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The Solvency II prudential framework which comes into effect in January 2016, is likely to trigger profound changes in the insurance sector, notably i) by requiring a holistic vision of risk management, ii) coherent with risk appetite as defined in accordance with governing bodies, and iii) in line with a clearly identified governance structure. Although the Directive leaves insurance companies free to choose how they structure the risk management system and function, it does, however, require that this system be fully integrated into the organisation and the decision-making process. This requires a real overhaul of the organisation of most companies and a significant cultural (r)evolution, notably in the formalisation of risk appetite.

The explicit formulation of risk appetite is the first step in the implementation of the ORSA (Own Risk and Solvency Assessment), which itself operationally fits into a more global Enterprise Risk Management (ERM) process. Risk appetite allows us to determine the level of risk that a company considers acceptable, the risks that will be kept, and those that will be reduced or avoided. As such, it is thus one of the main indicators of risk for the strategic management of insurance companies. As risk appetite is integrated into all decision-making processes, management and the Board of Directors are responsible for formulating its definition, its calibration and its application when determining a strategy in line with this appetite.

The regulator offers great flexibility with regard to the definition and calibration of the appetite, so that it can be fully coherent with the company’s culture and its strategic objectives. However, on ground, many players in the insurance industry question the definition, the choice of indicators, the calibration of risk appetite and the coherence it has with its own risk tolerances and risk limits.

The objective of this study is to analyse the relevance of the concepts of risk appetite, risk tolerance and risk limits that are adopted by players in the insurance sector, and to show how they will impact the management of insurance companies, mutual insurance companies and provident institutions.

As a first step, we have established the state-of-the-art practices employed within the sector, based on interviews with different corporate branches (general management, technical teams, finance and risk departments, ALM and investment teams) of insurance companies, mutual insurance companies and provident institutions. We have analysed the different indicators, the obstacles that have been encountered when choosing, defining, measuring and calibrating them, and we have devised solutions in light of the cultural specificities and DNA of each insurer. It results that expressions of risk appetite are very disparate, in terms of the number of indicators (2-6), the choice of indicators (solvency, profitability, budget or profit, MCEV, liquidity, satisfaction), the metrics and the calibration.

A detailed analysis has led us to call some of these indicators into question, particularly in terms of their relevance in the steering of a company. We have validated the indicators of solvency, profitability, and partially those of the budget as real indicators of risk appetite. Solvency indicators set a level of own funds linked to a risk budget and reflect the degree of risk aversion. Some profit indicators, despite being disconnected from own funds volatility and from notions of profitability, are justified by companies that have no shareholders, but only members. In this case, profitability is therefore no longer an end in itself, and some mutual insurance companies have set the minimum level of net income required to sufficiently meet capital requirements and
to satisfy the statutory solvency margin. On the other hand, we have major reservations about the relevance of some indicators, such as turnover, the technical result or customer and staff satisfaction indices, especially when there is no indicator linked to net income or profitability, even though they are often used to determine how to manage the company according to margin and/or turnover indicators.

Furthermore, in order for risk management to be fully integrated into the day-to-day management of a company and for it to be fully present within all corporate processes, regardless of the hierarchical level in question, risk appetite must be deployed to a tactical level (risk tolerance) and/or to an operational level (risk limits). In practice, we note that conducting a breakdown by business unit is not trivial, as on one hand it highlights problems linked to the treatment of correlations and diversification benefits, and on the other hand, it shows the willingness to adopt a pragmatic approach so as not to affect the business development and the work of operatives. Some significant disparities are again clearly evident.

Lastly, we have shown what exactly this new lifeblood of the company (the now-explicitly stated risk appetite) is made up of: each strategic decision that is made will thus be subjected to the company’s risk appetite. This requires a profound culture change for many players, the setting up of a sophisticated governance structure, and more generally a rethink of every element of the value chain (product design, distribution, contract management, handling of claims and the management of investments and capital). The generalisation and the widespread implementation of the holistic vision of risk management should lead to the optimal allocation of available capital, which lies at the heart of the competition among players in the insurance sector. We are thus witnessing a profound cultural change among all players in the insurance industry, which should mark the beginning of a new era in the art of managing a company.
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INTRODUCTION
INTRODUCTION

Solvency II, the European prudential regulation, now requires every insurance company to adopt a holistic view of its risks and explicitly formalise its risk appetite, i.e. the level of risk it is prepared to assume in order to achieve the objectives defined in its strategic plan.

In order for this measure to not only be administrative or regulatory, but to assist in the running of the company, the European regulator has defined governance processes that empower General Management and the Board of Directors to formulate the definition and the calibration of risk appetite and its operational indicators (risk tolerance and risk limits). Prudential regulation requires that this appetite be defined beforehand, and then systematically and effectively integrated into any strategic decision.

Risk management is, of course, not new to the insurance sector, but in fact a core element. However, as we will show throughout this study, we believe this requirement to explain it quantitatively and/or qualitatively, with the validation of governing bodies, is likely to lead to an in-depth restructuring of all management processes and, more generally, of the steering of insurance undertakings.

For many players, risk appetite and its variants are still often abstruse. The first objective of this study is therefore to present an overview and analyse the different practices that have been adopted by the sector. The second objective is to show what exactly this new lifeblood of the company (the now-explicitly stated risk appetite) should be made up of: each strategic decision that is made should thus be subjected to the risk appetite that the company itself has formalised and, as such, is thus assessed in a fully objective manner. We believe that this requires a profound culture change for many players, the setting up of a sophisticated governance structure (accountability of governing bodies, independent risk panels, internal control and reporting systems, etc.), and more generally a rethink of every element of the value chain (product design, distribution, contract management, handling of claims and the management of investments and capital).

In effect, by positioning risk appetite, and more generally risk management, at the heart of Solvency II to determine the capital requirements of any insurer, the European regulator is giving capital allocation a prominent role in the management of the company. This allocation of capital not only ensures that the company is solvent, even in extreme situations, but it should also serve to satisfy the objectives of the company. Even if this approach has more or less already been adopted by 15 leading European insurers, in the coming years, Solvency II should make its widespread adoption and implementation a priority for all players in the sector.

Companies must now therefore allocate capital to activities that generate a level of risk compatible with their own predefined risk appetite. The scope of the Solvency II regulation stops at this level: it focuses on holistic risk management, the requirement to formalise risk appetite, and
the obligation of means, notably by reinforcing the principles of governance. However, risk is not linear, additive nor is it an isolated element. Whatever the performance criterion used (satisfaction of mutual members, shareholder profitability, etc.), we believe it will have to be measured in accordance with the risks incurred by the activity in question. Risk appetite is thus likely to facilitate strategic planning and selection decisions at each level in the value chain, in accordance with risk-performance analysis.\footnote{We retain the risk-performance metric rather than the traditional risk-return ratio in order to respect the DNA of certain mutual insurance companies and provident institutions, for whom profitability is not an end in itself. These entities do not in fact have shareholders, but only members, and any gain in profitability is to be redistributed to members (in the form of a price reduction and/or improvements to the service) as soon as the solvency margin is deemed satisfactory.} It is on this point – evaluating the performance of allocated capital by activity, measured against the risks incurred – that a number of structural shifts, innovations and changes will have to be made.

Furthermore, capital allocation and risk appetite are typically broken down to the most disaggregated level of risks and divisions to allow for better management, thus affecting all stakeholders of the company. This “new” culture of risk management should not be limited to governing bodies, nor to experts, but should rather be shared and disseminated across the entire company. It would also form a common language.

Although the challenges with regard to risk appetite are widely shared, as previously mentioned, it is clear that this concept and its operational risk indicators remain unclear for many players within the insurance sector. The objective of this study is to clarify the underlying concepts of risk appetite, risk tolerance and risk limits, and to show how they will impact the management of insurance companies, mutual insurance companies, and provident institutions. To do this, we will first of all revisit the academic contributions in the field of risk management. Second, we will highlight the regulatory requirements of Solvency II related to risk appetite, and more generally with regard to risk management. In particular, we will show why Solvency II is a real catalyst for the implementation of Enterprise Risk Management (ERM) processes. Lastly, we will provide a detailed outline of the state-of-the-art practices adopted by players who have already defined their risk appetite, tolerances and limits by highlighting the obstacles they encountered and the different options chosen to overcome them. In light of this analysis, we will call some of these indicators into question, particularly in terms of their relevance with respect to insurance company management.
1. WHAT ARE THE BASES AND FUNDAMENTALS OF RISK MANAGEMENT?
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The explicit formulation of risk appetite is the first step in the implementation of the ORSA (Own Risk and Solvency Assessment), which itself operationally fits into a more global ERM process. Risk appetite is thus one of the main indicators of risk for the strategic management of insurance companies. It allows us to determine the level of risk that a company considers acceptable, the risks that will be kept, those that will be reduced and those avoided. As risk appetite is integrated into all decision-making processes, management and the Board of Directors are responsible for formulating its definition, its calibration and its application when determining a strategy in line with this appetite.

In order to understand the challenges of risk appetite and their consequences in terms of the management of insurance companies, it is useful to first of all revisit the theoretical principles of risk management and its benefits.

1.1. FROM THE THEORETICAL BASES WHICH GOVERN THE PRESENT WORLD OF RISK MANAGEMENT...

Although the academic literature abounds with articles on risk management, it must be recognised that there are few definitions of the notion of risk (Holton, 2004). In his analysis of the origin of profits, Frank Knight (1921) offered a first definition of risk, distinguishing between statistical (or objective) probabilities which reflected measurable uncertainty and subjective probabilities (or opinions). Thus, for Knight, risk corresponds to future events whose probability is measurable, while uncertainty is characterised by an indefinite and incalculable probability of future events occurring.

Today, when applied within the corporate context, risk is defined as an event, or combinations of events, which have an adverse impact on the economic value of an enterprise and uncertainty over the outcome of past events (Kelliher et al., 2012). Consequently, risk management relates to the ability to identify risks, measure them and assess their consequences, to take appropriate action, such as conserving, transferring or mitigating risk, in accordance with the company’s objectives. Thus, risk management requires on the one hand, the implementation of mechanisms, rules and procedures that reduce uncertainty and, on the other hand, an analysis and quantification of potential losses due to the occurrence of an event.

According to D’Arcy (2001), the first formalisation of risk management dates back to the 1950s and was later truly grasped by Mehr and Hedges (1963). According to them, the objective of risk management is to maximise the productive efficiency of the company. Risks must not only be taken on, but they need to be managed in their entirety. To do this, they define four steps in the risk management process:

i) Identifying and measuring losses on exposures;
ii) Evaluating the different methods of handling risk...
This definition was the first to closely resemble that of modern-day ERM. As a reminder, ERM can be defined as a holistic approach which allows a company to structure its risk management, to better understand exposure to risk and to determine the most appropriate strategy for achieving its objectives. All risks to which the company is exposed, regardless of their nature, are evaluated, compared and aggregated in order to determine their impact on the risk profile and objectives of the company. At the heart of this approach lies risk appetite, which is the key element and first step in a company’s ERM methodology.

The theoretical bases which govern the present world of risk management stems from Modern Portfolio Theory (Markowitz, 1952). It is a heuristic model which is positioned in an environment where markets are assumed to be perfect.\(^2\)

Markowitz (1952) stated that a company’s total risk could be broken down into idiosyncratic risk and systematic risk. The former is specific to each company, and linked to the operation and intrinsic management style of each business. The risk incurred by investors can thus be reduced by diversifying their portfolio with businesses that are not positively and perfectly correlated. On the other hand, systematic risk is an incompressible, undiversifiable risk, linked to the volatility of the market, and investors are only rewarded in relation to their exposure to this risk. Therefore, in the context of perfect markets, the company’s value does not depend on the total risk of the company, but only on the systematic risk to which it is exposed. Nocco and Stulz (2006) explain that when markets are perfect, risk management within the company itself is useless and may even be considered a waste of resources.

However, the heuristic model of Markowitz is based on an assumption of perfect markets, which does not reflect reality. Consequently, as we will see in the next section, many authors have made extensions of this model into a world of imperfect markets.

1.2. ... TO AGENCY, INFORMATION AND TRANSACTION COSTS

Within the context of imperfect markets, risk management can reduce the volatility of a company’s future cash flows, agency costs, asymmetric information, transaction costs, external financing and corporate tax (Monda et al., 2013). Let us revisit each of these benefits of risk management.

Risk Management Reduces Agency and Information Asymmetry Costs

According to Agency Theory (Jensen and Meckling, 1976), an agency relationship is created when one person (the “principal”) delegates authority to another person (the “agent”), in order to complete a mission. The simple agency model suggests that the agent will not act in the interest of the principal due to various factors such as the asymmetry of information, personal interests and the incompleteness of contracts. In particular, according to Jensen and Meckling (1976), these agency relationships can produce three types of costs:

- the monitoring and incentive costs incurred by the principal in order to guide the conduct of the

\(^2\) A perfect market is characterised by the following four assumptions, which are highly restrictive and thus rarely collectively observed:
- Atomicity of the market. All agents are small relative to the market and do not have the capacity to influence prices. There is only one price, which all accept.
- The products traded are all identical and homogeneous. As the price is also unique, competition is reduced to a minimum.
- Transaction costs are nil.
- Information is perfect. It circulates with full transparency.

Even if these assumptions are rarely observed, this model was a huge step forward in the world of risk management as it helped to better understand reality, even if this itself is more complex.
agent (such as audits, a system of performance-based remuneration);

- the costs incurred by the agent to ensure the principal will limit potentially detrimental activities or, where appropriate, offer compensation (for example, the costs linked to the presentation of additional information for shareholders, the auditing of accounts by an external auditor, or the establishment of contractual limits on the decision-making powers of management);
- a residual loss which corresponds to the inevitable gap between the result of the agent’s actions and the result of behaviour that maximises the well-being of the principal. For example, maximisation of the management’s utility is not necessarily optimal for shareholders.

We have indicated that according to Modern Portfolio Theory, shareholders can reduce the specific risk to which they are exposed through the diversification of their portfolio. Therefore, they are only compensated for the systematic risk to which they are exposed. On the other hand, management is exposed to systematic and specific company risks, and not able to diversify away its exposure (employment, wages, part of its wealth can be invested in the company, non-monetary benefits such as reputation, promotions, etc.). In this respect, according to Monda et al. (2013), managers will tend to be more risk-averse than shareholders and will thus make decisions that will be more beneficial in their eyes (adoption of an excessive diversification strategy, decisions to over-invest in low-risk projects, sub-optimal debt ratios).

The implementation of Enterprise Risk Management is likely to stabilise cash flows, reduce share price volatility, and consequently reduce management’s exposure to risk. Management will therefore have less incentive to take decisions that go against maximising shareholders’ profits (Monda et al, 2013).

More generally, risk management puts in place mechanisms that reduce the impact of exogenous factors on the performance of the company, the undiversifiable risks incurred by managers and consequently the conflicts of interest with shareholders and associated agency costs.

Risk Management Reduces so-called Transaction Costs

Coase (1937) was the first economist to raise the issue of the existence of the firm. According to him, the firm is a mode of coordinating transactions, an alternative to the market, where the price system generated so-called transaction costs. These costs correspond to the costs of information retrieval, negotiation, drawing up contracts, etc.

According to Stulz (1996), risk management allows the reduction of two types of costs: costs linked to a high likelihood of the firm going bankrupt and those related to hedging techniques. From among the costs linked to the probability of bankruptcy, we highlight:

- Direct costs linked to legal expenses, the cost of legal counsel, administrative and accounting expenditures linked to the reorganisation of the business; and
- Indirect costs, which are those that generally have the greatest impact on the value of the company, such as those related to its capacity to invest, to assume debt, the loss of customers, the forced sale of assets or management-shareholder conflicts of interest.
Risk management is likely to reduce the company’s cash flows and consequently reduce the likelihood of financial distress.

In the same vein, hedging techniques reduce cash flow volatility and enable the firm to boost its debt capacity. Monda et al. (2013) point out that companies with a high likelihood of financial distress are more encouraged to implement risk management mechanisms.

**Risk Management Provides Better Matching between Financing and Investment Policies**

Generally, a company creates value when it invests in projects with positive net present value and when it has secured the necessary financing. In fact, as cash flow volatility does not guarantee the availability of financing at any given time, all companies may be forced to choose between passing up on an investment opportunity or seeking out financing (issuing equity or debt).

Monda et al. (2013) stress that risk management can contribute to value creation thanks to better matching between financing and investment policies. By reducing cash flow volatility, risk management better aligns the need and the availability of funds, which is likely to reduce the cost of capital for growth opportunities.

**Risk Management can Lead to Tax Savings**

We can observe that companies resort to debt less than the deductibility of interest payments, as highlighted by Modigliani and Miller (1958, 1963). The explanation of this discrepancy lies in the absence of debt-incurred costs being taken into account. This is what trade-off theory proposes to examine.

More specifically, an increased debt level increases the probability of failure. When a company is no longer able to honour its obligations, it can find itself in a situation of financial distress, which translates into direct costs (lawyers, redundancies, etc.) and indirect costs (loss of customers, termination of contracts with suppliers, resignations and employee de-motivation, forced assets sales, etc.). So, the choice of the financial structure must take into account a comparison of the benefits of the interest tax deductibility and the disadvantages brought on by the costs of financial distress.

In this context, risk management allows cash flows to be smoothed out, debt capacity to be increased, thus paving the way for tax savings (Stulz 1996; Monda et al., 2013).
2. WHAT ARE THE REQUIREMENTS OF SOLVENCY II IN TERMS OF DEFINING AND CALIBRATING RISK APPETITE?
2. WHAT ARE THE REQUIREMENTS OF SOLVENCY II IN TERMS OF DEFINING AND CALIBRATING RISK APPETITE?

The objective of this section is to show how the Solvency II European Directive (2009) is likely to bring about deep cultural changes, notably i) by requiring a holistic vision of risk management ii) by conforming with risk appetite as defined in accordance with governing bodies, and iii) in line with a clearly identified governance structure. Although the Directive leaves insurance companies free to choose how they structure the risk management system and function, it does, however, require that this system be fully integrated into the organisation and the decision-making process. Looking at these three points, it is easy to understand why Solvency II requires a real overhaul of the organisation of most companies and a significant cultural (r)evolution in the formalisation of risk appetite.

What are the specific regulatory requirements when it comes to risk appetite?

In the document, "Preparation for Solvency II: Feedback from the 2013 ORSA Pilot Project" (ACPR, 2014), the regulator envisages that "Risk appetite addresses the attitude of the administrative, management or supervisory body toward the main categories of risks. It needs to be clear and detailed enough to express and reflect the strategic high level objectives of the administrative, management or supervisory body. It may include a quantitative assessment in terms of risk and capital. The administrative, management or supervisory body will give appropriate directions concerning the definition of risk appetite".

Each governing body is thus afforded substantial freedom with respect to defining and calibrating its risk appetite, so that each company can fully take ownership of it to make this appetite consistent with the company’s culture and strategic objectives. This is precisely the objective of this study (and of the third section in particular), to shed light on how to define and calibrate risk appetite under different market practices.
It is important to refer to article 45 of the Directive (2009): “As part of its risk-management system every insurance undertaking and reinsurance undertaking shall conduct its own risk and solvency assessment. This assessment shall include at least the following:
- the overall solvency needs taking into account the specific risk profile, approved risk tolerance limits and the business strategy of the undertaking
- [...]”

In this way, the Directive positioned risk appetite at the heart of the ORSA process. This is a key structural shift for the management of insurance undertakings. We should remember that the ORSA reflects the opinion of the company, its understanding of risks, of capital requirements and of its equity. “The ORSA is an integral part of a business and encourages leaders to initiate a process of reflection and risk control with regard to corporate activities and projects, taking a step back from Pillar 1, to develop a suitable approach for measuring and managing its risk profile and that is useful for decision-making” (Institute des Actuaries, 2014). Insurance undertakings should regard the ORSA as a strategic tool, which provides concrete recommendations and proposals on risk management, capital management, profitability, and corporate strategy. In this respect, it is therefore operationally embedded into the broader process of Enterprise Risk Management.

The regulator has defined five main principles of the ORSA: completeness (with respect to the assessment of the risks, including those not included in the calculation of the Solvency Capital Requirement — SCR); a prospective vision (of the risk profile); dynamism (continuous testing and improvement processes); proportionality (adapted to the nature, scope and complexity of risks); coherence (between risk profiles, risk appetite, volatility of the overall solvency needs – OSN); strategic management (measures to improve the risk management system, to optimise capital management, profitability, and to question the strategy).

Under the ORSA, three assessments are required by prudential regulation: the overall solvency needs; an assessment of permanent compliance with statutory capital requirements (coverage of the SCR, MCR, and requirements on the calculation of technical provisions) and lastly; an evaluation of the deviation from the risk profile to the underlying assumptions of the SCR calculation. Thus, the first objective of the ORSA is to assess the relevance of the standard formula taking into account all the risks to which the company is exposed. Its second objective is to envisage capital requirements in order to assess the risks to which the company is exposed or may be exposed over the medium and long term. Risks which are not taken into account or which are insufficiently taken into account in the standard formula of Pillar 1 will be analysed within the context of the internal risk assessment process of Pillar 2.3

We ultimately find that prudential requirements are more centred in the organisation of the company, and more precisely in the definition of its governance rather than in the definition and calibration of risk appetite sensu stricto. As indicated in the Introduction, the regulator essentially puts emphasis on the role of the governing body, which translates primarily as an obligation of means, more than a formalised result.

3 - This is the case, for example, of sovereign debt risks of European economic area (EEA) member countries such as Greece, Spain and Portugal which, according to the standard formula, are considered low-risk countries and are not subject to capital requirements such as spread risk and concentration risk. In the ORSA process, companies must manage the risks linked to holding these instruments and holding the own funds required to hedge them.
According to the Directive, the system of governance must therefore be composed of principles, functions and models which allow the development of an adequate risk management decision process within the company. To do this, Solvency II reinforces the responsibility of the managers (in general, by extending both the number of people with responsibilities and the areas of responsibility), seeks a balance of powers (appropriate checks and balances in line with the “four-eyes” principle) and also seeks independence of the various functions of managers, who must be competent (Fit and Proper). On the other hand, prudential regulation does not impose a predetermined system or organisation under the pretext of the principle of proportionality, but "a clear allocation and appropriate segregation of responsibilities" (article 41 of the Solvency II Directive, 2009). In order for this governance to become a reality, article 51 of the Directive explicitly requires the drafting of a report describing the system of governance and where the company shows how aligned it is with its risk profile.

In conclusion, the regulator offers great flexibility with regard to the implementation of the Pillar 2 requirements, and particularly with regard to the definition and calibration of the risk appetite, so that it can be fully coherent with the company’s culture and its strategic objectives. However, on ground, many players in the insurance industry question the definition, the choice of indicators, the calibration of risk appetite and the coherence it has with its own risk tolerances and risk limits. The next section looks at what the market "best practices" are in this area.

4 - The Directive introduced the notion of the AMSB (Administrative, Management or Supervisory Body). According to article 40, Member States must ensure that the AMSB assumes final responsibility for the concerned undertaking complying with the legal, regulatory and administrative provisions adopted pursuant to the Solvency II Directive. The AMSB thus constitutes the central element of the governance system and interacts with the established boards. One should take care when identifying whether the AMSB structure is mutualistic or shareholder-based, one-tier or dualistic. Does the AMSB include the Board of Directors and/or the Supervisory Board and/or general management?

5 - Article 258 of the delegated regulation of 10 November 2014 requires that insurance undertakings be effectively managed by at least two people (the four-eyes principle) in order to avoid a concentration of powers according to the governance principle of checks and balances.

6 - According to article 42 of the Solvency II Directive, insurance undertakings shall ensure that all persons who effectively run the undertaking or occupy key functions have adequate skills (professional qualifications, knowledge and experience) to enable sound and prudent management, and that they are respectable (of good repute and integrity).
3. HOW DO WE CALIBRATE RISK APPETITE, TOLERANCE AND LIMITS AND WHAT ARE THE ISSUES AT STAKE FOR CAPITAL ALLOCATION?
3. HOW DO WE CALIBRATE RISK APPETITE, TOLERANCE AND LIMITS AND WHAT ARE THE ISSUES AT STAKE FOR CAPITAL ALLOCATION?

The first section of this study focused on academic contributions regarding the challenges faced within risk management, and the second section presented the prudential regulatory constraints of risk appetite. The aim of this third section is to analyse the different approaches for defining and calibrating risk appetite as well as risk tolerance and operational risk limits, and to present the issues at stake and the cultural shift within the strategic management of insurance companies.

As previously highlighted, the regulator requires insurance companies to adopt a holistic approach to risk management and to define their own risk appetite, which will generalise and “democratise” the development of ERM in this sector and lead to profound cultural shifts in terms of corporate management. The great challenge is to integrate the management of available own funds through a capital allocation model via “business units” (business lines, countries or other depending on the company policy and strategy) by considering: i) a systematic measure of the sensitivity of steering indicators to risk factors; ii) Solvency II constraints, in particular the ORSA and the setting up of economic capital; and iii) risk appetite and its tolerances and operational limits.

It is to these questions that players in the insurance sector must find their own answers today, because it depends on their specific financial culture, on the sensitivity of management to risk, and on the strategic vision...without omitting that the European prudential regulator demands that risk management be positioned at the heart of decision-making processes.

Now, when a company will explore various strategies to achieve its objectives, it must make its choice within a dynamic perspective and contingent upon its risk appetite. In other words, companies’ strategic choices will be specified by envisaging them in a risk-performance environment, the boundaries of which are defined by risk appetite. Without a formal definition of risk appetite, there can be no holistic vision of the risk-performance trade-off: risk appetite is designed to protect the company against the simple pursuit of goals without a true understanding of the consequences of decisions that have been taken.

Strategic choices will thus be made or dismissed in line with the level of risk they present compared to what the company deems acceptable. Naturally, in order for it to be functional and integrated into the company’s risk management process, risk appetite should be fully deployed across several levels to let the different stakeholders know the exact boundaries within which they are “authorised” to act.

So, from the point of view of management, risk appetite provides answers to different questions:
- Risk Preferences:
  - Which risks should be taken on? Which risks should be avoided?
  - With which risks does the company have a
competitive advantage in terms of management?
- Risk Appetite:
  - Which risks need to be mitigated? At what level? Within what time frame?
- System of Limits
  - What future events/emerging risks might impact the strategy?

Risk appetite is a concept that is specific to each company and reflects its strategic challenges, and can therefore drastically differ according to its legal nature and/or its culture. Moreover, it is not strictly additive insofar as the risk appetite of a group is typically greater than the sum of its parts.

Risk appetite allows any company to position itself on the risk-performance spectrum, to optimise the allocation of its capital according to its risk profile and desired performance, while respecting its solvency requirements. Our goal here is to show how insurance companies, mutual insurance companies and provident institutions have moved forward (or are able to move forward) in defining risk appetite and its tolerances and operational limits.

3.1. WHAT ARE THE INDICATORS AND METRICS USED TO CALIBRATE RISK APPETITE AND WHAT ARE THE ISSUES AT STAKE FOR CAPITAL ALLOCATION AND ERM?

Risk appetite and its operational indicators are at the heart of strategic decision processes, ERM and the capital allocation model. We find that companies apply very different approaches, indicators and philosophies depending on their culture, their values, the involvement of management, the company objective, the weight and the role of these aggregates in the decision-making process and, of course, depending on the available means.

First, we should remember that numerous definitions of risk appetite have been suggested depending on the chosen ERM reference framework. The simplest definition is that of PWC (2004) and of the ISO Guide 73 (2009), which refer to the “[quantity] of risk that the firm is willing to accept within its overall capacity”.

The Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2004), adds a reference to value (“the amount of risk, on a broad level, an organization is willing to accept in pursuit of value”), the French Institute of Actuaries (2014) adds the notion of strategy (“risk appetite corresponds to how much risk an organisation is willing to take on within the framework of its strategy”); the International Risk Management Institute (IRMI) considers risk appetite as the degree to which management is willing to accept the uncertainty of a loss due to a risk while it has an option to transfer this risk to an insurer at a certain cost. The Risk and Insurance Management Society (2012) defines it as the “total exposed amount that an organization wishes to undertake on the basis of risk-return trade-offs for one or more desired and expected outcomes”. Lastly, but non-exhaustively, we note the contribution put forward by the Senior Supervisors Group (2010), which defines risk appetite as “the level and type of risk a firm is able and willing to assume in its exposures and business activities, given its business objectives and obligations to stakeholders”. Risk appetite should reflect the potential impact on profits, capital, funding and liquidity.

In a such universe which sometimes feeds off chaos according to some in the industry, we propose, in this section, to establish state-of-the-art practices
in terms of the definition, metrics and calibration of risk appetite, and to take stock of different approaches used by the market.

To do this, we interviewed around 30 individuals from insurance and reinsurance companies, mutual insurance companies and provident institutions, listed and unlisted firms, and purely French as well as international organisations of all sizes. The sample consists of respondents from different corporate branches: general management, risk departments, technical teams, strategy teams, asset-liability management and investment management, in order to have a broad spectrum of approaches and analyses.

From these interviews, it appears that although the manifestations of risk appetite are highly disparate, the different steps required to implement risk appetite are identical. We thus find the implementation steps described by Shang and Chen (2012), for whom the definition of a risk appetite framework helps management understand the company’s risk profile and to find an optimal balance between risk and return. Chronologically, seven steps are identified:

● a bottom-up analysis of the company’s current risk profile;
● interviews with the Board of Directors regarding the level of risk aversion;
● alignment of risk appetite with the company’s goals and strategy;
● formalisation of the risk appetite statement with approval from the Board of Directors;
● establishment of risk policies, risk limits and risk-monitoring processes consistent with risk appetite;
● design and implementation of the risk mitigation plan to be consistent with risk appetite;
● a communication plan.

Risk appetite is an essential component for management insofar as the notion of risk is inseparable from that of performance (and/or profitability), but under no circumstances must it dictate strategy and goals. Each company must therefore define its objectives in advance, based on its strategy, its culture and its DNA.

However surprising it may be, it is clear that beforehand, many stakeholders had not clearly defined their objectives and as such, the definition of risk appetite resulted in a first structural and cultural shift. In fact, although many incorporated companies have a goal of financial profitability, the choice of objectives is less evident for a mutual insurance company or a provident institution. We thus met with businesses, including large mutualist groups, who took advantage of this implementation of risk appetite to focus on establishing their true DNA. Their goals cannot effectively be simplified to a financial measure of solvency and/or profitability, but should also be linked to mutualist genes: responding to the needs and to the satisfaction of mutual members, ensuring the continuity of the company, financial independence, the positioning of the market, sustainable development, etc.

The second step is the definition of the risk profile. Here, again, establishing such a definition resulted in a second structural and cultural shift for certain groups. There is indeed a significant disparity of risk culture between players. The more sophisticated ones had implemented systems prior to Solvency II, sometimes with more developed measures than those of the European regulator (TVaR, more refined correlation matrices, etc.). However, for most insurers, the concept of risk in terms of managing the company remains a vague, non-formalised notion.
(“our risk profile is appropriate for our moderate risk appetite”), or even non-existent. It should be noted that in many mutual funds, Boards of Directors are often composed of professionals from outside the world of insurance.

Due to the requirements of the ORSA and of risk appetite in particular, a profound cultural shift is taking place among industry leaders, who must now employ this dimension of risk following the establishment of their new responsibilities, which until now were exclusive to industry experts.

Generally, a risk profile is determined based on a bottom-up approach. This analysis goes through a mapping of risks which can be based on Pillar 1 of Solvency II and which can (or should) integrate other risks, such as those linked to sovereign bonds, reputation, etc. The assessment involves identifying risks, measuring them, and determining the impact of each of them on the company. This risk profile analysis is usually coordinated by a Risk Department (or its equivalent), but each division of the company is responsible for conducting the analysis in its area of operation. Individual risk profiles are then aggregated to obtain the company’s global risk profile. Once the company has acquired a global understanding of the risks to which it is exposed, it can consider the types of risks that it wishes to retain, avoid or transfer, and the extent of exposure. A risk profile thus forms the basis for reflection on the global risk appetite. The last step corresponds to the choice of risk appetite indicators and to their associated metrics. Risk appetite is inherent in each enterprise and should therefore be directly linked with its objectives, its strategy and its culture. More ambitious goals must be associated with a greater risk appetite, and vice versa. At this stage, it is therefore important to identify the economic model and the strategic priorities of the company, its performance, its competitive environment, its historical risk profile (including events that resulted in significant losses and corrective measures taken), its present risk profile, its current capacity to absorb risks, its existing risk policies and risk limits, and the level of risk that the company is willing to take on to achieve its goals. All of these elements allow us to clearly identify the conditions for defining risk appetite.

Additionally, the COSO (2012) meaningfully recommends that risk appetite:

- be directly linked with the objectives of the organisation;
- be stated precisely enough that it can be communicated throughout the organisation, effectively monitored, and adjusted over time;
- helps with setting acceptable tolerances for risk, thereby identifying the parameters of acceptable risks;
- facilitates alignment of people, processes, and infrastructure in pursuing organisational objectives within acceptable ranges of risk;
- considers shareholders’ views in identifying the need to reassess or more fully communicate the risk appetite;
- recognises that risk is temporal and relates to the time frame of the objectives being pursued; and
- recognises that the organisation has a portfolio of projects and objectives, as well as a portfolio of risks to manage, implying that risk appetite has meaning at the portfolio level and at the individual objective level.

Lastly, it should be noted that risk appetite is a concept which may vary over time depending on the circumstances in which the company evolves,
one-off events that may change the risk profile of the company, the market situation or strategic objectives. Regular revision of the risk appetite is therefore necessary. However, it is also important to consider that risk appetite should not have a short-term dimension, but rather a medium-term vision in harmony with the company business plan. From an implementation perspective, we observe that Risk Departments (or their equivalents) are typically responsible for proposing a risk appetite level to the Board of Directors and the Executive Committee. This proposal is made following the work of the different business units or entities and taking into account the strategic objectives of the group (profitability, positioning market, customers, etc.). We also notice that depending on the company’s system of governance, discussions on risk appetite take place within the Risk Committee before being presented to the Board of Directors and/or the Executive Committee. This first discussion phase is aimed at challenging the risk proposals put forward by the Risk Department. That said, the final decision on the level of risk to be accepted lies with the Board of Directors and Executive Committee, who assume responsibility for the risk appetite definition, indicators and metrics. The crucial issue at stake is for this appetite to be subsequently cascaded into risk tolerances and limits across the entire organisation (see following sub-sections).

Once again, this constitutes a profound cultural shift. Moreover, in order to facilitate decision-making on risk appetite, some stakeholders preferred to first conduct a prior “awareness-raising exercise among members of the Board of Directors and the Executive Committee”, so they could identify the level of risk that they are really willing to accept. Different approaches have been identified: discussions on the basis of different scenarios, analysis of events that could impact strategy and objectives, the use of questionnaires or the economic modelling of scenarios. These exercises helped gauge the reaction of Board and Executive Committee members to the various scenarios presented, and thus determine their degree of risk aversion.

With these precautions thus taken, the choice of indicators and metrics can be achieved. We have remarked that risk appetite systematically (and logically) ensues from the strategic objectives set by the company. These are generally objectives of profitability, solvency, value (for example, the level of Market Consistent Embedded Value or MCEV within life insurance) or growth (increase in turnover or number of members). The indicators chosen to define goals (KPI - Key Performance Indicator or KRI - Key Risk Indicator) are then used to define the risk appetite.

From the interviews conducted with insurance companies, mutual insurance companies and provident institutions, it appears that the risk appetite is generally determined using a solvency, profitability or budget indicator. Occasionally, some companies have chosen up to six indicators. In addition to the former three, they add a value, a liquidity and/or a satisfaction indicator.

Regarding the selected metrics, again, in order to be aligned with the culture, strategy and objectives of the company, risk appetite is broken down into different forms: a maximum and/or minimum limit that sets the level of exposure, a single level that corresponds to an objective, or a range that defines the fluctuation area of metrics within which the company feels comfortable.
Below, we summarise the six indicators mentioned during our various interviews:

i) Solvency Indicators

- a capital consumption ceiling expressed in absolute terms or as a percentage of available capital;
- a minimum statutory solvency margin;
- linked to a target statutory solvency margin with a lower limit that should not be crossed;
- a target solvency margin where capital requirements are determined by the internal model;
- a range of solvency margins determined by the internal model with which the company is comfortable, for example a solvency margin that falls between 150% and 185%;
- a level of surplus capital.

The most commonly-used risk measure is Value-at-Risk (VaR), with a 99.5% confidence level, based on the Solvency II European regulation. However, some insurers have preferred to opt for additional levels of confidence. We note risk measures calibrated according to the occurrence of an event every 10, 20 or 100 years. Lastly, it should be noted that the most sophisticated insurers use Tail-VaR.

ii) Profitability Indicators

- a minimum or target level of economic profitability;
- a minimum or target level of IFRS-compliant profitability or compliant with French standards.

Profitability indicators are very interesting because they reflect the culture and the DNA of the company. For instance, a sophisticated listed company, which has an internal model, will necessarily calculate economic profitability, and even value creation (the difference between profitability and the cost of capital). However, such insurers also often added a profitability indicator under IFRS standards, because it still (perhaps, incorrectly?) acts as the reference for financial markets, and management wished to include it within risk exposure constraints, and consequently within risk appetite. In terms of capital allocation and risk management, we ought to be alert to sub-optimal financial and economic management in the quest to attain volatility objectives that are purely accounting in nature. We had previously raised these problems (Amenc et al., 2006), but it does not appear that the culture of the financial markets in this area has truly evolved.

Companies that do not retain economic profitability attest to the difference in sophistication when compared to those who include it in risk appetite. In effect, the implementation of Solvency II and the development of ERM offer, or will offer, access to all of the data needed to define an allocation of capital by business unit and thus establish economic profitability. We believe that this difference is not always linked to a problem of time or means, but to the culture of the company and/or the hesitation of general management.

Ultimately, a number of insurers have retained no indicator of profitability, because they believe that their performance should not be measured according to financial criteria, but rather according to indicators of member satisfaction and/or, if appropriate, staff satisfaction. Even if we share this willingness to respect the DNA, it does however seem that the profitability indicator could be an interim measure to ensure the true effectiveness of capital and solvency management. Naturally, in order to comply with the values of mutual
insurance companies, any gain in profitability can be redistributed to members (in the form of a price reduction and/or improvements to the service). At this stage, we believe that there is more of a cultural than a technical gap, but it cannot be discounted that new cultural mutations may soon take place.

iii) Budget or Profit Indicators
- a turnover target;
- a percentage of the turnover growth;
- a maximum volatility of the budget when compared to the business plan;
- a maximum volatility of IFRS profit or technical profits;
- a range for the technical result;
- a minimum technical result;
- the maximum loss level (economic and/or technical).

Companies that did not retain profitability indicators systematically applied a budget indicator, particularly in reference to the evolution of turnover. However, for those who retained a profitability indicator, it is easy to understand that this additional indicator allows them to calibrate the acceptable volatility of the technical result and/or net income.

Finally, as mentioned earlier, some insurers deemed it appropriate to add one or more indicators in order to respect their values, their culture and their objectives.

iv) Value Indicators
- Market Consistent Embedded Value (MCEV) within life insurance.

v) Liquidity Indicators
- The company must ensure payments to policyholders and collateral after a plausible shock.

vi) Satisfaction Indicators
- A customers and/or staff satisfaction index.

Lastly, we note these six quantitative indicators of risk appetite are sometimes associated with a qualitative vision that defines risk preferences by specifying the scope of the risk which is accepted or not. For example, in the description of its risk appetite framework, SCOR specifies that "The Group aims to cover a wide range of reinsurance risks and geographical areas. However, it has no desire to take operational, legal, regulatory, tax and reputation risks" (SCOR, 2012).

3.2. AN ANALYSIS OF INDICATORS AND METRICS USED TO CALIBRATE RISK APPETITE

With respect to the definition of the risk introduced in the first section of this study (Kelliher et al., 2012), which made reference to a negative impact on the economic value of the company, and different definitions of the aforementioned risk appetite, some indicator choices may initially be surprising and more in line with targets rather than an indication of appetite. Let us analyse each of these choices.

Solvency indicators are linked to a risk budget that the company is prepared to accept. Naturally, those expressed in reference to a surplus of the minimum capital requirement, to a capital ceiling (in absolute terms or as a percentage of available capital) or as a multiple (greater than 1) of the statutory solvency margin, reflect a stronger level of aversion than for insurers who “simply” set a risk
budget equal to the minimum statutory solvency margin. It is interesting to note that, generally, the least advanced players on these topics of risk appetite instead chose a solvency indicator that reflected the highest risk appetite (the statutory solvency margin). In addition, we note that the companies who chose a solvency range (i.e., those who have set a maximum solvency margin), reflect the fact that they do not want an excessive capital surplus (partners often hold dormant capital). Beyond this limit, the company is thus obliged to increase its exposure to risk.

Profitability indicators (economic or accounting, minimum or target) generally correspond to a strategic objective of the company, particularly with regard to its shareholders. However, they are also an indicator of risk appetite. In fact, beyond the constraint of the level of own funds (denominator) defined by solvency indicators, by setting a minimum profit objective (technical result, net income, etc.), the company thus restricts the volatility of its profit, and consequently that of its risk budget. Unlike profit indicators, which we will address in the following paragraph, the profitability indicator offers an additional dimension, insofar as the volatility of profits is expressed in terms of own funds volatility, which is of course more relevant from a financial point of view.

Budget or profit indicators (turnover, technical results, net income, budget compared to the business plan) also generally correspond to a strategic objective. These indicators may not appear to be intuitive when expressing risk appetite because they are disconnected from own funds volatility and from the notions of profitability that typically drive companies. However, the companies that have chosen these types of indicators typically do not have shareholders, but only members. Profitability is therefore not an end in itself. Therefore, given that they cannot directly raise own funds, these indicators are designed to help define the minimum level of net income required to sufficiently meet capital requirements and to satisfy the statutory solvency requirements.

Retaining a technical result indicator only defines risk appetite with respect to the insurance business and therefore ignores risk appetite in relation to the financial result. This choice often reflects how to steer the company according to margin indicators, rather than profitability. We consider this technical result indicator to be an interesting additional constraint in defining risk appetite, but it is insufficient, if there are no other indicators linked to the net or financial result, or to profitability. Turnover indicators (targets, expressed in absolute terms or as a percentage of growth) may also be surprising. They hardly seem relevant, because they are too far-removed from the concept of risk appetite and the problem of supplying a minimum level of own funds. For us, this indicator can only express risk appetite if it is expressed in terms of a cap: beyond a certain level of turnover, the statutory amount of own funds becomes too large to be solely increased by net income.

Thus, more generally, it appears that turnover and technical result indicators are insufficient when communicating risk appetite and can only be complementary to net income or profitability indicators. They are justified only in the event of the governing body being unwilling to make a break with the present culture of the company, and particularly when a management style is centred on one or both of these indicators.
For us, liquidity indicators appear to be more relevant indicators of risk appetite insofar as they impact risk exposure by measuring the company’s ability to be solvent in the short term.

Lastly, it would appear that customer or employee satisfaction indicators are more linked to the objectives of the company and not indicators of risk appetite, insofar as their link with risk exposure, with the risk budget, or with own funds volatility in particular, is very indirect.

This analysis of the various risk appetite indicators in use within our sample from the insurance sector leads us to the following conclusions in Table 1.

**3.3. WHAT ARE THE INDICATORS AND METRICS USED TO CALIBRATE RISK TOLERANCES?**

In order for risk management to be fully integrated into the day-to-day management of a company and for it to be fully present within all corporate processes, regardless of the hierarchical level in question, risk appetite must be cascaded from a strategic level to a so-called tactical level (risk tolerance) and/or to an operational level (risk limits).

According to the COSO (2012), risk tolerance is the level of variation in risk appetite that is deemed acceptable in the pursuit of an objective. Risk tolerance ensures that the company will achieve its objectives while adhering to the risk appetite. It is normally defined with the same indicators as risk appetite and it should be implemented at all levels of the organisation.

### Table 1: Summary of Risk Appetite Indicators

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Relevance</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency</td>
<td>High</td>
<td>These indicators are directly linked to a risk budget that the company is prepared to accept.</td>
</tr>
<tr>
<td>Profitability</td>
<td>High</td>
<td>When this indicator is set as the minimum, it limits the volatility of profits and, consequently, of the risk budget.</td>
</tr>
<tr>
<td>Budget / Profits</td>
<td>Medium</td>
<td>A somewhat non-intuitive choice for defining risk appetite. Indicators used by mutual insurers, for which profitability is not the main objective. They ensure that there are sufficient own funds to meet the solvency requirements.</td>
</tr>
<tr>
<td>Technical result / Turnover</td>
<td>Low</td>
<td>These indicators do not reflect risk appetite, but can be used to complement profitability and net income indicators:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Technical result: excludes the financial result. Insufficient if it is not linked to a financial result or profitability indicator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Turnover: far-removed from the concept of risk appetite and own funds. It can only be considered as an indicator of risk appetite if it is defined as a ceiling.</td>
</tr>
<tr>
<td>Liquidity</td>
<td>Medium</td>
<td>An indicator linked to risk exposure because it assesses the ability of the company to be solvent in the short term, but it must of course be associated with other indicators such as those of solvency and/or profitability.</td>
</tr>
<tr>
<td>A customer and/or staff satisfaction index</td>
<td>Null</td>
<td>Is does not serve as an indicator of the risk level. No direct link with risk exposure and/or a risk budget. It can be a goal, but not an indicator of appetite.</td>
</tr>
</tbody>
</table>

Source: EDHEC
As is the case with risk appetite, risk tolerance can be expressed in different forms depending on the culture and internal practices of the company. For example, we can mention:

- The amount of losses suffered by a business unit following a shock once every $Y$ years should not consume more than $X\%$ of the group’s available capital;
- The amount of losses in each extreme scenario must be less than $X\%$ (e.g. 35\%) of the capital buffer (capital surplus);
- The annual exposure for each major source of risk should be less than $Y\%$ (e.g. 20\%) of total available capital;
- The probability of the capital surplus being diminished should be lower than $X\%$;
- The probability of the statutory or economic capital of the business unit in question being diminished by $X\%$ should be lower than $Y\%$;
- The amount of losses of a particular risk (e.g. risk of natural disasters) must not exceed EUR $X$ million on the basis of $X\%$ VaR.

On ground, the determination of risk tolerance is faced with the non-trivial breakdown of risk appetite by business unit, and with problems linked to the treatment of correlations and diversification benefits, so much so that some stakeholders are still fumbling. The other major dimension raised by the respondents is the desire to adopt a pragmatic approach that does not affect the business market or the work of operatives.

Thus, the most simple and pragmatic approach adopted by some insurers, involves defining risk tolerances based on existing investment, underwriting and reinsurance policies. In fact, irrespective of Solvency II, all companies have defined a general investment policy where limits are set for each assets class (stocks, bonds, real estate, strategic assets, socially responsible investments), as a percentage of the portfolio, by geographic concentration, by duration, type of bond (sovereign, corporate) and by rating. As for underwriting, limits are also often set on a case-by-case basis (exposure by type of activity, by risk, by portfolio concentration, etc.). In order to transform these limits into risk tolerance (by establishing the corresponding Solvency Capital Requirement), these insurers have tested their efficiency in terms of risk protection and verified their adequacy in relation to the overall risk appetite. Some companies subsequently reported that this exercise also served to re-evaluate the relevance of these limits, many of which were in fact obsolete and heavily outdated, and which had been in use for unknown reasons.

Most stakeholders have not adopted this approach. Even if their described formulations and processes appear to be quite varied, we believe it is possible to ultimately set out an overall pragmatic and logical approach, with each stakeholder bringing contributions to the table in terms of treatment, as we shall show.

The starting point for the definition of risk tolerance is the company’s current situation, and it must certainly be compatible with the group’s risk appetite. In other words, the observed levels of risk make up risk tolerance. At this stage, some insurers have integrated an additional constraint with the aim that the capital consumption of each individual risk does not exceed a set percentage of economic or statutory capital.

Secondly, assumptions are set in order to establish a budget over a three-year period. It is then
verified that the risk tolerance is always in line with the risk appetite. The third step involves applying a shock to these assumptions with a 99.5% VaR, or even 90% VaR depending on the company, and comparing them to risk appetite by integrating diversification benefits. If this latter step is respected, no action is taken and risk tolerance should match the exposure set out in the budget.

Conversely, if the adequacy of risk appetite is called into question by the projected distribution of losses by perimeter, then the factors responsible for the deviation will be sought out. Therefore, a first approach should involve proceeding with an iterative process (stress tests, risk assessments and their sensitivity) with operatives, to determine the capital allocation that would once again appropriately match the overall risk appetite. However, in the event of a strong deviation (linked, for example, to a problem with the economic model) or lack of willingness to change the capital allocation, action plans are defined (new allocation of financial assets, reinsurance, pricing and trade policies) in order to revert to the desired level of risk-weighted profitability that is compatible with risk appetite. It is interesting to note that depending on the state of the business unit, this return to better fortunes may be witnessed over several years. Another option taken by some insurers when defining risk tolerance is to add a surplus of capital to this risk profile, based on the performance of the business unit.

Some companies have completed this approach in three steps, by defining "strategic risk tolerance". This involves going beyond simply matching the risk appetite and including a new constraint, which incorporates a strategic dimension defined by the Board of Directors. These "strategic" tolerances must reflect the level beyond which certain losses become too great to bear (for example, natural catastrophes, large risks, credit and surety), not in terms of bankruptcy risk, but relative to the company’s ambition in terms of market share (problematic in terms of image), the room for manoeuvre that management wishes to grant the company in order to recover from a situation, etc.

### 3.4. WHAT ARE THE INDICATORS AND METRICS USED TO CALIBRATE RISK LIMITS?

Risk limits represent the most granular level of risk appetite across the organisation. They allow us to make risk appetite operational, by setting the risk level beyond which corrective action must be put in place (risk mitigation). These risk limits must be specific, quantifiable and based on forward-looking assumptions, just as risk appetite is. They can take different forms (ceilings, thresholds and triggers) and correspond to indicators different from those of risk appetite and risk tolerances because they must be chosen so that they speak to insurance operatives, who are the owners of risk limits.

Currently, the risk limits set by insurance companies do not appear to be directly (mathematically) connected to risk appetite. In fact, the top-down approach that stems from the definition of risk appetite and which breaks down into tolerances, which then define specific limits, is a complex process which is difficult to implement due to a lack of unique and explicit analytical solutions.

The approach favoured by the sector is therefore a bottom-up approach. The indicators used by operatives in the business are considered to be
a benchmark and their levels must match the risk appetite. In fact, if the testing of these limits results in them not being considered to be in line with the risk profile deemed acceptable by the company, they will be subject to a new calibration.

In practice, as there is no single mathematical solution to deploy risk appetite across the organisation into tolerances and then into risk limits, business unit managers “freely” choose the operational limits in line with the strategic objectives of the company (often economic return on allocated capital) and the Risk Department measures if they match the risk appetite and whether they are effective in terms of hedging risk.
CONCLUSION
CONCLUSION

The objective of this study was to show how risk appetite, which is at the heart of the holistic vision of risk management, is likely to lead to an in-depth restructuring of all management processes and, more generally, of the management of insurance undertakings (insurance companies, mutual insurance companies and provident institutions).

Risk appetite indicators must be chosen so as to allow insurers to systematically integrate the risk dimension into every company’s strategy, to ensure that risk management is consistent with risk limits that are aligned with risk appetite, and to protect the value created. Thus, by requiring that risk appetite be systematically and effectively integrated into any strategic choice, and by defining the governance processes that empower general management and the Board of Directors, the European regulator is building an environment in which any strategic decision must have clear objectives which are in accordance with risk appetite, which the company itself has defined.

Due to its nature and scope, risk appetite affects the entire value chain (product design, distribution, contract management, handling of claims, and managing investments and capital). Furthermore, it must allow all risks to be measured, understood, monitored and managed at the most basic level of business units, as well as at the broadest level of the company, and as such, creates an objective framework for making strategic and tactical decisions. This appetite also serves as a common language for all internal and external stakeholders of the company, including the Board, whose responsibility has profoundly increased. Under the guidance of the European regulator, the allocation and management of capital in accordance with risk appetite is an approach that will be widely implemented and universalised, thus leading to deep structural changes in terms of culture, as well as in terms of the organisation and design of corporate management.

Although the challenges with regard to risk appetite are widely shared, it is clear that its definition, its calibration and its dissection into risk tolerances and risk limits (which are currently the subject of debate by a number of players with the impending implementation of Solvency II in January 2016) are still often abstruse.

Based on interviews with different corporate branches of European insurance companies (general management, technical teams, finance and risk departments, ALM and investment teams), mutual insurance companies and provident institutions, we have developed state-of-the-art best practices, identified obstacles that have been encountered, and devised solutions in light of the cultural specificities and DNA of each insurer, in order to calibrate the indicators of risk appetite and its variants. It results that expressions of risk appetite are very disparate, in terms of the number of indicators (2-6), the choice of indicators (solvency, profitability, budget or profit, MCEV, liquidity, satisfaction), the metrics and the calibration.

A detailed analysis led us to validate the indicators of solvency, profitability, and partially those of
the budget as real indicators of risk appetite. Solvency indicators set a level of own funds linked to a risk budget and reflect the degree of risk aversion. The least risk-averse companies are those who took into consideration a target level of own funds that would allow them to “just” satisfy the statutory solvency margin. Some have set an upper bound of solvency, reflecting their willingness to be exposed to more risk as soon as surplus capital starts to become dormant capital. Profitability indicators constitute a new risk budget constraint, by introducing the notion of net income volatility. Some profit indicators, despite being disconnected from own funds volatility and from notions of profitability, are justified by companies that have no shareholders, but only members. Profitability is therefore not an end in itself, and some mutual insurance companies have set the minimum level of net income required to sufficiently meet capital requirements and to satisfy the statutory solvency margin.

On the other hand, we call into question the relevance of some indicators, such as turnover, the technical result or customer and staff satisfaction indices, when there is no indicator linked to net income or profitability, even though they are often used to determine how to manage the company according to margin and/or turnover indicators. These are not indicators of risk appetite and are justified only in the event of the governing body being unwilling to make a break with the present culture of the company.

Nevertheless, the various implementation stages for risk appetite were identical and very structured within the organisation and culture of each insurer. Chronologically, the objectives and strategy of the company, the risk profile, the risk appetite indicators and their associated metrics, were all successively defined.

In order for risk management to be fully integrated into the day-to-day management of a company and for it to be fully present within all corporate processes, regardless of the hierarchical level in question, risk appetite must be deployed to a tactical level (risk tolerance) and/or to an operational level (risk limits). In practice, we note that conducting a breakdown by business unit is not trivial, as on one hand it highlights problems linked to the treatment of correlations and diversification benefits, and on the other hand, it runs against the willingness to adopt a pragmatic approach so as not to affect the business development and the work of operatives. Some significant disparities are again clearly evident.

In conclusion, the ongoing processes of defining and calibrating risk appetite, tolerances and limits by most players in the insurance sector, must more broadly form part of a profound shift in the concept of managing businesses solely based on the risk-performance dimension. The latter must thus lead to a complete re-evaluation of the culture, objectives, strategy and organisation of the entire insurance value chain. The generalisation and the widespread implementation of the holistic vision of risk management should fall under the umbrella Enterprise Risk Management and, more generally, lead to the optimal allocation of available capital, which lies at the heart of the competition among players in the insurance sector. We are thus witnessing a profound cultural change among all players in the insurance industry, which should mark the beginning of a new era in the art of managing a company.
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About NN Investment Partners
What matters to you, matters to us

Main strategies

- Insurance company founded in 1845
- 15 million clients
- 12,000 employees, 18 countries
- Quoted on Euronext Amsterdam stock-exchange in 2014
- 2014 turnover: Individual & group Life insurance (86%), P&C (11%), Asset management (3%)

- 1,200 employees, of which 286 dedicated to investment
- 3 investment hubs: Europe (The Hague / Brussels / London), Asia (Singapore / Tokyo), USA (New-York / Atlanta)
- 187 bn EUR under management end of 2015: 46% NN Group, 28% Retail Distribution, 26% Institutional
- AUM: 72% Fixed income, 15% Equity, 13% Multi-Asset

Fixed income specialist, from non-quouted to quoted assets, through open funds & dedicated mandates

Investment solutions
- ALM approach, overlay
- Fiduciary management

Some core expertises
- Emerging Markets Debt since 1993
- Flexible multi-asset strategies, from Absolute to Total Return approach
- Alternative credit
- ESG equities
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