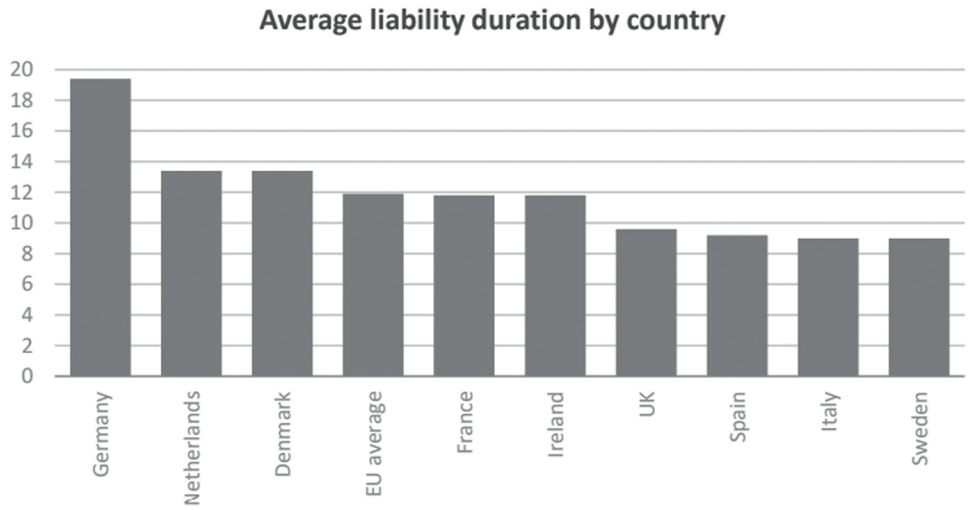


FIGURE 1.13 Germany has the longest life liability duration in Europe

As bond yields have continued to trend lower, even the lower guarantee rates on the new generation of products have become increasingly unaffordable. Companies are pushing further to reduce the cost of guarantee through various ways, such as offering a guarantee for only a proportion (typically 60 to 90%) of the premium instead of 100%, or charging fees higher than the "nominal" guarantee rates.

Further solutions have been developed since 2016 across the world.

- Decelerating the distribution of variable annuity and general account sales until interest rates mean-revert to sustainable long-term levels.
- Reducing the capital guarantees of the general account, "net of fees", and so with a level of 80 to 92% of the initial amount.
- The establishment of a hybrid euro fund that incorporates a portion of general account (e.g. 30 to 50%) while the residual is invested in non-guaranteed unit-linked (UL) assets.
- As persistent low interest rates have increased customers' concerns about fees and triggered drastic changes in their behaviour (lower lapse and partial withdrawals), retrieving resilience in profitability requires the development of customer-centric designs within a "rational" framework that balances benefits against fees.
- The reinsurance of businesses: fixed and variable annuity businesses embedding rich guarantees, such as Jackson in 2019, Equitable Financial (2006–2008 legacy block, accounting for 33% of the fixed-rate GMIB and 13% of total variable annuity in force) in 2020 and Prudential (block before 2010) in 2021 to Apollo. Such reinsurance initiatives enabled the generation of approximate value and capital release while reducing risks (respectively $1.2 billion and $800 million for Equitable Holdings on a statutory basis, so –64% statutory capital requirements and about –50% of net amount at risk).
- The exit and disposal of businesses. MetLife divested Brighthouse in 2016. ING, which had $12.3 billion in sales in 2008, ranking fourth among sellers, exited the VA business and separated its legacy policies in fixed and variable annuities from its ongoing business (now VOYA), sold to Apollo Capital in 2016. Ameriprise discontinued wholesale sales at the end of 2010.

- Further buyouts, notably "lump sum payment options" that provide certain contract holders with a percentage of the PV of the lifetime payments in a one-time lump sum payment at the time their annuity account value falls to zero (either due to a withdrawal or surrender).

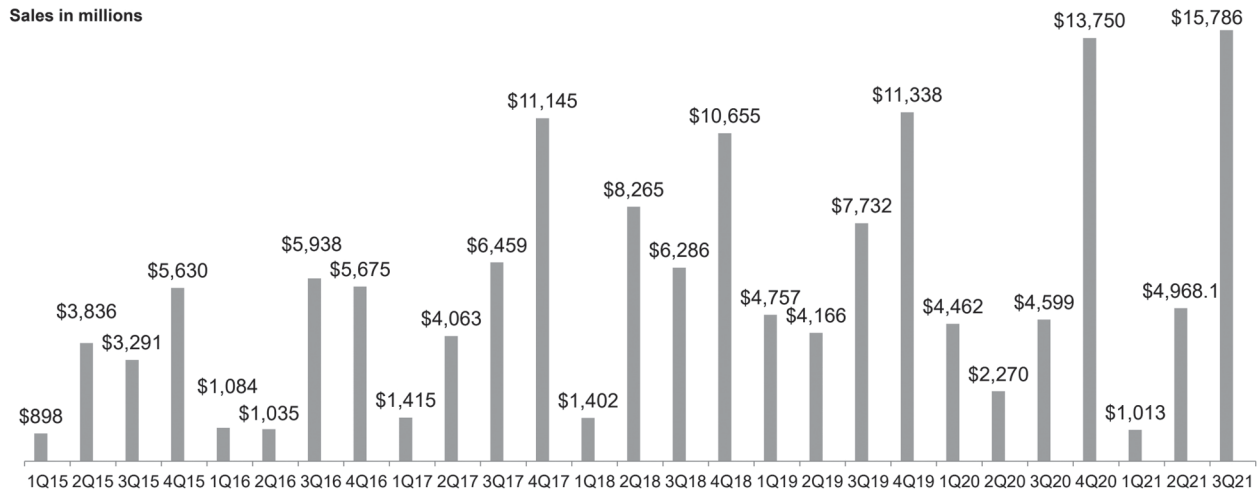


FIGURE 1.14 Buyout sales in the United States

- Develop alternative products more resilient to persistently low interest rates, such as:
  - fixed index annuities, which not only suffer less from guaranteed rates, thanks to market value adjusters and resets of guaranteed rates after short guarantee periods, but also benefit from the equity upside potential, as illustrated by the 75% S&P 500 growth since 2013;
  - asset management retail products (individual constant proportion portfolio insurance [iCPPI] policies), offering best-effort-only capital protection (versus capital guarantee within fixed or variable annuities);
  - structured index annuities (so-called registered index-linked annuities: RILAs) with third-party guarantees, leveraging on partnerships with investment banks to hedge the market risks;
  - "eurogrowth" funds, which hold a partial capital guarantee (e.g. 80 to 85%) only at maturity (and no more at all times); and
  - German, Swiss and Italian life insurers launched "hybrid" contracts, which combine unit-linked and traditional savings features; these hybrid products typically offer lower guarantees and have much lower interest rate risk, and therefore are more capital-efficient.

Even so, the higher market volatility and further lowering of interest rates triggered by the Covid-19 market crash has strengthened the increasingly "efficient" behaviour of policyholders, illustrated by lower lapse and withdrawal rates, among contracts with the highest propensity to exercise the benefit (e.g. in-the-money contracts following the end of the deferral bonus period or the surrender charge period).

1.1.3 In-Force Management Opportunities and Challenges: a Strategic Asset for Sustainable Savings and Retirement

Until recently insurers have focused on acquisitions, and resources and technology were deployed to generate growth, and sometimes returns, from new customers. In particular in emerging Asia, with its strong economic growth, increasing urbanization has increased incomes, contributing to an increase in life insurance

penetration rates. Even so, in recent years the ratio of the new business premium to the in-force premium has decreased, with worldwide premiums +2% over the 2008–18 compound annual growth rate (CAGR) p.a., vs. +7% CAGR p.a. for the 1998–2008 period.

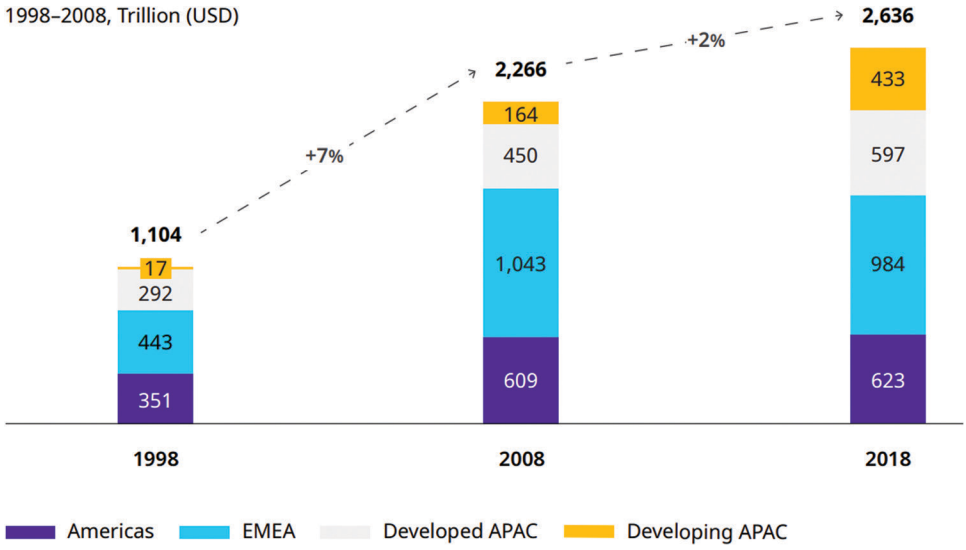


FIGURE 1.15 Premium growth of life insurers

Notes: EMEA = Europe, Middle East and Africa; APAC = Asia–Pacific.

In-force portfolios have traditionally provided life insurers with a steady and reliable stream of earnings that has driven stable industry margins and contributes a relatively large share of the profit and revenue. However, with low interest rates here to stay, inducing both lower yields and higher reserves of increasingly costly guarantees, and increasing volatility in investment markets and risk-based capital regimes becoming prominent in most markets, margins have been under pressure while customers' risk appetite and the needs of both financial protection and market upside are less satisfied. Thus insurers need to re-examine how they can create value for their customers while delivering attractive returns for shareholders, translating into KPIs such as stronger profitability and improved capital efficiency.

Furthermore, operational costs have continued to increase, hiding within them a worrying trend around the slow pace of automation and digitization of back-end processes in the sector. The in-force book is hardly homogeneous, comprising many product lines, vintages and customer sub-segments with varying degree of profitability. Therefore, an opportunity exists to focus on one of their most valuable and underexploited assets – their in-force portfolio – while unlocking significant basis points (bps) of reserves in additional operating profits.

Because of the scale of insurers' in-force portfolios, a relatively small incremental improvement in in-force performance can significantly impact bottom-line earnings and the value of the business as a whole.

These performance gains can be significantly improved if insurers use a targeted approach to in-force portfolio management, given the wide variety of customer and policy characteristics that exist within life insurance portfolios. There are many ways insurers can improve the performance of their in-force portfolios:

- improved customer experience, notably through customers' retention management combined with cross-/upselling and conversions of legacy products to alternative offerings;
- capital optimization;

- earnings generation and increased resilience;
- expense control;
- strategic rationalization of the asset allocation without compromising value for customers;
- liability management through more sustainable and flexible new business; and
- risk transfer.

Any project to improve performance must also be grounded in granular and robust analytics. High-quality informative analytics, combined with deep business experience and local market knowledge, tell us where to find and how to extract the value from an in-force portfolio that can give a much-needed boost to sustainable earnings and shareholder value.

Some insurers have implemented major in-force management projects during the last decade to enhance value using the activities outlined above, while more insurers will follow suit. Here are some examples.

- AXA Group's in-force optimization programme, which was composed of over 300 projects between 2010 and 2015, has managed to release €2.6 billion of capital for life and savings business, delivered €500 million in additional underlying earnings, with a 12% ROE, and delivered significant cost savings (lower administrative costs and acquisition costs through higher distribution efficiency and commercial productivity). Among the key initiatives are:
  - reshaping the capital-intensive general account savings offer (14% of the annual premium equivalent [APE] during the in-force programme) through reduced guarantees on new business, or combined with UL/protection riders (using customer incentives such as "Bonus Euro+" and distribution commission schemes), into less capital-intensive hybrid savings that are more resilient within the persistent low interest rate environment, and a selective growth focus;
  - closing (if unprofitable), repricing, redesigning (e.g. passive assets or floating-rate liability guarantee) and de-risking new business in variable annuities, and externalizing guarantees on market risks to third parties (asset managers, investment banks such as Structured Capital Strategies in the United States, Valore Performance in Italy, Sérénité in France or in Switzerland);
  - actively upselling protection and health within savings and retirement products (17% of APE during the in-force programme) – benefiting both from new clients' needs and lower exposure to interest rates risks;
  - diversifying the unit-linked product offer (34% of APE during the in-force programme), based on customers' profiles, with alternative asset classes;
  - expanding the ALM duration gap strategy to lower the sensitivity to interest rates risks;
  - introducing buyout initiatives (Belgium in 2016);
  - identifying growth opportunities in specific countries:
    - group pensions in France (defined benefits schemes for high-level executives and defined contribution schemes to all employees until annuity exit, with a high small and medium-sized enterprise [SME] market penetration rate) and in the United States (municipal workers and SMEs, through leveraging a leading position and expertise from the educational profession business, with direct-to-consumer distribution capabilities);
    - individual retirement income solutions in the United States (leveraging on a dedicated proprietary tied agent network, the strength of the existing wholesale model, cross-selling opportunities with

US property and casualty [P&C] carriers, expanding the 403 (b) K-12 education market, while decreasing market risks exposure through floating-rate guarantees/passive asset management and selective buyout offers), in Japan (partnerships with a national tax advisory company to educate customers), Italy (online tools to educate retirees and generate leads) and France (a "PERP" savings plan, characterized by tax-deductible lump sums blocked until annuity exit, through the development of the eurogrowth product, a higher share of unit-linked, modernization of IT systems and reinsurance);

    - high growth savings markets in Thailand (bundling with health and protection riders, a successful proprietary network and a bancassurance channel);

  - enhancing the distribution (41k tied agents specialized in savings) through new digital entry points, raising adviser expertise (sales tools and processes, regular training and news flow, technical support to sales force), partnerships with major banks, and social-media-linked customer relationship management; and

  - the disposal of pension businesses.

- In 2014 Zurich embarked on phase 1 of its in-force management programme and aimed to deliver $80 to 100 million in additional operating profits in two years. By the end of 2016 the programme had managed to deliver more than $150 million. Phase 2 of the programme, from 2017 to 2019, also exceeded the $100 million target, delivering $172 million in additional operating profits p.a. by 2019. Initiatives to simplify operations also have managed to reduce operating expenses, by $600 million.

1.1.3.1 Assess and Prioritize Opportunities for Earnings, Value and Capital Enhancements

The in-force book is hardly homogeneous, consisting of many product lines, vintages and customer sub-segments, all with varying degrees of profitability. Given the range of performance improvement opportunities by type and by portfolio, insurers will need to prioritize their actions based on the financial impact, the risks involved and the implementation timescales.

Insurers must first understand the profitability of their own in force by conducting a detailed review of what is in force and determining its profitability by sub-segments, thus providing the appropriate prioritization and allocation of resources to the most impactful actions. Additional investigation will probably be required to ensure the appropriate allocation of revenue, expenses and capital items at a more detailed level, including consideration of the impact of marginal changes in the portfolio, including any potential diversification effects.

In this respect, leveraging the efforts of a dedicated team to institutionalize a focus on the in-force book across the enterprise makes sense. Such a team must streamline processes for the capture of financial data for analysis, establish a knowledge store (i.e. a comprehensive inventory of all data, metrics, analysis and reporting that currently exist for the life in force, to be able to pinpoint the source of variances and perform statistical analysis to identify the impact if current trends continue), partner with service centres and customer analytics to identify key operational and customer metrics and then integrate the financial and operational data into a holistic view for the management board.

The financial impact of each opportunity will typically examine a range of accounting bases (local regulatory, Solvency II, local generally accepted accounting practice [GAAP], IFRS and embedded value [EV]); in fact, for some opportunities such as retention management, different accounting metrics can produce very different results and, potentially, drive different management actions. Depending on the specific business, the focus may be different across the four axes, earnings/value/capital/liquidity: on earnings volatility and capital burden, to support cash generation and new business for capital-intensive business (general account, variable annuities), but also on efficiency of capital usage and value creation, including customer behaviour (single-premium immediate annuity [SPIA] and deferred annuity).

Even so, the selection of most economic metrics, such as embedded value, combined with a metrics illustrative of earnings cash distributions to shareholders, will be the usual key drivers of decision-making to align actions more closely with both customer and shareholder values.

Once the most adequate metrics has been selected, both the short- and long-term implications of decisions will need to be taken into account (e.g. not just the current value of customers' in-force policies but their customer lifetime value, including allowance for any market cyclicality), as well as other material business issues that affect daily operations (e.g. how the cash flow position and the profit of the business will be affected), and balance sheet and business strategy impacts.

Within such a process, insurers also need to look again at their existing end-to-end processes around in-force servicing, such as claim processing and payments, which are often plagued with inefficiencies and low-value manual tasks, which could be expedited and automated through process re-engineering and automation, so as to reduce not only cost but also claim leakage, and improve the customer experience (e.g. improved response time due to straight-through processing, faster turnaround times for customer requests, more predictable outcomes and experiences, and an increased level of personalization).

In this respect, insurers will need to look at their existing IT infrastructure and assess whether there are opportunities for cost optimization through outsourcing, such as to potential software-as-a-service (SaaS) providers and cloud-based policy administration systems that not only reduce complexities associated with in-house customizations but also have many downstream benefits, such as faster and more seamless customer response and more autonomy to agents through self-service portals.

With a suite of approved business cases, opportunities can be prioritized and an overall programme can then be established, developed and implemented to improve in-force portfolio performance.

The in-force management initiatives can take advantage of the levers depicted in Figures 1.16 and 1.17 to make an impact.

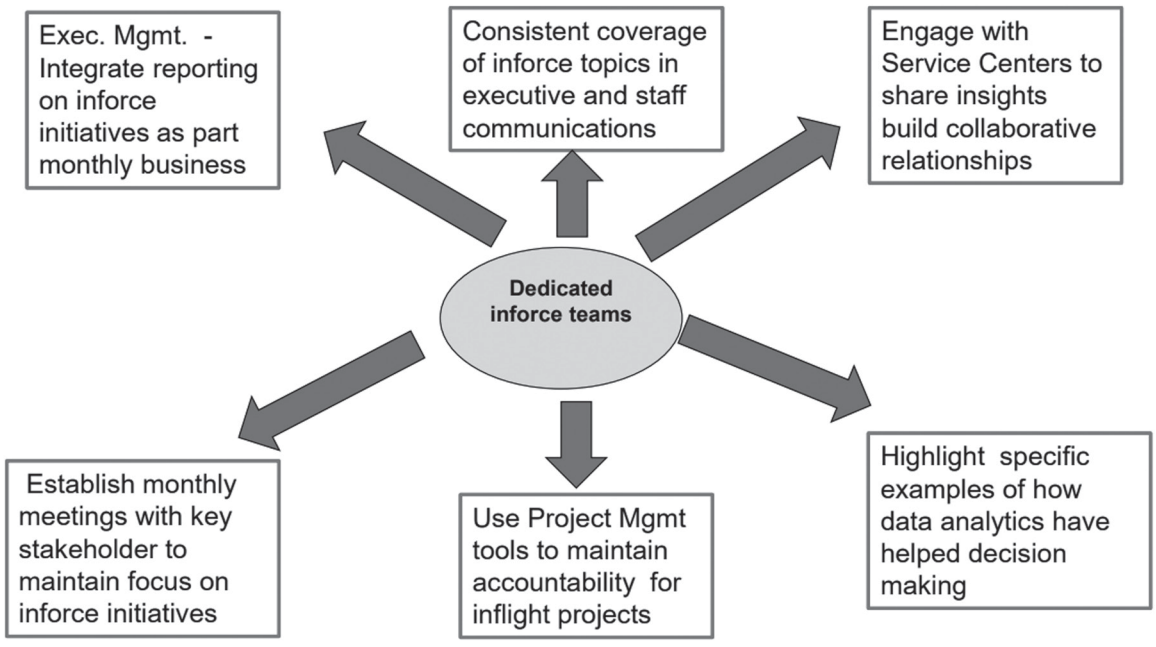


FIGURE 1.16 Dedicated in-force management team

Lever	How can it impact profitability?	Potential issues
Cross-Sell and Up-Sell	• Additional product sales • Improve inforce economics	• Impact on distribution • Cost to execute
Customer / Advisor Behavior	• Lapse • Utilization of benefits • Additional premium contributions • Asset allocation • Execute options against the company (e.g. utilization) • Trigger lapse/rollover	• Very difficult to influence • Waking of 'sleeping dogs' with any proactive outreach • Ensuring a fair deal for consumers • Willingness and ability to pay compensation • Ensuring tri-party alignment of interests • Ability to execute any programs at sufficient scale
Financial management	• Direct costs (e.g. hedging) • Overall risk profile and financial flexibility (both hedging and reinsurance)	• Limited supply of capital currently • Many options may be cost prohibitive or contain limited benefits
Funds	• Manage separate account economics and risk profile	• Legal and compliance
Pricing and Offers	• Manage our fee levels (product, rider, convenience) as appropriate	• Many products are limited • Legal and compliance • Cost of execution
Rates	• Managing crediting rates to improve spreads	• A large portion of the business is at minimum • Crediting strategy as environment changes

FIGURE 1.17 Levers for in-force management impact

Retention management and asset and liability management are two of the key areas for in-force portfolio performance improvement, which we develop and illustrate further below.

1.1.3.2 Better Understand Customers' Retention Drivers and Tailor Interactions to Improve Portfolio Profitability

For life insurers with a cross-regional footprint, lapse rates vary radically across markets, for market-specific and product structure differences. Given the long-term nature of most life insurance contracts and the high acquisition costs associated with getting new customers, even basis point improvements in lapse rates can unlock millions in profit and embedded value.

Retention management is the process of measuring the value of customers at a granular, segmented level, of identifying policyholders' behavioural characteristics that drive lapse rates and subsequently implementing measures aimed at retaining positive or high-value customers. Among the key stages of such a process are the following.

- Developing a rigorous understanding of individual customers' value across their life cycle, which reflects the value of future earnings of existing policies and the potential value of additional policy sales (a customer lifetime value assessment). As their life circumstances change, very few customers actively seek out and reassess if their insurance needs are adequate.
- Analyses of the drivers of policyholder behaviour and their quantitative impact on withdrawal rates, allowing for the interactions and correlations between factors: product class, distribution channel, socio-economic characteristics, policy riders, policy duration (current and remaining), the "moneyness" of guarantees, benefit amount, policyholder age and gender, number of recent contacts with the insurer.

For instance, what makes a customer use systematic small and regular withdrawals as opposed to using irregular but very significant ones or lapsing?

- Developing more effective customer lifetime value models requires bringing together multiple internal data sources, supplemented with relevant external data sets benchmarked with competitors, and deploying more sophisticated analytical and optimization predictive techniques, including propensity-to-lapse models, to estimate the impact of changes in features. Deploying these models effectively requires not only embedding this information within the operations and servicing teams as well as the distribution teams but also effectively training them on how to use this information.
- This approach also allows insurers to segment customers into homogeneous groups that respond similarly to changes in behavioural drivers. Insurers can then consider how to influence policyholder behaviour in each segment so as to improve overall portfolio profitability and to estimate the degree to which each segment will react to changes in each behavioural driver.
- Insurance/pensions can then focus their retention management activities on higher-value customers, by, for instance, tailoring written communication to the high-value policyholders to emphasize the merits of their policy, particularly over time; scripting specific responses to inbound telephone surrender enquiries from high-value policyholders (with messages to persuade them to maintain their policies) yet delivering a different message to less valued customers (which may direct them to an alternative product that would benefit both parties, subject to regulatory requirements); offering loyalty programmes (e.g. non-insurance-related products or voucher bundles) that are proactively offered to high-value customers and timed to coincide with high-withdrawal external-factor changes (e.g. significant changes in investment market returns).

Models are an excellent starting point, but human behaviour is unpredictable – so it is best to learn from an initial pilot. These activities can then be incorporated into policyholder data sets, allowing subsequent analyses to analyse the effect on retention rates and assess their effectiveness and/or cost efficiency.

1.1.3.3 Manage In-Force Assets to Enhance their Resilience to Lower Interest Rates and Yields

One of the ALM challenges facing insurers is the lack of assets of sufficiently long duration. Insurers can leverage derivative instruments to extend the duration of the asset portfolio to enhance the ALM position.

Furthermore, insurers may not always seek to precisely match asset and liability positions, because such a strategy could be inflexible and expensive. Insurers could deliberately choose to create a temporary mismatch if such a strategy allows them to generate incremental returns.

Lastly, under the current and persisting low interest rate environment, there has also been increasing interest from insurers in alternative assets, which could provide good risk-adjusted returns and low correlation to traditional assets. Insurers can invest beyond real estate and private equity, to those assets such as infrastructure, natural resources and private debts. In this respect, in-force blocks that have longer terms and low cash value are more suitable to being backed by alternative assets.

1.1.3.4 Manage In-Force Portfolio Liabilities to Enhance the Runoff Value

Liabilities can also be managed after the sale, and insurers have a variety of ways to influence and enhance the runoff of life insurance portfolios. Three levels can be distinguished.

- The first level relates to the ability of insurers to reprice/restructure the liabilities within the current legal and regulatory framework – i.e. when the insurer is voluntarily offering better terms and conditions than are legally required. Typically, contractual requirements are compared with actual practice, invoking potentially unused insurers' rights or providing the right incentives to distribution channels to promote the desired behaviour. Examples would be with-profit policies, using the discretion of the insurer within the profit-sharing rules; using the discretion of the insurer within the asset allocation through

fund substitution (e.g. in the United States during October–December 2008 by switching all funds into major large indices; capping the weight in asset allocation to less liquid funds), or within the modelling of liabilities (discount rate reference – swap or govie [government] rates – for the liabilities value); forbidding additional future premiums; and letting fees increase under extreme market conditions. Most often, as in Europe, policyholders individually must agree to policy changes before they can be applied; but sometimes, in the United States, customers just need to be notified by a letter at least 90 days in advance, with changes then implicitly being approved in the event of no explicit refusal. In markets such as Australia, where protection policies are priced annually, significant value can be unlocked by looking more granularly at the emerging experience and better differentiating the pricing of the portfolio.

- The second level relates to treating customers differently depending on the underlying financial attractiveness of their policy to the insurer – such as, for example, launching unit-linked targeted campaigns to encourage additional premium payments and extending the policy term, whereby distribution partners and customer service staff are encouraged and incentivized. In contrast, for policies with high guarantees or any other onerous policy terms with significant capital consumption, insurers consider reviewing policyholder communication and targeting surrender.
- The third level relates to the conversion of an entire portfolio into new policy types or a lump sum (instead of the systematic lifetime payments embedded in the annuity policy), translating into cash or credit the base contract.

This often happened during the last decade as interest rates persistently declined to historic lows, which generated so-called "lapse-supported" in-force-embedding onerous guarantees.

Within these buyout and conversion initiatives, policyholders receive compensation for the loss of these features through higher reserves translated into cash. Individual conversions generally diversify in-force portfolios, as seen in programmes in Germany and Austria, whereby clients' policies were converted into unit-linked CPPI policies with a reduced guarantee in exchange for higher upside potential. Most countries allow conversion exercises only if policyholders individually agree to policy changes.

	AXA EQ	Transamerica	Hartford
Rider	Greater of Roll or Annual Ratchet GMDB (Standalone)	Family Income Protector, Managed Annuity Program, Managed Annuity Program II or Guaranteed Minimum Income Benefit.	Lifetime Income Builder II (GWBL)
Number of contracts	~22000	~25,000	?
Regulatory Filings	• State filing in all jurisdiction where the rider was sold • SEC Filing	• SEC Filing	• State filing in all jurisdiction where the rider was sold • SEC Filing
How offer amount is calculated	~70% of IFRS reserves or 2 years of rider fees whichever is greater.	80% of minimum annuitization value or income base under Eligible rider minus the cash surrender value.	a) Contract value on the full surrender date. Any applicable fees are waived upon surrender or b) Contract value on the Surrender date plus 20% of Payment Base subject to a cap of 90% of Payment Base
Impact to base contract	GMDB rider is terminated and the Offer amount is added to AAV; client have option of maintaining base contract with a Return of AAV as the new death benefit	Once offer is accepted, client must surrender contract and transfer to Transamerica or external carrier's product	Once offer is accepted, client must surrender contract and transfer to external carrier's product
Impact to surrender charge and other fees	Existing surrender charges remain as is and if applicable are not waived if client surrenders contract. Prorated death benefit charges are waived.	Surrender charges are waived however rider charges are prorated	Surrender charges and other fees are waived
Impact to other riders	• If the Earnings Enhancement Benefit (EEB) is elected, it is also terminated. • The standard death benefit (ROP) is also terminated.	Any death benefit is terminated	Any death benefit or other living benefit is terminated
Marketing Support	Client letters, prospectus supplement, Brochure; microsites; dedicated service desk	Client letters, prospectus supplement	

FIGURE 1.18 Buyout examples

Note: ROP = return of premium.

These are the lessons learned.

- A simple valuation method is helpful, as advisers feel they need to understand the calculation to better explain it to their clients.
- Clients and representatives also want to see the "number", through an offer amount in letters as well as via a website; over-communication is a necessity, and reduces the opportunity for misinformation. Clear and transparent client–adviser communication is also a key requirement; finally, engaging the distribution organization is critical to success.
- The success of a buyout depends on its content (whether immediate annuity or lump sum), the offer amount (the "fair" amount being the SPIA premium generating the equivalent future income), the policyholder's age, the interest rate level (lump sum buyouts take up rates rising with interest rates, particularly for account value depletion buyouts).
- Although the first buyout initiatives may be very successful (e.g. with a take-up rate of up to 60%), subsequent campaigns have been be far less successful (often a 3 to 10% take-up rate: 8% in the event of a 50% IFRS reserve offer, 11% in the event of a 70% IFRS reserve offer), as the interested customers have already left.
- Assessing the recoverability of the customer behaviours after the buyout to a long-term lapse rate is extremely hard. In addition, the anti-selection effect may be very significant, with the risk that the targeted policies (the richest ones) may not be the actual ones or may not be efficient (e.g. policyholders who would have left without the buyout incentive).

The different in-force management initiatives launched over the past decade have led to several key lessons.

- **One size does not fit all.** In-force management approaches need to be tailored carefully to each portfolio's specifications, as well as the values and objectives of individual companies, country-specific laws and the need to manage reputational risk.
- **There is no silver bullet.** Generally, in-force management is driven by many small steps, and only rarely do individual actions have a significant impact on overall performance. Often only the combination of the three levels outlined above helps companies improve their situation in a meaningful way.
- **Everyone should benefit.** Conversion offers need to be financially attractive to both the policyholders and the insurer to attract sufficient participation. For instance, low-payment lifetime annuities could be converted to higher-payment annuities with a fixed term, translating into more meaningful annuity payments for customers, while substantially reduced administrative costs, a reduced term and reduced longevity exposure are the benefits for the insurer.

1.2 SECURING LONG-TERM SUSTAINABLE BUSINESS GROWTH: FROM GOVERNANCE TO EFFECTIVE RISK MANAGEMENT

1.2.1 Risk Is Embedded within the Insurer's Business Model

Risk management is not a by-product but, rather, is at the core of the business model of insurance companies. Risk lies at the heart of the insurance business. Risk is the insurer's raw material, as insurance is the business of managing risk:

- taking risks off clients' balance sheet;
- taking these risks on their balance sheet;

- transforming it and/or transferring it; and
- generating profit from this activity.

The risk management objective, therefore, is that risks are taken, in a controlled and disciplined manner:

- risks are taken consciously;
- risks are adequately measured;
- risks are limited and frequently monitored; and
- risks are at the forefront of management actions.

The risks across the life insurance industry are multiple and diverse: financial (equity, interest rates, basis, foreign exchange [FX]); policyholder behaviour and longevity risks; operational, counterparty and liquidity risks.

Specifically, life products are long-term products, and profitability and value creation must be measured over the life cycle of the contracts: contracts quite often generate a negative result in year 1 (acquisition cost), but they usually generate positive margins in the following years.

As mentioned above, life insurance risks come from a number of sources.

- The biometric cover given to policyholders – e.g. the death risk for a term insurance, for which the death frequency can be higher than expected, and value creation can be at risk, though the longevity risk is the risk that mortality is lower than expected, which implies a longer duration (and cost) of the lifetime income period within an annuity.
- Customer behaviours – e.g. lapses for an investment product, when customers may lapse earlier than expected (higher lapse rates) and value creation can be at risk. Lapses include cancellations, total and partial surrenders and changes in paid-up status (regular premiums). The lapse mass is the risk of adverse unanticipated lapses in the coming year as a result of a mass phenomenon due to an additional lapse driver that is observable only in extreme scenarios. Among other customer behaviour risks there is the risk that policyholders are more rational than expected and exercise more embedded options in a way that adversely affects the company (e.g. guaranteed annuity options, as illustrated in the subsection above).
- The company and its ability to manage its expenses correctly, which may be higher than expected, putting value creation at risk

These risks translate into billions of dollars in exposures and associated capital requirements – but also business opportunities, such as growing needs for financial protection and yields, and care for sustainability and responsibility.

1.2.2 From Risk as a Constraint to a Culture: Risk Management as Sustainable Business Partner and Risk Factor Control

> There are known knowns. There are things we know that we know.
> There are known unknowns. That is to say, we know there are some things we do not know.
> But there are also unknown unknowns, the ones we don't know we don't know.
>
> DONALD RUMSFELD
> *Former US Defense Secretary, 12 February 2002*

Attitudes towards risk are often ambivalent, from threat perception to opportunity realisation.

Our classic knowledge of risk has its origin in our perceptions, and so it is put at risk today. We fear dangers that we are familiar with or that we can directly perceive with the senses: when confronted with a wide array of hazards, we select and identify them as risk sources. Risk is thus defined by checking whether and how it threatens to jeopardize our way of life. Risk is also a measure of danger:

Probability of occurrence × Magnitude of harm.

However, as many dangers today can no longer be perceived with the senses, we do not know how high the risk is, and everybody may say something different that we cannot verify. Thus we may fear risks that can cause only moderate harm while we ignore significant risk scenarios.

Moreover, as the world is increasingly closely linked (due to globalization, increasing interconnectedness and the maximization of efficiency of systems), we become more vulnerable to external disturbances, as risk factors influence one another, such that effects can lead to a long chain of mutual dependences, which may not be apparent at first glance and develop stealthily -> unable not only to assess the probability but also to foresee the possible nature of harm.

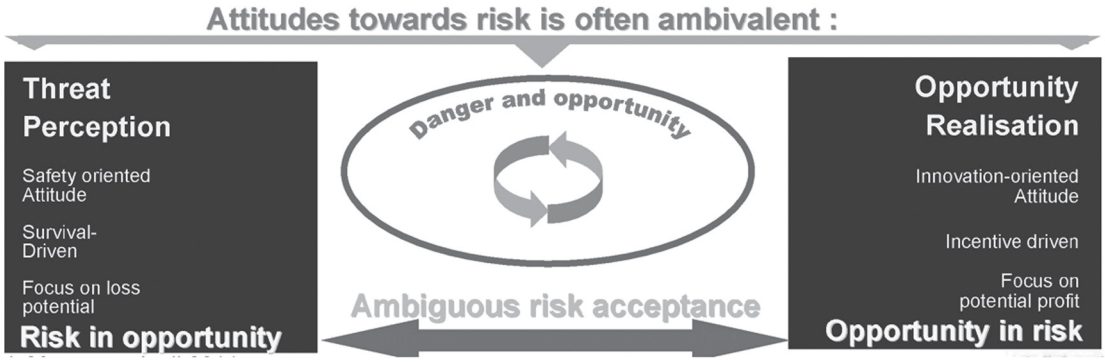


FIGURE 1.19 Attitudes towards risk

Without taking risk there would be insufficient appetite for innovation and limited opportunities for growth. Risk cannot be eliminated without forgoing profitability -> assessing how we can reduce risks and when it is worth becoming more committed.

Making decisions on risks is about striking a balance between potential gains (rewards) and potential losses (risks) -> maximizing potential gains while being constrained by maximum tolerable losses.

Risk management is about decreasing uncertainty, getting as many events as possible in the "known" category and limiting unexpected volatility. The key is in being able to move swiftly and quickly in doing so, and that starts with identifying opportunities and threats and effectively monitoring them in a consistent way that people can adapt and get used to.

The objective of risk management is not to prevent people from taking risks but to allow people to understand and manage in the optimal way the risks that they take. The objective of risk management is not to avoid taking risk but to promote a culture of selective risk taking by providing advice in risk taking.

Risk management should not focus simply on analysing "cold" figures; for example, value-at-risk – i.e. the amount lost on positions if market values move adversely by a certain amount – assumes continuous liquidity for sufficient amounts to close all positions, which may not be possible if all market participants hold similar positions and try to execute closing trades at the same time. The same limitations apply regarding stress tests, when the maximum relevant historic experience might not be sufficient.

Risk management should understand in depth the market, the underlying exposure, underwriting and claims processes to be able to "read" the figures, assess the level of capital required through realistic scenarios

and help in building an appropriate action plan. The risks analysed will be specific to the product types and to their respective market. In particular, the size and distribution of market participants need to be understood, and the size and concentration of positions held by these participants and the way they interact with each other and with exogenous events must be anticipated and evaluated.

Regarding the content of risk management advice, it should not be based only on figures and models: sound business judgment should also be used. Assessments, models, etc. are always wrong to some degree … A risk management framework may not be sufficient to solve all real-time risks (e.g. systemic risks with feedback loops). There might be multiple varied interpretations of novel and unfamiliar risks that materialize in unexpected ways. The usual normalized prospective approach based on prediction might not be possible. Mathematical analysis may offer little guidance in the short term when action is required. Controlling practices such as top-down commanding may not respond well "online".

Rules of thumb erring on the side of caution make sense in the event of a lack of reliable data. Common sense, sound governance, expert judgment, intuition and out-of-the-box thinking ("Think the unthinkable!") are essential. Additionally, a pragmatic approach is often better than an in-depth study that comes too late.

> Any observed statistical regularity will tend to collapse once pressure is placed upon it for control purposes. And remember that, when a measure becomes a target, it ceases to be a good measure.
>
> PROFESSOR CHARLES GOODHART FBA
> *Chief adviser to the Bank of England*

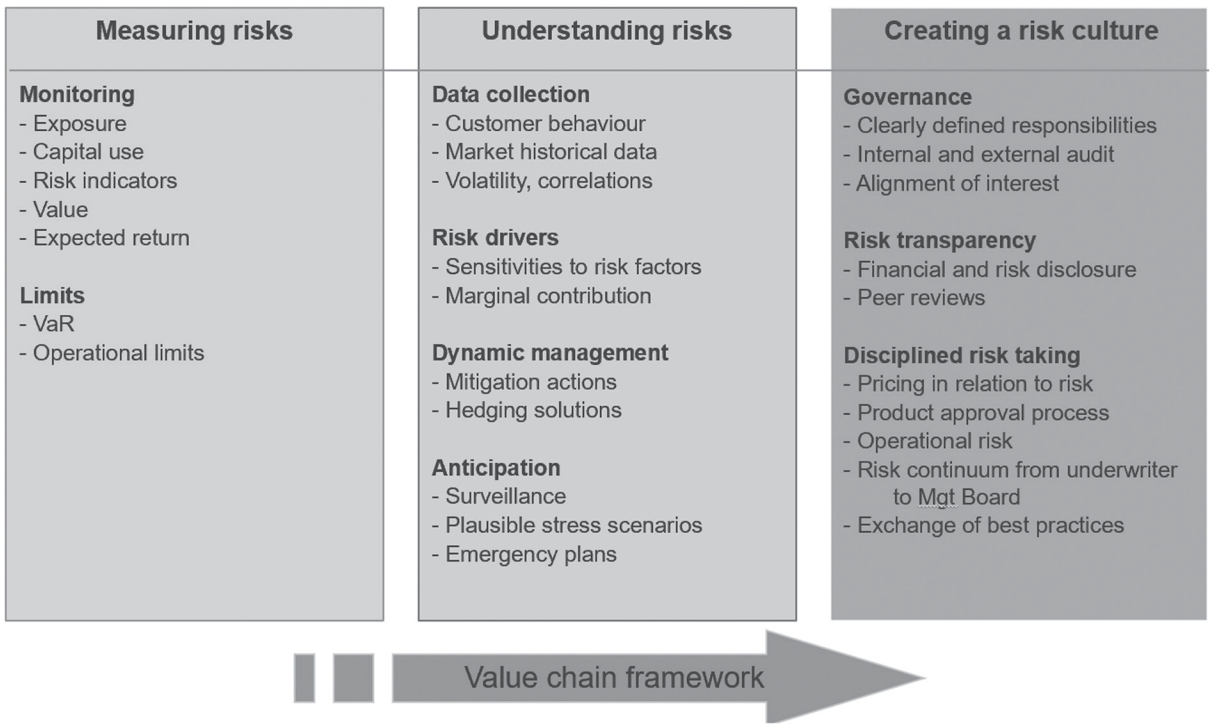


FIGURE 1.20 From risk measure to risk culture across the value chain of risk management

Note: VaR = value at risk.

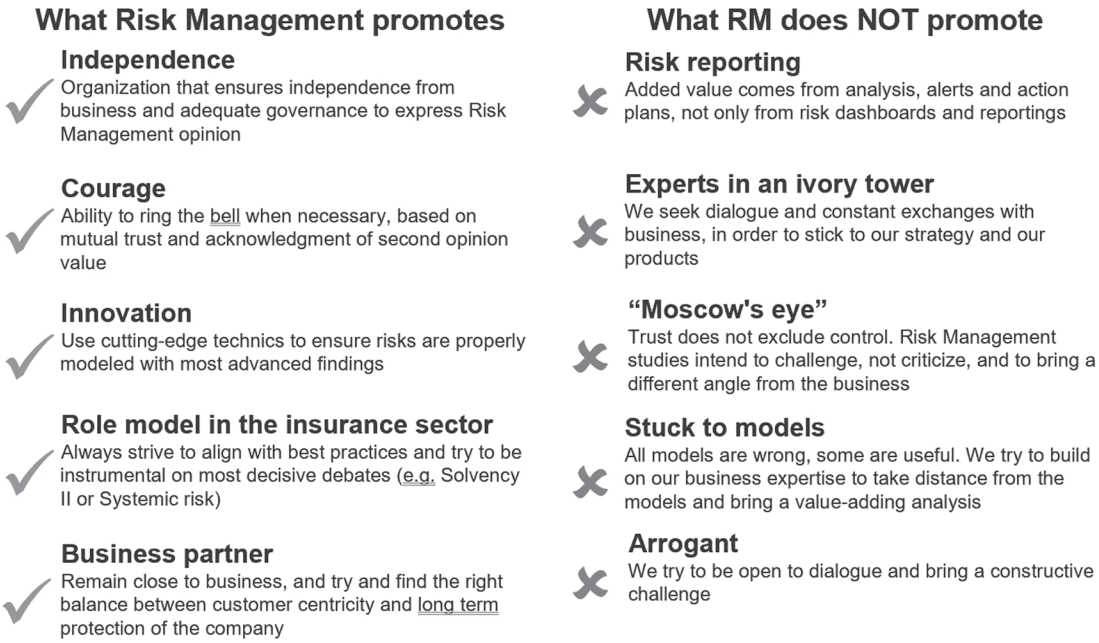


FIGURE 1.21 Risk culture

To play its role efficiently, risk management must be closely embedded into business processes and decision-making. Taking selective risk is part of a triptych: risk, return, capital.

- Insurance companies must efficiently manage risks to protect the company.
- Taking risks requires holding capital; thus the return must at least compensate for the cost of holding capital ("cost of capital").
- Unexpected large claims may occur at any time and must be backed by an adequate amount of capital, which acts as a company's buffer.

FIGURE 1.22 Triptych risk/return/capital

In this respect, an attractive risk provides "good" return on capital (short-term and long-term), has a positive contribution to the solvency ratio and is manageable over time (in terms of guarantees with the ability to reprice or mutualize losses; in terms of expertise in underwriting and medical selection; in claims management and general knowledge of the risks).

High capital requirements do not necessarily, therefore, mean "unattractive risk" if they are sufficiently compensated for by high profitability (e.g. lapse up in unit-linked or health and protection).

Capital scarcity adds a new level of complexity in the running of the business. Working together on these subjects could give the insurance company a competitive advantage. As a result, risk management becomes a sustainable business "partner" and not just a risk factor control function, with three main missions.

- To define and formalize a framework to help in choosing consciously the risks we want to retain.
  - Governance and processes: *not* to annoy people and be bureaucratic *but* to ensure that proper information is considered and challenged to base decisions on. On level 1 or 2 (see Figure 1.23), operational decisions are mainly taken at entity level and controlled through group processes/initiatives. When level 3 is reached (i.e. impacts and damages are increasing), the group moves temporally towards more centralization of decision-making, with local or central execution. In the event of a crisis scenario, decisions to mitigate the impacts are recentralized (e.g. equity-hedging programmes).

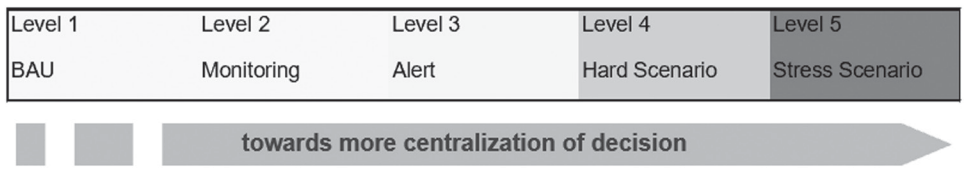


FIGURE 1.23 Governance of risk escalation

Note: BAU = business as usual.

  - Defining metrics: *not* to create new complicated indicators *but* to provide a common measurement basis across all risks and consistent across the group.
  - Setting limits: *not*, sadly, to decrease the bottom line *but* because the company's capacity to take risks is limited and should be clearly allocated -> define alert levels and "What if?" action plans at group and operating unit levels to detect a crisis in its early phases and mitigate the impact (hedging, BCP, communication plans …).
  - Control and challenge the level of risk assumed in the different departments.
  - Report to senior management on the level of risks.
- To aim for the long-term survival of the company ("Still be here in 50 years").
  - Why purchase an insurance product if you are uncertain about the insurer's ability to pay claims when it occurs in the future?
  - Insurers have a key social responsibility to play in providing long-term solutions (pensions, long-term care).
  - Insurers need to be prepared against adverse events: *not* because they are so pessimistic *but* to quicken their reaction and make a difference when it matters most -> analyse the consequences of extreme events through description of the scenarios and quantification of the impacts.
- To promote a culture of selective risk taking, based on the identification, evaluation and management of risks.
  - People in the chief investment officer (CIO) function, underwriting, etc., are all risk takers.

- The professionals in the risk management community cannot manage the risks of a large company purely by themselves.
- Everybody should therefore feel as though they are a risk manager, beyond the risk teams themselves.
- Risk awareness will then rise, as they feel more "in charge" of delivery.

In conclusion, the risk management function is there to ensure that insurance companies do only the business they want to do.

1.2.3 From Prudential Regulation Frameworks to Effective Sustainable Insurance Risk Management

1.2.3.1 Why Do We Need Regulation?

The aim of prudential regulation in insurance is to protect policyholders from a company's insolvency (long-term pensions, savings), something that has been reinforced in the wake of the crisis: financial stability is considered the number 1 priority.

Since insurance obligations are very far in the future, companies need to start saving early to pay out future claims, and so are required by the regulator to hold reserves.

The purpose of reserves is twofold:

- to help insurance companies honour commitments to policyholders and promote solvency ("prudential reserves"); and
- to help determine company earnings for stockholder markets ("earnings reserves").

In addition to statutory reserves, regulators require insurance companies to hold an additional layer of capital, the solvency margin (capital requirements), against unexpected events and hence provide policyholders with further protection.

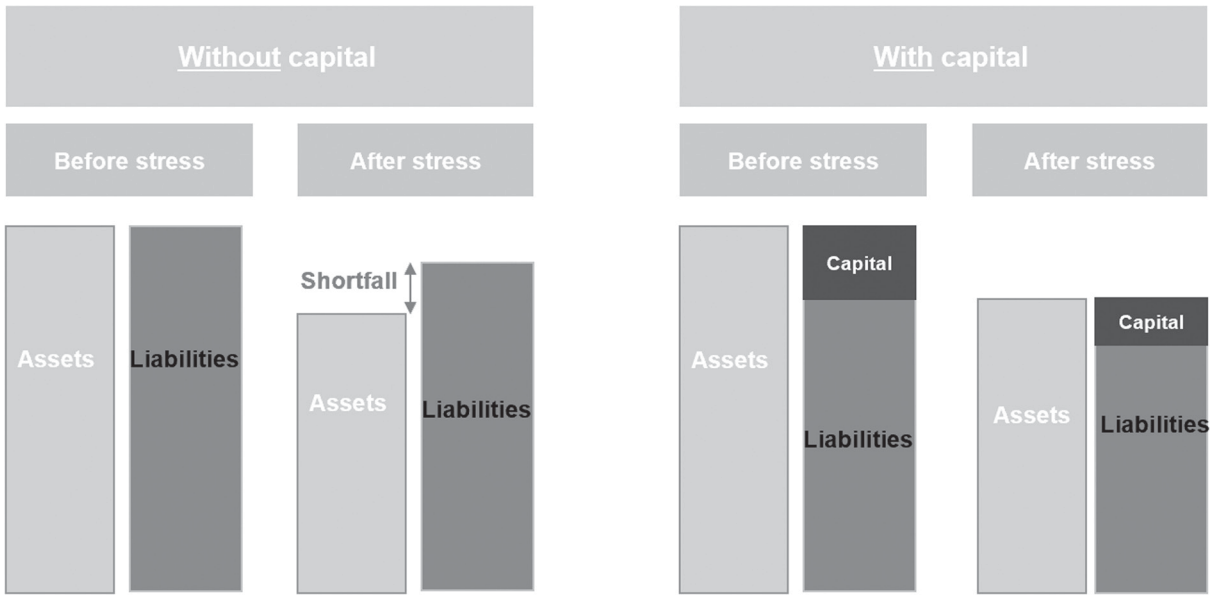


FIGURE 1.24 Asset versus liability management with and without capital

Players from various horizons usually contribute to the setting of such prudential regulation (see Figure 1.25).

FIGURE 1.25 Major players around prudential regulation

1.2.3.2 The Structure of Capital Requirement Prudential Regulation: Focus on the European Solvency II Framework

There is a trend of modernizing the required capital frameworks across the globe, with significant changes towards market-consistent, principle-based and risk-based frameworks: the United Kingdom's ICA/ICG, Swiss Solvency Test, Solvency II in the European Union since 2016 and the United States' National Association of Insurance Commissioners (NAIC) statutory framework from 2020 to 2023.

Overall, these new required capital frameworks are designed to:

- provide greater protection to policyholders through an enhanced prudential regime;
- better align capital requirements to the firms' asset and liability profiles and enhance the quality of capital;
- improve firms' own risk management with the aim of reducing the probability of firm failure; and
- reform the public disclosure of firms' financial condition, to encourage the effective exercise of market discipline.

These prudential regulations usually rely on three pillars, defined as follows.

- Pillar 1 covers the capability of an insurer to demonstrate that it has adequate financial resources in place to meet all his liabilities and that they consist of the quantitative requirements, such as the amount of capital an insurer should hold. It is all about the calculations, models and capital requirements.
- Pillar 2 sets out requirements for the governance and risk management framework that identify and measure the risk against which capital must be held, as well as for the effective supervision of insurers.
- Pillar 3 focuses on the disclosure, reporting and transparency requirements around these risks and capital requirements.

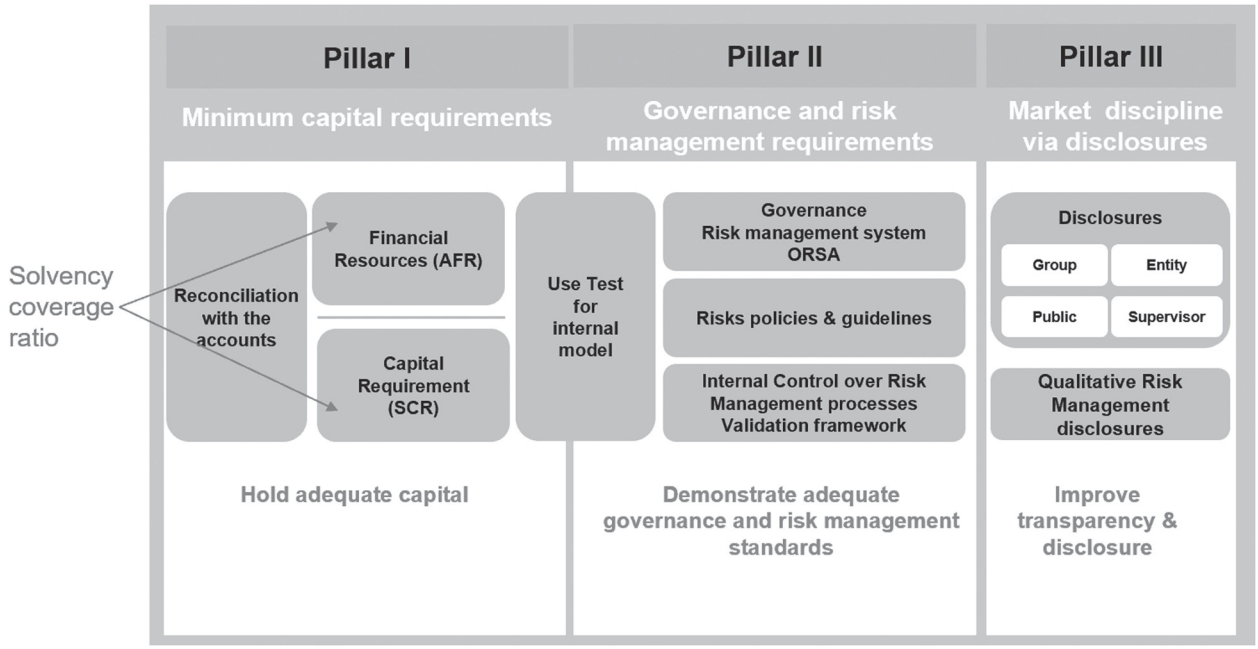


FIGURE 1.26 Solvency II pillars

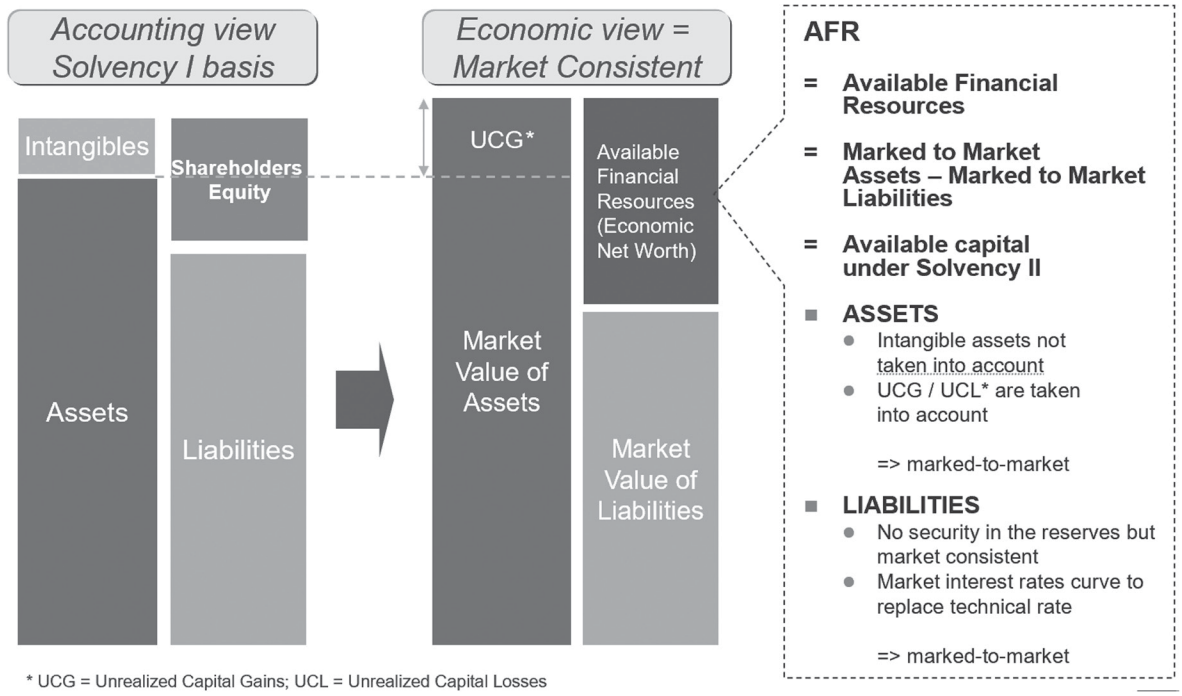
Notes: AFR = available financial resources; ORSA = own risk and solvency assessment.

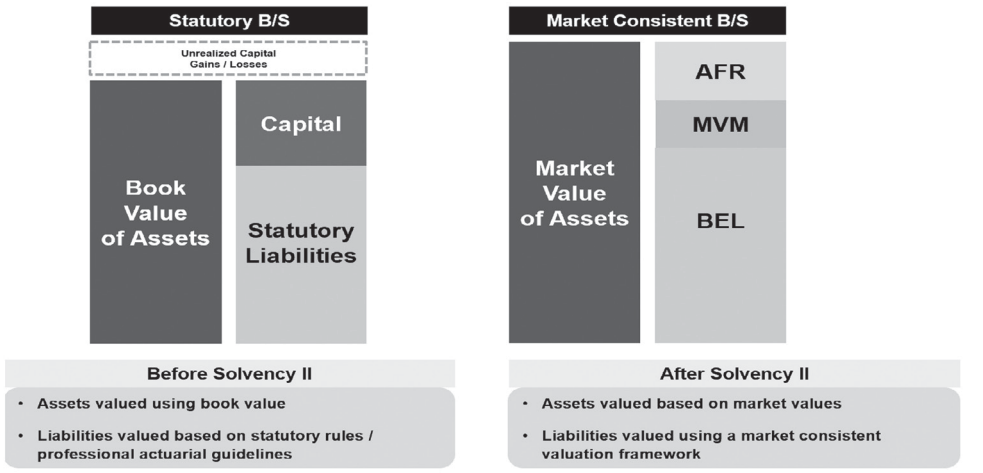
Given that the NAIC framework reform is under way, in the following (Figure 1.27) we illustrate with respect to the European Solvency II prudential regulatory framework, characterized by the following changes from the former Solvency I: under Solvency I, there is no difference between risks and ALM is not considered, nor the diversification of risks nor advanced risk transfer techniques. In addition, there is a conservative approach to hybrid debt capital, putting insurers at a disadvantage with regard to banks.

FIGURE 1.27 Key milestones in Solvency II implementation

Note: QIS = quantitative impact study.

- In terms of the balance sheet, there was a switch under Solvency II from a mostly accounting view to an economic view (see Figure 1.28).





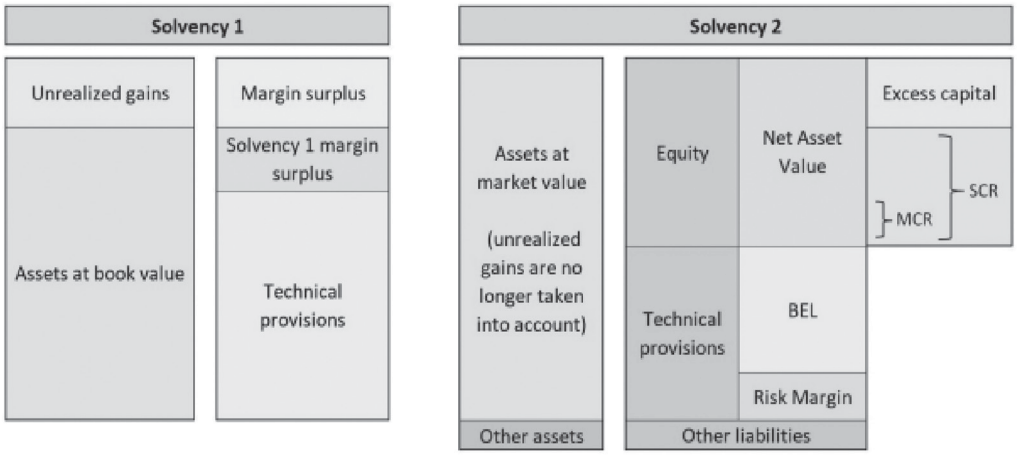


FIGURE 1.28 Solvency II versus Solvency I balance sheet

Notes: UCG = unrealized capital gain; UCL = unrealized capital loss.

AFR (available financial resources) is the amount of capital available to cover the capital requirements – i.e. to absorb losses in stress events. AFR is the surplus from a market value balance sheet, and it changes from Solvency I into Solvency II, as shown in Figure 1.29.

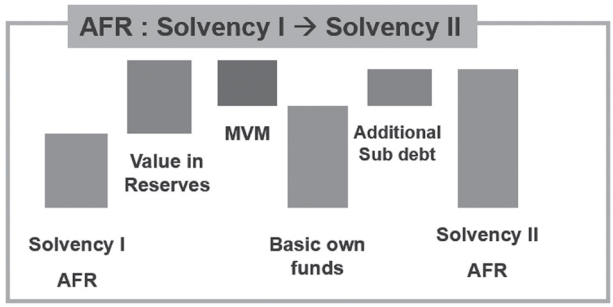


FIGURE 1.29 Solvency I to Solvency II AFR

Notes: MVM = market value margin; BEL = best-estimate liability; MCR = minimum capital requirement.

- In terms of the value of liability, there has been a switch from a statutory accounting value to a "market value", using two specific components relative to the market (thus hedgeable) and technical (life, thus non-hedgeable) risks under Solvency II: the best-estimate liabilities, defined in article 77 of the EU directive, correspond to the expected current value of future cash flows required to settle the insurer commitments towards policyholders, using the relevant risk-free interest rate term structure (potentially adjusted for counter-cyclical measures). The cash flow projections should, ideally, be performed on a policy-by-policy basis. However, approximations are permitted, and grouped model points can be used provided certain conditions are met, including validation of accuracy.

  For with-profits businesses, discretionary benefits need to be allowed for. When calculating the best-estimate liability figure for businesses that incorporate a discretionary element, the BEL must be calculated separately for the guaranteed and future discretionary benefits. The future discretionary benefits should relate to normal expected bonus distributions only.

  The cash inflows and outflows considered must include the premiums, the insurer's benefits and all types of expenses due to the insurance contracts, taking into account every option inherent to the contract, which are financial guarantees or rights granted to the policyholder.

  Future premiums can be taken into account up to the "contract boundary", which is broadly defined as the point at which a company can unilaterally terminate the contract, refuse to accept a premium or change the premiums or benefits in such a way that they fully reflect the risks. For life insurance business, this normally means the maturity or expiry date of the contract, or in some cases an earlier date at which premiums or benefits are reviewable so that they fully reflect the risks. Allowance for future expenses needs to take into account both overheads and directly attributable expenses, and future expense inflation.

  All BEL assumptions should be genuine best estimates, with no prudential margins. The projections should allow for all expected decrements and policyholder actions, including lapses. Insurance companies must take into account all relevant available data, both internal and external, when arriving at assumptions that best reflect the characteristics of the underlying insurance portfolio.

  The risk-free discount rates are published by the European Insurance and Occupational Pensions Authority (EIOPA) on a monthly basis. The rates are based on swap rates when there is a sufficiently deep

and liquid swap market, or government bond rates otherwise. These rates are then adjusted (by EIOPA) to reflect the risk of default of the counterparty (i.e. credit risk adjustment). For longer maturities for which data are not available, the yield curve is extrapolated to a defined long-term equilibrium rate.

When insurers have long-term predictable liabilities, and can hold matching assets to maturity, they are not exposed to the risk of changing spreads on these assets (they are not exposed to the liquidity component of spread risk, although they are still exposed to default risk). In such cases, insurers are allowed to adjust the risk-free discount rate in line with the spread movements of their assets, called "matching adjustment", derived by taking the spread on the portfolio of matching assets and deducting the "fundamental spread", an allowance for the credit risks retained by the insurer. EIOPA publishes the fundamental spreads that insurers must use.

When insurers have liabilities that are not eligible for use of the "matching adjustment", they can alternatively add a "volatility adjustment" to the risk-free discount rate. The purpose of the volatility adjustment is to reduce the risk of forced sales of assets in the event of extreme bond spread movements. The volatility adjustment is based on the spreads on a representative portfolio of assets for each relevant currency (or for each national insurance market when the assets held by insurers in that market are under particular stress). Risk-free discount curves including the addition of a volatility adjustment are also published by EIOPA for firms to use.

Regarding savings and retirement contracts, the best examples of options and financial guarantees inherent in the contract are as follows.

- ✓ Surrender: during the term of the contract the policyholder has rights on the mathematical provisions of the contract, as she may claim her right on it during the contract and thus terminate it before the initial settlement date. This choice may be motivated by the difference between the rate paid by the insurer and those of competing insurers.
- ✓ Minimum guaranteed rate, fixed at the subscription that must be respected by the insurer during all the life of the contract, regardless of the evolution of its portfolio.
- ✓ Profit-sharing mechanism: life insurers have to share with their policyholders a portion of their technical and financial benefits, depending on the evolution of the assets held by the insurer. The profit-sharing mechanism can be contractual or discretionary.
    - The risk margin called the market value margin (MVM): such as to ensure that the total value of the technical provisions is equivalent to the amount a potential buyer would be expected to require in order to take over and meet the insurance and reinsurance obligations of the undertaking without any additional financial risks. It is thus intended to increase the technical provisions to the amount that would have to be paid to another insurance company in order for it to take on the best-estimate liability. It therefore represents the theoretical compensation for the risk of future experience being worse than the best-estimate assumptions, and for the cost of holding regulatory capital against this.

      The risk margin is determined using the cost of capital (CoC) method, which takes the perspective that sufficient capital is needed to be able to run off the business – i.e. based on the cost of holding capital to support those risks that cannot be hedged. These include all insurance risk, reinsurance credit risk, operational risk and "residual market risk". For Solvency II, it is a fixed rate of 6% per annum.

      The MVM is estimated as the present value of the expected cost of current and future SCR for non-hedgeable risks to support the complete run-off of all liabilities.

The MVM calculation thus involves first projecting forward the future capital that the company is required to hold at the end of each projection period (e.g. year) during the run-off of the existing business. For Solvency II, the projected capital requirement is a subset of the SCR, consisting of those risks that cannot be hedged in financial markets. These projected capital amounts are then multiplied by the CoC rate.

The product of the cost of capital rate and the capital requirement at each future projection point is then discounted, using risk-free discount rates, to give the overall risk margin.

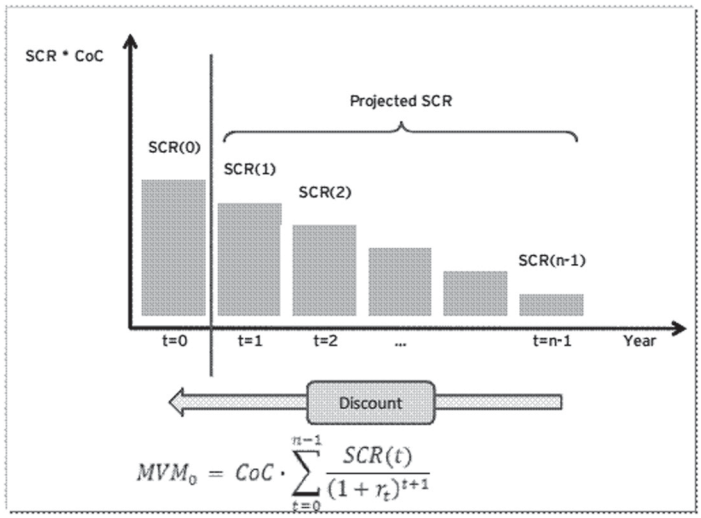


FIGURE 1.30 MVM computation

Since the projection of the SCR is potentially complex, various simplified approaches can be used. For example, this could involve selecting a driver (e.g. reserves or sum at risk) that has an approximately linear relationship with the required capital or its components. The initial capital requirement can be expressed as a percentage of that driver, and the projected capital is then approximated as the same percentage of the projected values of the driver.

Although the risk margin must be disclosed separately for each line of business, it can be reduced to take into account diversification between lines up to legal entity level. The allocation of diversification benefit can be approximated by apportioning the total diversified risk margin across lines of business in proportion to the SCR calculated on a standalone basis for each line, or by other approximate methods if appropriate given the materiality of the results.

- Also based on a market-consistent approach, technical provisions should represent the amount that the insurance company would have to pay in order to transfer its obligations immediately to another insurance company. The technical provisions consist of the BEL and the MVM. The calculation should be segmented by homogeneous product type.

- In terms of the solvency capital requirement, this is translated into a more realistic measure as an economic and risk-based capital requirement: in Europe, under Solvency 1, there is no link between capital requirements and the level of risk

when the "expected result" is based on the "baseline reserving assumptions"

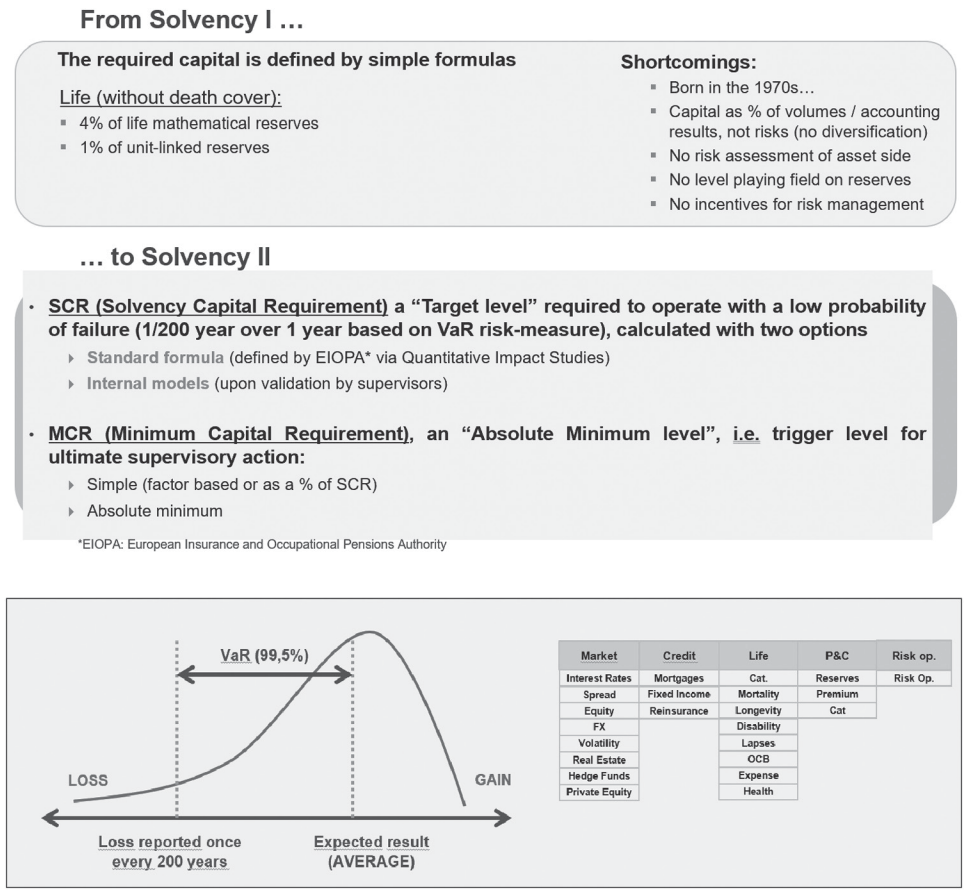


FIGURE 1.31 Solvency I to Solvency II SCR

Note: OCB = other customers' behaviours.

As a value-at-risk metric over a one-year time horizon, the SCR measures the change between the average "value" of a product and a specific percentile of the loss distribution (e.g. 99.5th percentile).

Under Solvency I, the capital requirement is based on year-end accounting results (premiums, reserves) linked to the volume of business (4% of life mathematical reserves, 1% of unit-linked reserves), with no consideration of underwritten risks or risk diversification.

In contrast, under Solvency II the SCR is a function of risks underwritten, e.g. market or life.

- The main drivers of the market SCR are spread, equity and interest rates. The life business (savings and retirement) tend to consume the vast majority of the SCR (~80%). Let us also mention that the counterparty default risk is distinct from the market risks.
- The main drivers of the life SCR are the technical risks, such as customer behaviour and expense risks (~60%) and biometric risks (~40%).
- Among products, savings and retirement are mostly geared towards market risks, while protection and health are more geared towards technical risks.

The Solvency II capital requirement considers diversification of risks through an aggregation risk matrix, including both geographical and business diversifications (Bourgeois 2014).

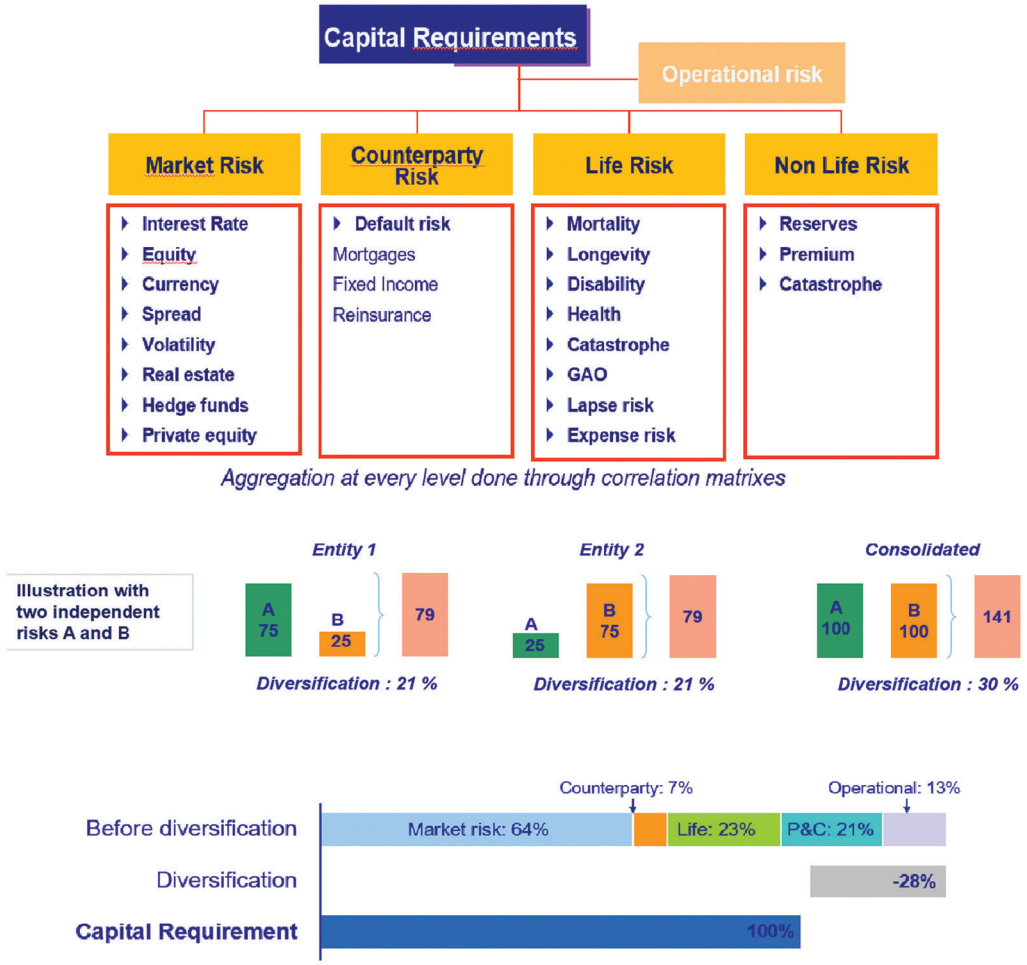


FIGURE 1.32 Risk diversification under Solvency II

Note: GAO = guaranteed annuity option.

Risks that diversify well are usually mortality, disability and medical expense risk, and some customer behaviours (lapse up, mass lapse) that are highly profitable while being mitigated via hedging, reinsurance and retention actions. While risks that do not diversify well (so-called "cumulative") are usually sensitive to the financial market environment and are difficult to hedge (thus requiring costly reserve strengthening or buyouts), such as some customer behaviours (lapse down, annuitization, fund switches) and longevity (risks influenced by the market environment) and market risks within guarantees. Thus, these risk definitely need prudent assumptions.

As a result, protection and health and unit-linked without guarantees are generally well diversified, while savings with rich guarantees (whether UL or general account) or longevity are mostly concentrated in the cumulative risk category, which is usually very dependent on the market environment (and the associated moneyness of embedded options).

It is then possible to draw and monitor the SCR risk signature for each product per type of risk (see Figure 1.33) and illustrate the impact of both market conditions (increase or decrease in interest rates or volatility) and mitigating actions (additional hedge instruments, improvement in product designs, reinsurance …) (Bourgeois 2014).

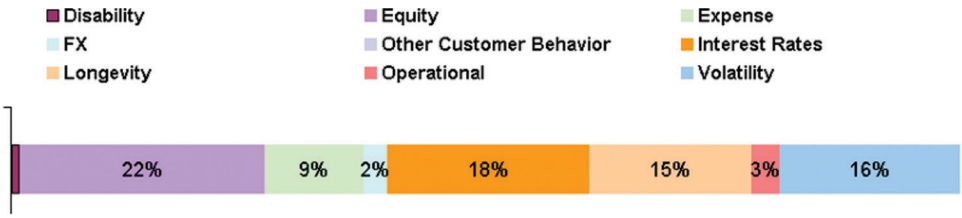


FIGURE 1.33 SCR risk signature

Given that AFR is the amount of capital available to cover the SCR – i.e. to absorb losses in stress events – it makes sense to produce and monitor the solvency coverage ratio, which is AFR/SCR.

The insurer usually targets a specific coverage ratio level, for the following reasons:

- to allow the business to absorb a good degree of volatility;
- to allow early action to stop a deteriorating capital position;
- to maintain solvency after a number of adverse, but plausible, events;
- to make allowance for non-quantifiable risks, not measured by the SCR; and
- to be prudent.

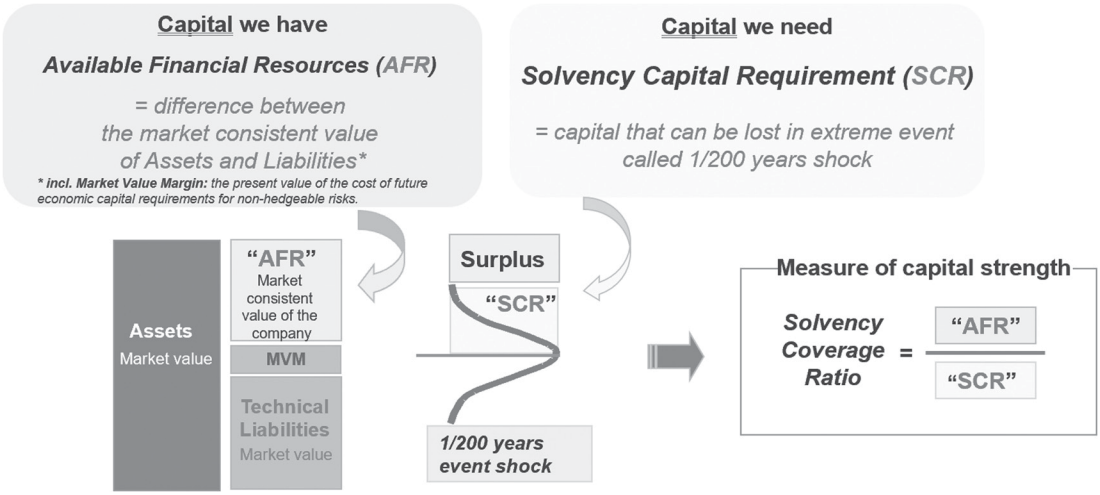


FIGURE 1.34 AFR and SCR

Solvency II prudential regulation is about making sure that the initial available financial resources are high enough to remain positive, after one year, when confronted with a combination of the most adverse conditions that can occur every 200 years.

The supervisor can oblige the undertaking to retain an additional amount of capital (capital add-on) to cover insufficiently controlled risk. If the level of capital SCR is not reached, it will probably result in regulatory intervention and require remedial action. The minimum capital requirement is the minimum amount of capital the insurer needs to cover his risks. If an insurer's risk capital falls below the MCR, he will be prohibited from writing any further business.

In the event of this happening, among the management (corrective) actions considered are:

- a capital injection;
- a restructuring of assets;
- a reduction in expenses;
- a review of reinsurance structure;
- a cut in dividends;
- an increase in fees; or
- closing/reducing new business.

✓ **Quick win**: coverage ratios are more volatile under Solvency II than Solvency I, so a close monitoring of the Solvency II coverage ratio is required, specifically within the context of market volatility and low interest rates, as experienced over the past decade. The impact is shown in Figure 1.35.

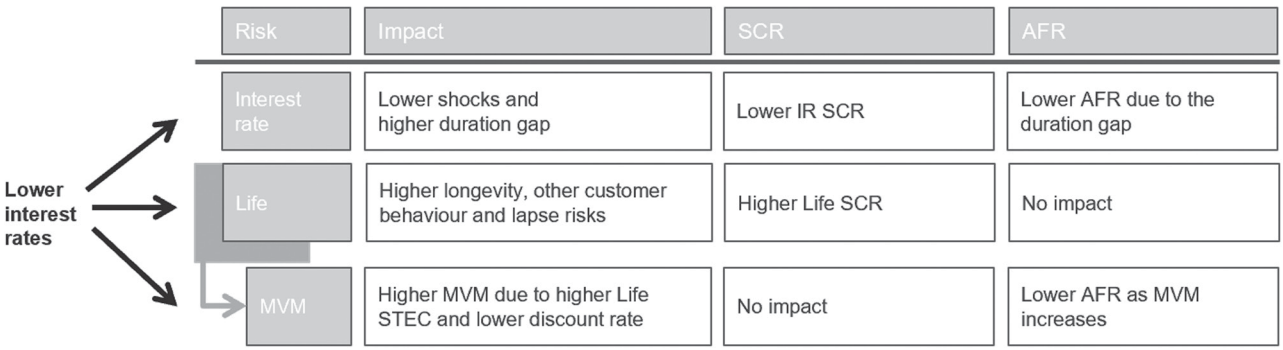


FIGURE 1.35 Impact of risks on SCR and AFR under Solvency II

Linked to the SCR is the notion of "required capital", which can be defined as the capital on top of other resources (notably VIF: value in force – i.e. the value of the business already sold, and still with the company) such that the target Solvency II ratio (e.g. 150% or 200% of the SCR) is achieved (floored by 0):

NB: The value in force is the present value of local regulatory (statutory) profits projected over the entire future duration of existing liabilities, with provision for the cost of financial options and guarantees, and net of the cost of holding additional capital required to support the business.

The VIF is thus composed of three elements: CE PVFP + TVOG + CoC/NFR

✓ The certainty-equivalent present value of future profits (CE PVFP) corresponds to the deterministic value of new business without taking credit for any future investment risk premiums -> discount rate = risk-free rate.

It is before the time value of option and guarantee (TVOG) costs and the cost of capital (CoC): cash flows are projected using a risk-free rate of interest then discounted at the constant risk-free rate. Effectively, this approach assumes that all assets are risk-free and, as such, the insurer has no financial risk. The next two components of value allow for this risk.

✓ The time value of options and guarantees is the risk-neutral value minus the CE PVFP – i.e. the difference between the risk-neutral value calculated with stochastic models and the certainty-equivalent

value calculated with a deterministic model (in practice a stochastic model run on a single CE scenario is used) at current risk-free rates -> products with guarantees that are correlated with financial markets will effectively be discounted at a rate higher than the risk-free rate.

This is significant when worthy guarantees/embedded options are offered: interest rate guarantees on traditional products (guaranteed cash values and guaranteed annuity options), profit sharing, such as bonus rates, credited interest rates and policyholder dividends, guaranteed benefits on unit-linked products (GMDB, accumulated benefits, income benefits, withdrawal benefits …), "no lapse" guarantees on life insurance products, dynamic policyholder behaviour, such as full or partial surrender, annuitization and premium discontinuance.

✓ The cost of capital divided by non-financial risks (NFR) is the cost incurred through the payment of investment expenses and taxes on investment income of assets held in excess of the policyholder reserves, for operational and non-financial risks.

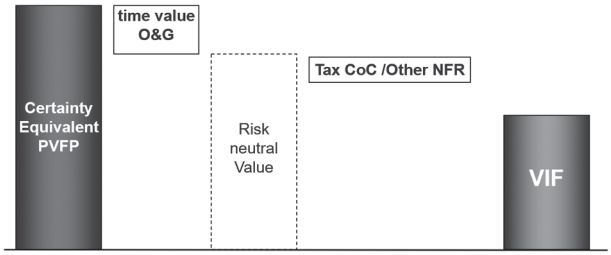


FIGURE 1.36 Decomposition of the VIF

Then the sum of the VIF and the ANAV (adjusted net asset value = free surplus + required capital, which represents the economic net assets, derived by taking reported shareholder net assets, adding unrealized capital gains and then adjusting for intangible assets and other items) gives the so-called "statutory balance sheet" attached to the local statutory accounting framework, which thus defines the profit and loss – i.e. the sum of different margins (financial, technical, expense), or premium – claims + investment – Δreserve – expense.

Ultimately, EEV (European embedded value), AFR and SCR all share the same framework, as shown in Figure 1.37.

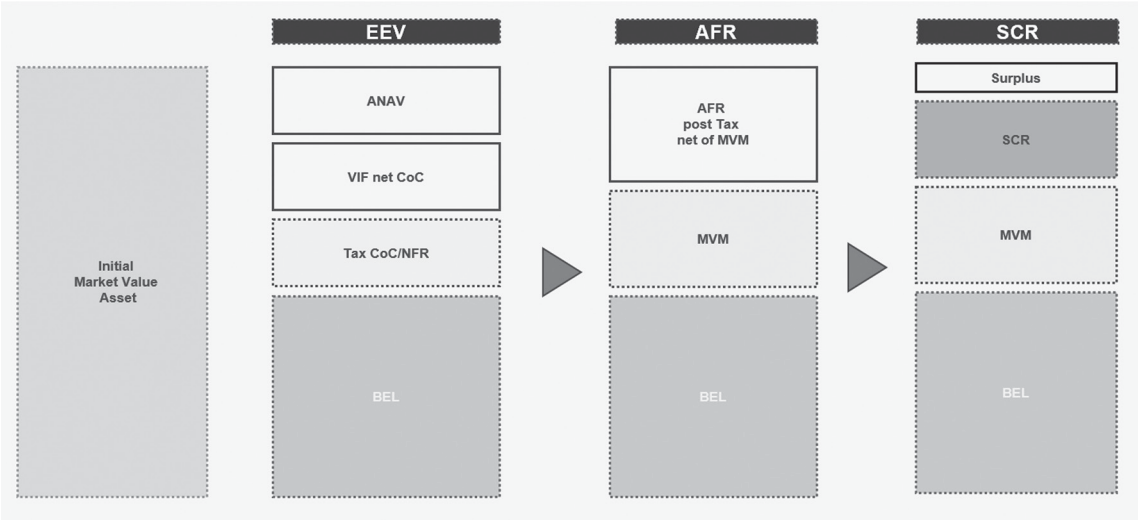


FIGURE 1.37 EEV/AFR/SCR balance sheets

1.2.3.3 From Regulation Concept to Sustainable Corporate Risk Management Practices: Enterprise Risk Management (ERM)

Despite the diversity of risks, there is one integrated ERM (see Figure 1.38).

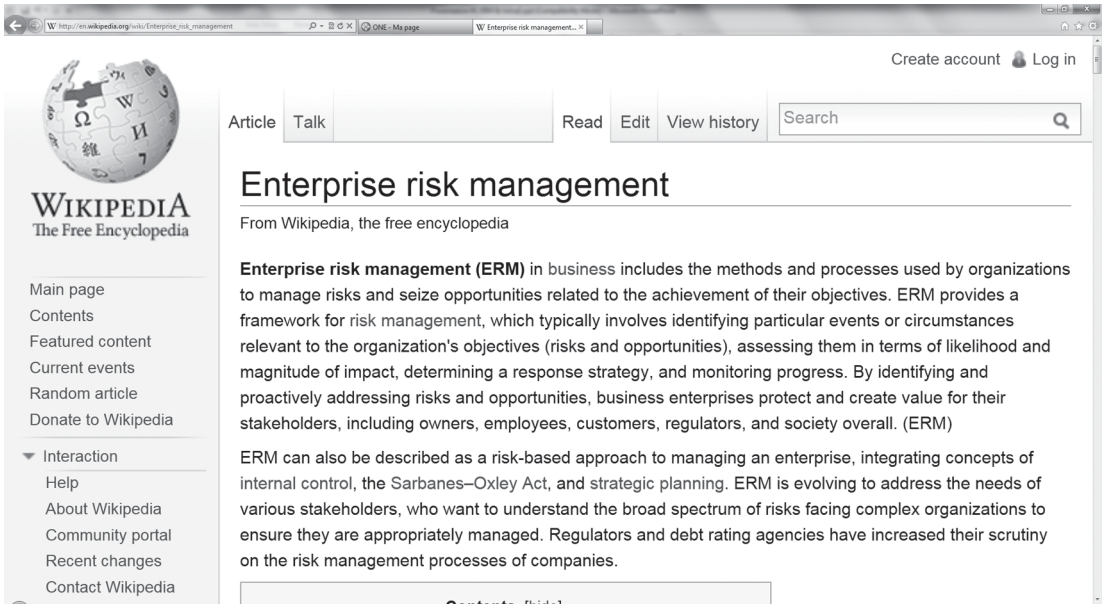


FIGURE 1.38 ERM definition

In terms of governance, the ERM must be compliant with Pillar II, which deals with the system of governance, rules and guidelines, and internal control (Figure 1.39).

FIGURE 1.39 Risks embedded within ERM

In particular, the own risk and solvency assessment (ORSA) is defined by the US National Association of Insurance Commissioners as "an internal assessment conducted by [the] insurer of the material and relevant risk associated with an insurer's current business plan and the sufficiency of capital resources to support those risks". The two primary goals of an ORSA, per NAIC, are as follows.

- To foster an effective level of enterprise risk management at all insurers through which each insurer identifies, assesses, monitors and reports on his material and relevant risks, using techniques that are appropriate to the nature, scale and complexity of the insurer's risks, in a manner that is adequate to support risk and capital decisions.
- To provide a group-level perspective on risk and capital, as a supplement to the existing legal entity view.

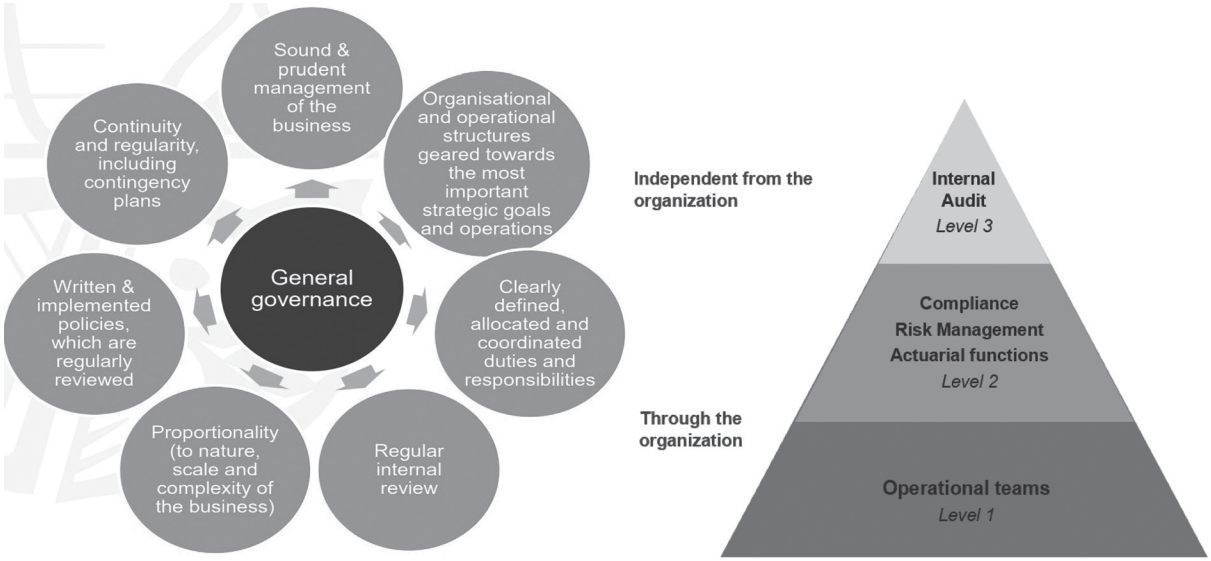


FIGURE 1.40 Governance and internal control of ERM

The ORSA is to ensure that insurers:

- identify and assess all risks they are (or could be) exposed to;
- maintain sufficient capital to face these risks;
- develop and better use risk management techniques; and
- monitor and manage these risks.

It is the key linkage between the company´s risk capital modelling capability and the way the business operates and should be an integral part of the business strategy. It provides a holistic view of short- and long-term risks in relation to current and future capital and solvency needs. It is, therefore, the process by which the company demonstrates how the SCR will continue to be met while executing its business plan.

It is a management tool for the senior executives to undertake strategic decision-making within appetite, considering risk and capital profile and sensitivity to future stressed conditions. Thus it helps to strengthen the culture of risk management (see Figure 1.41).

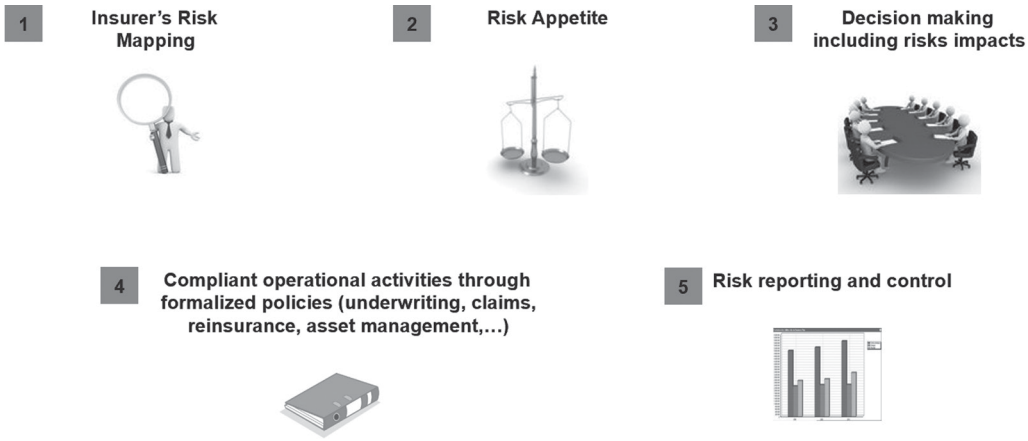


FIGURE 1.41 Risk management strategic axes

In terms of reporting, the ORSA translates into an annual summary report that includes information regarding:

- a description of the risk management framework;
- an assessment of risk exposures;
- capital planning, including balance sheet projections and "reverse stress tests";
- a capital and prospective solvency assessment; and
- evidence of the effectiveness of the ORSA process for the internal and external stakeholder review coverage ratio.

The ORSA report includes three sections that are strongly and directly linked to the ERM framework:

- the description of the insurer's risk management framework;
- the insurer's assessment of the risk exposure; and
- the risk capital and prospective solvency assessment.

In terms of governance, the ERM is based on the "subsidiary principle": subsidiarity is an organizing principle of decentralization, stating that a matter ought to be handled by the smallest, lowest or least centralized authority capable of addressing that matter effectively. The Oxford English Dictionary defines subsidiarity as the idea that a central authority should have a subsidiary function, performing only those tasks that cannot be performed effectively at a more immediate or local level (source: Wikipedia).

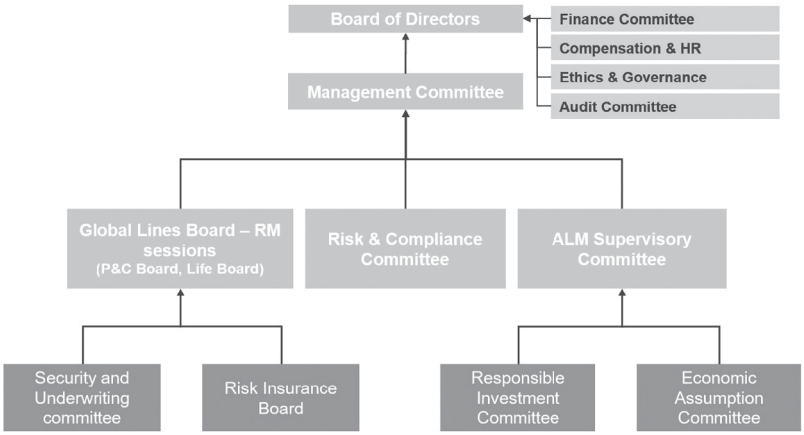
There are two axes.

- Dual global and local risk governance: the local chief risk officers (CROs) report to both the group CRO and the local chief executive officer (CEO), while the group CRO reports to the group CEO.
- Organization by risk factors at group level: life versus financial risks.

Decisions should be made by appropriate committees based on thorough studies -> it is a structured way to handle conflicts that naturally arise and reduce individual psychological biases in making decisions in a risk environment.

In particular, a fit and proper policy must ensure that all persons who effectively run the undertaking or are responsible for other key functions are at all times fit and proper; it has to:

- demonstrate the competence and integrity of the decision-makers to the regulator;
- implement a mechanism for preventing conflicts of interest; and
- in compliance with the EU directive, establish separate responsibilities across the key functions within the risk management system.



	Tasks/ Missions
Management Board	- Approves risk policy - Defines risk strategy - Defines limit system
Group Risk Committees	- Committees in place to monitor the risk profile - Defines risk standards and Group limits - Recommends/ approves actions to mitigate risks
Group Risk Management	- Enhances risk dialogue b/w Group & local - Implements internal risk capital model - Reports and communicates Group risks - Defines guidelines
Operating Units	- Manages risks proactively within Group policies - May set local limits (while respecting Group) - Reports risk exposures to Group

FIGURE 1.42 ERM governance

In addition, appropriate "checks and balances" and second opinions should be in place.

Overall, much of the insurance industry has a well-documented ERM framework, but evidence of use and effectiveness remains inconsistent regarding the following.

- Risk culture documentation and evidence.
- Risk appetite and limits frameworks: insurers have struggled to directly link risk appetite and risk limits across key risk types. Including quantitative measures in the risk appetite requires the adoption of a consistent quantitative measure of risk.
  - Limited focus on "group risks" (e.g. fungibility of capital between legal entities in stressed conditions), when accounting differences across geographies and product lines increase difficulty.

  - Difficulties due to a lack of exposure data; significant approximations are used within the quantitative metrics.
  - Difficulties for the projection of future income statements and balance sheets (including new business) under stressed conditions for key risks.
  - Limited comprehensive views of future balance sheets under various accounting regimes (e.g. statutory, GAAP, economic) and the capital framework.
- Evidence of risk management's role in the business and strategic decision-making process: Consistent implementation of an ERM framework across an insurance group can be a challenge across countries (e.g. multinationals) and/or lines of business.

The specific impacts of Solvency II are as follows.

- Regarding the implementation of Solvency II and ORSA within the insurance industry, the challenges have been diverse, numerous and very significant, among them the following.
  - An increased reporting burden on insurance firms, as Solvency II requires insurance companies to supply numerous reports a year to supervisors, many of which are produced quarterly.
  - There are concerns with the significant ongoing cost
  - Technology is crucial to the implementation.
  - Flexibility and automation are essential, given the volume and frequency of reports, and the speed with which companies have to produce them (it takes up to three weeks just for the SCR number).
  - The use of different data formats makes aggregation a challenge

✓ **Quick win**: one solution is to collect all the data in a single central data warehouse (a "data lake"), which will simplify the process of data governance, meaning companies can apply controls or rules quickly and consistently to all data rather than seeking to replicate rules across separate databases. Virtualization digital technologies may be very useful in this respect.

- Regarding the impact of Solvency II on capital management, using market values may exaggerate the true exposure of the balance sheet to temporary market volatility and therefore force the company to hold significant extra capital buffers to cope with the large volatility.
- Regarding the impacts of Solvency II on the business strategy, they also have been diverse, numerous and very significant.
  - Consistent with the drastic and persistently low interest rates, combined with recurrent volatility spikes, there has been a shift in business, as illustrated by the drastic reduction in general accounts and most unit-linked ones with rich guarantees, together with the emergence of new "capital-light" savings products with lower guarantees to policyholders.

    In this respect, the volatility adjustment (a spread on top of the risk-free rate, specifically introduced to alleviate the burden on long-term guarantees when there are persistently low interest rates) failed to achieve its designed purpose during the recent market turmoil, with limited and artificial effects.

Besides, the risk margin is very sensitive to long-term interest rates, meaning that, in periods of record low interest rates, it can cause insurers to hold a high a level of capital, particularly hitting insurers that are writing longer-term annuities or savings products with any form of guarantee.

There may be a move to increase the last liquid point for the euro swap rate curve from 20 to 30 years, while the ultimate forward rate (UFR) decreased (from 4.2% to 3.6%), which could then significantly increase the value of certain long-term liabilities.

Given the structural long-term nature of the life insurance business, the industry expresses the wish to work with the regulator to ensure that opportunities are taken to develop a more effective long-term approach to the treatment of insurers holding long-term assets, so as to match long-term liabilities.

- There is also the danger that the sheer volume of the rules and guidance acts to limit understanding and effectiveness of Solvency II.
- Consistent with the very high SCR for equities (linked to significant 39/49% downward shocks), there has been a drastic reduction in equities, from as high as 35% in 2000 down to 3 to 5% in major insurers such as Allianz and AXA. Moreover, due to their higher capital requirements, insurers may choose or be forced to sell equities in falling markets, which causes markets to fall further, with the risk of a vicious circle.
- Consistent with the mitigating effect of hedging, there has been an increase in the use of hedging assets (whether FX, fixed income or equities).
- Growing M&A activity: since Solvency II rewards well-diversified insurers with lower capital requirements, larger insurers may look to diversify further, and smaller insurers with specialized businesses (and less capacity to handle all the new analysis and reporting that Solvency II requires) may seek to combine.

1.2.4 Effective Sustainable Insurance Risk Management Implementation

Even though it is not sufficient to solve all real-time risks, an effective risk management framework is definitely necessary: Enterprising businesses need to accept calculated and appropriately mitigated risks in exchange for measurable and commensurate rewards.
Among the key elements are:

- a measurable tolerance and appetite for risk, including the trade-off between risk and reward;
- systematic risk identification as anything that could prevent an organization from achieving its goals and objectives (whether strategic, operational or financial);
- assessing the likelihood, severity and correlation of identified risks;
- developing targeted risk response strategies (internal control, risk mitigation initiatives); and
- creating a system of ongoing review and monitoring that uses key risk indicators (KRIs) and trigger points for the timely identification and escalation of organizational threats.

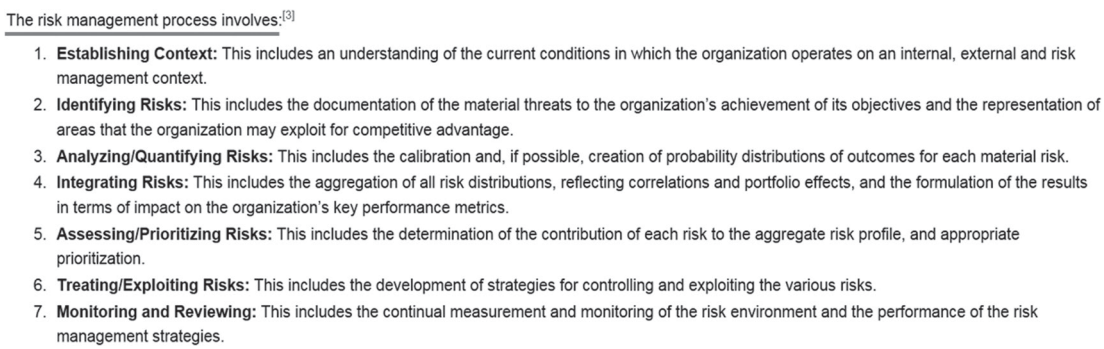
1.2.4.1 Sustainable Operational Risk Management

The risk management function shall "[p]ut in place strategies, processes and reporting procedures necessary to identify, measure, monitor, manage and report on a continuous basis the risks, at an individual and at an aggregated level, to which the company is or could be exposed, and their interdependencies" (article 44, Solvency II).

The risk management function should:

- assist the board, management and other functions in the effective operation of the risk management system;
- monitor the risk management system;
- maintain an entity-wide view on the risk profile of the undertaking;
- report in detail on risk exposures and advise the board and management on risk management matters;
- identify and assess emerging risks;
- regularly evaluate the design and effectiveness of the risk management system and report findings;
- design, implement, test, validate and document the internal model;
- assess the appropriateness of external credit rating assessments; and
- cooperate closely with the actuarial function.

In terms of processes, see Figure 1.43.



The risk management process involves:[3]

1. **Establishing Context:** This includes an understanding of the current conditions in which the organization operates on an internal, external and risk management context.
2. **Identifying Risks:** This includes the documentation of the material threats to the organization's achievement of its objectives and the representation of areas that the organization may exploit for competitive advantage.
3. **Analyzing/Quantifying Risks:** This includes the calibration and, if possible, creation of probability distributions of outcomes for each material risk.
4. **Integrating Risks:** This includes the aggregation of all risk distributions, reflecting correlations and portfolio effects, and the formulation of the results in terms of impact on the organization's key performance metrics.
5. **Assessing/Prioritizing Risks:** This includes the determination of the contribution of each risk to the aggregate risk profile, and appropriate prioritization.
6. **Treating/Exploiting Risks:** This includes the development of strategies for controlling and exploiting the various risks.
7. **Monitoring and Reviewing:** This includes the continual measurement and monitoring of the risk environment and the performance of the risk management strategies.

FIGURE 1.43 Risk management processes

Operationally, the above cornerstones translate into the following five pillars of the ERM.

- Independent and comprehensive control.
  - Second line of defence: always somebody in charge – i.e. to ensure that monitoring and resolving procedures are in place;
  - ORSA process.
  - Governance and standards (who/how to make decisions/on what information).
  - Within this framework, operational entities are autonomous; outside this framework, prior approval from risk management is required (e.g. large case sizes, such as over €20 million; business not in line with underwriting guidelines; distribution channel compensation system; innovative marketing campaign).
- How much risk to take and which: the risk appetite, with monitoring across the four dimensions of earnings, value, capital and liquidity, across all risks, including stress scenarios and emergency plans.

- A systematic second opinion: challenge to business decisions (on reserves, ALM and asset allocation, reinsurance).
- Rigorous underwriting and pricing:
  - underwriting guidelines; and
  - systematic product approval process (PAP) prior to launch, including proactive updates of product features and pricing in response to market conditions.
- Unified metrics to measure exposure: economic capital (additionally, a measure of profitability), leading the approval process with the regulator, reverse stress scenarios.

FIGURE 1.44 ERM processes

1.2.4.2 The Product Approval Process for Sustainable Savings and Retirement

The PAP aims at ensuring that an adequate risk–return trade-off is met before any product launch and formalizes the approval before significant investments are made. It helps the sharing of best practices of product development across the group (design, pricing and risk management). It provides the basis for wider business action on poor profitability and/or highly capital-intensive products.

The PAP makes sure that, for the launch of a new product, there is an appropriate decision-making process in place in local entities.

- It measures value creation: risk analysis based on minimum requirements (product features, pricing, hedging, profitability).
- It ensures consistency throughout the group: pricing report (description, analysis of profitability and sensitivities, capital efficiency, risk mitigation strategies), legal/compliance/regulatory aspects.

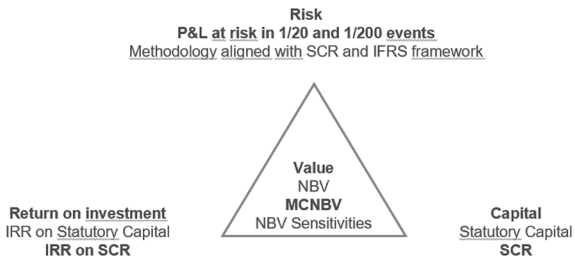


FIGURE 1.45 KPI and KRIs

✓ Among the profitability metrics are the following.

- NBV (new business value) = CE PVFP – strain + TVOG + CoC/NFR

  NBV is the value of new business issued during the current year, after deducting the cost of capital. The corresponding ratio is the NBV margin (denoted NBVM), defined as NBV / PVFP (where PVFP is the present value of future profit).

✓ **Quick win**: the NBV is usually high for protection and health, but low for investment and savings (I&S) (excluding the accumulator) and servicing profitability.

- 1st year AFR = CE PVFP – strain + TVOG + MVM
  where
  - CE PVFP is certainty-equivalent present value of future profits.
  - Strain is the initial cost of selling the business.
  - TVOG (< 0) is the time value of options and guarantees.
  - CoC is the cost of holding capital (< 0) and NFR is non-financial risks.
  - MVM is the market value margin (cost of life insurance, operational risks and reinsurance default risks) < 0
- The sensitivities of these two metrics with respect to equity, interest rates and volatility moves.
- ROI = statutory return on investment (internal rate of return).
- ROE = GAAP return on equity.
- Profit margin = present value of profits as a percentage of present value of premium.
- ROA = present value of profits as a percentage of present value of reserves/fund.
- VNB = present value of one year of new business as a percentage of first-year premium.
- The free cash flow = statutory earnings – Δrequired capital.
- The decomposition of change in value from the previous year, through a "roll-forward" waterfall chart (Bourgeois 2014).

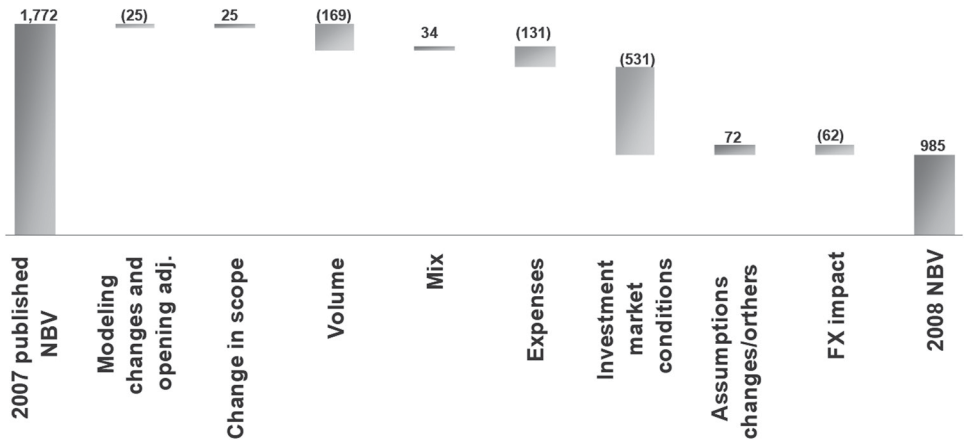


FIGURE 1.46 Roll-forward waterfall of NBV

✓ Among investment efficiency metrics is the investment performance ratio = investment performance / SCR

✓ Among the capital efficiency metrics are:

- Coverage ratio = AFR / SCR (or risk-based capital [RBC] ratio in the United States).
- Solvency II return = ΔAFR / STEC.
- Hard capital = 150% or 200% SCR – VIF (value of in force) + MVM
- $\textbf{Required capital}_t = \textbf{Max}\left(150\%\,\textbf{STEC}_t - \textbf{VIF}_t + \textbf{MVM}_t, 0\right)$

✓ **Quick win**: the MVM is to be compared with VIF (thus, looking at the difference, VIF – MVM, which makes a *significant* portion of the AFR). MVM is significant for general account savings, translating into potential negative AFR. Even so, a significant MVM can be compensated for by high VIF, resulting in a positive AFR, as in protection and health and UL policies.

✓ **Quick win**: in terms of capital leverage, the MVM is to be positioned against the SCR: high MVM relates to high SCR, the maturity of business run-off (over 15 years) and the projection of future premiums (e.g. Switzerland, Hong Kong, Germany, Japan).

- Capital consumption, which measures the total amount of free surplus consumed for new business = 1st year AFR – 150% or 200% SCR.

✓ **Quick win**: the capital consumption metric is usually low for health protection and servicing, while traditional life and savings tend to remain the highest for capital consumption.

- The internal rate of return (IRR), the discount rate at which the present value of distributable earnings is equal to the strain and initial required capital invested to support the business underwritten; defined as the solution to the following equation:

$$\sum_{t=0}^{n} \frac{Distributable\ earnings_t}{(1+IRR)^t} = 0$$

$$\sum_{t=1}^{n} \frac{Distributable\ earnings_t}{(1+IRR)^t} = strain + initial\ required\ capital$$

$$\text{Distributable earning}_0 = \text{Statutory earning}_0 - \text{required capital}_0$$
$$\text{Distributable earning}_t = \text{Statutory earning}_t - \text{required capital}_t + \text{required capital}_{t-1}.$$

The amount and timing of distributable earnings are based on four key components: the first year's investment (i.e. strain to acquire new business, including acquisition and administration costs, plus initial required capital); statutory earnings (SE; including investment return on capital); release of required capital (RC); and financial and non-financial assumptions underlying the projection.

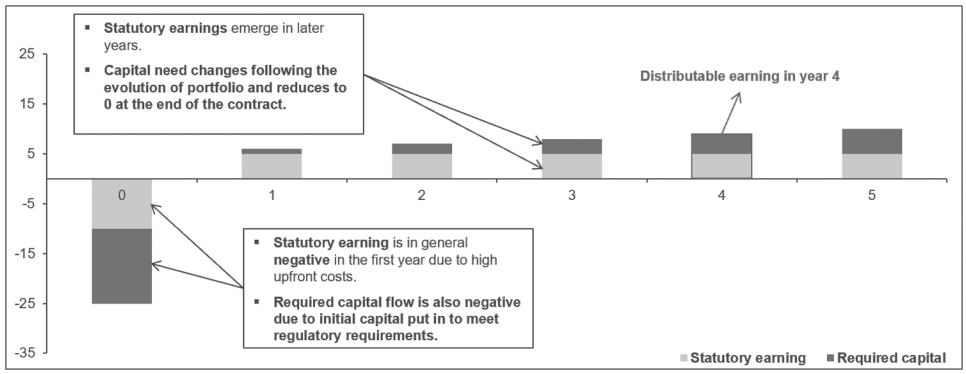


FIGURE 1.47 Timing of distributable earnings

The IRR may be computed on a base case scenario or on a stress scenario (e.g. market crash or economic deflation).

The impact of a change in the regulatory capital requirement framework may be significant, depending on the magnitude of risks.

- When there is no additional capital requirement, SII IRR = SI IRR.
- Due to the low-risk nature of a pure unit-linked product, the AFR is sufficient to cover the majority of the SCR, implying a lower hard capital requirement under Solvency II, while the Solvency II IRR is higher than the Solvency I IRR.

✓ Among profitability/capital efficiency combined metrics are:

- short-term return = earnings / SCR; and
- long-term return = (VIF – CoC × PVSCR) / PVSCR; this reflects the long-term margin adjusted for the cost of capital required to finance the SCR; the present value solvency capital requirement (PVSCR) provides the average view of the capital used over the maturity of the product.

Screening and benchmarking the quality of businesses are then possible through the following charts of solvency IRR versus coverage ratio, or NBV versus SCR in favour of life and savings without guarantees (or

with guarantees externalized to a third party) and protection products (see Figure 1.48) or NBV versus capital consumption, also in favour of life and savings without guarantees (or with guarantees externalized to a third party) and protection products.

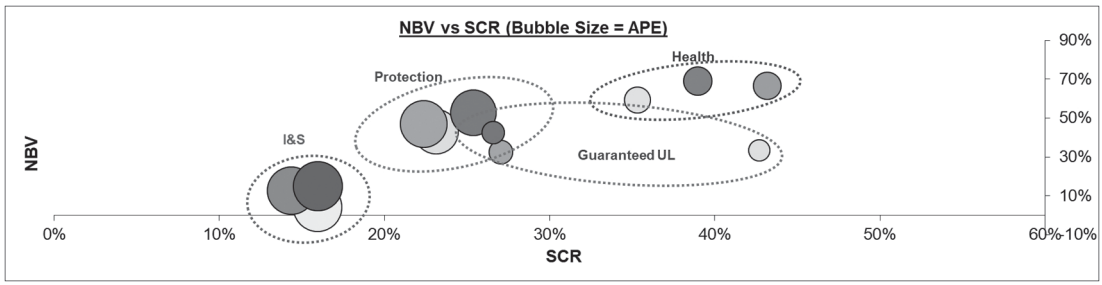


FIGURE 1.48 NBV versus SCR

- Improve formalization: all new products must have a formal sign-off required by the chief financial officer (CFO), senior actuary and head of product management.
- Launch of specific products requires group management board approval.

In terms of governance, the PAP is local responsibility with group oversight (Bourgeois 2014).

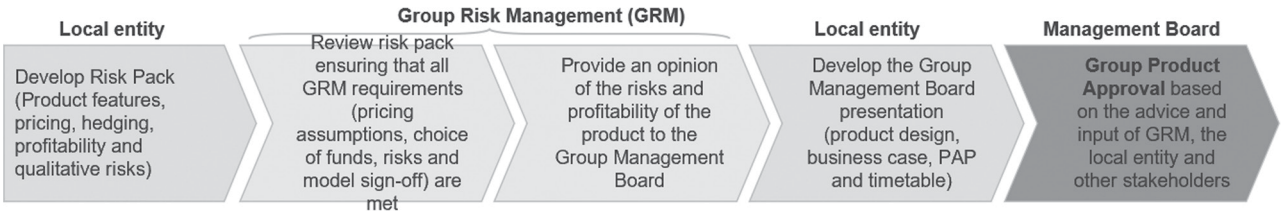


FIGURE 1.49 PAP process

For products that do not meet the targeted PAP threshold for the country, sign-off by the local CEO and group business line is required.

PAP reports must have a formal sign-off at least by the local heads, usually the CFO/CIO/CRO/chief actuary or pricing actuary (if no chief)/chief marketing officer (CMO)/the head of product management. In addition, the compliance must receive a formal sign-off before launch by the head of legal or compliance officer or senior legal officer and the head of product management. In addition, the chief corporate responsibility officer is usually consulted.

In terms of reporting, the PAP report is composed of five elements:

- product design;
- pricing (e.g. fees/loadings, GMxB pricing, protection, …);
- profitability analysis (base case + sensitivities);
- risk analysis; and
- risk pack required in some cases (e.g. GMxBs, long-term care) (guaranteed minimum death and living benefits are collectively known as GMxBs).

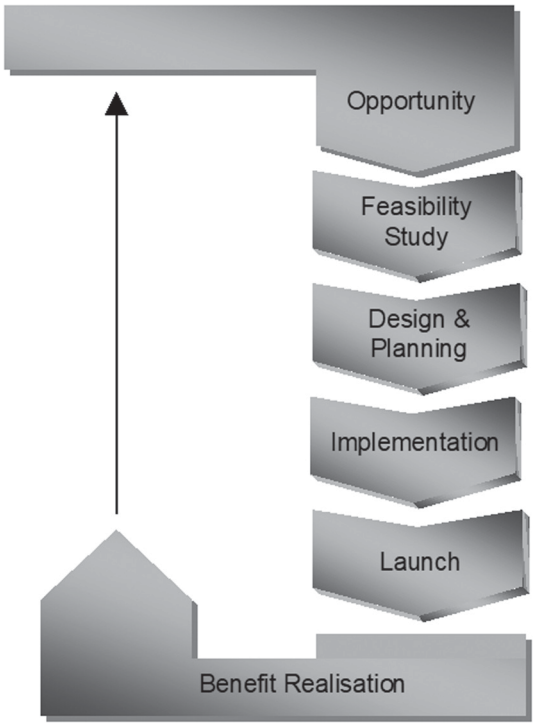


FIGURE 1.50 PAP report components

1.2.4.3 The Risk Appetite Framework for Sustainable Savings and Retirement

The risk appetite is a risk governance tool to ensure that risks are limited, their consequences on all dimensions understood and reviewed on a regular basis. Risks are therefore taken on the basis of management choices. The aim of the risk appetite framework is to ensure that appropriate governance, reporting, limits and decision processes have been set up to drive risk management decisions. It helps the group

- have a clearly stated risk appetite that defines the tolerance of senior management to a negative variation in earnings, value, capital and liquidity;
- monitor the accumulation of risks through the positions versus the risk limits; and
- manage its own exposure through interactions with local operating units.

In terms of governance, the risk appetite is a structured process between the group and local units to ensure consistency of risk tolerance, related governance and decision processes – empowering local units to actively manage their risk exposures through their own choice of local risk limits. In this respect, it both empowers local units and manages the group. At group level, the management committee is responsible for the definition of the group limits, while the different committees manage the group's exposure. Local operating units have defined their governance and set their own choice of local risk limits (consistent with but not equal to the group's) and respective action plans. The product launch requires local and regional risk management review and formal approval.

The coordination is increased in periods of crisis, with a temporary ban applied across all business lines and all countries.

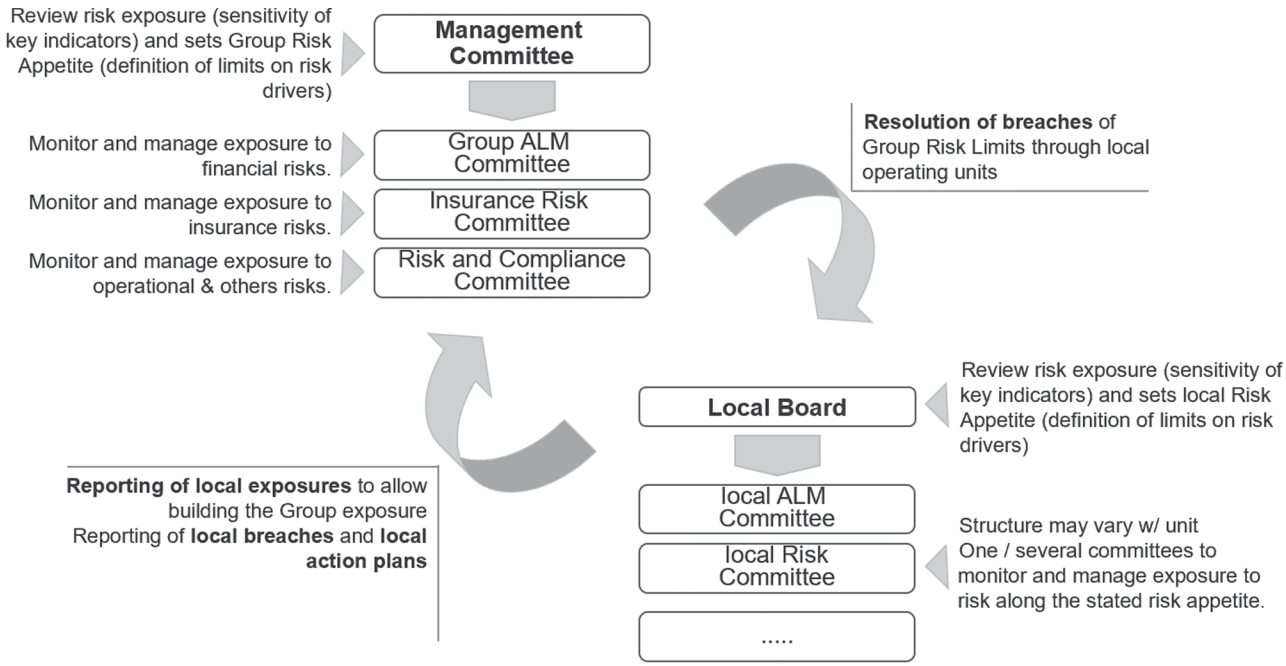


FIGURE 1.51 Risk appetite governance

It is an operational framework with alerts and limits to actively manage risk exposure. In this respect, the risk appetite considers the potential impact of risks on four dimensions across several key performance and risk indicators to set up limits on functional risk indicators (see Figure 1.52).

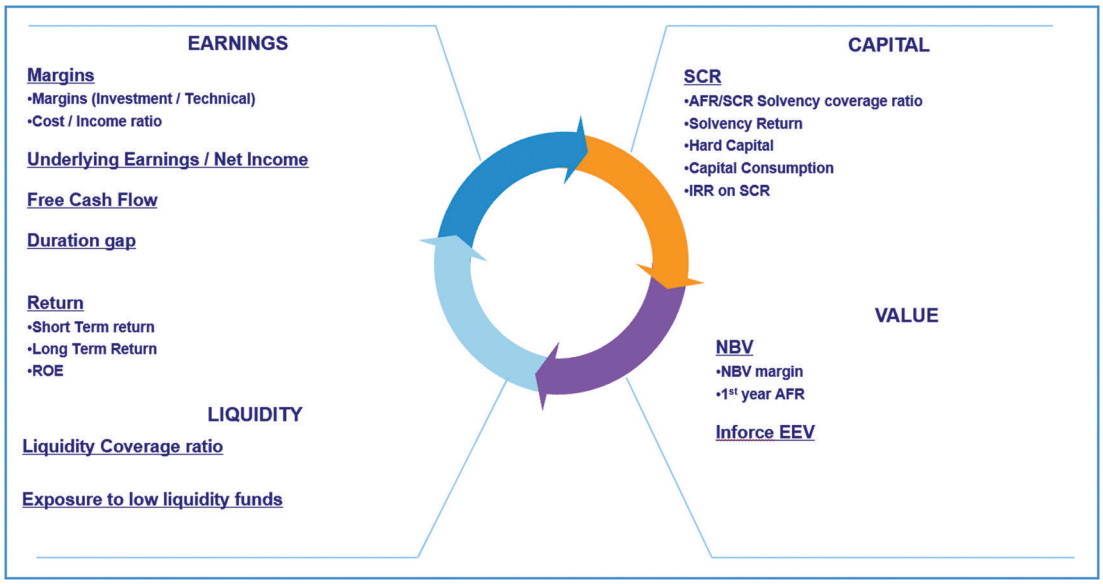


FIGURE 1.52 Risk appetite dimensions and corresponding KPIs/KRIs

The functional risk indicators are simple indicators (no complex calculations), used day to day to manage the risk exposures; they are easily and frequently monitored, reported and understood by people in the operations. They are needed to ensure that risk appetite will translate operationally, as actions are taken to manage risk depending on the area of the reported exposure.

For each functional risk indicator, the three areas of the exposure are defined by two thresholds (see Figure 1.53).

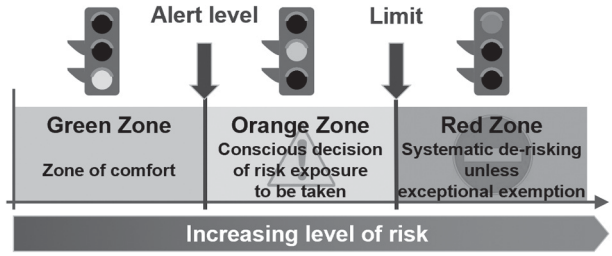


FIGURE 1.53 Traffic light system

These thresholds are called the risk appetite limits across the four dimensions (earnings, value, solvency, liquidity), usually consistent with a 1/200-year (extreme scenario) or a 1/20-year event (adverse scenario).

The risk limits are then specifically set to each category of risk (financial, life, operational) (Bourgeois 2014).

✓ **Quick win**: regarding the market risk appetite, the total exposure (P&L) can be decomposed into a Taylor expansion of so-called "Greeks", with respective risk limits for both adverse and extreme scenarios.

The above computation is made for both liability option value (LOV) and hedge assets. The SCR is based on the net hedging position (hedge assets change minus the LOV change).

Such decomposition is linear, offering a direct comparison between the categories of risks, offering a direct and transparent P&L attribution.

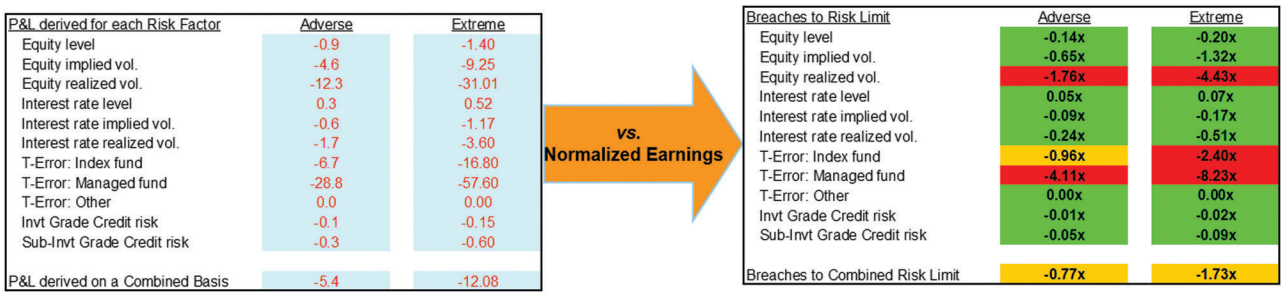


FIGURE 1.54 Risk appetite framework

As the methodology is aligned with the capital requirement methodology, the risk appetite framework directly assesses the impact of management decisions on the solvency ratio.

In terms of processes, the following are entailed.

- Monthly monitoring of the risk appetite metrics across the four dimensions.
- A quarterly release of a group risk report, with the sensitivities of the seven key indicators to various risk factors (financial and insurance) in case of adverse events (1 in 20 years) and extreme events (1 in 200), and the translation into risk limits at group level, to be validated by the management committee.
- Regular reporting and management of the group risk exposure versus limits, specifically monitored by the group ALM supervisory committee for financial risks, the risk insurance supervisory committee for insurance risks and the risk and compliance committee for operational risks.
- This process mirrored in local units: quarterly reporting, risk limits, ongoing management of exposure, with ongoing discussions with the group to ensure alignment.

In the event of these limits being breached, mitigating actions are required, in particular to secure the risk appetite in a sustainable and cost-efficient way – i.e. at a pace function of opportunistic views versus a systematic approach.

- Hedging for market risks, which involves the following:
  - minimizing the interest rate risk by adjusting the duration and convexity using swaps and different options (caps, floors, swaptions);
  - minimizing the equity volatility risk using options, based on opportunistic volatility or interest rates triggers;
  - using total return swaps to reduce basis risk; and
  - "pre-hedging" to secure profitability.
- The credit risk is also actively managed through:
  - having a well-diversified credit portfolio across all sectors and with good ratings;
  - the disciplined use of repos and credit default swaps (CDSs);
  - more stringent derivative exposure management, with collateralization of all trades being implemented; and
  - the reallocation of some funds with corporate exposure to governments.
- Liquidity risk is closely monitored, and the necessary mitigation measures are put in place so that liquidity resources exceed liquidity requirements under stress conditions.
- Enhanced product designs are introduced:
  - restriction of features such as revisions to guarantee features, including flexible roll-ups, the ability to increase rider fees, the waiting period for dollar-for-dollar withdrawals and resets, reduced equity exposure and penalties on deferral period and fund switches;
  - adjusting profit-crediting rules for traditional with-profits liabilities;
  - premium suspension (no additional contributions into legacy);
  - higher fees; and
  - more prudent assumptions (e.g. a lower lapse floor, higher volatility or correlation assumption, more efficient customer behaviour).
- Reinsurance for life risks (longevity, normality, lapses).
- In-force actions are taken:
  - reduction of basis risk through changes in the fund line-up (e.g. from 10/90 to 70/30 passive versus active funds, allocating cap to funds with low liquidity);
  - the roll-out of managed-volatility funds to reduce exposure to realized volatility;
  - selective partnering in third-party activity, incentivizing sales through commissions;
  - buyout initiatives; and
  - the disposal of structurally unsustainable businesses.

- Strengthening reserves through assumption changes (e.g., for non-hedgeable or non-reinsurable risks such as behaviour risks, a two-sided dynamic lapse function and "efficient" withdrawal assumptions).
- Stopping selling new businesses.

These mitigating actions can be categorized across the four dimensions of risk appetite. The associated costs of the measures above need to be balanced with the expected future savings under a 1/20- or 1/200-year event. Given that the risk appetite framework is structured across these four dimensions (earnings, value, solvency, liquidity), the mitigating actions are expected to produce a significant improvement in the alignment between capital and earnings targets (see Figure 1.55).

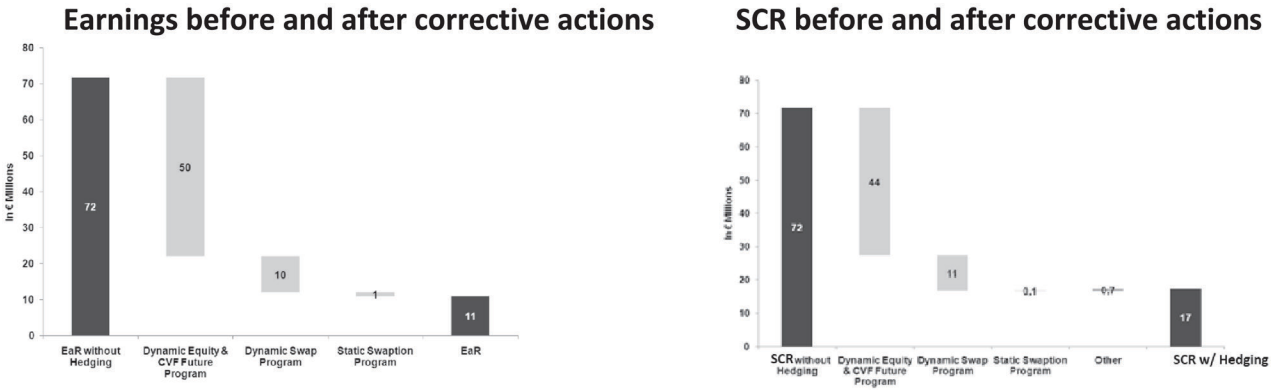


FIGURE 1.55 Impact of corrective risk management actions on SCR and earnings at risk

It is also possible to assess the impact of the mitigating actions through the evolution of the SCR risk signature.

- Swaption hedges reduce the interest rates convexity risk, while equity options hedges reduce the implied volatility (IV) risk.
- A new shock calibration, with a lower dynamic lapse floor, may in contrast increase the lapse risk.