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A framework for incorporating diversification in the solvency assessment of insurers

The Chief Risk Officer Forum



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1. Preface

As Chairman of the Chief Risk Officer Forum, I am delighted to be presenting the study “A framework for incorporating diversification in the solvency assessment of insurers”. The Chief Risk Officer Forum comprises risk officers of the major European insurance companies and financial conglomerates, and was formed to address the key relevant risk issues. It is a technical group focused on developing and promoting industry best practices in risk management. The membership comprises:

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The discussions at the European level around the new prudential regime for insurers defined under the banner of Solvency II have gathered pace in recent months. As a technical group representing the leading European insurers, the Chief Risk Officer Forum therefore established a subgroup¹, under the leadership of John Hele of ING and Sue Kean of Aviva, to coordinate our responses and input to the Solvency II project on the topics of diversification and group solvency.

The purpose of this report is to start what will be an informed debate on the issues surrounding the treatment of diversification in the solvency assessment of insurers. At present, although diversification is very much the *raison d’être* of the insurance industry, there is an imbalance in the recognition (or lack thereof) of diversification effects within solvency regulation. This paper aims to correct that imbalance, and we make some initial suggestions for how diversification should be treated within a prudential regulatory framework.

This report does not look at all aspects of the Solvency II framework – a separate study by the Chief Risk Officer Forum is examining the role of internal models, and

¹ The subgroup comprised representatives of Aegon, Aviva, Fortis, ING, Munich Re, Prudential plc, Swiss Re, and was supported by Mercer Oliver Wyman

recommends principles for the admissibility of internal models within the Solvency II framework, and a third study is examining the topic of risk mitigation. Further studies by industry practitioners are being carried to examine other topics, such as how a standard model can be developed for Pillar 1 calculations for those insurers that do not adopt internal models.

Finally, many individuals gave considerably of their own time to contribute ideas and thinking that went into the writing of this paper. In particular, Sue Kean of Aviva and John Hele of ING provided great leadership in guiding the development of this paper. I would like to take this opportunity to acknowledge their contribution, and that of everyone else who contributed to the writing of this paper:

Henrik Bjerre-Nielsen, Tony Brooke-Taylor, Henk van Broekhoven, Martin Coppens, Alberto Corinti, Lucas du Croo de Jongh, Petra Faber-Graw, Jürgen Guhe, Noel Guibert, Karel van Hulle, Christoph Hummel, Olav Jones, Rob Jones, Alan Joynes, Pablo Koch-Medina, Matt Leonard, Ulf Linder, Philip Long, Mike MacKenzie, Edoardo Malpaga, Tom Moore, Ruben Olieslagers, Bruno Porro, Arjun Raychaudhuri, Vesa Ronkainen, Francis Ruijgt, Jose Sanchez-Crespo, Paul Sharma, Anthony Stevens, John Westby, John Whitworth, Tom Wilson, Hans Wright, and Hans-Peter Würmli

We hope that you will find this study useful and we are looking forward to tackling the remainder of this challenging project for the European insurance and reinsurance industries.

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2. Executive Summary

Concentration of risk is bad for the insurance industry and consumers. It is the main contributor to insurer impairments, especially in times of major stress.

Diversifying strategies are the basis of sound risk management and can be used to counter concentrations of risk, particularly in times of stress. It is a vital fact that every insurer uses diversification to manage the portfolio of risks that arise in their business. Empirical studies and scientific research as well as many industry-standard business practices highlight the importance of building balanced portfolios.

Strong management practices are essential for creating well-diversified portfolios. Measurement is necessary but not sufficient alone for realising the benefits of diversification. Appropriate practices, organisational structures and internal controls are also required. Many of these practices are already implemented at leading insurers.

Current regulatory solvency approaches for insurance do not adequately take diversification into account, and there are inconsistent approaches across jurisdictions. As a result, capital becomes ‘trapped’ in entities where diversification is not recognised, which leads to competitive distortions and a ‘deadweight loss’² to consumers. Moreover, it weakens the incentives for good risk management practices.

Given the importance of diversification to the insurance industry and the excess costs of treating it inconsistently, **we strongly believe that this is an issue that regulators must address;** a practical framework for incorporating diversification in the solvency assessment of insurers is required.

Insurers have developed internal frameworks that assess and recognise diversification effects for capital adequacy purposes and **we are now proposing a set of core principles to form the basis of such a framework within European insurance regulation.** This framework is defined to strike a balance between the needs of local regulators and the needs of the industry, and maintains the basis of local regulation – namely that local regulators will analyse local entities in the same way as the subsidiaries of groups. This framework also enables smaller insurers to benefit by giving them full credit for risk transfer arrangements where these are in place, which allows them to benefit from the diversification within others’ balance sheets.

The following principles demonstrate how diversification can be recognised in a consistent manner:

² In economics, this refers to a loss in social welfare that results when the benefits generated by an action fall short of the opportunity cost of pursuing that action, and indicates a structural inefficiency. For more on this refer to Nicholson, Walter; Microeconomic theory: basic principles and extensions; 8th edition.

1. Incorporation of the effects of risk diversification into solvency frameworks is critical for the purpose of rewarding strong risk management and discouraging risk concentration
 - Risk diversification is a critical component of successful risk management for insurance companies
 - Conversely, risk concentration is one of the major drivers of insurance company default
 - Furthermore, diversification effects are uniquely determined by a company's portfolio mix and legal entity structure
2. Diversification effects must be recognised when risk factors, their dependencies and the company's exposure to them are:
 - Identifiable
 - Supported by empirical evidence, scientific research or expert opinion of causal linkages
 - An active consideration in business decision-making
 - And, where capital / risk mobility does not impose barriers to the diversification effects being realisable
3. For the purpose of recognising diversification effects, capital mobility and risk transfer should be recognised if financial resources are available to back policyholder and other creditors' claims:
 - With sufficient economic value and
 - As they fall due
4. Capital requirements at the solo entity level³ should reflect:
 - The diversification effects within that solo entity
 - The formalised support, where present, provided by transferability of capital between a Group and the solo entity, or an external party and the solo entity
5. Capital requirements for an insurance Group must be assessed separately from those of the solo entities within that Group, and should reflect:
 - The diversification effects specific to that Group, taking any constraints to capital mobility into account
 - The capital implications of both Group legal structure and any intra-group agreements
6. Co-ordination between supervisors of local entities and Groups is essential to ensure an efficient, competitive European insurance market. This includes the co-ordination by a mandatory Lead Supervisor.

³ Solo entity refers to a legal entity that is part of a larger Group. These terms are used interchangeably throughout this paper.

These principles are an important first step, and we recognise that translating these into policies may seem a difficult task. Therefore **we are also proposing a practical framework to translate these principles into policies** for the solvency regulation of both insurance Groups and solo legal insurance entities. The policy framework covers several important areas:

- Roles and responsibilities of Groups, solo entities and regulators to promote efficiency and ensure a level playing field
- Disclosure standards, to promote transparency of the measurement, extent and management of diversification benefits
- Risk modelling requirements, to set a standard for use of internal models

The principles and policy framework presented here **promote and reward sound risk management practice**. In doing so they address many of the recognised shortcomings of Solvency I, by **aligning insurers' regulatory capital and their risk profile in a consistent, transparent way**.

3. Introduction

3.1. Purpose of this paper

The discussions at the European level around the new prudential regime for insurers defined under the banner of Solvency II have gathered pace in recent months. The European Commission sent out the first request for advice in July 2004, to which CEIOPS⁴ provided a progress update and plan of subsequent work in October 2004. Since then the draft response of CEIOPS to the 1st wave for advice was published at the end of February 2005, and CEIOPS' Working Groups have started work on the second and third wave calls for advice and as such require stakeholders' input – notably the insurance industry's. For the 2nd wave, a draft answer from CEIOPS is expected at the end of June, with comments from external stakeholders to CEIOPS expected to be accepted until the end of September, and CEIOPS' final report due at the end of October 2005. The formal input from CEIOPS to the 3rd wave will be published at the end of February 2006.

Aside from this, many national insurance associations have, in consultation with their members, developed their own views on how the insurance solvency regulation should be developed under Solvency II, and in their home states.

The purpose of this paper is to start what will be an informed debate on the issues surrounding the treatment of diversification in the solvency assessment of insurers; we (the Chief Risk Officer Forum) seek to re-dress the current imbalance in the recognition (or lack thereof) of diversification effects. Herein suggest a framework for how diversification should be treated within a prudential regulatory framework.

3.2. Scope of this paper: risk diversification

Diversification in the context of this paper refers to risk diversification or the spreading of an insurance portfolio over a variety of exposures, rather than only a few select areas. This includes financial, insurance and operational exposures, collectively considered 'risk factors'. Diversifying strategies aims to reduce risk by exposing one's portfolio to different areas that would react differently to the same event and thereby mitigate the aggregate exposure to a single source of risk.

However, it must be recognised that not all risk can be diversified away. For example, an investor can only reduce non-systematic risks – those that are specific to a company, industry or market – through diversification. On the other hand, systematic risk (also known as undiversifiable or market risk) cannot be eliminated through diversification and is not specific to a company or industry.^{5,6} Companies can however, reduce systematic

⁴ Committee of European Insurance and Occupational Pensions Supervisors

⁵ For more on this topic refer to Richard A. Brealey and Stewart C. Myers, Principles of Corporate Finance, 7th ed., McGraw-Hill/Irwin Series in finance, insurance and real estate

risks by actively engaging in risk mitigation strategies (e.g. through reduction in their equity-backing ratios and concentrations in single investments, hedging of interest rate risks, purchase of reinsurance and other risk mitigation strategies). It is interesting to note that although the insurance and reinsurance industry has significantly reduced systematic risks since the capital market crisis of 2000-2002, regulatory and accounting barriers remain for encouraging insurers to adopt economically sound risk mitigation strategies – this topic is being addressed by the Chief Risk Officer Forum’s Risk Mitigation Study.

Furthermore, improved diversification can be achieved by strategic decisions such as acquisitions or market entry. However, where the misguided pursuit of risk diversification leads insurers to enter businesses where they have no expertise or advantage, value destruction can result.

⁶ As described in the Chief Risk Officer Forum paper “Principles for Regulatory Admissibility of Internal Models – A Benchmarking Study”, the market value margin for liabilities, which defines the differences between the discounted value of best-estimate cash flows and the economic value of the liability reflects the amount of undiversifiable, unhedgeable risk, and represents the price one would have to pay a willing, rational and well-diversified 3rd party to take on the risk

4. Recognising Diversification: The Case for Change

William Shakespeare (1595): Recognising diversification benefits	Antonio: 'My ventures are not in one bottom trusted, nor to one place; nor is my whole estate upon the fortune of this present year; Therefore, my merchandise makes me not sad'
The Economist (2004): Understanding diversification benefits more clearly	Antonio's first mistake in 'The merchant of Venice' was to bet his whole fortune on a fleet of ships; his second was to borrow 3000 ducats from a single source. The first rule of risk management is to identify your risk; the second is to diversify it.

This section makes four critical assertions:

- Concentrations of risk can have very damaging effects on insurer solvency;
- Risk diversification plays a critical role in the economics of insurance businesses and that there is widespread and accepted evidence of diversification benefits;
- Recognition of these facts has led many insurance companies to dramatically improve their risk management capabilities;
- Current regulatory approaches for dealing with diversification are inadequate and need to be updated.

4.1. Concentration of risk is a significant cause of insurer impairment

Several reports have been produced over the last few years analysing the historical impairments of insurance companies and classifying them based on the proximate and underlying reasons for the impairment. Three such reports are both recent and of particular relevance for understanding the linkages between concentration, diversification and default:

Table 1. Summary of impairment studies

	Sharma report ⁷	AM Best report ⁸	S&P report ⁹
Market	▪ Pan-European	▪ USA	▪ USA
Time period	▪ 1996-2001	▪ 1977-2002	▪ 2001, 1996-2004
Segment	▪ Aggregate Life and P&C study	▪ Life and P&C in separate studies	▪ Aggregate Life and P&C study
Approach	▪ Uses a combination of 21 case studies, and general industry surveys, sample spans defaults and near misses across the entire industry	▪ Uses in-house data to analyse 98% (by premium volume) of the US market, analyses 583 impairments	▪ Uses in-house data, examines 533 failed insurers
Causes of insolvency	▪ Identifies 12 risk types which could lead to an insolvency, of which two are major causes	▪ Separately identifies five main factors that affect Life and P&C insurers	▪ Identifies five main factors that contribute to insolvency

Two such reports – the AM Best Report and S&P Report – are both recent and of particular relevance for understanding the linkages between concentration, diversification and default. While also highlighting other causes, these reports identify concentration of risk as an important contributory factor towards insolvency or impairment for insurers. A further very influential report has been prepared by the "London Working Group" chaired by Paul Sharma. This report focuses on qualitative causes for insolvencies and near-insolvencies and derives lessons for the supervisory toolkit.

Moreover, direct analysis of the experience of the US insurance sector (where there are a sufficiently large number of insurance companies to make such statistical analysis meaningful) tends to corroborate these reports. In the P&C sector, peaks in insurer insolvencies occurred in 1985, 1989-1992 (including a particular peak in 1991) and again in 2000-2002. These coincided with specific events that occurred during each of these periods:

- The liability crisis in 1985
- The collapse of the junk bond, real estate and Savings & Loan markets in 1989-1992
- Hurricane Andrew in 1991
- The 9/11 terrorist attacks in 2001

⁷ Prudential supervision of insurance undertakings; Report, Conference of Insurance Supervisory Services of the Member States of the European Union, Dec 2002

⁸ AM Best Insolvency study, P&C insurers, May 2004; Life and health, Dec 2004

⁹ 'Insurer Insolvency Analysis identifies key factors', 28 May 2003; 'US insurers fall to lowest level since 1996', 10 Feb 2005

The general conclusion is that these spikes in insolvencies were largely driven by insurers with highly concentrated risk profiles (either geographically, or in terms of asset mix), which were particularly adversely impacted by the large loss events of these periods. Geographical concentration is particularly important. For example, Hurricane Andrew led to higher impairment rates among P&C insurers, including 11 insolvencies. Yet no large multi-state insurer (i.e. more geographically diverse) was impaired, even though many such insurers did suffer losses from the same natural catastrophe event.

In the Life sector, although geographical diversification of activities is somewhat less important than in P&C, management of asset liability mismatch risk is critical – indeed, all six¹⁰ of the largest insolvencies during the period 1989-1991 (which is the peak historical period for Life insolvencies in the US) were driven by the accumulation of risk concentrations in individual asset classes, particularly property and credit.

4.2. Diversification is critical to risk management

Given the potential dangers of concentration it becomes clear that diversifying strategies are important. Indeed, **diversification, or the concept of spreading risks, forms the foundation of insurance and is the key-stone on which important risk management processes ultimately rest**, either implicitly or explicitly. Modern finance theory regarding capital markets pricing¹¹ depends on the concept of an optimally diversified market portfolio. The management of banking credit portfolios depends on the ability of the bank to diversify across multiple counterparties, sectors and geographies. The rapid growth in the mutual fund market over the last two decades is testament to the importance retail investors place on owning diversified portfolios of investments.

Within the insurance industry, diversification plays two key roles. First, **it provides consumers with access to protection from risk at a reasonable cost**. The size and timing of insurable events (death, motor accidents, natural catastrophes, etc.) for individual exposures is uncertain, and the downside risk to the individual of an uninsured event is often significant. The fundamental service that insurers provide is to pool individual exposures into a shared portfolio, allowing individuals and businesses a way of reducing their overall exposure to individual risks, and increasing their ability to plan and invest with confidence for the future.¹²

¹⁰ First Capital, Executive Life, Mutual Benefit Life, Mutual Security Life, Guarantee Security Life, Pacific Standard Life

¹¹ The principles of which are at the heart of recent trends in insurance solvency regulation in the UK, Netherlands and Switzerland, specifically with regard to the valuation of liabilities

¹² Clearly reinsurance plays a similar role, arguably taking the concept of diversification to a higher rung – reinsurers pool insurance risks globally and are able to maximise diversification effects by virtue of their geographical, line of business and size characteristics. In this report, reference to insurance risks and diversification of such risks is used interchangeably with reference to reinsurance risks and diversification of reinsurance risks.

Second, it enables *insurers to manage the type and amount of risk in their portfolio*.

Insurers have the ability to manage risks by pursuing diversifying strategies, including:

- The pooling of similar and sufficiently independent risks – usually similar in terms of the characteristics of the risk subjects, but this pooling could occur over time as well;
- The combination of opposite risks to provide internal hedges – for example, the insurer can sell policies that contain features resulting in a risk exposure when interest rates are low, as well as policies whose value to the insurer *increases* when interest rates are low;
- The ability and incentive to reduce risk concentrations in a similar way to that used by individuals and businesses when they seek to reduce exposure. This can be achieved by either limiting the underwriting to certain specific risks or classes of insurance or limited amounts via reinsurance, hedging and/or securitisation of the risks.

In the remainder of this section we present further evidence that risk diversification effects exist, describe the increasingly common management practices that insurers are adopting to manage risk concentrations and diversification, and conclude that it is imperative for solvency regulatory frameworks for insurers to explicitly address the issues of diversification and concentration, and in a much more consistent and comprehensive fashion than currently is the case.

4.2.1. There is widespread evidence that risk diversification effects exist and are significant ...

Extensive work has been carried out on examining the effects of risk diversification. Broadly speaking, the evidence is that the benefits of diversification are significant, with the evidence falling into three principal categories:

- ‘Industry back-testing’ or the analysis of insurers that have actually defaulted
- Analysis of relationships between insurance risks
- Historical analysis of correlation factors between financial risks in ‘stress’ scenarios

In Section 4.1 we presented evidence of the benefits of diversification. We now examine the other principal categories of evidence: analysis of relationships between insurance risks and historical analysis of correlation factors between financial risks

4.2.2. Diversification across insurance risks exists, and can be analysed

The unique portfolio of insurance risks faced by each insurer make direct statistical analysis of publicly available firm data less useful for estimating the diversification and concentration effects that might exist between insurance risks. Nevertheless, many insurance risks are amenable to well accepted, more fundamental scientific analysis.

At a fundamental level, it is well accepted both within the industry as well as by regulators that, under 'normal' trading conditions, the results of life or P&C insurers become more stable or predictable as the number of insureds increases; this is a direct application of the law of large numbers to a portfolio of risks.

However, it is equally well accepted that large potential concentrations may exist even within large collectives, concentrations for which specific studies and threat scenarios have been developed by the industry in order to better assess and manage their overall risk profile. For example, in Life and Health Insurance, epidemiological studies have been used to estimate the impact of different diseases on mortality rates, and in particular have been used as a basis for incorporating the impact of AIDS / HIV into mortality tables. Similarly, geographic concentrations potentially triggered by terrorist or natural catastrophe events have been well analysed, leading to specific concentration limits.

In P&C insurance, complex meteorological and geological models have been used in combination with the modelling of contour lines, flood plains and the distribution, structural soundness and value of properties in order to assess the impact of weather- and earthquake-related losses.

These scientific approaches to the measurement of risk are used by insurance companies to support analysis and management of risk concentrations (for example, the concentration an insurer or reinsurer might face from a portfolio of contracts covering European windstorms) and diversification (for example, the diversification a reinsurer might expect to receive from having exposures to California earthquake, Atlantic tropical storm, Australian bush fires, man-made property and casualty risks and mortality risk in its life reinsurance business).

In each of these areas, there are examples of standard approaches which command general acceptance and which use sophisticated models as well as threat scenarios to assess and manage risk concentrations and diversification, even when there is little direct historical data. **The data points that exist for extreme insurance loss events suggest that these events are not 100% correlated with each other and with financial risks.** For example, in Figure 1 we list each of the 10 largest (insured) natural catastrophe events from 1926 – 2004, showing the size of the insurance loss event (in currency terms), and compare these with three financial risk factors (equity, interest rate and credit) during the same year as the loss events, indicating the % change in the financial risk factor. These data suggest that there is not a 100% relationship between insurance risk and financial risk factors, even in the most extreme observed events, and therefore that 'adding up' stand-alone capital for each of these risk types is incorrect.

Figure 1: Assuming 100% correlation between extreme insurance loss events and financial risks is inconsistent with historical evidence^{13, 14, 15}

10 largest catastrophes			Absolute values of other risk exposures (% change in index)			
Rank		Date	Cost (\$BN)	Equity index	5 year bond yield	Corporate defaults
1	WTC, Pentagon terrorist attacks	Sep-01	40,000	-14.6%	-26.1%	3.8%
2	Hurricane Andrew, US	Aug-92	20,328	4.6%	-19%	1.3%
3	Northridge, CA, earthquake US	Jan-94	15,520	-1.6%	-12.7%	0.6%
4	Typhoon Mireille, Japan	Sep-91	7,598	-38.7%	16.7%	n/a
5	Hurricane Charley, US	Aug-04	7,475	4.3%	+2.3%	0.7%
6	Hurricane Ivan, US	Sep-04	7,110	4.3%	+2.3%	0.7%
7	Winterstorm Daria, France	Jan-90	6,441	27.1%	16.1%	n/a
8	Winterstorm Lothar, France	Dec-99	6,382	31.5%	-28.3%	n/a
9	Hurricane Hugo, US	Sep-89	6,225	19.1%	+11.9%	2.3%
10	Storms and Floods, UK	Oct-87	4,839	18.9%	-4.4%	n/a

4.2.3. Diversification across financial risks exists, even in stress scenarios

Diversification across financial risks in most ordinary market developments is well accepted and supported by the enormous quantity of daily data and statistical analysis of price movements¹⁶. It is so well established that banking regulators allow most banks to use their own Value-At-Risk models (where the correlation factors between risk factors are typically set by historical statistical analysis and are typically below 100%) to set capital requirements for Market Risk, explicitly recognising the existence of diversification effects across financial risks.

However, Value-at-Risk analysis is typically used for liquid trading portfolios with relatively short-holding periods (days, or at most weeks) and confidence intervals of the order of 97.5%. When assessing the solvency of insurance companies, longer timeframes (e.g 1 year) and higher confidence intervals are typically used, raising the question of whether risk correlation factors are stable even in times of severe market stress that insurance solvency standards seek to address.

¹³ Catastrophe data obtained from the Insurance Information Institute. Corporate default data obtained from Moody's weighted default rate studies. Equity and bond yield data from Datastream.

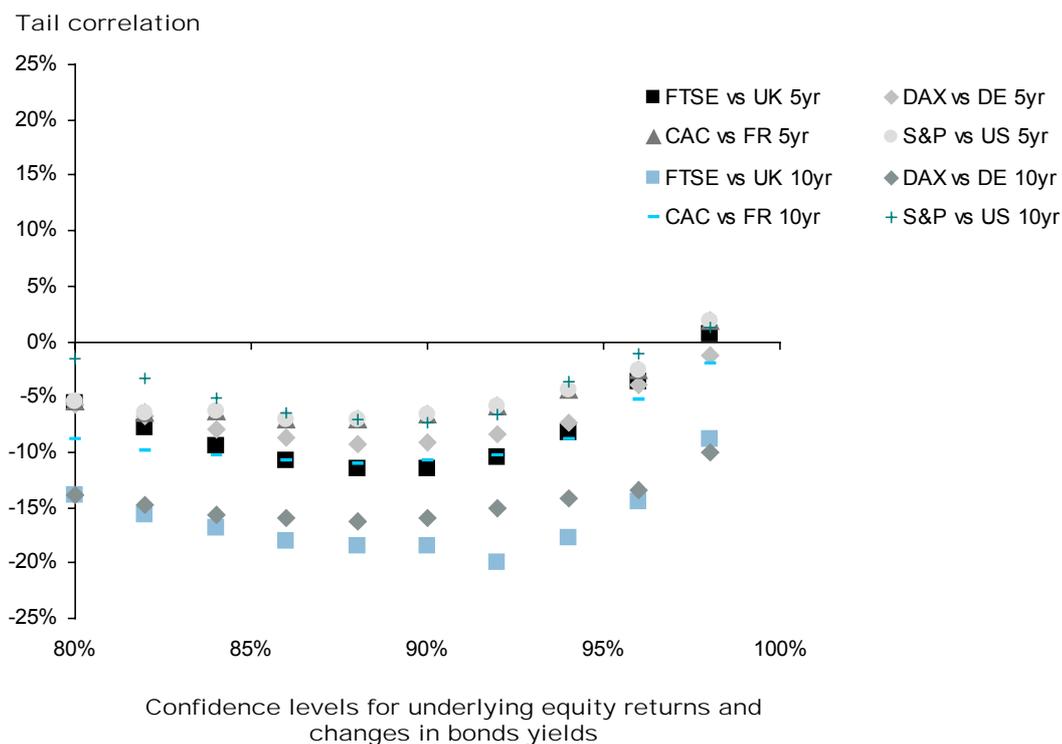
¹⁴ Insurance catastrophe rankings obtained after adjusting costs for catastrophes to 2003 dollars, except for Hurricanes Charley and Ivan, which are 2004 figures

¹⁵ Equity index information – consisting of FTSE (UK), NIKKEI 225, France CAC 40, S&P 500 – ranked on basis of annual % change. Corporate default rates available for US only; ranking of the absolute values of default rates. Interest rates consist of: Japan BENCHMARK 5 YEAR DS GOVT. INDEX - RED. YIELD, France BENCHMARK 5 YEAR DS GOVT. INDEX - RED. YIELD, UK BENCHMARK 5 YEAR DS GOVT. INDEX - RED. YIELD, US: 5-Year Treasury Note Yield at Constant Maturity (% p.a.) calculated using the annual % change in bond return.

¹⁶ For example, the information on volatilities and correlations for all major financial products and indices produced on a daily basis by RiskMetrics Group

The evidence is that they do remain lower than 1.0, even in the extreme events. For example, taking the last 26 years of returns on various major equity indices and interest rates, and analysing the correlation factors between these risk factors at different confidence intervals¹⁷ one sees that the correlation factors between these are weak. This is illustrated in Figure 2 below:

Figure 2. Assuming 100% correlation between equities and interest rates is incorrect (1979-2005)¹⁸



Clearly there are differences in correlation factors across risk factors, some are more strongly correlated and others more weakly related. Indeed, an understanding and analysis of these differences is an important component of a sound risk management framework and such differences are reflected in the internal models of leading insurers. However, the benefits of diversification are clear.

¹⁷ We conduct one-tailed tests, i.e. a “correlation between x and y at a confidence interval of z%” as being the correlation between x and y for those data points which lie in the lowest z% of outcomes for x and for y.

¹⁸ Here we consider the statistical correlation (in the tail) between the monthly change s in the referenced equity indices and the monthly changes in the yield on government bonds of 5- and 10-year maturities.

4.3. Recognition of diversification effects by insurers has supported improved risk management

The importance of diversification for the economics of insurers, combined with the strong evidence of the existence of diversification effects, has driven dramatic improvements in the management of portfolios of risk, identifying and assessing diversification effects as well as risk concentrations within the industry.

4.3.1. Managing Diversification within Lines of Business

Within lines of business or risk categories, better measurement approaches have led to dramatically improved management practices. In terms of measurement, financial risk economic scenario generators which produce sets of correlated asset return and inflation scenarios are now widely used in the industry; as described in the earlier section, commercial catastrophe risk models¹⁹ are widely used to model the potential impact of earthquakes, windstorms and even terrorist events. These models have reached a high level of acceptance within and outside the industry; for example, outside examples include: catastrophe models are now used by rating agencies to rate catastrophe bonds; banking regulators explicitly recognise historical correlation factors for the assessment of financial market and credit risks based on internal models.

These models are also typically accompanied by the use of threat scenarios tailored to each line of business in order to make risk concentrations within lines more transparent and therefore actionable, e.g. Lloyd's of London's Realistic Disaster Scenarios.

Once potential concentrations have been identified based on these internal models, they are explicitly managed by most insurance companies through underwriting limits, special acceptances, adjusted terms and conditions, reinsurance or retrocession contracts, etc.

4.3.2. Diversification across Lines of Business

In terms of measurement, **there are various standard models that have been developed to take account of the effects of risk concentration and diversification across lines of business and risk categories.**

The industry has taken steps to standardise the definition and classification of different risk types. For example, the Fisher II risk disclosure classification²⁰ adopted in the Multidisciplinary Working Group on Enhanced Disclosure has defined four principal risk categories – Market Risk, Funding Liquidity Risk, Credit Risk and Insurance Risk – and a

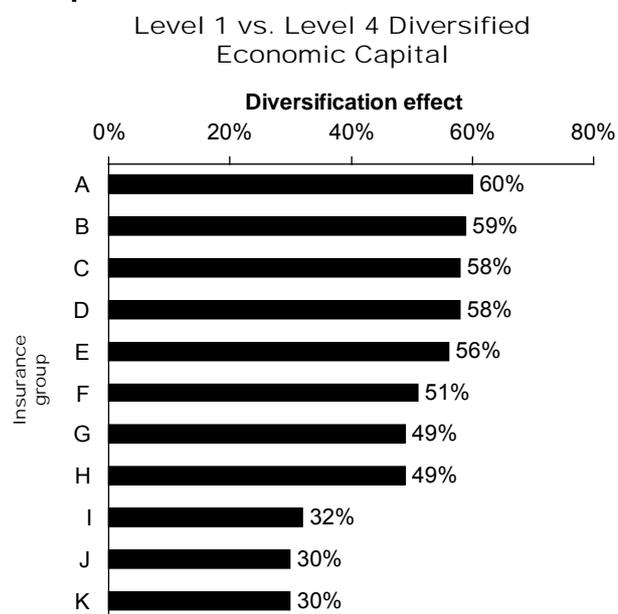
¹⁹ For example, those of Risk Management Solutions (RMS), EQECAT and AIR Worldwide Corporation

²⁰ 'Multidisciplinary Working Group on Enhanced Disclosure, Final Report to ...', January 2001, www.bis.org/publ/joint01.pdf

more detailed set of risk sub-categories. The International Actuarial Association (IAA) have defined a similar set of categories – Underwriting Risk, Credit Risk, Market Risk and Operational Risk²¹. Most insurers that have adopted Economic Capital models for internal risk and capital measurement purposes have adopted analogous classification approaches and use them as a basis for identifying concentrations and measuring the effects of diversification.

Taking this risk framework one step further, **most institutions actively allow for diversification effects across risk categories as part of their internal capital model framework**. In the course of this study, the Chief Risk Officer Forum commissioned a survey of its member companies. Figure 3 below, presents a comparison of the diversification effects observed by moving from a simple sum of the parts (we shall call this ‘Level 1’, as defined later in section 4.4) to a fully diversified capital requirement for the Group (Levels 1-4 inclusive).

Figure 3. Measured diversification effects, Chief Risk Officer Forum member companies²²



This further highlights the fact that diversification effects observed in these companies are both material and unique to the risk profile of the company.

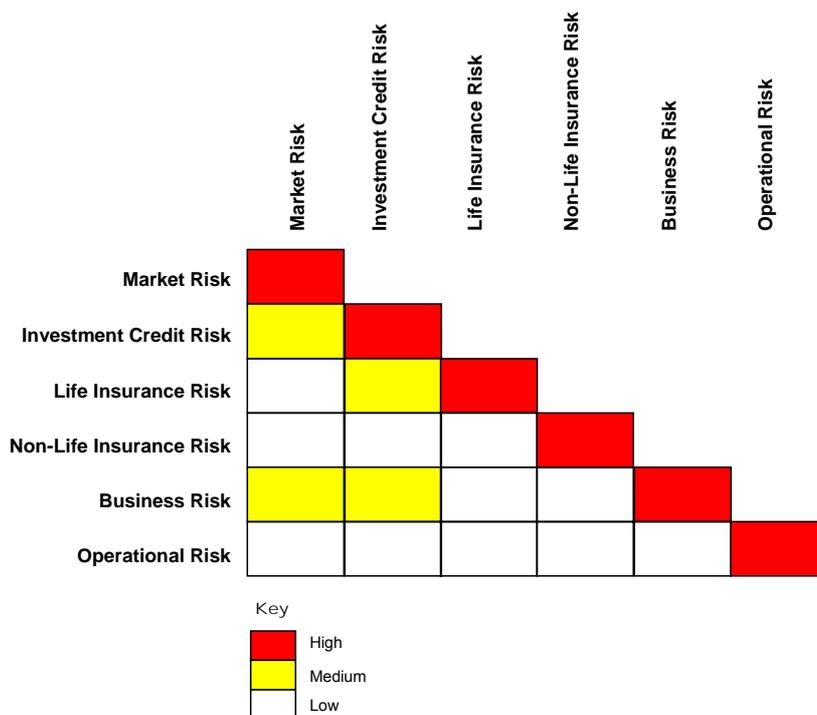
Based on the type of measurement is measurement work described at the beginning of this section, **correlation matrices built on these standard risk classifications have**

²¹ ‘A Global Framework for Insurer Solvency Assessment’, IAA, 2004

²² Sample of 11 companies

been adopted by some insurers, with the correlation factor parameters estimated conservatively by analysis of historical correlation factor data as well as by consideration of the causal linkages between different risk types.²³ We illustrate below an example correlation matrix used by an insurance group to measure such cross-risk correlation factors.

Figure 4. Illustrative Cross-Risk Correlation Structure used in an Economic Capital Framework for an Insurance Group²⁴



The widespread adoption of such practices has allowed the industry to identify and manage concentrations and diversification effects more effectively, leading to an improvement in the companies' overall risk profiles. For example, this is often accomplished by the explicit specification of a company's overall risk appetite and the management of its exposure to the different risk categories through the business planning process and limit setting. It has also created a common language to discuss concentration / diversification effects which has helped to spread best practices more widely across the industry. As a result, many insurers have not just improved measurement of risk and diversification; they have also significantly developed their risk and capital management capabilities in a variety of ways:

²³ Other risk modelling approaches capture dependencies among risk factors by copula functions, giving more refined, but in many cases quite similar, results of diversification effects.

²⁴ Although not strictly defined: high correlation ~ 0.75 - 1.0; medium ~ 0.40 – 0.75; and low ~ 0.0 – 0.40. Mathematically (and in practice) there is also the possibility of negative correlations.

- Risk reporting frameworks established to *identify* concentrations in a timely way (e.g. global counterparty exposure reports in investments, accumulation reports in P&C, asset-liability matching reports)
- Committees and/or organisational functions that are empowered to make decisions to manage concentrations (e.g. centralised reinsurance purchasing groups, Group asset-liability management committees, capital and limit allocation committees, etc.)
- Group level statements of risk appetite, and guidelines for how risk appetite translates into decision-making regarding risk profile and capital allocation
- Integration of diversified risk measures into the strategic planning process
- Risk tolerance limits to avoid concentrations

This combination of measurement and management tools increasingly recognises the importance of understanding the aggregate risk exposure of the business in decision-making, and the role that diversification plays in driving the aggregate risk exposure. **It is therefore important that supervisors ensure that regulatory capital requirements do not lead to perverse behaviour. Management should be encouraged to improve the measurement and management of diversification and excessive risk concentrations**, setting in place responsible safeguards that prescribe the spirit of the regulation and not just the letter of the law.

4.4. Current regulatory capital adequacy frameworks do not adequately promote better risk management

Diversification lies at the heart of risk management for insurance companies. In their own self-interest, insurance companies have developed significantly better diversification and concentration management practices based on improved measurement and scientific quantification techniques.

Unfortunately, this trend is not supported by many of the current capital adequacy frameworks used by regulators and rating agencies. **At present, the recognition of risk diversification for determining capital adequacy in the insurance industry (and indeed in financial services more broadly) is both incomplete and inconsistent.** It is incomplete for several reasons: firstly, until recently, the focus of insurance solvency regulation in most jurisdictions was on the individual regulated insurance entity, with almost no account taken of the possible effects that might arise from being part of a Group. In the EU, the introduction of the Insurance Groups Directive (IGD) and the Financial Groups Directive (FGD) have introduced separate tests of overall Group capital adequacy, but these are essentially just *additive* tests – the Group capital requirement is equal to the sum of each entity’s individual capital requirement; the Group available capital is equal to the sum of each entity’s available capital, with adjustments made for multiple leverage and for capital which is not transferable and is ‘trapped’ inside a solo entity.

The same is true of some rating agency capital adequacy models. For example, although rating agencies retain the ability to use qualitative factors to adjust ratings, the

quantitative factors such as Standard & Poor's Capital Adequacy Ratio (CAR) do not take explicitly into account diversification effects, either across risk types, across lines of business, or across entities within a Group.

The current frameworks are also inconsistent across risk types, sectors, and geographies, both in the approach currently applied and in the treatment of diversification benefits. In the NAIC Risk-Based Capital (RBC) rules, diversification across risk types is included in the calculation of RBC requirements (with asset risks and liability risks assumed to be independent), whereas **in the existing Solvency I rules, no explicit account is taken of diversification**, although there are capital penalties for excessive concentrations, for example through asset concentration limits. As shown earlier in this report the introduction of the NAIC RBC rules in 1993-94 in fact lead to one of the most benign periods in terms of insurer insolvencies since that time.

Similarly, in banking, where the BIS rules govern capital requirements for most banks, diversification across risk factors is explicitly included in the setting of capital requirements to cover Market Risk, whereas diversification is only implicitly included (on an average basis in the Credit Risk capital requirements (based on a notion of the 'average' bank's portfolio).

For the purposes of distinguishing between the approaches adopted by different regulators and rating agencies, we have classified diversification benefits into four distinct categories (as we shall demonstrate later on, these categories are to some extent academic in determining the overall *risk profile* and *solvency* at the Group level, and can lead to misleading conclusions, but they do allow simple comparison of solvency regimes):

- **Level 1 – Within risk types:** the diversification observable in a homogenous insurance portfolio. Examples of this level of diversification would be: 1) adding more unrelated risks to the portfolio reduces the volatility of the claims results, or 2) investing in an index of common shares rather than a single company reduces the volatility of investment returns.
- **Level 2 – Across risk types:** 1) the combination of two classes of insurance such as motor insurance and household insurance within one company or 2) the diversification of insurance risks and market risks, where claims results are unrelated to investment markets.
- **Level 3 – Across entities, within a given geography:** two or more insurance companies within an insurance Group (who may offer different or identical products). While this is an extension of levels 1 & 2, it is recognised separately given the realities of today's insurance markets; in terms of regulation and legal structure^{25, 26}.

²⁵ Regulation is often developed separately for life and P&C businesses.

²⁶ Insurance Groups often comprise different brands, acquired through the years, which frequently remain separately licensed and incorporated insurance companies.

Also, different entities will face different issues surrounding the transferability of capital.

- **Level 4 – Across geographies or regulatory jurisdictions:** the consolidation of entities operating in different geographies. Also an extension of the intra- and inter-risk diversification in levels 1 & 2 however the practical realities of separately incorporated or regulated insurance companies make this distinction relevant.

We now use this four-way classification of diversification effects to illustrate in the table below some of the differences between the different solvency regimes in their treatment of diversification.

Table 2: Many solvency frameworks recognise diversification already

		Level 1	Level 2	Level 3	Level 4
Europe	Solvency I	No	No	No	No
Australia	APRA	Yes	Yes	Yes	Yes ²⁷
Germany	GDV	Yes	Yes	No	No
NL	DNB (FTK) ²⁸	Yes	Yes	Implicit	No
Switzerland	FOPI (SST)	Yes	Yes	Undecided – talks in progress	Undecided – talks in progress
US	NAIC RBC	Yes	Yes	No	Not applicable
UK	FSA Pillar 1	Yes	Implicit	No	No
	FSA Pillar 2	Yes	Yes	Discretionary	Discretionary
Rating agency ²⁹	S&P	Considering internal models	Considering internal models	Considering internal models	Considering internal models
	Moody's	Yes	Yes	Qualitative	Qualitative
	A.M. Best	Yes	Yes	Qualitative	Qualitative
	Fitch	Yes	Yes	Considering internal models	Considering internal models
Global	Basel II	Yes	No	Yes	Undecided – talks in progress

The incompleteness and inconsistency in current approaches are costly and create barriers to sensible risk management:

- Misalignment between risk of failure and capital adequacy requirements
- Very few reinforcing incentives to pursue diversifying strategies and to manage accumulations / concentrations of risk
- Few incentives for insurers to invest in risk management improvements
- Incentive for regulatory and rating agency capital arbitrage by companies

As a general principle, **capital and solvency standards should support and reinforce the highest risk management standards by explicitly addressing the issue of**

²⁷ With exceptions

²⁸ Framework prescribes two accepted approaches – standard & internal models. Standard approach described here, but internal approaches appear to allow for Level 3 diversification. Level 4 diversification is not discussed.

²⁹ All rating agencies makes qualitative adjustments to incorporate the impact of diversification on solvency assessments, but do not yet implement this in a quantitative way across all four levels

diversification benefits. They should attempt to incorporate them explicitly into the assessment of solvency and capital requirements. Indeed, a rigid stance that diversification does not exist unless proven otherwise flies in the face of both the empirical and scientific evidence of diversification effects being important and the practical reality that insurers (and indeed all financial institutions) actively use diversification as a risk management and risk mitigation technique. Such a stance at a minimum fails to incentivise good risk management, and may even in some cases (e.g. with financially weak insurers) lead to adverse incentives for management to ‘bet the house’ on a small number of highly concentrated risk positions (the so-called “trader’s option”).

This leads us to suggest the following as the key foundation principle for any framework for solvency regulation of insurers:

Principle 1

Risk diversification is a critical component of successful risk management for insurance companies; conversely, risk concentration is one of the major drivers of insurance company default. Furthermore, diversification effects (at the proposed levels, 1-4) are uniquely determined by a company’s portfolio mix and legal entity structure. Consequently, incorporation of the effects of risk diversification into solvency frameworks is critical for the purpose of rewarding strong risk management and discouraging risk concentration.

While important in itself, this principle does not answer the question as to **how** diversification effects can be incorporated in a solvency regulatory framework. Before answering this question, we discuss in the next section additional core principles that underlie our policy proposals for a solvency framework that incorporates diversification.

5. Designing a regulatory framework for diversification – Core Principles

In the last section, we developed the case for changing the way that diversification is recognised by current capital adequacy frameworks. The purpose of this section is to provide a broad set of principles which can guide the development of a new capital adequacy framework which recognises diversification. These principles encompass four key areas:

- The need for a robust measurement framework
- The need for demonstrable links between measurement and management
- The need of recognition of capital mobility and risk transfer
- The need for a balance between local and Group capital requirements and a revised Group solvency test

5.1. A robust measurement framework

In order to recognise diversification benefits, the institution’s overall risk profile must be well understood. Diversification effects can be measured in many ways; the ‘theoretically correct’ approach might not be appropriate for all business applications.

The most suitable approach should balance the practical decision-making needs of the business and the materiality of the risk under consideration. Possible approaches could include factor-based approaches³⁰ as well as simulation, variance-covariance and stress scenario approaches.

Best practices are defined by internal models as opposed to simpler models based on industry averages, as internal models best capture the true risk exposure of the company, and therefore are more likely both to be robust and to encourage good risk management practices.

As such, **any framework reform should explicitly support the development of internal models.** While it is recognised that for the standard approach, other simpler methods such as factor-based approaches might be necessary, such approaches are significantly inferior to the use of internal models, and will only be appropriate if they are regularly calibrated against more sophisticated probabilistic methods. Henceforth, in this paper we focus on the use of internal models to capture diversification effects, rather than a standard model – further technical work is needed to define how a standard model should take account of diversification effects, in so far as is it possible to do so.

³⁰ Factor-based approaches can work if the portfolio mix and risk characteristics remain stable over time, and if they are regularly calibrated against more sophisticated probabilistic methods.

Whichever mix of model implementation is ultimately adopted, measurement of risk and therefore diversification effects requires the methodology to be combined with a set of assumptions to support the diversification benefits that are being claimed. The assumptions in turn need to be supported in one or both of two possible ways:

- Empirically supported – for example:
 - By analysis of the historical correlation factors between risks, including ‘in stress’ scenarios, and
 - By considering whether different business units have similar or opposite directional exposures to the same underlying risk factors
- Supported by scientific research, such as seismic modelling and analyses based on expert opinion of causative factors

The measurement / data issues in supporting these assumptions are not unique to diversification and **similar assumptions in financial models are already readily accepted by regulators in other contexts**. These include, for example:

- Claims volatility assumptions in the US NAIC RBC framework, S&P CAR framework, and in the more recent UK FSA RCM framework, risk factors for P&C lines of business are based on analysis of historical volatility in annual loss ratios.
- Risk factor volatility and correlation factor assumptions in Market Value-at-Risk calculations in banks
- Credit default rate calibrations in the internal models approaches that are permitted in the Basel II credit risk framework. (Where the low frequency of actual default data, especially in corporate lending, makes the estimates of default rates an equally challenging statistical task as the estimation of correlation factors in the insurance sector)

Where risk management challenges exist, **solely relying on excess capital to provide additional protection does not encourage good risk management** (if anything it encourages the opposite by providing a false sense of security due to the additional capital cushion). **Fostering improved risk management and measurement is the best solution to such challenges**, while at the same time incentivising improvements in risk management practices such as:

- Documented models and procedures for use, to promote strong internal control environments
- Stress and scenario testing of assumptions, to identify sensitivities
- Risk tolerance limits and hedging policies, to manage significant exposures and prevent concentrations
- Disclosure of results, including movement analysis and discussion of material changes in methodology, to promote transparency

For details on an appropriate standard for internal models, **please refer to the Chief Risk Officer Forum’s internal model benchmarking study**, a separate study from this diversification study.

5.2. Links between measurement and management

Although there are many benefits to diversification, being part of a large insurer or Insurance Group can also give rise to unexpected concentrations of risk. As a result, **a critical aspect of recognising diversification benefits in a solvency framework is the need to ensure that risk diversification and risk concentrations are actively managed**. As was described on pages 16-19, risk management practices in the insurance industry have significantly advanced over the last few years and the active management of diversification and risk concentrations is a core management role within insurance Groups.

In addition to strong general risk management practices, **there are two particularly important risk and capital management mechanisms for realising diversification benefits – capital mobility and risk transfer**. These two mechanisms are, from a capital management perspective, mirror-images of each other – **you can either move the capital to where the risk is, or move the risk to where the capital is**. There is therefore a clear link between each of these two concepts and the likely impact on an insurer’s ability to realise diversification benefits.

With regard to capital mobility, **the extent to which it can be used to realise diversification benefits across an insurer or Group depends first of all on the existence of an active capital allocation process, and then secondarily on the speed with which capital can be redeployed**. A variety of instruments exist to facilitate such capital mobility – for example, intra-group reinsurance, dividending of profits, intra-group lending, securitisation of future cash flows / earnings, issuance of surplus notes, sale / liquidation of a business. As we will highlight later in Section 5.3, such instruments also vary in the speed with which capital can be reallocated, in the cost of execution, and potentially in the impact they have on the insurer’s strategic goals. With regard to risk transfer, parallel issues apply – how rapidly and effectively can risk be transferred across the insurer.

With regard to both capital mobility and risk transfer, **insurers clearly have to consider the real differences in availability of different forms of capital across the Group**. In general, this is a greater challenge for insurance companies than it is for banks:

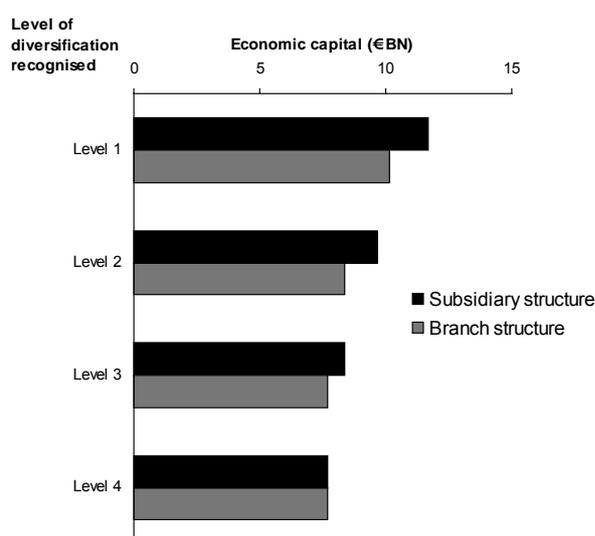
- Banks typically operate from a single (or a small number) of balance sheets, and they finance the aggregate risk of the Group from a single ‘pot’ of capital; insurers

typically have to have multiple separate legal entities, and so have multiple ‘pots’ of capital supporting the aggregate risk profile³¹

- Risk transfer mechanisms (and risks) in banking are highly standardised (e.g. ISDA documentation of swaps agreements), whereas those in insurance are somewhat more customised

Indeed, if capital were completely fungible and equally committed across all legal entities within the Group, the Group’s overall level of risk would be independent of the way in which we categorise the diversification benefits or the Group’s legal entity structure. This is illustrated in Figure 5 below, where we considered two ‘virtual’ insurance Groups, with identical business mixes and underlying risk profiles within each business. One of the Groups is organised as a parent-sub subsidiary structure, and the other Group in a branch structure, with the bulk of the business being written out of a small number of entities. Our analysis assumes that the capital is completely fungible across entities, and then proceeds to show how the Economic Capital required by the Group as a whole is affected as successive levels of diversification effect are recognised.

Figure 5. Illustration of level 1-4 diversification benefit for branch and parent-sub subsidiary structures



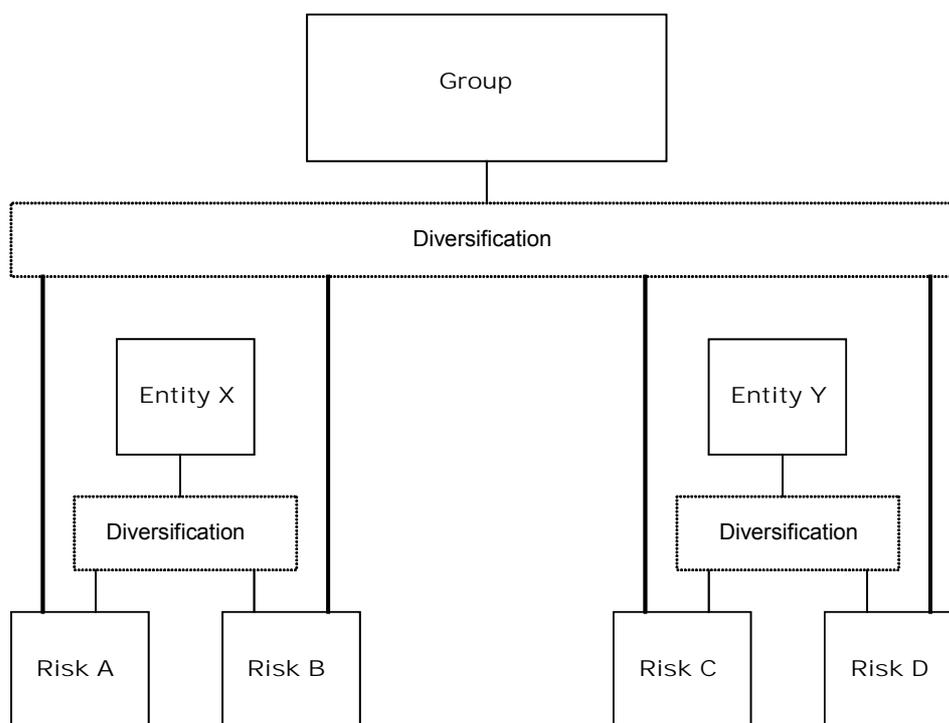
Taking all levels (1-4) of diversification into account both the branch structure and the parent-sub subsidiary structure require the same amount of capital. This is a consequence of the assumption that capital is fully fungible. However, **as gradually less group-wide diversification is recognised, the capital required by the subsidiary structure rapidly increases, and is far higher than that of the branch structure, which does not need to sub-optimally invest standalone capital in each individual branch.**

³¹ Global reinsurers that operate from a dominant branch structure are closer to banks in this respect than they are to primary insurers with multiple subsidiaries.

Moreover, this picture would be even more extreme were the capital within each subsidiary not to be fungible. Therefore **to better serve local markets, both regulators and insurers need to ensure that capital is available where and when it is needed with as few barriers as possible.** Barriers to capital mobility and internal risk transfer ‘trap’ capital at the local solo entity level, increase the overall amount of capital that the insurer as a whole needs to hold, and ultimately increases the price that the insurer has to charge customers in order to achieve a return commensurate with its shareholders’ requirements on the higher level of committed capital. One example of such a barrier in the reinsurance world is the push for some stakeholders for collateralisation requirements.

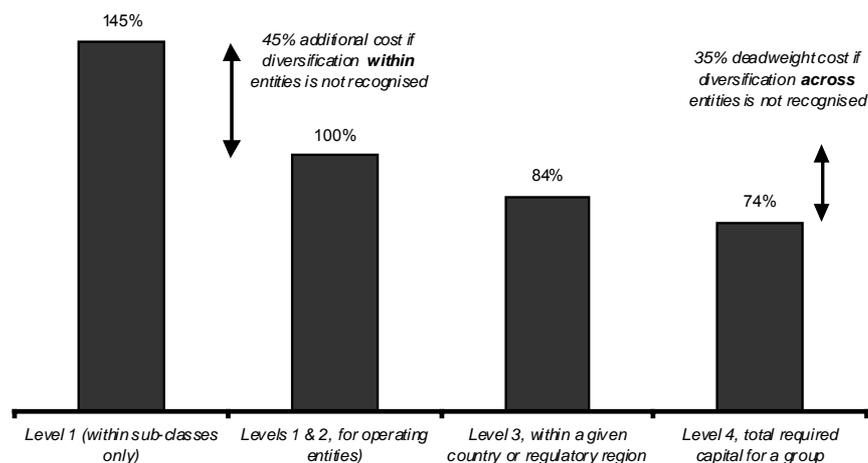
The following diagram illustrates the regulatory framework that this discussion implies – namely a Group solvency test that directly examines Group-wide diversification effects rather than adopting a sum-of-the-solo-tests approach:

Figure 6. Illustration of proposed regulatory framework



We now look at the real costs of excess capital to the European insurance industry. In the same way that Figure 5 above presents Economic Capital requirements in a stepwise fashion; in Figure 7 we present aggregate Economic Capital figures for those companies participating in the previously mentioned Chief Risk Officer Forum survey.

Figure 7. The deadweight cost of excess capital³²



We see from these figures that **the costs to the industry, and ultimately to consumers, of ignoring diversification effects in the solvency assessment of insurers is significant.** In the case of groups, this results in ‘deadweight capital’ of approximately 35% of the total capital base due to the lack of recognition of diversification across entities within the group. Moreover, if diversification effects **within** entities are ignored in the future Solvency II framework, then this may result in a further 45% additional amount of excess capital to be held, imposing costs on the industry which policyholders will ultimately have to bear.

In recognition of these important conditions that define the extent to which insurers are able to understand and demonstrate the impact of diversifying strategies, and to use them to manage their portfolio of risks, we put forth the following principle:

Principle 2

Diversification effects must be recognised when risk factors, their dependencies and the company’s exposure to them are:

- Identifiable
- Supported by empirical, technical, scientific or expert opinion of causal linkages
- An active consideration in business decision-making
- And, where capital / risk mobility does not impose barriers to diversification being realisable

³² Sample consists of 8 companies, who provided data dis-aggregated at each level depicted.

5.3. Recognition of capital mobility and risk transfer

When diversification benefits arise *within a single entity*, simply understanding how the various individual risks diversify and aggregate is sufficient for one to be able to assess the risk to the solvency of the entity. However, **when diversification benefits arise across multiple entities within the same Group, consideration also needs to be given to the extent to which capital can move between the different entities.** If capital cannot move between the different entities, then although the Group has adequate capital resources after allowing for diversification, at the time of stress the necessary capital could not be delivered to a particular entity. Therefore, **consideration of the extent to which capital is truly mobile within a Group is critically important to understanding Group solvency.**

Consideration of capital mobility requires an analysis of many factors, including the following:

- The liquidity / convertibility of the capital *within* an entity into cash *outside* the entity (which can then be used to support other entities within the Group)
- The extent to which capital can be removed from an entity without prejudicing the ability to meet the claims of the policyholders of that entity or damaging its franchise
- The regulatory regime itself, which can also provide barriers to the movement of capital

As described earlier, capital mobility can be and is achieved in a variety of ways. **What is important is that the capital can be made available to meet policyholder and other creditors' claims as and when they fall due**, which is ultimately a question of the ease with which capital can be converted into cash. Figure 8 presents a comparative view of types of capital and the speed of mobility.

Figure 8: It is important to recognise differences in the speed of capital mobility

Category	Forms of capital and/or risk transfer	Liquidity	Quality	Cost efficiency of unlocking	Speed of capital
Sources of economic value	Reserve redundancy, including future shareholder transfers (VIF)		n/a		
	Regulatory minimum solvency margin		n/a		
	Target solvency margin		n/a		
	Shareholder equity (free surplus in excess of target solvency margin)		n/a		
Risk-bearing liabilities	Subordinated debt	n/a			
Off-balance sheet items	Contingent capital instruments	n/a			
	Limited guarantee				
	Unconditional, unlimited guarantee				

As well as such approaches, which allow capital to be moved around a Group, **moving risk around a Group also allows the benefits of inter-entity diversification to be realised.** For example, a P&C Group where every legal entity buys 100% quota-share reinsurance from the parent entity is effectively pooling all of its insurance risk in that parent, and each legal entity should be able to benefit from the diversification it enjoys as a result of such intra-group risk transfer.

The rationale for regulatory recognition of such intra-group risk transfer is in principle no different to the rationale for recognising externally purchased reinsurance – namely, that the use of risk transfer is an essential tool of good risk management. As the International Actuarial Association (IAA) succinctly put it,

“It is obvious that a proper recognition of reinsurance is a must to assess the risk reduction for the ceding company with implications for its capital requirements in order to ensure effective supervision of insurance enterprises in relation to solvency and capital requirement.”³³

Clearly, consideration of the extent to which such internal risk transfer generates real benefits in terms of improved diversification also requires an evaluation of multiple factors related to the risk transfer in question:

³³ ‘A Global Framework for Insurer Solvency Assessment’, 2004, IAA, Page 71

- Extent to which there is genuine risk transfer
- Counterparty risk – will the internal counterparty have the ability to pay out in the event of a claim on the risk transfer transaction?
- Policyholder detriment – is risk (and are losses) being transferred to an internal entity that is already financially weak?

Given that there are a plethora of different internal risk transfer instruments, ranging from quota share reinsurance to non-proportional forms of reinsurance (excess of loss and stop loss), to the use of derivatives and to other financial risk transfer instruments, **it is extremely difficult to adequately capture the effects of such instruments through simple, top-down approaches.** Understanding their effects on the risk profile of a single entity (let alone a Group) requires an analysis of many factors, and typically cannot be captured by a simple factor or ratio. As the IAA Solvency Report made clear:

“Given the diversity and complexity of reinsurance contracts, it is apparent that a simple factor-based approach is likely to be too crude to reflect the effect of reinsurance on capital requirements accurately. Therefore, standardised (e.g. factor-based) approaches should be used with caution since the proper treatment of reinsurance really requires a modelling approach”³⁴.

This case for externally-purchased reinsurance also applies for internal risk transfer. In our view, the criteria used to assess internal risk transfer should be no different from the criteria used to assess external risk transfer, and identical credit in terms of capital relief should be given for identical quantum of risk transferred.

This brings us to put forward the following principle concerning capital mobility and risk transfer:

Principle 3

For the purpose of recognising diversification effects, capital mobility and risk transfer should be recognised if financial resources are available to back policyholder and other creditors’ claims:

- With sufficient economic value and
- As they fall due

³⁴ ‘A Global Framework for Insurer Solvency Assessment’, 2004, IAA, Page 71

5.4. Balance between local and Group capital requirements

We have already laid out three foundation principles, namely that diversification exists and should be given credit for if it is measured and managed, and that risk transfer and capital mobility should be also given full recognition in solvency capital assessments in so far as they are tools to enable the realisation of diversification benefits across entities (just as reinsurance is given recognition as a tool for smaller insurers to ‘rent’ the diversification benefit that reinsurers enjoy). In this section we build on these earlier principles.

As has been recognised by CEIOPS and the European Commission, **there is a need for balance and consistency between local and Group capital requirements.**

“It would be highly desirable for all involved supervisors to reach an agreement on the use of internal models for the SCR calculation in a consistent manner at group and solo levels.”³⁵

There are markets / jurisdictions where the entire focus of regulation is on the legal entity, and there is no regulation of Groups. This was the case in the EU until relatively recently. However, in the EU, Group solvency tests have recently been put in place, with the Insurance Groups Directive and Financial Conglomerates Directive.

At the solo level, in theory any individual legal entity can benefit from the wider diversification benefits that come from belonging to a Group. At the same time, CEIOPS and European Commission have made it clear that some kind of capital ‘safety net’, widely referred to as the Minimum Capital Requirement (MCR), has to be maintained within each entity in order for to be licensed to carry out insurance business³⁶.

While such a safety net provides additional assurances that capital will be available to meet local obligations, it may still lead to the **unnecessary trapping of capital in local entities** in the ways described earlier in Section 5.1, where we quantified the substantial costs of overly conservative and inconsistent local requirements. Moreover, to ensure consistency with the current treatment of banks, where sufficiently strong intra-Group capital support mechanisms are in place, it should be possible for such safety nets to be considered on a consolidated Group basis³⁷. In the case of insurance companies with branch structures, this also means that the branches should **not** be required to hold capital.

Achieving the desired consistency between the solo and Group tests, in a way that recognises the benefits of diversification, therefore requires a practical consideration of where and how such benefits arise.

³⁵ Second Progress Report to the European Commission on CEIOPS work in the field of the Solvency II Project, CEIOPS, February 2005, Page 21

³⁶ Article 28, Directive 2002/83/EC, European Commission, 5 Nov 2002

³⁷ See article 69 of the Capital Requirements Directive for Banks

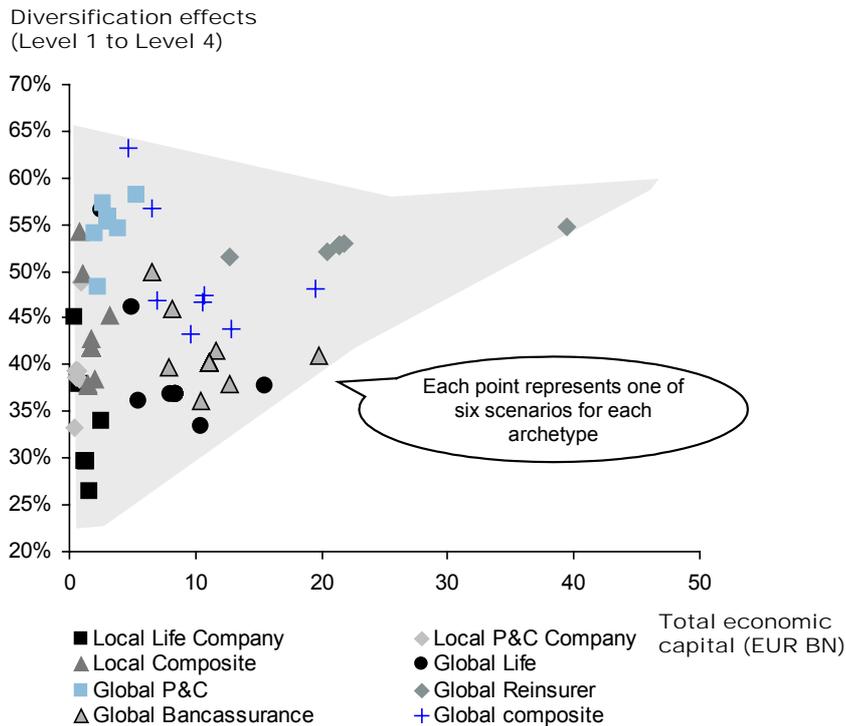
In the case of the solo test, there is a clear connection between those risks arising from the business that the solo entity undertakes and the diversification effects it enjoys as a standalone entity. In this respect, **it is those effects arising within risk types (level 1), across risk types (level 2) that are within the control of the solo entity. We believe that each of these levels should be incorporated in any solo test.**

For the Group test, it is the combination of portfolios of risk across the constituent parts of the Group that defines the overall risk profile. When considering the capital requirements for the Group, therefore each of **those effects arising within risk types (level 1), across risk types (level 2), across entities (level 3) and across regulatory jurisdictions (level 4) impacts the Group risk profile. Each of these should be recognised in the Group test.**

Diversification benefits vary substantially from company to company, and depend on an enormous variety of factors, including business mix, geographical mix, corporate structure (e.g. branch versus subsidiaries) and capital management philosophy and use of risk transfer instruments, to name but a few. In our experience, **the impact of these factors can cause the level of diversification benefit enjoyed in a Group** (i.e. the total reduction in Group Capital requirement relative to the sum of stand-alone capital requirements) **to vary from 20% to more than 60%**. It is extremely unlikely that any factor-based model would be able to capture this to any level of accuracy.

To illustrate this, we have constructed a series of ‘virtual’ insurance entities, with risk profiles at the legal entity level and business / geography mixes representative of different insurance company archetypes. We have then applied an Economic Capital model to each archetype to analyse both the overall Economic Capital requirement, and the amount of diversification benefit that each enjoys. We summarise the results in the graph below, and they demonstrate graphically the range of diversification benefits that different companies and Groups enjoy, as well as showing how difficult it is to define a single factor, or set of factors, that can be used to estimate diversification benefits.

Figure 9. A single ‘magic’ number cannot capture diversification effects; characteristics of companies lead to material differences in diversification effects



Appendix A provides further details on the approach taken to model these insurance company archetypes.

Recognition of these important means of ensuring an appropriate balance between solo and Group capital requirements leads us to propose the following two principles:

Principle 4

Capital requirements at the solo entity level should reflect:

- The diversification effects within that local entity, recognising formalised risk transfer and capital support
- The formalised support, where present, provided by transferability of capital between a Group and the local entity, taking into account the credit risk of the Group³⁸

³⁸ Clearly, when considering the Group solvency test rather than the solo test, consideration of such credit risk associated with intra-Group transactions should be eliminated. Further work is needed, though, in determining how such risks should be handled in the context of the Winding-Up Directive and the existence of national policyholder protection funds

Principle 5

Capital requirements for an Insurance Group must be assessed separately from those of the individual entities within that Group, using models to explicitly reflect:

- The diversification effects specific to that Group, taking any constraints to capital mobility into account
- The capital implications of both Group legal structure and any intra-group agreements³⁹

The last, but **arguably most important, means of establishing the necessary balance involves co-ordination between solo and Group supervision**. We support collaboration between national supervisors, under the overall leadership of a single lead supervisor, in the way envisioned by the European Financial Services Roundtable⁴⁰ within a ‘College of Financial Supervisors’. Indeed, recognition of the importance of collaboration amongst supervisors is also evident outside of Europe.

In the US for example, the NAIC has recognised a growing need to more fully coordinate regulatory efforts across states. Even though significant coordination exists in the case of insolvent insurers, the NAIC believes that there is a need to provide coordinated regulation even to solvent and financially strong insurers. To this end, the NAIC has published a Framework for Insurance Company Holding Analysis (13 March 2005) which provides guidance on the concept and role of the Lead State in regulation of multi-state insurers. The Lead State concept is a significant step for US regulation, and also of significance to the Solvency II project, as it **reinforces our view that a lead supervisory model is necessary to facilitate efficiency in the supervision of Groups**.

In Europe, the concept of co-operation between member states is already well established in the Insurance Groups Directive and further supported by CEIOPS in the Helsinki protocol:

“CEIOPS has agreed, through the Helsinki Protocol, that within the framework of the IGD, Member States’ insurance supervisory authorities should strive to cooperate via a Co-Co⁴¹. The Co-Co should consist of Members of EEA Supervisory authorities involved with the supervision of insurance undertakings within the insurance group. The supervisors concerned should strive for forms of cooperation in the exercise of the supplementary supervision which are sufficiently flexible. The Co-Co of an insurance group may decide to appoint either a Key Coordinator and/or a Lead Supervisor.

³⁹ When considering the Group solvency test, consideration of credit risk associated with intra-Group transactions should be eliminated

⁴⁰ “Towards a Lead Supervisor for Cross-Border Financial Institutions in the European Union”, European Financial Services Roundtable, June 2004, <http://www.efr.be/members/upload/news/997322RepSV04.pdf>

⁴¹ Co-ordination Committee

We believe that this concept of cooperation is the crucial platform on which appropriate supervision of Group diversification benefits can be carried out.

However, without a lead supervisor to facilitate the overall process at the same vantage point as the group parent, it will not be possible for the combined regulatory authorities to understand the true risk profile of the organisation.

Keeping this in mind, we need to strengthen the existing approach to the appointment of lead supervisors, which is completely in line with the recommendations of the European Financial Services Roundtable⁴². CEIOPS noted⁴³ that in a recent survey conducted among the Co-Cos involved in supervising insurance groups operating in more than one EEA country it appeared that a lead supervisor was often not appointed, on the grounds that even without appointing one colleague as Lead Supervisor, the flow of information, information gathering etc. runs smoothly. **While this partial approach is acceptable for the current solvency regime, it is imperative for Solvency II that the role of the lead supervisor becomes a mandatory feature of the supervision of Groups, rather than elective.**

Principle 6

Co-ordination between supervisors of local entities and Groups is essential to ensure an efficient, competitive European insurance market.

It is essential that for each Group, there is a mandatory Lead Supervisor who understands the aggregate risk profile for the Group, facilitates co-ordination across individual supervisors, ensures that it runs smoothly, and has the ability to take decisions when a consensus among individual supervisors is not forthcoming.

⁴² “The lead supervisor’s responsibilities should include: defining all reporting schemes, validate and authorise internal models, approve capital and liquidity allocation, and approve the cross border set-up of specific functions. Local supervisors should of course be involved in the process, based on specific agreements with the lead supervisor. We propose that the national supervisors should form a ‘college of supervisors’ in which they can exchange information and give advice to the lead supervisor. The college should not, however, be able to delay the decisions of the lead supervisor. In cases of disagreement the college should have the right of appeal”

⁴³ ‘Report on Possible need for Amendments to the Insurance Groups Directive’, CEIOPS Consultation Paper Number 6, March 2005, Page 11

6. Policy recommendations for incorporating diversification effects in solvency regulation

In this section we propose a framework for the solvency assessment of insurers that, at a high level, comprises three components:

- A Solo Entity Solvency Test that recognises diversification, risk transfer and capital support provided by companies within the Group
- A Group Solvency Test that recognises diversification effects at Group level
- A regulatory framework that encourages the development and use of approved internal models

We believe that this framework promotes sound risk management while offering supervisors a tractable solution. In particular, the chief improvements that this framework offers versus the Solvency I system are that it:

- Aligns regulatory capital requirements with the risk profile of the insurer
- Promotes transparency in the way insurers measure, manage and disclose the risks in their business
- Incentivises a deeper understanding of the firm's risks and its capabilities for managing them by supporting and encouraging the development of internal models
- Creates a level playing field, whereby all insurers are subject to consistent application of regulatory capital requirements
- Encourages an efficient regulatory environment, wherein supervisors collaborate to share relevant information and ensure appropriate safeguards

In the remainder of this section we first describe the conceptual foundations and then detail these three components of our policy framework, highlighting the advantages over existing approaches.

6.1. Conceptual foundations

The framework that we are putting forward incorporates several existing regulatory concepts.

- Solvency tests for individual (solo) insurance entities and, separately, for Groups
- Dual levels of capital requirements: minimum and target solvency capital requirement
- Lead supervisor

These, combined with each of the 6 Principles described earlier, serve as the foundations for our proposed policy framework.

First, it is based on the notion that there are separate solvency tests for solo entities and for Groups. At present the tests for solo entities vary, based on the requirements of the local supervisor (although within the EU these are being harmonised through the Solvency II project) while the Group test is a sum-of-parts test that takes no account of diversification. It is these two features in particular of the Group test that we are proposing to change and refine.

Second, it is based on the concept of two levels of capital requirement – a minimum capital requirement (MCR) and a target, or solvency capital requirement (SCR). This concept is already embedded in the discussions of CEIOPS and the European Commission regarding the Solvency II framework.

According to CEIOPS, although the MCR has yet to be defined in full detail, its working definition is that it *reflects a level of capital below which an insurance undertaking's operations present an unacceptable risk for policyholders, and therefore immediate supervisory action is required.*⁴⁴

The working definition for the SCR is that it *should reflect the amount of capital necessary to meet all obligations over a specified time horizon (including the present value of future obligations) to a defined confidence level, taking into account all significant, quantifiable risks.*⁴⁵

Finally, it is based on the concept of each Group having a 'lead supervisor', who is responsible for supervising each such Group's overall capital adequacy. This concept too is already articulated as part of the Insurance Groups Directive and Financial Conglomerates Directive, where the lead supervisor is responsible for carrying out the 'adjusted solvency calculation' in both cases. We propose to mandate and extend this role.

So, while the framework we are putting forward is based on existing regulatory concepts, it also differs in several fundamental ways, which we describe in the following sub-sections. We stress that the three elements in this proposed framework are inextricably linked and that taking some of these proposals, but not others (for example by allowing diversification to be accounted for at the solo level while not mandating a single lead supervisor to authorise the use of internal models for the solo and group tests), would undermine the entire framework by creating unnecessary duplication, and by potentially leading to internal consistency and comparing 'apples with pears'.

⁴⁴ Second Progress Report to the European Commission on CEIOPS work in the field of the Solvency II project, CEIOPS, February 2005, Page 7

⁴⁵ Second Progress Report to the European Commission on CEIOPS work in the field of the Solvency II project, CEIOPS, February 2005, Page 7

6.2. Solo Entity Solvency Test recognises diversification, risk transfer and capital support provided by companies within the Group

The concept of a solo entity solvency assessment is firmly established within the existing regulatory framework. We propose however to improve upon the existing solo tests by better aligning risk and capital requirements. In particular we propose:

Policy 1a – Recognition of diversification in required capital calculations

Explicit recognition for MCR and SCR calculations of diversification (both within risk type and across risk type and, where applicable, across geographies⁴⁶) at the solo/legal entity level, where the diversification effects are those observable within that solo entity, subject to risk modelling requirements (see Policy 3 – Risk modelling requirements)

Policy 1b – Recognition of risk transfer in required capital calculations

Explicit, consistent and comprehensive recognition of internal and external risk transfer in terms of MCR and SCR determination of the solo entity. In order to receive credit for risk transfer in the determination of required capital at the solo entity level, companies must meet the following standards:

- Companies must be able to demonstrate the extent to which this offsets their risk positions (e.g. model the impact of both simple and complex structures on the aggregate risk position)
- Companies must evaluate and disclose material performance or basis risks
- Companies must evaluate and disclose concentrations of exposure to counterparties (both individual entities as well as the ultimate parent exposure)
- Full recognition must be given to internal risk transfer provided the receiving entity is regulated by recognised and accepted solvency supervision
- If the entity runs counterparty risk either internally or externally, the risk modelling (see risk modelling requirements as defined in Policy 3) should include an appropriate assessment of counterparty risk. When considering the Group solvency test rather than the solo test, consideration for such credit risk associated with intra-group transactions should be eliminated.

⁴⁶ Comprises levels 1, 2 and 4 of diversification, as described in Section 4.4. Level 4 diversification could arise in a solo entity that undertakes cross-border business.

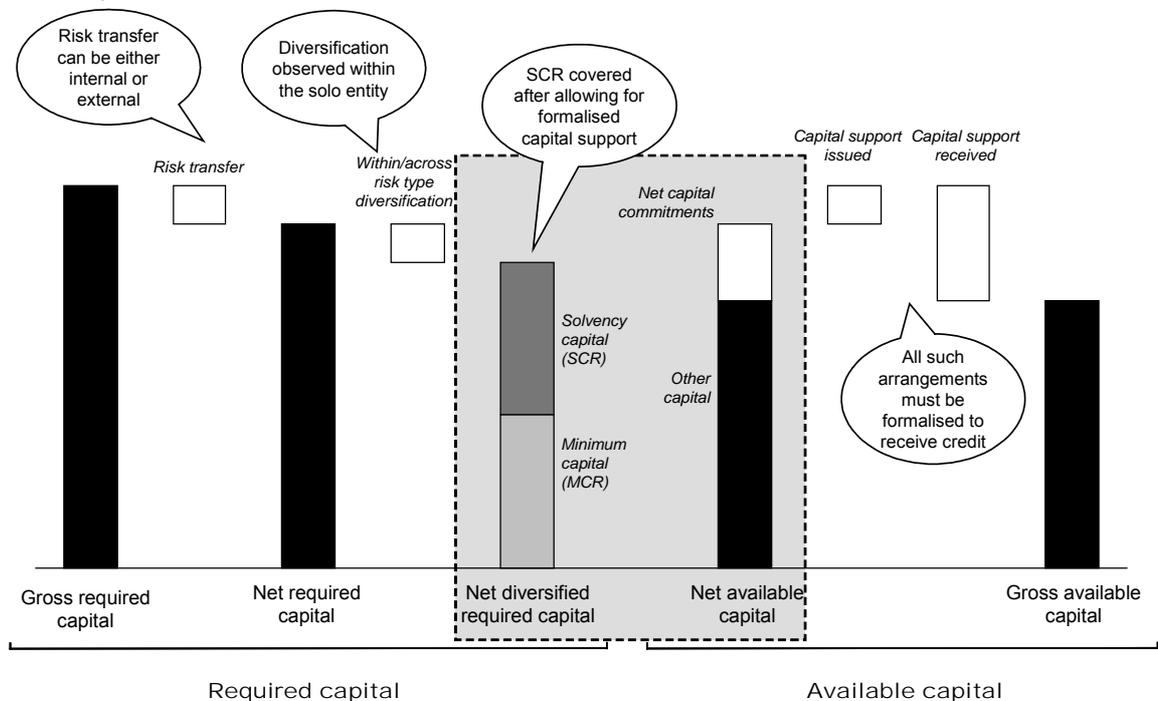
Policy 1c – Recognition of capital support in available financial resources assessment

Explicit, consistent and comprehensive recognition of formalised capital support (from within or outside the Group taking into account the associated credit risk) in the assessment of available financial resources of the solo entity. Includes all qualifying forms of capital, insofar as they are backed by formalised agreements between the receiving and pledging entity.

Formalised capital support could be used to satisfy the solo SCR, although further work is needed to determine which forms of such capital support should qualify towards satisfying the solo MCR.

These policy proposals for the solo entity test are illustrated in Figure 10, below.

Figure 10. Solo test that incorporates diversification, risk transfer and capital mobility



In our view, there are several material benefits to this approach. Namely, that **such a solo test would align the regulatory capital requirements with the risk profile of the company by recognising diversification and discouraging concentrations.** Furthermore **it treats all companies similarly, by considering in the required capital assessment only those effects arising within the solo entity, making it apparent from where the diversification impacts arise.**

The only difference between the treatment of those companies that are part of Groups and those that are not is in the assessment of available financial resources. Policy 1c proposes that **companies could hold capital pledged from elsewhere within or outside a Group, as long as that pledge is backed by formalised agreements and the capital is sufficiently mobile**. Access to such capital is an advantage of a Group structure, whereby free assets can be held centrally and re-allocated when called upon, thereby reducing the frictional costs of actual capital transfers where not required. Recognition of this type of capital support is already recognised in the setting of capital requirements for banking subsidiaries through Article 69 of the Capital Requirements Directive for Banks although we believe it is important for this Directive to be extended, for both banks and insurers, to apply across Member States⁴⁷ and recognised territories outside the EU. Not recognising such instruments not only reduces the flexibility of insurance groups to use their full group balance sheet to support individual entities, but also at present places insurance groups at a competitive disadvantage to banking groups.

6.3. Group Solvency Test recognises diversification effects at Group level

As stated in Principle 5, to correctly assess the effects of risk concentration and diversification in an insurance Group, **it is critical to have a Group level capital assessment that is not simply a ‘sum-of-standalone’ capital assessments of each of the solo entities within the Group**. Moreover, given the extent to which diversification effects can vary across different insurance Groups, based on their risk profile, business mix, geographical profile, corporate structure and risk management practices, it is difficult to define a set of standard factors that can appropriately capture the effects. Instead, the Group level capital assessment should aim to explicitly capture the effects of risk diversification and capital through a realistic, risk-based model.

This raises the question of what precisely should be the form of such a Group level capital assessment. Current risk-based solvency tests (of solo entities) are typically based on an ‘asset-adequacy test’, whereby the overall assets of an entity are required to be sufficient to meet the liabilities to a certain solvency standard. For a solo entity, that is not part of a Group, this is a relatively easy assessment because the entirety of the assets and liabilities are held by the local entity. However, **for a Group, capital mobility means that free assets held in other parts of the Group structure (e.g. by the parent or subsidiary company) are also available to meet local obligations**. Moreover, some assets within the Group might be partially ‘trapped’ inside individual companies, and therefore not fully able to support other companies within the Group. Therefore, what is needed for the Group level solvency assessment is:

- Analysis of the Group capital structure to identify acceptable forms of capital for the Group solvency test

⁴⁷ Article 69 currently applies in situations where both the subsidiary and the (parent) credit institution are subject to authorisation and supervision by the same Member State.

- Identification of any additional Group level assets or liabilities that should be included in the solvency test
- Assessment of the capital within each entity that could potentially be transferred out of it to support other entities within the Group, taking account of local regulatory capital requirements – the “distributable cash flows”
- Assessment of the capital that each entity might potentially need to have transferred into it from other entities within the Group in order to meet local regulatory capital requirements
- Analysis of any capital support provided by the Group to the solo entities.

Therefore we propose the following policy framework for the assessment of Groups in a way that reflects diversification effects:

Policy 2a – Recognition of diversification in required capital calculations

Explicit recognition for MCR and SCR calculations of diversification (within risk type, across risk type, across entities and across regulatory jurisdictions⁴⁸) at the Group level, subject to risk modelling requirements (see Policy 3 – Risk modelling requirements)

Policy 2b – Recognition of risk transfer in required capital calculations

Explicit, consistent and comprehensive recognition of internal and external risk transfer in terms of MCR and SCR determination at the Group level. In order to receive credit for risk transfer in the determination of required capital, companies must meet the following standards:

- Companies must be able to demonstrate the extent to which this offsets their risk positions (e.g. model the impact of both simple and complex structures on the aggregate risk position)
- Companies must evaluate and disclose material performance or basis risks
- Companies must evaluate and disclose concentrations of exposure to counterparties (both individual entities as well as the ultimate parent exposure)
- If the entity runs counterparty risk either internally or externally, the risk modelling (see risk modelling requirements as defined in Policy 3) should include an appropriate assessment of counterparty risk.

⁴⁸ Consists of levels 1 through 4, inclusive of diversification effects as described in Section 4.4.

Policy 2c – Recognition of capital support in available financial resources assessment

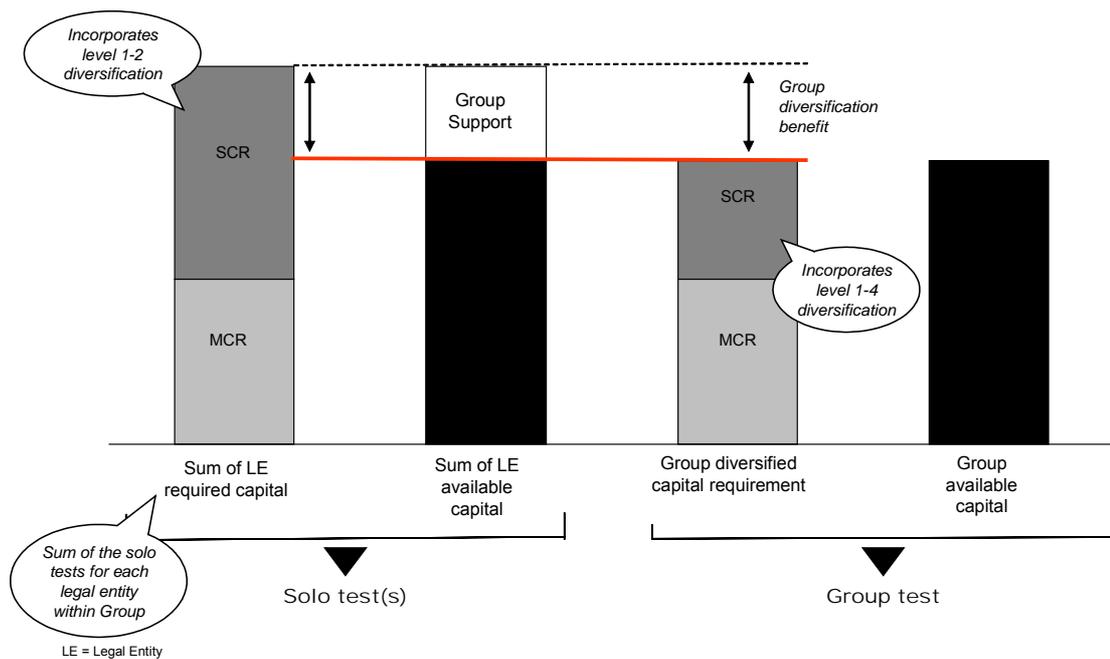
Explicit, consistent and comprehensive recognition of formalised capital support (from within or outside the Group) in the assessment of available financial resources of the Group. Includes all qualified forms of capital, insofar as they are backed by formalised agreements between the receiving and pledging entity.

The Group’s ability to pledge formalised capital support is subject to its ability to meet the Group solvency test.

Such forms of capital support are already recognised in the setting of capital requirements for banking subsidiaries through Article 69 of the Capital Requirements Directive for Banks, although we believe it is important for this Directive to be extended to apply across Member States⁴⁹ and recognised territories outside the EU.

These policy proposals for the Group test are illustrated in Figure 11, below.

Figure 11. Group test that recognises diversification, risk transfer and capital mobility



⁴⁹ Article 69 currently applies in situations where both the subsidiary and the (parent) credit institution are subject to authorisation and supervision by the same Member State.

Again, we see many advantages to this approach. **Those diversification effects that arise across the Group (namely levels 3 & 4) are reflected in the assessment of the Group, aligning the risk and capital requirements.** Instead, the diversification benefits flow through the Group SCR, and, to the extent the Group meets the Group SCR, the diversification benefits (sum of solo SCR less Group SCR) are available to be pledged/down-streamed as capital support to the solo entities. This, unlike the current additive approach of Solvency I and other frameworks (recall Table 2), reflects the true risk profile of the Group.

As with the solo test, **transparency and certainty are significant improvements over the current system.** Since risk transfer and capital mobility are governed by formalised agreements, they ensure that the terms are known in advance. This gives the local supervisor confidence that the quantum and extent of support are certain, rather than simply an implicit understanding. In addition, **the approach for the Group test is consistent with the approach for the solo test,** having the advantage of applying the same model and preventing that risks are not recognised by applying models that are different. Furthermore, **it provides protections to the Group, solo entities and customers alike from contagion, by maintaining firewalls between entities.** In this way, if one entity within a Group were to fail, others would have no obligation to bail it out apart from any formal commitments pledged to do so, thereby limiting a spread of risk from that entity to the rest of the Group. Furthermore, our proposals promote disclosure of such arrangements to the relevant supervisor, promoting transparency in the system.

In addition, as mentioned in the discussion of the solo tests, persisting with the current test would penalise insurers relative to banks, which through Article 69 of the banking Capital Requirements Directive are able to provide formalised support in such a way that the entire balance sheet of the Group can be supported by a single entity. Allowing insurers to utilise similar instruments of formalised capital support would also bring it into line with the risk-based solo solvency framework.

Table 3 below summarises the policy proposals described thus far.

Table 3. Recognising diversification in Solo and Group tests

		Solo test	Group test
Required capital	<i>Level 1 diversification – Within risk types</i>	Fully recognises diversification arising within the solo entity	Fully recognises diversification arising across the Group
	<i>Level 2 diversification – Across risk types</i>	Fully recognises diversification arising within the solo entity	Fully recognises diversification arising across the Group
	<i>Level 3 diversification – Across entities</i>	Not applicable	Fully recognises diversification arising across the Group
	<i>Level 4 diversification – Across regulatory jurisdictions</i>	Not applicable	Fully recognises diversification arising across the Group
	<i>Internal risk transfer in or out</i>	Full recognition, where formalised agreements in place and disclosed	Full recognition, where formalised agreements in place and disclosed
	<i>External risk transfer in or out</i>	Full recognition, where formalised agreements in place and disclosed	Full recognition, where formalised agreements in place and disclosed
Available capital	<i>Formalised capital support from Group</i>	Full recognition, where formalised agreements in place and disclosed	Full recognition, where formalised agreements in place and disclosed
	<i>Formalised capital support pledged to Group</i>	Full recognition, where formalised agreements in place and disclosed	Full recognition, where formalised agreements in place and disclosed

6.4. Approved internal models for risk modelling

As discussed earlier, the unique and varied risks faced by each company as a result of the products they offer, the investment decisions they make, and the risk transfer and hedging programmes they implement makes it extremely difficult to accurately assess an insurer, particularly a Group, in a standardised model. Accordingly, **we support the development of internal models as a means of promoting a greater and more precise understanding of the risk profile in general, and diversification and concentration effects in particular.** However we also recognise that a proliferation of models makes it more difficult for supervisors to have confidence that risks are being assessed appropriately. Therefore, we propose a generalised framework that defines the conditions for use of an internal model for risk modelling by standalone insurance companies and Groups:

Policy 3 – Risk modelling requirements⁵⁰

The calculation of the MCR and SCR allow for the following⁵¹:

- Diversification within risk types (Level 1)
- Diversification across risk types (Level 2)
- Diversification across entities (Level 3)
- Diversification across regulatory jurisdictions / geographies (Level 4)

However, since the use of simple factor models often fails to effectively measure the effects of diversification, nor does *any* model ensure that both concentrations and diversification are being actively managed, we propose the following conditions for when diversification effects can be taken:

- Companies must use an appropriate solvency model that reflects those risks inherent in the business undertaken / positions taken, including the impact of concentrations. If applicable, the model should appropriately reflect the impact of counterparty risk on risk transfer transactions. The methods adopted for assessing internal counterparty risk however, should reflect that the greater information available from internal counterparties may reduce certain aspects of the risk e.g. credit risk and legal risk.
- Companies must stress test their model assumptions and review systematically for reasonableness
- Companies must disclose to their lead and local supervisor the assumptions underlying their risk modelling which lead to diversification effects
- Companies must maintain a risk governance system
- For diversification across business unit or business line, benefits may only be recognised when it can be demonstrated that the business is being managed to capture them
- The supervisor for the company (or lead supervisor in the case of Groups) must be satisfied (whether through own evaluation or by outsourcing the evaluation) that the modelling assumptions and control environment are sufficient for the business undertaken

Clearly the use and supervision of internal models for understanding and managing diversification and concentrations, as described in Policies 1-3 creates obligations for companies and supervisors alike. For solo entities and Groups, this means meeting the various conditions described herein in order to receive credit for diversification, risk transfer and capital mobility.

⁵⁰ Please refer to the Chief Risk Officer Forum's internal model benchmarking study for a detailed discussion of risk modelling standards

⁵¹ Subject to policies 1a-1c and 2a-2c governing the incorporation of diversification into the solo and Group solvency tests

For supervisors, this means developing an understanding of the internal frameworks developed by companies. **Lead supervisors will have the added obligation of confirming to local supervisors that capital support is backed by sufficient Group resources.** For local and lead supervisors alike, collaboration is required to ensure proper supervision across all entities within the Group.

Policy 4 – Supervision

For every Insurance Group⁵², it is mandatory that a single ‘lead supervisor’ is appointed. The lead supervisor is responsible for supervising Group solvency, including setting Group capital requirements, and reviewing the use of any internal models across the entire Group to support both the Pillar 1 calculation of capital requirements and the Pillar 2 supervisory review. Lead supervisors will also facilitate the sharing of relevant information with and between local supervisors of Group entities.

This recommendation builds on and extends Article 129, paragraph 6 of the Capital Requirements Directive for banks⁵³.

To reiterate, our proposal for a lead supervisor is consistent with the role as defined under the IGD and FCD, however **we are proposing that rather than this being an elective appointment, it be mandated for the supervision of each insurance Group.** Such supervision is an important means of **promoting efficient and effective supervision.** Furthermore, it becomes an important enabler of recognition of Group diversification effects, whereby the lead supervisor would be able to provide the necessary information to local supervisors to enable them to effectively assess solo solvency.

The roles and responsibilities under our proposed policy framework are as follows:

⁵² In the case of insurance companies that are not part of a larger Group (e.g. local, mono-line insurer), the lead supervisor would be, by definition, the supervisor in their local jurisdiction.

⁵³ In our view, there are strong compelling reasons, from both legal precedent and competitive ‘level playing field’ perspectives, for this Article at a minimum to apply with equal force to insurers as it does to banks, and ideally for the rule to be extended to further strengthen the role of the lead supervisor in supervising insurance Groups for both Pillar 1 and Pillar 2 issues. Indeed, were this Article **not** to be applied with equal force to insurers, there could well be anti-competitive consequences, and increased scope for regulatory arbitrage.

Table 4. Co-ordination among supervisors is an important enabler

Role	Responsibility
Solo entity	<ul style="list-style-type: none">▪ Quantifies diversification effects across the solo entity, allowing for both internal and external risk transfer, and demonstrates to the local supervisor how they are actively used in the management of the business▪ Quantifies diversification effects across the Group, insofar as applicable⁵⁴▪ Demonstrates to the local supervisor that its own capital resources are sufficient to cover the MCR and, after allowing for any Group support, are sufficient to cover the SCR
Insurance Group	<ul style="list-style-type: none">▪ Quantifies diversification effects across the Group, accounting for both internal and external risk transfer, and demonstrates to the lead supervisor how they are actively used in managing the business▪ Provides the lead supervisor with Group level diversified solvency assessment▪ Provides support to solo entities, subject to formalised contractual terms and limits
Local supervisor	<ul style="list-style-type: none">▪ Supervises the solo entity risk identification and quantification process and the diversified solvency assessment allowing for diversification effects and risk transfer within the solo entity▪ Collaborates with lead supervisor to incorporate Group support of local entity
Lead supervisor	<ul style="list-style-type: none">▪ Supervises the group-wide risk identification and quantification process (including internal models used) and the diversified solvency assessment▪ Signs-off on the use of all internal models across the Group if the group of supervisors responsible for supervising each of the Group's operations have not formulated a response to a request for approval of internal models⁵⁵▪ Promotes efficiency in the system by confirming to the local supervisors of the solo entities that any Group support is sufficiently covered (on a diversified basis) by Group capital resources

⁵⁴ This situation could in theory apply where a Group exists within a single country only, and therefore only Levels 1-3 diversification are considered.

⁵⁵ See Article 129, paragraph 6 of the Capital Requirements Directive for Banks

7. The Way Forward

In this paper we have highlighted the importance of diversifying strategies to risk management in the insurance industry. We have also presented a set of core principles to form the basis of European insurance regulation that incorporates diversification in a consistent manner and a policy framework that promotes sound risk measurement and management practices, in a way that can be implemented and supervised with confidence.

The Chief Risk Officer Forum recognises that the evolution of the Solvency II project is still at a relatively early stage and there is a wide range of issues that could affect its future evolution. However, the Chief Risk Officer Forum strongly believes that the Solvency II project represents an important opportunity to build a forward-thinking insurance regulatory system, fostering the most sophisticated risk management practices leading to the strongest and most efficient insurance companies worldwide. Such a system would align regulatory capital requirements with the risk profile of the insurer. Recognition of diversification, in a consistent, transparent way is an important step in this process. We welcome and encourage an open dialogue on this important topic.

Appendix A. Virtual company analysis: approach and key insights

As a part of our study, we perform a detailed analysis of virtual companies to gain an insight into the effects of diversification. We now elaborate on the scope of this analysis and the methods we have employed.

As a starting point, we construct a set of virtual companies representing several different business archetypes observed in the industry. We then flex several different properties of each business archetype sequentially, to study the impact of these properties on the risk profile and economic capital requirements. We have taken utmost care to ensure that the virtual companies, their business properties and standalone capital requirements are representative.

Our analysis is divided into two sections

1. Construction of business archetypes:
 - A. Calculation of capital requirements for the local companies
 - B. Aggregation of capital requirements using correlation factors
2. Analysis of business archetypes:
 - A. Observing the differences in diversification effects across the different business archetypes
 - B. Measuring the sensitivity of diversification effects to various business properties for each business archetype

A.1. Construction of business archetypes from local companies

The various business archetypes are constructed using local companies as building blocks. It is useful to think of the local companies as subsidiaries. This allows us to sum up the local company premiums, balance sheets and standalone capital requirements to get the equivalent for the business archetype.

We use four local companies as building blocks: these include a local life insurer, a local Property & Casualty (P&C) insurer, a local reinsurance company and a local bank. These building blocks are used to create the business archetypes depicted in Table 5.

Table 5. Composition of business archetypes

	Business archetypes	Product mix	Geographical footprint
Insurance company	Local Life Insurer	▪ Life only, with protection, savings and annuities	▪ Operating in a single country
	Local P&C Insurer	▪ P&C only, with industry typical mix of business lines	▪ Operating in a single country

	Business archetypes	Product mix	Geographical footprint
Insurance Group	Local Composite	▪ Even split between P&C and Life premiums	▪ Operating in a single country
	Global Life	▪ Life only	▪ Operating in 6 countries
	Global P&C	▪ P&C only	▪ Operating in 6 countries
	Global Composite insurer	▪ Even split between P&C and Life premiums	▪ Operating in 6 countries
	Global Reinsurer	▪ Split between P&C and Life premiums 80%:20%	▪ Operating globally (12 countries)
Financial conglomerate	Global Bancassurance	▪ Even split between P&C premiums, Life premiums and banking revenues	▪ Operating in 4 countries

A.1.1. Calculation of capital requirements for the local companies

The four local companies are constructed based on a set of underlying assumptions regarding size and product mix. The line of reason for each assumption is provided below:

- The insurance companies have annual premiums of €800 MM and the bank has gross revenues of €800 MM. This is in line with the values for any top-20 player in any of the large European markets
- The P&C and banking companies both have market-average product mixes. The life company sells mostly non-linked products and the reinsurance company writes mostly P&C insurance, of which 20% is property catastrophe. All its other business is proportional reinsurance.
- Each company has only localised operations, within a single country

We need to make another set of assumptions to derive the capital requirements for these local companies that we have constructed. These include:

- The capital is held by the local company to satisfy economic purposes (as opposed to regulatory or rating agency capital) at a target rating of single A.
- Instantaneous risk factor shocks are calibrated to a 1-year time horizon, but cash flows may be affected over a longer period of time. The liabilities are valued using market consistent approaches.
- We exclude operational and business risks due to a lack of definitional clarity regarding these risk types. We feel that incorporating these risk types may diminish the illustrative value of the capital assessments of business archetypes

Figure 12. Standalone capital requirements for local companies

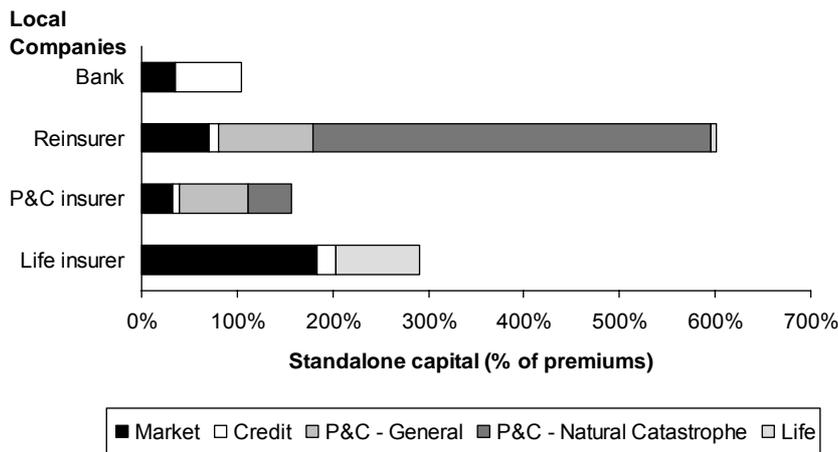


Figure 12 depicts the capital requirements for the 4 local companies. It is interesting to note the prohibitively large standalone capital requirements for the local Reinsurance Company, making such standalone reinsurance entities seemingly unviable. This raises the question of how reinsurance companies exist in the first place. The answer is that a large, well-diversified Reinsurance group benefits from a substantial reduction of capital levels through diversification effects across geographies. Our analysis however artificially restricts the local Reinsurer to a single territory.

A.1.2. Aggregation of capital requirements using correlation factors

In addition to the standalone capital requirements and the composition of the business archetypes, we also need the tail correlation factors between risk (sub-) classes to derive the capital requirements at Levels 2 (BU-diversified), 3 (Country-diversified) and 4 (Group-diversified).

Figure 13. Correlation factors to aggregate capital requirements within a geography

Risk type	Market				Credit			P&C Insurance				Life Insurance			
	Equity	Interest rate	Real estate	Other investment	Investments	Reinsurance	Other receivables	Basic losses	Large losses	Natural Catastrophe	Persistence	Mortality	Morbidity	Expenses	Persistence
Market	Equity	100%													
	Interest rate	80%	100%												
	Real estate	80%	80%	100%											
	Other investment	80%	80%	80%	100%										
Credit	Investments	80%	80%	80%	80%	100%									
	Reinsurance	80%	80%	80%	80%	80%	100%								
	Other receivables	80%	80%	80%	80%	80%	100%								
P&C Insurance	Basic losses	20%	20%	20%	20%	30%	20%	100%							
	Large losses	20%	20%	20%	20%	40%	20%	50%	100%						
	Natural Catastrophe	20%	20%	20%	20%	50%	20%	10%	10%	100%					
	Persistence	10%	10%	10%	10%	0%	10%	10%	10%	100%					
Life Insurance	Mortality	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%				
	Morbidity	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	100%			
	Expenses	20%	20%	20%	10%	10%	0%	10%	0%	0%	10%	0%	100%		
	Persistence	20%	20%	20%	10%	10%	0%	10%	10%	10%	20%	0%	0%	50%	100%

Figure 14. Correlation factors to aggregate capital requirements across geographies

Risk type	Market				Credit			P&C Insurance				Life Insurance			
	Equity	Interest rate	Real estate	Other investment	Investments	Reinsurance	Other receivables	Basic losses	Large losses	Natural Catastrophe	Persistency	Mortality	Morbidity	Expenses	Persistency
Market	80%														
Equity	80%														
Interest rate	70%	80%													
Real estate	70%	70%	80%												
Other investment	70%	70%	70%	80%											
Credit															
Investments	70%	70%	70%	70%	80%										
Reinsurance	70%	70%	70%	70%	70%	80%									
Other receivables	70%	70%	70%	70%	70%	70%	80%								
P&C Insurance															
Basic losses	10%	10%	10%	10%	10%	10%	10%	30%							
Large losses	10%	10%	10%	10%	10%	10%	10%	30%	30%						
Natural Catastrophe	10%	10%	10%	10%	10%	40%	10%	0%	0%	30%					
Persistency	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%				
Life Insurance															
Mortality	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%			
Morbidity	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	30%	50%		
Expenses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	
Persistency	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%

The correlation factors that have been assumed for the purposes of this virtual company analysis are depicted above in Figure 13 and Figure 14. They refer to aggregation of risks between the Life, P&C, Reinsurance and Banking subsidiaries. The matrix in Figure 13 comprises subsidiaries within the same geography. The matrix in Figure 14 comprises subsidiaries in different geographies. The entries in the Figure 14 should be smaller the difference in physical geography, business mix, legislation, economic environment etc. Note that we have not assumed specific geographies for this analysis (e.g. France) but instead have maintained a generic model. Note also that these correlation factors are **illustrative**. Neither are they the actual correlations used by any particular insurer, nor are they a recommendation for correlation factors to be used.

A.2. Analysis of business archetypes

A.2.1. Range of diversification effects across business archetypes

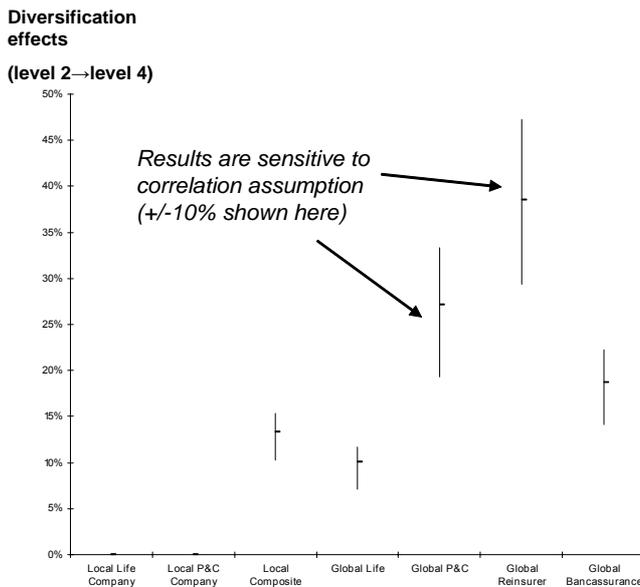
Diversification effects vary significantly and there is no single multiplier that can be applied across the board to accurately portray such effects. In this section we discuss the differences in diversification effects between business archetypes. In the next section, we will extend this discussion to the impact of the underlying business properties.

For each business archetype, the capital requirements are derived twice. First, they are calculated at Level 2 (where the BU-diversified capital is calculated for each subsidiary and then added together) and then they are calculated at Level 4 (Group-diversified). The relative decrease in capital requirement from level 2 to level 4 of aggregation is depicted in Figure 15. The following observations are noted:

- P&C related groups display the largest diversification effect. For P&C companies, insurance risks are a large contributor to standalone capital requirements and these risks diversify well when we aggregate from level 2 to level 4

- Global Life groups display the lowest diversification effects. For global life companies, market risks are a large contributor to standalone capital requirements and these risks diversify less well
- The diversification effects for all business archetypes are sensitive to the correlation factor assumptions that are used; For each archetype, varying the correlation factor assumptions by 10 percentage points in either direction changes the diversification effect by 25% in the opposite direction

Figure 15. Diversification effects per business archetype



A.2.2. Sensitivities of diversification effects to business properties

In the preceding section, we noticed that diversification benefit is dependent on the business archetype in question. Further analysis reveals that differences in business properties are an equally significant influence on the observed diversification effect.

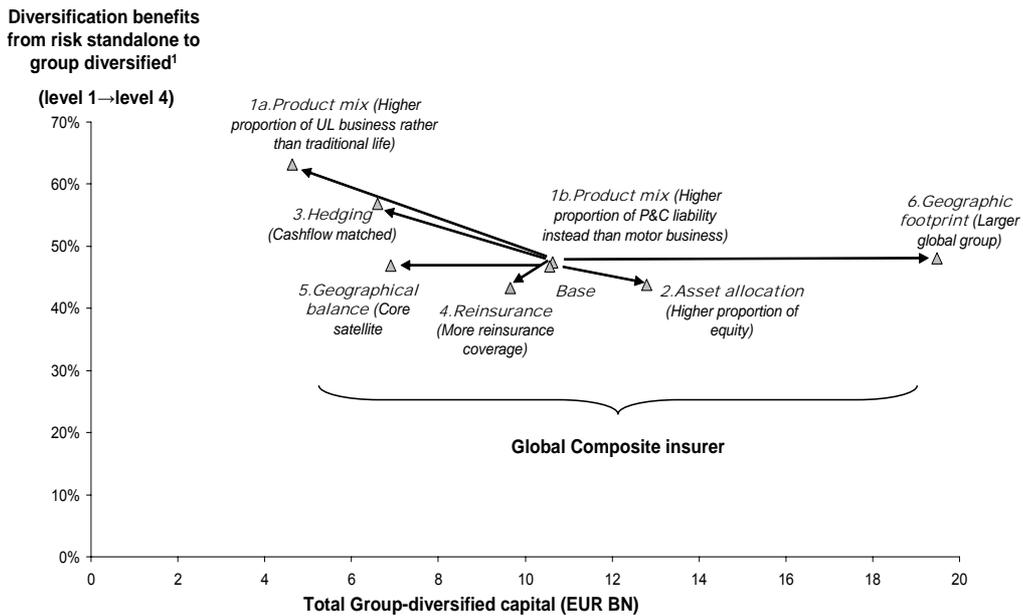
We take each business archetype, and flex six relevant business characteristics sequentially. For each ‘flexed’ archetype, we then observe the diversification effect by measuring the difference in capital requirements faced at the standalone (level 1) and group levels (Level 4). Table 6 discusses the impact of these sequenced adjustments of the business characteristics on the observed diversification benefits.

Table 6. Sequenced adjustments of business characteristics⁵⁶

Adjustment	Impact on business archetypes		
	Capital requirements	Diversification effects	Impact
<ul style="list-style-type: none"> ▪ Product mix: <ul style="list-style-type: none"> – For Life, traditional business is replaced by unit-linked business – For P&C, the motor business (the largest product line in the original archetypes) is replaced by public liability business. 	<ul style="list-style-type: none"> ↓ ↓ ↑ 	<ul style="list-style-type: none"> ↑ ↑ Small 	<ul style="list-style-type: none"> ▪ Capital: most of the downside risks on investments are shifted to the policyholders. Therefore the largest risk exposure for a Life subsidiary disappears ▪ Diversification: the remaining insurance risks diversify substantially better than the (removed) market risks ▪ Capital: liability is a more volatile business than motor. ▪ Diversification: as insurance risks already are a significant part of the overall risk profile for a P&C subsidiary, the diversification effects do not change much. Moreover the direction of the change depends on the total composition of risks for a specific business archetype
<ul style="list-style-type: none"> ▪ Asset allocation: the proportion of equity within total assets is increased 	<ul style="list-style-type: none"> ↑ 	<ul style="list-style-type: none"> Small 	<ul style="list-style-type: none"> ▪ Capital: a larger equity share makes future cash flows less certain ▪ Diversification: for a Life subsidiary, the main risks are already market risks and these diversify less well. For a P&C subsidiary, the main risks remain P&C related, and market risks will still “wash out”
<ul style="list-style-type: none"> ▪ Hedging: switch to cash-flow matching 	<ul style="list-style-type: none"> ↓ ↓ 	<ul style="list-style-type: none"> ↑ (Life) Small (P&C) 	<ul style="list-style-type: none"> ▪ Capital: cash flow matching immunises a company from market volatilities/ risks to a large extent. For a Life subsidiary this is the largest risk exposure ▪ Diversification: the remaining risks within a Life subsidiary diversify substantially better than the – reduced- market risks. Within a P&C subsidiary the market risks are not dominant as in a Life subsidiary
<ul style="list-style-type: none"> ▪ Exposure to reinsurance: extra reinsurance is used to cover all natural catastrophe risks for P&C and the remainder is for quota share (for both Life and P&C) 	<ul style="list-style-type: none"> ↓ ↓ 	<ul style="list-style-type: none"> ↓ (P&C) Small (Life) 	<ul style="list-style-type: none"> ▪ Capital: for a P&C subsidiary the natural catastrophe risks are mostly mitigated. Quota share reduces all risks except for credit risks as it scales down both the asset and the liability side of the balance sheet. However, it increases reinsurance credit risk ▪ Diversification: in the remaining risk composition of a P&C subsidiary the market risks play a more prominent role and these risks diversify less well
<ul style="list-style-type: none"> ▪ Geographic balance: restriction of majority of business to few core subsidiaries. All other subsidiaries become “satellites” 	<ul style="list-style-type: none"> ↑ 	<ul style="list-style-type: none"> ↓ 	<ul style="list-style-type: none"> ▪ Capital and diversification: the risks of the core subsidiaries dominate; the capital requirements are driven mainly by the stressed scenarios for the core subsidiaries with little contribution of the satellite subsidiaries
<ul style="list-style-type: none"> ▪ Geographic footprint: subsidiaries in additional countries are added 	<ul style="list-style-type: none"> ↑ 	<ul style="list-style-type: none"> ↑ 	<ul style="list-style-type: none"> ▪ Capital: risks grow with company size, albeit not at the same pace ▪ Diversification: effects increase with size. The marginal increase levels off quickly: Once a group contains around 3-4 subsidiaries, each additional subsidiary to the group will have a similar, non-zero contribution to the overall risk profile of the group

⁵⁶ Reinsurance is not explicitly discussed as Reinsurance and P&C insurance have very similar sensitivities.

Figure 16. Dependence of capital and diversification effects on underlying business characteristics



In Figure 16, the quantitative impact of these changes is depicted for a single business archetype, the Composite insurer.

Figure 17 illustrates the impact for all archetypes. We observe a very wide range of possible outcomes, depending on the archetype and the underlying business profile. The total diversification effects vary from 30% to 60% across business archetypes and 10% within a business archetype. The group-diversified capital varies by as much as 50%.

Within our analyses of the sensitivities, diversification effects show strongest dependence on reinsurance and cash-flow matching.

Figure 17. Dependence of all archetypes on business characteristics

