EDHEC RISK AND ASSET
MANAGEMENT RESEARCH CENTRE

EDHEC FINANCIAL
ANALYSIS AND ACCOUNTING
RESEARCH CENTRE
393-400 promenade des Anglais
06202 Nice Cedex 3
Tel.: +33 (0)4 93 18 32 53
E-mail: joanne.finlay@edhec.edu

QIS3: meaningful progress towards the implementation of Solvency II, but ground remains to be covered

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Samuel Sender
Research Associate with the EDHEC Risk and Asset Management Research Centre

Philippe Foulquier
PhD, Professor of Finance and Accounting, Director of the EDHEC
Financial Analysis and Accounting Research Centre

Abstract

This document outlines our position on the third quantitative impact survey on the standard formula for the calculation of capital requirements for insurance companies under Solvency II.

Before reviewing the principles that underlie the standard formula, we will give a brief introduction to Solvency II. In light of this introduction, we will then review the changes that QIS3 has brought about in the design of Solvency II; we will also point out major improvements as well as changes that are inconsistent with the very principles of this body of regulations.

We will then focus on the proposed calibration, as calibration is one of the main objectives of QIS3.

We argue that the third quantitative impact survey (QIS3) has brought substantial improvements to the standard formula for the calculation of solvency capital requirements. In particular, the guidelines, the structure of the calculations, as well as calibration have been the beneficiaries of these improvements.

In preceding works[1], EDHEC had underlined the importance of giving clear guidelines for the use of the standard formula and internal models, by showing that diverging interpretations of the necessary calculations could lead to significant differences in capital requirements as well as to an inability to compare results across insurance companies and countries. With the support of the European Commission, the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS) has markedly improved the practical definition of concepts and given far more accurate guidelines for calculations; for instance, it gives a clearer definition of the scope within which a market-value margin shall be applied.

The structure of the standard formula has also been improved since Solvency II:

- The reduction for profit-sharing states that profit-sharing can be reduced in the event of a shock. In most savings contracts, with the notable exception of unit-linked products, risk and return are shared between the policyholder and the shareholder, hence the so-called profit-sharing contracts. Significant progress has been made by eliminating the arbitrary "K-factor" approach, which sometimes led to negative capital requirements. The ability to use profit-sharing as a buffer against risk is now examined in a manner consistent with the rest of the standard formula. What we now expect from CEIOPS is to propose a more realistic way of testing for the maximum ability to use profit-sharing to reduce risk.
- Credit risk has been split into default risk and spread risk, the latter a sub-component of market risk.
- Concentration risk has been calculated separately, a method of calculation that permits a clear distinction between systematic risk and idiosyncratic risk.
- A special status has been given to operational risk, as must be the case in any economic framework[2]. Operational risk is the only risk that brings no reward; no one is in charge of producing it. It is therefore treated separately, especially since strategic planning is involved[3]. For EDHEC, the prudential regulations taking shape in Solvency II are a significant step forward for the insurance industry, insofar as they will reflect risk profiles more clearly and provide incentives for improved risk identification and management. However, despite the significant improvements in the Solvency

1 - Philippe Foulquier and Samuel Sender, " CP20: Significant improvements in the Solvency II framework but grave incoherencies remain ", January 2007, EDHEC Position Paper, 20 p. - Philippe Foulquier and Samuel Sender, " QIS2: Modelling that is at odds with the prudential objectives of Solvency II ", November 2006, EDHEC Position Paper, 20p. Noel Amenc, Philippe Foulquier, Lionel Martellini and Samuel Sender, " The Impact of IFRS and Solvency II on Asset Liability Management and Asset Management in Insurance Companies ", EDHEC Publications, November 2006, 215p.

2 - An economic framework models the very nature of the business, in particular the interactions between the risk factors and the behaviour of agents, i.e., both the policyholders and the shareholders. Key concepts such as market-consistent value, risk and economic capital are central there. A counter-example is the arbitrary Solvency I framework, where the solvency position of a company could strengthen whereas its net asset value was turning negative and vice-versa.

3 - Good management practices generally involve diversifying risks because diversification permits a reduction in risk for a given level of return. However, as operational risk involves only losses while other risk types generate potential profits, it is generally preferable to diminish operational risk if it can be done at no cost. Operational risk therefore tends to be excluded from the analysis in the first place, and reintroduced at the end when assessing the overall level of risk a company is exposed to. This exclusion-reintroduction is embedded in the latest approach to the standard formula.

Abstract

II framework, EDHEC finds that grave inconsistencies remain at the very heart of the standard formula: 1) asset-liability management is not well captured by CEIOPS, which has failed to account for interaction between the different risks; 2) as far as non-life insurance is concerned, even though modern valuation methodologies such as those promoted by CEIOPS are based on the discounting of cash flows, CEIOPS measures risk on an undiscounted basis[4].

However practical it may be to use traditional key performance indicators as the basis for the new regulatory standards, this usage may be a conceptual error. The CEIOPS choice currently penalises companies such as Berkshire Hathaway that price their products according to market-consistent principles whereas it favours those that do not discount cash flows, thus subverting the very principles of market consistency that underlie Solvency II and modern regulation in general.

As far as calibration is concerned, the industry has generally focused on the reduction of the value at risk of equities from 40% to 32%. In addition, the methodology for estimating parameter values has been fine tuned and communicated to those concerned. However, EDHEC argues that:

- Calibration for risk parameters should be made to market values where the information is available.
- As the Solvency horizon is one year, the resulting fall in market value shall be observed in one year's time rather than immediately. The recognition that risk accrues progressively within the Solvency time-horizon shall lead to the recognition of dynamic hedging strategies (CPPI[5] or other risk mitigation techniques where documented). The current lack of recognition is unfortunately more of an incentive to regulatory arbitrage than to good risk management practices.
- The "alternative" approach to equity and property risk that reduces the implied volatility of equities (from 36% for short-tail businesses to 13% for long-tail businesses) has no theoretical foundation. The main reason long-tailed businesses have more equities in their books is that there are more expected future profits as well as more expected profit-sharing as a buffer to risk.

4 - The premium received is in theory equal to the discounted expected cash flows related to a contract plus a risk margin and tax outlays. CEIOPS compares the premium with the ultimate loss, that is to say, the actual undiscounted cash flows from a contract. In between lies the discount factor, and failing to take it into account leads to an overestimation of premium risk volatility.
5 - Constant Portfolio Protection Index.

About the Authors

Philippe Foulquier, PhD, heads EDHEC's Financial Analysis and Accounting Research Centre and is Professor of Finance and Accounting at EDHEC Business School. He has a PhD in Economic Science and is a member of the SFAF (the French Financial Analysts Society). He joined EDHEC after an extensive professional career as a sell-side financial analyst specialised in the insurance sector. In 2005, Philippe was named "best French financial analyst in the insurance sector" in the reference international ranking established by Extel/Thomson Financial.

Samuel Sender is a Research Associate with the EDHEC Risk and Asset Management Research Centre as well as ALM expert and senior insurance consultant for Finalyse, a consultancy specialised in implementing risk and performance measurement solutions at finance institutions. Formerly with the Economics, Strategy and Quantitative Research unit at HSBC Asset Management Europe, and then head of Asset-Liability Management for a life insurer, he is a graduate in Statistics and Economics from ENSAE (Ecole Nationale de la Statistique et de l'Administration Economique) in Paris.

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1. Introduction: Solvency II in a nutshell

1.1. Underlying concepts on Solvency II

Through successive Quantitative Impact Studies (QIS) and Consultation Papers (CP) seeking the input of those in the industry the new regulations for the European insurance market are taking shape.

It is on the basis of this preliminary work, undertaken by CEIOPS, that the European Commission is to publish in July 2007 a plan for a European directive. With final adjustments based on responses to QIS 3, QIS 4, and QIS 5 (the latter concerning pillars 2 and 3—thus the importance of responses to QIS 3 for pillar 1), the European Directive Solvency II should be completed by late 2008; it should go into effect around 2010, after having been written into national law of member states.

Solvency II is to insurers what Basel II is to banks, but it is a more modern project. The aim of Solvency II is for the solvency capital requirement for insurance companies to be set according to the company's true risk profile. In simple terms, arbitrary statutory capital will be replaced by economic capital. Within this framework, insurers should be authorised in due course to use their internal models in setting capital requirements, provided that they meet adequate standards, that standard information can also be extracted from the internal models and that they are validated by the supervisor.

One of the goals of Solvency II is to compel insurance companies to better measure, monitor and manage their risks. The solvency capital requiredment defines the capital that insurance companies should hold to meet their obligations to policyholders with a 99.5% probability.

An economic framework such as Solvency II shall create direct incentives to measure and monitor risk correctly, as well as to balance the risks through optimal strategic planning. It is for this main reason that EDHEC considers Solvency II a huge step forward for the insurance industry.

Diminishing the amount of required capital, after all, makes a company richer, because capital has a cost. Shareholders and debt holders must be rewarded, and taxes must be paid on the income generated on the invested capital. The consequence is a capital cost. The definition of market consistency incorporates a market value margin (MVM). The latter is equal to the financing cost of the regulatory capital that is necessary to run-off the company's balance sheet. The cost of holding capital is also recognised in the technical provisions.

In principle, all actions instrumental in reducing risk must be taken into account in the calculation of required capital, in order to provide the best incentives for companies to reduce risk, and to reflect as accurately as possible the amount of capital required to limit the probability of bankruptcy to the 0.5% threshold, given the risk management practices in place. Likewise, all risk exposures must be adequately measured, so that insurance companies have a comprehensive risk management policy.

When these conditions are met, Solvency II can be considered a cultural revolution. For the first time, the regulations will provide direct incentives to understand and manage risk. Those who do so will have an immediate capital advantage and will in turn be able to provide customers with more competitive products and shareholders with stronger returns. On the other hand, the companies that do not understand, measure or manage their risks adequately will be directly penalised through larger capital requirements and greater technical provisions[6]. Some companies may be forced out of business either because they lack capital to cover their risks or because their inability to manage risk forces them to sell over-priced and uncompetitive products.

It is for this reason that this project may be considered a revolution for insurance companies, for their customers and for regulators. It is also a revolution for the financial industry in general

6 - Technical provisions include a risk-margin, which may be overestimated.

because it is the first truly economic set of regulations in the industry. And the progress of Solvency II is followed closely in the financial world. The European insurance industry is naturally concerned, because the process directly involves insurance companies (responding to the quantitative impact surveys) as well as their professional organizations (CEA). US companies are also monitoring the progress, as it is likely that the US regulator will update its regulatory framework to include more elements of risk-capital: the current risk-based capital approach is less sophisticated. It has been reported that many major U.S. property/casualty, life and health insurers have already installed software products that capture critical information needed to comply with Solvency II.

Given the great importance of regulations in general and Solvency II in particular in the progress of business practices towards optimal management techniques, EDHEC believes that the change to Solvency II is totally relevant. However, as in our previous position paper, we also think it important to give feedback where risks are not adequately measured or modelled, or worse, where insurance companies are given incentives to regulatory arbitrage rather than to state-of-the-art risk management.

1.2. Main principles underlying the supervisory process and the standard approach

1.2.1. Solvency II – A Three Pillar Approach

Like Basel II for banks, Solvency II has set up a three pillar risk-based approach. Beyond harmonisation and efficient supervision of insurance groups and conglomerates, it is also designed to provide incentives for risk management.

• First pillar: quantitative approach

Pillar 1 is "holistic and quantitative". It deals with the quantitative computation of minimum and target capital requirements. Technical provisions for non-hedgeable risks must be computed with a "prudent margin" called the market value margin (MVM). The market value margin is established as the cost of borrowing Solvency II regulatory capital to support the business-in-force until run-off. Technical provisions under Solvency II differ from traditional mathematical reserves, because under Solvency II cash flows are discounted and a market value margin is applied on top of these discounted cash flows.

Technical provisions, together with the market value of the assets, enable calculation of available capital. Under Solvency I, there are limits on eligible elements, just as there are for the banking sector. For instance, subordinated debt is taken into account only when it is under 25%—50% of required capital if it involves loans that do not have a fixed maturity. Under Solvency II, which is a pure economic framework, all elements may enjoy unlimited eligibility for the solvency capital requirement (the unpaid part of capital would be limited in SCR and not accounted for in MCR). However, CEIOPS has not finalised its view on potential eligibility limits of the elements of capital.

Under the standard formula, the available solvency capital requirement is an aggregation (by means of a correlation matrix) of the risk-capital for each risk factor. For each risk-factor, the capital charge is defined as the 99.5% value at risk in this risk dimension, that is, the worst impact on the balance sheet conditional on the realisation of that risk, with a 99.5% confidence interval. Technically, risk-capital for risks that cannot be quantified appropriately (e.g., CAT mortality risk, operational risk) is worth a fixed percentage of technical provisions and premiums in the standard formula.

In life insurance, it is recognised that "discretionary future bonuses may be used to cover 'general' losses", so that some of the risk is passed through to the policyholder. Contracts that have profit-sharing clauses therefore benefit from reduced capital requirements for a given level of risk, as that risk is shared by policyholders and shareholders.

Solvency II is a two-tier approach (standard formula – internal models) that can be further broken down as follows:

- Factor-based approximation of the capital charges of the standard approach (for small structures that cannot retrieve the risk characteristics of their contracts).
- Standard formula with market-wide volatility estimates—requires the ability to retrieve the risk characteristics of contracts and to project best estimate cash flows with regulatory tables and/or traditional techniques (e.g., Chain-Ladder for non-life).
- Standard formula with undertaking-specific volatility measure—requires the use of historical data on a specific undertaking or company for internal estimate of risk. CEIOPS suggests methodologies to estimate undertaking-specific volatility, e.g., the case of premium risk.
- Partially internal models. For a given risk-type, a company can estimate the capital charge using its own methodology rather than the one suggested by CEIOPS for the standard formula. Companies that make such an effort can expect to benefit from reduced capital requirements.
- Full internal models—the most advanced calculations. The definition of the solvency capital requirement is straightforward: available capital should be at least such that the probability of failure is less than or equal to once in two hundred years, that is to say, 0.5% per year.

The possibility of developing and using a fully or partly internal model for risk measurement is intended to give insurers incentives to evaluate and control their risks more precisely by increasing individual risk awareness. As a matter of fact, capital requirements will probably be higher for insurers that use the standard formula than for those that use internal models, or at least company-specific information about risk.

• Second pillar: supervisory control

The second pillar is more qualitative. It aims to set standards for internal processes and to assess the quality of relationships with external supervisory management. Developing internal control principles, defining intervention powers and responsibilities, establishing principles for sound risk management—early warning indicators and stress tests, investment policy, asset-liability matching, reinsurance programmes—are all integral to pillar II. In principle, whatever is effective in reducing risk in pillar II should be instrumental in reducing capital requirements in pillar I—this is currently not the case for dynamic hedging strategies and active risk management, which are deliberately excluded from pillar I.

• Third pillar: market discipline

Pillar 3 aims for transparency in communication about value and risk in the balance sheet. The IAIS's ongoing work on public disclosure provides a foundation for risk and risk management disclosure requirements[7]. "The idea is that public disclosure requirements under Solvency II shall work as a strong incentive to insurance undertakings to conduct their business in a sound and efficient manner, including an incentive to maintain an adequate capital position that can act as a cushion against potential losses arising from risk exposures"[8].

Supervisory reporting—all information to be submitted for supervisory purposes in periodical reporting—as well as orderly reporting in case of predefined events shall be defined in the third pillar.

Public disclosure will exclude contractually confidential information as well any proprietary information—any information that could undermine the competitive position of the insurance undertaking if shared with the public. As a result, insurance companies are likely to become much more forthcoming about risk—the relative opacity of their communication has heretofore made it impossible to assess their risk exposures. Under Solvency II, it is expected that analysts will be able to use public information to assess the solvency position of an insurance company.

7 - Regarding Pillar III, CEIOPS´s advice on the principles of supervisory reporting and public disclosure under Solvency II will be finalised (CP 15). In 2007, CEIOPS will provide further advice towards Level 2 measures and Level 3 standards, advice that can contribute to the process of convergence in the field of public disclosure under Solvency II. CEIOPS will also work in detail on convergence principles for supervisory reporting, regarding minimum common supervisory reporting contents and formats.
8 - Source: the CEA's response to CEIOPS CP15 to CP19

1.2.2. MCR and SCR

SCR (solvency capital requirement) is the level of capital that reduces the likelihood of ruin to less than 0.5% on a one-year horizon. MCR (minimum capital requirement) is the absolute level of capital under which an insurance company will have its accreditation withdrawn. It will probably be calculated in a simpler way than the SCR. MCR could be calculated using a modular approach similar to that of the SCR but calibrated on a 10% probability of ruin on a one-year horizon. Even simpler, it could be a proportion of SCR or of required capital in the Solvency I mode. We will not focus on MCR in this position paper.

1.2.3. Quantitative Impact Studies, QIS

"The European Commission (EC) has requested the Committee of European Insurance and Occupational Pension Supervisors (CEIOPS) to prepare advice in order to introduce a new solvency and supervisory standard for European insurance undertakings (Solvency II). For this purpose, CEIOPS has been requested to acquire insight into the possible quantitative impacts of this new solvency standard through a series of quantitative impact studies (QIS)"[9].

The objectives of the QIS could be summarised as follows:

- letting insurance companies prepare gradually to implement the new concepts and calculations,
- collecting the qualitative and quantitative opinions from companies and associations about the structure of the standard formula, the clarity of the instructions communicated by CEIOPS, the repercussions of the choices selected,
- calibrating the standard formula,
- and, of course, having CEIOPS's proposals to the European Commission evolve for the preparation of the level 1 directive (to be examined by the European parliament in July and voted on in 2009).

The first quantitative impact survey (QIS1) tested the implicit level of prudence in the statutory mathematical reserves. It turned out that current mathematical reserves overestimate the value of insurance company liabilities (because expected flows from the liabilities are not discounted).

The second quantitative impact study (QIS2) tested the first architecture of the standard formula, as well as two methods of calculating market value margin (MVM): on the one hand, the so-called percentile method, in which MVM represents the distance between the mean value of liabilities and a given percentile of their distribution; on the other, the cost-of-capital method.

The aims of the third quantitative impact study, which insurance companies and more generally all participants shall return by 29 June of this year, consist mainly of:

1. evaluating the practicability and suitability of the calculations involved in the standard formula,
2. evaluating the calibration of the standard formula, with regards both to the SCR and to the MCR,
3. testing for the first time the calibration of the standard formula to conglomerates.

1.2.4. Solvency II and IFRS: shared principles

Solvency II and IFRS have in common the principle of market-consistent valuation of assets and liabilities. The development of financial markets has created new references that now allow most components of finance industry balance sheets to be valued in a manner consistent with the price of assets as traded on open markets.

It was originally planned that IFRS phase II would be completed by 2007, so that insurance regulation could be based on IFRS principles for the valuation of both assets and liabilities. However, delays in writing these standards meant that CEIOPS had to produce a methodology to value insurance liabilities on a market-consistent basis before completion of phase II reporting standards.

9 - http://www.CEIOPS.org/media/files/consultations/QIS/QIS3/QIS3CoverNote.pdf

For the asset-side of the balance sheet, Solvency II also goes farther towards market consistency than does IFRS, as IFRS allows the use of amortised costs in the case of held-to-maturity bonds (though this possibility has not been much used). Under Solvency II, all assets must be valued at market-consistent prices. Moreover, subordinated debts are considered capital as they are used as a buffer against risks, and therefore, as in IFRS, they are not valued at market price under Solvency II.

2. Main changes to the standard approach in QIS 3

In this part we will review the changes and analyse their relevance. The final sub-section is devoted to the most significant problems remaining in the standard approach.

2.1. Structure of the standard formula

The standard approach consists of modules that represent the main risk types, and whose capital requirements are aggregated thanks to a correlation matrix. Since the draft structure presented in QIS2, significant changes have been made, most of them communicated in consultation paper n°20 produced by CEIOPS at the end of last year.

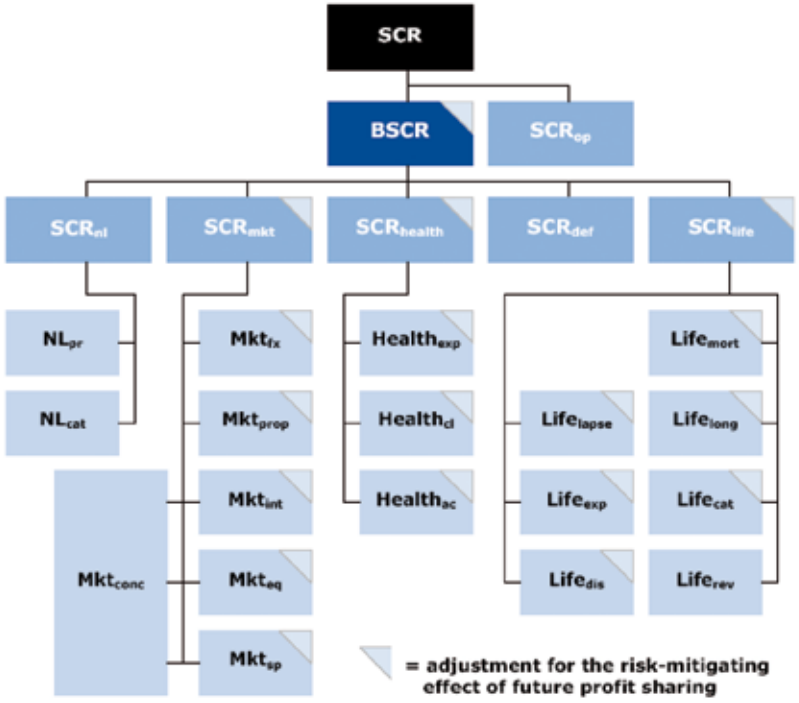
2.1.1. A special status for operational risk

A significant change in the aggregation process consists of giving a special role to operational risk. Instead of being aggregated with the other risk types, as in QIS2, it is now added to the "Basic SCR" (BSCR) that results from the aggregation of the risks that are voluntarily taken as a result of doing business. This change can be seen in the illustration of the architecture of the standard approach below.

EDHEC agrees that this choice helps achieve consistency with economic principles. Operational risk can be seen as a pure cost (expected operational losses plus the cost of capital associated with the unexpected losses). In strategic planning, any money invested in monitoring and reducing operational risk should simply be expected to reduce the cost of operational risk (expected loss + cost of capital) by at least the same amount. On the other hand, as far as other risk-types are concerned, best practices for strategic planning certainly consist of optimising the risk-return trade-off of the portfolio of risks that define the business structure, by using metrics such as the return on risk-adjusted capital. As operational-risk decision-making tools differ greatly from those used to make decisions about other risk types, giving a special role to operational risk is entirely justifiable.

Operational risk is now defined as a maximum of:
- 30 % of BSCR,
- a factor-based approach, i.e., the sum of factors times technical provisions and premiums for the different business lines.

The calculation of the capital requirement for operational risk has not received much attention from CEIOPS. At this stage, insurers who wish to use more advanced models such as those used in the Basel II process may choose partly internal models for operational risk.



2.1.2. Improvement in credit risk

Credit risk has been split into spread risk and default risk in QIS3. Spread risk is now attached to market risk, so that default risk is a risk type on its own.

As spread risk can naturally belong to market risk as a value-at-risk concept and as it can be calculated from public data on corporate spreads, this change is justified. Default risk is, on the other hand, an earnings-at-risk concept, as the defaults imply a P&L loss whatever the accounting standard and whatever the classification of the bond.

Spread risk is modelled in a relatively simple manner in QIS3 as it does not explicitly include migration risk. EDHEC recommends that the scenario for the movement in credit spreads be calibrated slightly higher to account for migration risk in this sub-module.

Default risk is counterparty risk where this is not taken into account elsewhere. It does not apply to corporate (and foreign government) bonds, where the price for risk is supposedly embedded in the market price. It only applies to reinsurance assets[10] as well as to counterparties of derivatives positions. Only systematic risk is measured here—default risk can therefore be defined as the 99.5% worst-case probability of default of a portfolio that would theoretically be infinitely granular.

2.1.3. A specific sub-module for idiosyncratic risk

Idiosyncratic risk has been dealt with in a clever manner in the concentration risk sub-module. Low granularity leads to risk exposure in addition to exposure to systematic risk. This additional exposure is pragmatically measured in the concentration risk sub-module, in which an additional capital requirement is imposed for all amounts larger than 3% of the total credit risk exposure. Capital requirements from all these lines are aggregated (risks are supposed to be independent). Concentration risk is a sub-module of market risks—it could also have been decided to make it a sub-module of default risk.

Measuring idiosyncratic risk is naturally interesting from a theoretical standpoint. But measuring this risk is mostly a pragmatic issue for the insurance sector, since the traditional use of reinsurance as a risk-mitigation tool tends to give rise to large counterparty risk with larger partners. To be more precise, counterparty risk with reinsurance companies arises when insurance companies do not hold securities as a pledge for reinsurance commitments. As all other sub-modules for market and credit risk measure systematic risk alone (by means of a scenario in which main indices fall), adding concentration risk is a significant improvement.

A side effect of the measurement of idiosyncratic and counterparty risk is the likely disappearance of quantitative limits on the composition of assets and on the use of reinsurance. Quantitative restrictions will naturally disappear when all risks are properly measured.

All these changes have an impact on the structure of market risk, which now consists of the following sub-modules: Mktint (interest rates), Mktprop (property), Mktfx (foreign exchange), Mktsp (spread), Mktconc (concentration), Mkteq (equity)

We will comment more specifically on the calibration of market risks in the third part of this document.

2.1.4. New calculations of the risk-mitigating effect of profit-sharing

The reduction for profit-sharing states that profit-sharing can be reduced in the event of a shock. In most savings contracts, with the notable exception of unit-linked business, risk and return are shared between the policyholder and the shareholder, hence the so-called profit-sharing contracts. Significant progress has been made since QIS2, when the reduction for profit-sharing was calculated using the "K-factor"

10 - "Reinsurance assets" is the discounted best estimate of the recoveries from reinsurance companies, where in QIS3 it is assumed, for practical reasons, that reinsurers will not default.

approach, which allowed insurance companies to declare (without any accompanying calculation) that a certain amount of the expected profit-sharing (expected pay-off to the policyholder above the guaranteed pay-off) could be cut to reduce risk. The approach was not only arbitrary; it also led to negative capital requirements for some companies—a very strange situation.

The reduction for profit-sharing is now computed consistently with the rest of the standard formula. The risk absorption capacity of profit-sharing must be evaluated against each risk factor: in each sub-module, the risk-scenario leads to two calculations: one where profit-sharing is equal to its expected value (without shock), the other where profit-sharing is diminished after stressed market and biometric conditions. These risk-mitigating effects are aggregated with the same correlation matrix used in the standard formula. This computation results in Basic solvency capital requirements (before operational risk is added) calculated in the following formula:

$$BSCR = \sqrt{CSCR' . \Omega . CSCR} - min(\sqrt{KC' . \Omega . KC}, FDB)$$

where
Ω is the correlation matrix used in the formula
CSCR is the vector of capital charges for the individual SCR risks
KC is the vector of the risk-mitigation effects for the individual SCR risks
FDB is the total amount in technical provisions corresponding to future discretionary benefits

Another problem in QIS2 was that the reduction for profit-sharing "RPS" mistakenly implied that all conglomerates used profit-sharing in life books to help reduce unexpected losses in the non-life books of a subsidiary. On the other hand, by stating that profit-sharing could be used only as a buffer against market risks, the intermediate CP20 proposal was too restrictive. CEIOPS has improved the formula by recognising that profit-sharing could serve as a buffer against market and biometric risk. This improvement is significant because in some cases the regulator imposes sharing unexpected profits and losses from biometric risks with policyholders—for instance, when annuities are managed together with savings contracts. In France, at least 85% of the (French GAAP) financial profit and 90% of the technical result must be credited to the policyholder, so biometric risks automatically have an impact on profit-sharing.

Finally, the current formula will overestimate the risk-mitigating capacity of profit-sharing and still needs to be improved. Where management can reduce profit-sharing by a certain amount in a discretionary way, then it may do so whenever any risk factor is present. In that case, aggregating these risk-mitigating capacities will result in counting this reduction multiple times. EDHEC recommends that the maximum reduction in profit-sharing be calculated in a scenario where all risks happen at the same time (the combined scenario of all single scenarios).

2.1.5. Life underwriting risk

This risk concerns specific risk stemming from the underwriting of life insurance contracts, associated with both the perils covered and the process of doing business. Life underwriting risk is split into biometric risks (comprising mortality risk, longevity risk and disability/morbidity risk), lapse risk, expense risk, revision risk and catastrophe risk.

The major change in the structure from QIS2 is in adding revision risk as a sub-module and eliminating incapacity, now merged with disability.

Revision risk *"is intended to capture the risk of adverse variation of an annuity's amount, as a result of an unanticipated revision of the claims process. This risk should be applied only to annuities arising from non-life claims that are allocated to the SCRlife module"*[11]. It may arise from a deterioration of the health condition of the beneficiary or from legal changes in the price index (e.g. health) it is linked to.

11 - *Technical specification*

2. Main changes to the standard approach in QIS 3

The approach to underwriting risk is scenario-based. For instance, for mortality, the scenario is that of a permanent 10% increase in mortality rates for each age. For longevity, it consists of a scenario of a 25% decrease in mortality rates for each age. As we have noted in our previous comments, even in the case of a standard formula, this approach could be refined, as uncertainty about mortality rates tends to grow with time (there is more uncertainty about mortality rates 20 years from now than about next year's mortality rates) rather than with age.

For some reason, volatility risk has disappeared from mortality and other biometric risk sub-modules. This disappearance is surprising because volatility risk is a natural component of biometric risk. Trend/parameter risk accounts for dependency among individual risks. But biometric risk is that of an event that is random in essence, where claims are independent. Including volatility risk—where the number of contracts then provides for some diversification—as was the case in QIS2, had seemed a good compromise between accuracy and simplicity of implementation. In QIS3, the elimination of volatility risk from the calculations may lead to underestimation of mortality risk in heavily concentrated portfolios.

2.1.6. No more double-counting of non-life catastrophe risk

There has been a significant improvement in the capital requirement for the catastrophe sub-module of non-life underwriting risk:

- Capital charges for different lines of business are now aggregated rather than simply added up, as was the case in QIS2. In other words, the diversification benefits from a combined exposure to earthquakes in Italy, windstorms in Denmark and floods in London are now recognised.
- The scenarios for catastrophe risk are described precisely and avoid double-counting of risks in the volatility "VOL" and the catastrophe "CAT" parts of underwriting risk. In CP20, the proposed calibration of CAT risk was equivalent to underwriting risk as a whole, i.e., the 99.5% VaR, which led to the double-counting of risks.

2.1.7. Valuation of insurance contracts

CEIOPS has introduced the principles for the market-consistent valuation of insurance contracts to the insurance community. These principles will be particularly welcomed by the financial community, since the feeling has long been that financial statements from insurance companies are more of a black-box than a reflection of underlying economic realities.

The proposal made by CEIOPS is now consistent with the CFO Forum's "Elaborated Principles for an IFRS Phase II Insurance Accounting Model", in particular with the choice of the cost-of-capital approach to market value margins.

By comparison, it must be said that only on 3 May 2007 did the IASB open[12] a first public consultation on accounting for insurance contracts. The main precepts of Solvency II (using market references, discounting cash flows and applying a risk margin) can also be found in the IASB's draft proposal, so in a sense Solvency has paved the way for IFRS, though the opposite was planned.

Since our last report[13], CEIOPS has greatly improved its guidelines for the calculations of and perimeter for hedgeable and non-hedgeable risks. Non-hedgeable risks are risks that are not tradable on liquid markets and consist mainly of insurance risk, because insurance risk, by definition, is specific to a person or an event and therefore is not standardised as a commodity. The development of financial markets and techniques tends to blur the distinction between hedgeable and non-hedgeable and guidelines are thus necessary to establish a level playing field. For instance, financial techniques can transform a pool of insurance contracts into a financial product and make non-hedgeable risk hedgeable. On the other hand, some purely financial pay-offs are traded not on liquid markets but over the counter, as is the case for complex options on bonds, making the market price unobservable. In QIS3, CEIOPS has provided clearer guidelines for these calculations, in all probability as a result of

12 - The IASB commented that it expects an exposure draft to be published towards the end of 2008 and the new standards to be in place by 2010.
13 - Philippe Foulquier and Samuel Sender, " CP20: Significant improvements in the Solvency II framework but grave incoherencies remain ", January 2007, EDHEC Position Paper.

recommendations from the European Union, but largely in line with our own recommendations.

As far as the risk margin (market value margin, MVM) is concerned, CEIOPS has recommended the use of the cost-of-capital approach, where MVM is calculated as the cost of borrowing the regulatory capital necessary to run-off the company's balance sheet. Principles were set forth in the Swiss Solvency Test. The philosophy is that insurance contracts, by definition, bear[14] risks that are specific to the policyholder and are therefore not traded directly on exchanges. By contrast, contracts traded on exchanges must be *commodities*[15]. This circumstance means that these contracts have to be produced by a company, which in turn needs to bear capital. In an economic framework such as Solvency II, the capital a company must bear is defined, naturally, as the solvency capital requirement. The assumption used for the calculation is that, in case of failure, the company that takes over will reduce risk as far as it can, which will in turn lead to diminished capital requirements and financing needs. The cost of capital must be understood as a financing cost of capital (as opposed to the frictional cost of capital defined in embedded value), i.e., the money that the company that takes over needs to pay to borrow the risk capital necessary to run-off the business.

One of the main issues left unfinished here is that of the consistency between the value of a given liability (at the level of a line of business) and the aggregate value of the liability side of the balance sheet. The diversification benefits of having different lines of business must be taken into account, so that the risk margin at the line-of-business level must be aggregated rather than summed, as currently recommended by CEIOPS. The sum of risk margins would otherwise exceed the required margin at the balance-sheet level. It seems to us that the only practical solution is to aggregate the risk margins calculated at the level of the lines of business when reporting the full balance-sheet value, so as to achieve the maximum level of consistency. CEIOPS's recommendation for the calculation of the risk-margin in the technical specification of QIS3 is rather intricate but fails to address the problem of consistency mentioned here, so it needs to be revised.

2.2. Problems remaining in the standard formula

2.2.1. Interaction risk should be measured too.

In a number of cases, market risks cannot be entirely eliminated, notably in the presence of non-hedgeable risk or insurance risk. This residual market risk remaining on top of underwriting risk can be called interaction risk. It stems from the interaction between financial risk and insurance risk. In life insurance, the surrenders (early withdrawals) will tend to be exceptionally high when interest rates rise, forcing the company to sell bonds at a loss, and the reduced number of customers will limit its ability to pass these losses on to those remaining. In non-life insurance, in the case of strong sinistrality, inflation exposure is naturally higher than in the case of average sinistrality, where there is less property to replace. So hedging the average inflation exposure will prove insufficient in the risk scenario—inflation risk cannot be totally shed. We recommend measuring interaction risk as described in this paragraph by means of a scenario where the risk factors that combine are simultaneously degraded.

The example above also reflects the need to measure inflation risk, which—like interest-rate risk—is a financial hedgeable risk present both on the asset and liability sides of the balance sheet. There has been no significant progress in that aspect since our last recommendation.

2.2.2. Solvency shall rely exclusively on discounted cash flows—the methodology for non-life premium risk must be reviewed.

One of the great merits of Solvency II was to define in lieu of IFRS phase II the principles and guidelines for the evaluation of the market-

14 - An insurance contract is a "contract under which one party (the insurer) accepts significant insurance risk from another party (the policyholder) by agreeing to compensate the policyholder if a specified uncertain future event (the insured event) adversely affects the policyholder".
15 - A commodity could be defined as a purely interchangeable product, traded based solely on its price rather than on its quality and features (e.g., electricity, Brent crude).

consistent value of insurance liabilities. This market-consistent value is defined as equal to the discounted expected cash flows related to the contracts plus a "market value margin" equal to the cost of financing of the regulatory capital necessary to the production of these contracts.

Whereas only discounted claims matter for the pricing, for the measure of non-life underwriting risk, CEIOPS uses an undiscounted ratio, the ultimate loss ratio (the ratio of undiscounted losses to the paid premium). In theory, the paid premium is equal to the expected discounted losses plus costs, taxes, risk margin and profit.

More precisely, the standard deviation for premium risk in the individual line of business (LoB) is derived as a credibility mix of an undertaking-specific estimate and a market-wide estimate as follows:

$$\sigma_{prem} = \sqrt{c.\sigma_u^2 + (1-c).\sigma_m^2}$$

where c is a credibility factor that rises with the length of available data, σm is the market-wide estimate of volatility as provided by CEIOPS, and σu is the undertaking-specific measure of volatility measured by the premium-weighted average volatility of the historical loss ratio.

The ultimate loss ratio is an indicator not of overall profitability but of underwriting profitability and, moreover, it is a non-market consistent indicator. This ratio may overestimate the excess volatility in the measure of volatility for the non-life business, as when the net combined ratio was used in QIS2. Approximating the liability by a bond of the same duration shows clearly that the volatility of the expected net combined ratio and of the expected loss ratio is equal to the volatility of underwriting risk plus that of a bond of the same duration as that of the liability.

The experience of Berkshire Hathaway perfectly illustrates this matter. Its net combined ratio lay in the 105%-110% range in the 90's, when interest rates were high and financial income even from risk-free investments permitted underwriting losses. This net combined ratio fell below 100% after the fall in interest rates this decade, as lower expected financial income required rising underwriting profitability.

Companies that price their products in a market-consistent way re-price their products according to the interest-rate cycle, which leads to greater volatility of underwriting profitability but lower overall P&L volatility. However, these modern and competitive companies would be penalised by current CEIOPS choices.

As the aim of Solvency II is to promote market consistency and modern techniques in the insurance world, this situation seems particularly absurd to us.

3. Calibration

3.1. Calibration should be made to market data whenever possible

The calibration of the market-risk module within the SCR standard formula is based on the use of historical observed changes in market rates and market prices. Though we must admit that there has been considerable improvement in research into—and communication about—calibration, two important points must be emphasised.

Firstly, the concept of market consistency can also be applied to the calibration of stress scenarios for risk charges. While the lack of market data makes calibration to historical prices the only option for most risk factors, market instruments can be used to calibrate the value at risk for some of the most liquid risk factors.

For example, the put options on the Eurostoxx 50 index, whose strikes are spaced by 50 points, make it possible to reconstitute the implicit density of probability of the equity market, as well as its 99.5% value at risk. For a given strike, the implied volatility of a put gives the density of the distribution of the Eurostoxx—provided it is under the strike, and assuming that the distribution of the index price is lognormal. The implied distribution of x is approximated correctly when intervals between strikes are small, as is the case for options on Eurostoxx– only the part of the distribution between 0 and the lowest traded strike price will be badly approximated. The market-implied probability of x lying between strikes k1 and k2 is simply P(X<k1)-P(X<K2). Interpolation allows retrieval of the 99.5% value at risk implicit to option prices[16].

EDHEC thus recommends calibration, whenever possible, on market rather than on historical data, notably for market risks.

3.2. The one-year calibration horizon must be respected and active risk management accounted for

Risk management best practices in financial institutions involve dynamic risk-control procedures. As far as Solvency II is concerned, some of these procedures must be implemented at insurance companies as part of the second pillar, where companies must monitor capital requirements and ensure compliance on a regular basis–for large institutions "regular" will probably mean at least quarterly.

Firms are monitoring their risk exposure not only to comply with the second pillar of the coming regulations but also because, in an economic framework, risk exposure has a cost, whether it stems from idiosyncratic or systematic risk, and risk-control procedures help reduce the cost of capital. Solvency II will be called an economic framework only if it manages to abide by these principles.

Currently, even though Solvency II's second pillar aims to set qualitative standards for risk management, good risk-management practices are not taken into account in first-pillar calculations. From a purely methodological point of view, the scenario recommended to measure capital charges is inconsistent with the time horizon chosen for calibration and adequate solvency. Calibration principles are based on the *Framework for consultation*[17] as mandated by the European Commission. In this framework, a one-year horizon is set for calibration. However, market risks supposedly materialise instantaneously—for instance, a single-day fall in all equity markets of 32%; a single-day increase in bond markets of 46% for an eight-year bond; a single-day widening of 125bp in the credit spread for a BBB bond; a single-day fall in Forex markets of 20%—naturally making any monitoring of the balance sheet totally inefficient. And a company that does not manage its equity position at all may have the same capital charge as a company

16 - From a practical standpoint, the existence of a liquid put option whose strike is less than the interpolated 99.5% value at risk will inspire confidence in the use of implied value at risk.
17 - European Commission (2006) - Amended Framework for Consultation on Solvency II. MARKT/2515/06 (http://ec.europa.eu/internal_market/insurance/docs/markt-2506-04/amendedframework_en.pdf).

that uses CPPI funds, as the CPPI market-risk reduction technique will not be recognised. Failure to recognise either management actions or the use of CPPI is also inconsistent with risk-mitigation principles as stated by CEIOPS itself: *"A broad assumption is made that the effect of risk mitigation techniques should be given adequate recognition in reducing the relevant risk capital charges"*[18]. We have shown in our previous papers that this inadequate recognition encourages regulatory arbitrage rather than the implementation of good risk management.

In our position paper on QIS2 we were confident that CEIOPS would revise its proposal to the European Commission, as the aim of Solvency II is to create incentives for insurance companies to measure and monitor their risks. In our answer to consultation paper n° 20, we recommended that these strategies be considered instrumental in reducing risk when:

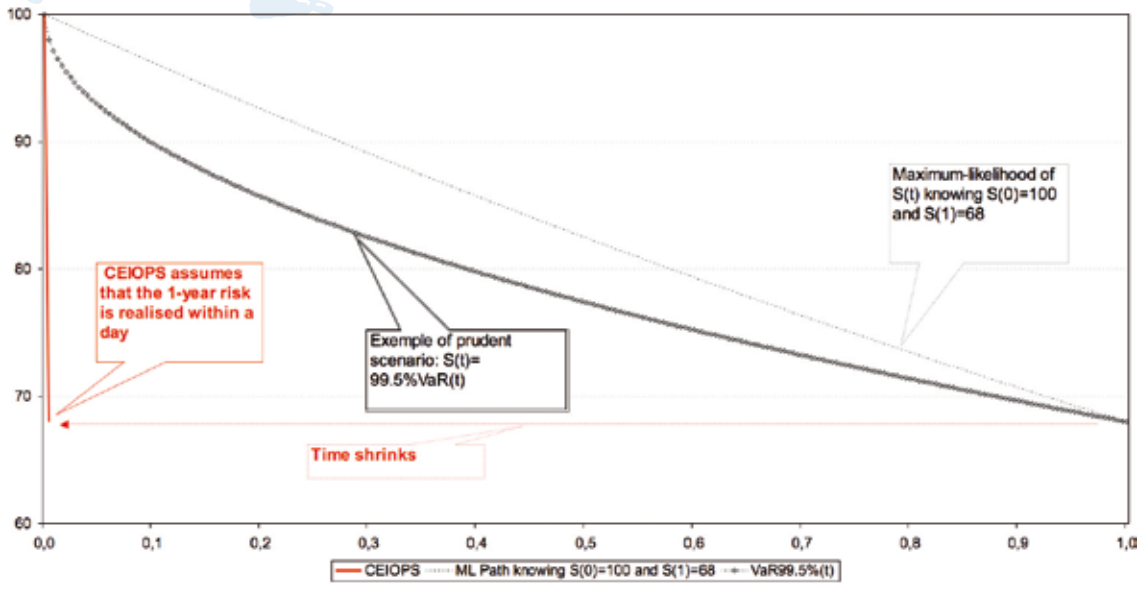
- they are documented,
- it can be shown that they are applied, or that there is commitment from management and,
- they are valued with a prudent infra-annual scenario.

By documenting strategies, we mean that all assets held will be held for the year unless the ALM policy specifies that the composition of the portfolio be changed—in certain circumstances—during the course of the year.

We will illustrate below how two different methods (closed formula and infra-annual scenario) can achieve prudent valuation of dynamic strategies.

- Closed Formula. CPPI[19] funds are an example of dynamically managed positions for which an analytical formula of the one-year volatility can be found under standard modelling assumptions. CEIOPS can ask insurance companies that use CPPI to use a prudent estimate of the volatilities of such funds, e.g., the analytical volatility increased by 20%.

- Infra-annual scenario. If we consider a call option with a smoothed asset price, CEIOPS may require the calculation of the capital charge for this position to be made by means of a prudent infra-annual scenario, as illustrated below: for a given point in time before t=1, the 99.5% value at risk of the stock price is below the expected[20] stock price given the yearly scenario.



18 - QIS3 Technical Specification Part 2, II.3.4
19 - Constant-Proportion Portfolio Insurance
20 - The 99.5% value at risk of the stock price is lower than its maximum likelihood, conditional on reaching 0.68 at the end of the year.

EDHEC regrets that no progress has been made on the treatment of management actions at this stage. More and more financial institutions are setting risk limits (equivalent to economic capital budgets) for a given set of risk factors or because they understand the benefits of managing risk and naturally expect these benefits to be recognised, and it would be unfortunate if CEIOPS's decisions were to put a halt to this trend.

3.3. Improved calibration of the interest-rate scenario

More maturity buckets are considered for interest-rate risk than in QIS2 calibration work. Furthermore, the stress factors for interest-rate risk are now higher, consistent with EDHEC's view that there was an inconsistency in the relative size of the implied volatility of equities and of bonds.

This move helps strike a balance between these two asset classes.

3.4. Calibration of the equity scenario

Since QIS2, the drop of equity indices has been lowered from 40% to 32%.

The 32% was taken as in the range of global equity shocks, consistent with the 99.5% confidence level when considering different regional indices as well as with levels in the banking sector.

3.5. Alternative calibration of equity and property risk

In QIS3, participants are invited to test an alternative approach to equity and property risk, where the duration of the equity portfolio backing insurance liabilities is supposed equal to the average duration of insurance liabilities, and where the scenario for the fall in the stock market depends on the duration of the portfolio, as shown in the following table:

Duration of the portfolio	Fall to be applied on equities
0-2 years	36%
2-5 years	33%
5-10 years	23%
> 10 years	13%

We think there is no theoretical backing for this idea. The volatility of the equity portfolio over one year is naturally independent of the duration of the liability.

It seems as if CEIOPS has tried to lend support to the traditional view that long-term liabilities allow more risk-taking. However, the main reason portfolios backing long-term liabilities have a larger share in equities is that there tends to be more available capital in these portfolios. Future profits, after all, are generally higher, and so is expected profit-sharing: for life-with-profit contracts, the regulator mandates that long-term guaranteed rates be lower than short-term guaranteed rates, and profit-sharing tends to be a larger share of technical provisions; for other contracts, the expected annual margin compounded over a longer horizon gives a larger expected profit.

The problem with traditional practices is that they may not be founded on theoretically sound bases, so it is advisable to view them critically. One of the lessons of the debacle in the American insurance industry in the 1980's is that the industry was mistaken to assume that the long-tail nature of its business meant that it was more protected from financial risk than the banking industry.

The assumptions that underlie CEIOPS' proposal are that the bond market, the equity market and the duration of liabilities are independent. However, because rising interest rates may trigger a fall in equity prices and subsequently shorten the duration of liabilities, these assumptions may inappropriate for companies subject to the risk of policyholder surrenders.

At Executive Life, for instance, excessive risk taking, allowed by the regulator, led to large market losses after the collapse of the junk bond market. These losses, publicised by rating downgrades and the financial press, triggered a wave of surrenders that significantly shortened the duration of the life business and led to the company's 1991 bankruptcy declaration.

As a consequence, there is no reason—given the current definition of insolvency[21]—to allow companies with a longer duration of liabilities to increase their short-term risk of bankruptcy. These companies may be penalised in any case by rating agencies and by suppliers of capital.

This "alternative" approach has neither theoretical foundations nor empirical support. Capital requirements for equity risks are too high because—as in Basel II—good risk management practices are not taken into account. CEIOPS should therefore depart from the Basel-II approach and favour good risk management practices.

3.6. Correlation between interest rate and equity risk

The correlation between the interest rate and the equity sub-modules has been reduced to zero, on the grounds that the main risk for insurance companies is that of lower interest rates. While this risk may once have been the case for countries such as Denmark, the Netherlands and Belgium, where companies were selling very long-term guarantees they could not match at the time with very long-term bonds, it may no longer be:

- in some companies with very long liabilities because of the very long-term bonds now available,
- in some countries where clients have the option to surrender their contracts and where a large rise in interest rates could provoke surrenders.

EDHEC recommends that the zero-correlation assumption be used when interest-rate risk is higher than equity risk and where there is a risk of a fall in interest rates.

On the other hand, where there is a risk of a rise in interest rates, a stronger correlation should be used—because of the traditional link between sharp increases in interest rates and falls in equity indices.

3.7. The illusion of consistency with Basel II

We will end this position paper with a brief comment about the question of consistency between insurance and banking regulations. Consistency with the banking sector is important in particular for the treatment of financial conglomerates—groups that include a bank and an insurance subsidiary and could to a certain extent be tempted by arbitrage opportunities.

Unit-linked products are generally produced by asset-management subsidiaries but can be distributed by banks or insurance companies and wrapped in a bank or insurance account. In the asset-management and banking worlds, future profits tend not to be accounted for as available capital (unit-linked products are shown at their surrender-price value rather than diminished by the expected present value of future profits [PVFP]). On the other hand, in QIS2, as in the embedded-value approach, PVFP was considered available capital. This situation created an incentive to distribute unit-linked products through insurance rather than banking channels. To prevent arbitrage on this type of product, CEIOPS has mandated that no more than 25% of the present value of future profits from unit-linked products (versus 100% for euro-denominated products) be considered available capital for all players.

We take the point from CEIOPS that—for market risk as well—consistency between these two

21 - In the Solvency II framework a firm is considered insolvent when the market value of its assets falls below the market value of its liabilities plus the minimum capital requirement (MCR)

sectors could be an issue; after all, risk taken on own funds will naturally be located in the banking book if the risk charges there are lower and in the insurance book if they are higher. This argument pleads for the same capital charges and justifies the scenario of a 32%-fall in the equity market: "For QIS3, CEIOPS decided to test a 32% stress factor which is consistent with the treatment in the banking sector[22]."

However, this argument from CEIOPS is undermined by its recognition of diversification of risk-type in insurance regulation but not in banking regulation. Let us suppose that a financial conglomerate has a banking subsidiary regulated under Basel II and an insurance subsidiary regulated under Solvency II. The regulatory capital requirement for each regulated entity is €100 before the group decides to add a €312-equity exposure on its own funds. The capital charge for this equity exposure is 32%*€312=€100 if located in the insurance book and 312*300%*8%=75 in the banking book. However, if it is added to the banking book, the regulatory requirement for the banking activity will jump from €100 to €175 because these requirements are additive in banking. On the other hand, if it is located in the insurance book, this additional equity exposure would lead to a lower increase in regulatory requirements because individual capital requirements are aggregated. The regulatory requirement could be as low as €141=(100^2+100^2)0.5, depending on the actual mix of risk exposures, an increase of €41, much lower than the €75 increase in the banking book.

Because correlation between risk types is recognised in Solvency II but not in Basel II, it seems somewhat illusory that CEIOPS will find a calibration of market risks for the insurance sector that would be consistent with banking regulations.

22 - CEIOPS, QIS3 Technical Specification part 1, §2.9 page 29

4. Conclusion: considerable improvements but serious inconsistencies remain

The task of providing the insurance sector with a standard formula for the calculation of solvency capital requirements is not an easy one. In an ideal world, Solvency II would be an ALM-based regulation where solvency requirements are calculated from internal models, provided these reflect management actions and vice-versa. But a standard formula is needed for the wide range of companies that do not have internal models, and for the vast majority of companies that do not model all risk factors.

To be standard, the formula needs to be a good compromise between accuracy and simplicity of implementation. Though relatively simple, it is essential that the formula not hinder the evolution of the sector and in particular its ability to manage risk.

EDHEC recognises that—compared to the proposals in QIS2 and CP20—there has been significant progress in QIS3. We are pleased to see that more precise guidelines have been given, and that the arbitrary K-factor approach for profit-sharing has been replaced by a more consistent one.

Concentration risk that allows the measurement of idiosyncratic risk is also an advance. Double-counting of risks may now be avoided in non-life underwriting. And the special nature of operational risk has been recognised.

Nonetheless, serious inconsistencies remain:

- Interaction risk has not been taken into account in the standard formula—we recommend a scenario for non-life where both claims and inflation are high. For life, there should be a scenario where both surrenders and interest rates are high.
- The calculation for capital requirements for non-life underwriting risk is based on an undiscounted measure of cash flows and is inconsistent with the very principles of market consistency
- Even though the second pillar of Solvency II aims to set qualitative standards for risk management, first-pillar calculations fail to take into account good risk-management practices. The consequence of that choice is that though insurers are theoretically supposed to manage their risks they are at the same time considered unable or unwilling to do so. This lack of recognition is also inconsistent with the very principles of risk-mitigation as written by CEIOPS itself: *"II.3.4 A broad assumption is made that the effect of risk mitigation techniques should be given adequate recognition in reducing the relevant risk capital charges"*.

For two reasons, finally, we fear that by trying to achieve consistency with the banking sector, CEIOPS may worsen insurance sector regulations. First, banking regulation is of a former generation (for instance, it does not take into account the correlation between risk-types), so trying to achieve consistency with an older framework may be counter-productive. Second, the insurance and banking businesses are quite different—for instance, liquidity runs, a risk for banks, are much less of a risk for insurers, where assets are relatively liquid but liabilities rather *illiquid* because of fiscal constraints on surrenders. An excessive focus on Basel II is not beneficial.

As Solvency II and Basel II are of different generations, it naturally falls upon the lead supervisor to ensure that financial conglomerates do not perform regulatory arbitrage. It is of course our hope that—for the benefit of both the banking sector on its own and for financial conglomerates—Basel II will be updated. But for the long-term stability and competitiveness of the European insurance sector, we feel that Solvency II should focus primarily on incentives for risk management and on setting adequate calibration for insurance companies.

Notes

EDHEC is one of the top five business schools in France. Its reputation is built on the high quality of its faculty (104 professors and researchers from France and abroad) and the privileged relationship with professionals that the school has been developing since its establishment in 1906. EDHEC Business School has decided to draw on its extensive knowledge of the professional environment and has therefore focused its research on themes that satisfy the needs of professionals.

EDHEC pursues an active research policy in the field of finance. Its Risk and Asset Management Research Centre carries out numerous research programmes in the areas of asset allocation and risk management in both the traditional and alternative investment universes. The EDHEC Financial Analysis and Accounting Research Centre deals with financial analysis issues: valuation of firms; impact of IFRS on the management of companies and risk pricing; due diligence; and reform of the status of independent financial experts. The research centre aims notably to use state-of-the-art academic expertise to question certain financial paradigms, particularly that which ignores idiosyncratic risks in the calculation of the risk premium on the basis that such risks are diversifiable.

EDHEC
BUSINESS SCHOOL
Lille - Nice

EDHEC RISK AND ASSET
MANAGEMENT RESEARCH CENTRE

EDHEC FINANCIAL
ANALYSIS AND ACCOUNTING
RESEARCH CENTRE
393-400 promenade des Anglais
06202 Nice Cedex 3
Tel.: +33 (0)4 93 18 32 53
E-mail: joanne.finlay@edhec.edu