ON SOME KEY RESEARCH ISSUES IN ENTERPRISE RISK MANAGEMENT RELATED TO ECONOMIC CAPITAL AND DIVERSIFICATION EFFECT AT GROUP LEVEL

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ABSTRACT

The goal of this short communication is to give an overview of the key research issues in Enterprise Risk Management that arose during the talks and the brainstorming session of the first ERMII research workshop, which was held at ISFA, University of Lyon in June 2007. To define and compute economic capital at group level, fundamental problems related for example to value creation, correlation and capital allocation are stated. The ideas gathered in this paper are not directly ours, we just collected and summarized the ones that arose during the workshop. A full list of participants to the brainstorming session who contributed to this document is given in the acknowledgement section at the end of this paper.

INTRODUCTION

The Institut de Science Financière et d'Assurances (ISFA) hosted the first ERMII research workshop in Lyon, France, in June 2007. ISFA is one of the member institutions of the Enterprise Risk Management Institute, International (ERMII), and a component of University of Lyon. More than 100 participants (researchers and practitioners from many different countries) attended the conference and provided a truly international perspective to the discussions. The workshop was funded by ISFA and ERMII, and organized and chaired by Stéphane Loisel (ISFA). After an introduction by Wayne Fisher (ERMII Executive Director) and presentations by academics and practitioners, a brainstorming

session was held to determine key issues and define research projects. This report aims at disseminating the main findings of this first research workshop and at receiving feedback and collaboration proposals from anyone interested in ERM research.

1.   SUMMARY OF THE MAIN IDEAS THAT AROSE DURING THE PRESENTATIONS AND DISCUSSIONS

Shaun Wang (Georgia State University & ERM-II) gave an introductory talk on Correlation Modeling and Correlation Parameters for Economic Capital Calculations. He examined various drivers of correlation, along with their diversification benefits or contagion effects. After reviewing some correlation models and tail correlation measures, he discussed practical issues associated with Solvency II and Company Internal Economic Capital Models. Such issues include correlation between risk factors, business lines and across geographic regions.

Alexander McNeil (Heriot-Watt University) described some Mixture Models of Dependent Risks, and explained how mixture models for random vectors may be useful in risk modeling. His key arguments are that by mixing underlying distributions with tractable forms (Normal, independent component models, Uniform on simplices,...), we introduce features (like additional dependence and asymmetry) in simple, intuitive ways without completely sacrificing tractability. Besides, as simulation is easy to perform, these models are useful in a Monte Carlo context. Lastly, the latent structure introduced by the unobserved mixing variable(s) has a factor interpretation. Models may often be estimated with statistical techniques for models with a latent structure.

Steve Kou (Columbia University) tackled the following question: What Is a Good Risk Measure: Bridging the Gaps between Data, Coherent Risk Measures, and Insurance Risk Measures. Two main axiomatically based risk measures are the coherent risk measure, which assumes subadditivity for random variables, and the insurance risk measure, which assumes additivity for comonotone random variables. Steve proposed a new, data-based risk measure, called natural risk statistic. This risk measure is characterized by a new set of axioms that require comonotone subadditivity instead of subadditivity. This provides an axiomatic justification for Value-at-Risk (VaR), including Tail Conditional Median (TCM), which is more robust than Tail Conditional Expectation (TCE) and may incorporate scenario analysis.

Pauline Barrieu (London School of Economics) gave a talk on General Pareto

optimal allocations and applications to multi-period risks. Pauline considered the problem of Pareto optimal allocation in a general framework, involving preference functionals defined on a general real vector space. The optimization problem is equivalent to a modified sup-convolution of the different agents' preference functionals. The results were applied to a multi-period setting and some further characterization of Pareto optimality for an allocation was obtained for expected utility for processes. As the Market-Value Margin for one risk in Solvency II is often deduced from the price that one would ask to incorporate this risk in his portfolio, these questions on risk transfersare hidden but of primary importance. Some of the next steps to better study practical issues were identified as having more than two agents, dealing with continuous-time models, and inferring the preference functional from existing transactions.

Pablo Koch-Medina (Managing Director, Risk Management, Swiss Re) tackled the following question: when is diversification a benefit? Pablo mentioned some unresolved issues relevant to diversification and suggested that more effort has to be spent in modeling dependencies and calibration/specification of dependency, that one should investigate how insurers can best realize diversification through intra-group transactions, that one should establish societal costs of regulatory barriers to diversification and identify regulatory environments minimizing them (e. g. equal treatment of all policyholders), and investigate how the adequacy of transferability of funds should be measured and ensured (e.g. liquidity test, etc). Pablo also prescribed investigating evidence for the existence of a risk premium for insurance risks, how to quantify frictional costs and what the drivers of frictional costs are, how allocation of capital costs can serve decentralization, and incentives created by different allocation methods.

Max Bézard (Head of Group Capital Management, BNP Paribas) aimed at setting the bridge between strategic planning, risk profile measures and economic capital. Max discussed the following questions to be addressed: how to link a value based management approach with economic capital? Does economic capital need to reflect a bank's risk aversion rather than a regulator's one? Are there some risks that should not be covered through capital? What is the appropriate notion of time horizon / risk schedule (i.e. multi-period notion) for risk measures and capital needs? How to make sure to identify and leverage correlation and diversification effects? Is there anything other than catastrophic events to be taken into account in economic capital?

Guillaume Gorge (P& C Chief Risk Officer, AXA) discussed practical issues raised

by calibrating risk (especially correlation) of an insurance company. He recommended to develop models (opposite to statistical approach) with a clear understanding of the underlying phenomenon we model: in a word, to focus on dependencies and not too much on correlations. This may be a significant change in paradigm for actuaries, who have developed a non-causal posture with respect to the risks they have to model. In addition, in the Solvency II framework, insurers tend to develop "non-causal" models because these latter are far more simple to explain to third-party and more robust to normal deviation (but less to extreme deviation!). Guillaume thinks that academics should work to fill this gap and propose appropriate models that explain the phenomenon and can be used by insurers in their risk assessment. To show the interest to understand the dependencies to measure correlations, he gave several examples of catastrophe risk and counterpart risk modeling. In a second part, Guillaume discussed diversification in the market consistent framework: in theory, we should allocate diversification according to the way financial markets valuates this diversification: propose for instance two risks and a third risk, bundling of the first two and see the difference in price. But this simple idea is difficult to apply, due to other factors coming in consideration (financial distress,...) and therefore more academic work is expected in that area. A last issue is the horizon of the risk measure: in Solvency II, the risk measure is limited to a one-year horizon but a majority of risks in insurance are carried by insurers on a much longer horizon. Guillaume ended his talk with this question: how can we take into account this time-diversification?

Gary Venter (Columbia University & Guy Carpenter) gave a talk on risk-adjusted profitability. For companies that want to allocate capital, Gary prescribed using marginal decomposition, preferably with a risk measure based on transformed probabilities of underlying events. An alternative to capital allocation (for measuring risk-adjusted profit) could be to charge each business unit for its right to access the capital of the company (consuming capital). Each business unit has the option to use capital when premiums plus investment income on premiums runs out (the company provides stop-loss reinsurance at break-even). Gary discussed the problems associated with the valuation of this option. His conclusions were that marginal decomposition with co-measures improves the allocation exercise, that the choice of a risk measure can make the results more meaningful, that capital consumption removes some arbitrary choices and artificial notions of allocation, and that market value of risk is what is needed in each method... But that we do not really know how!

2.   RESEARCH ISSUES FROM THE TALKS AND THE BRAINSTORMING SESSION

After the talks, an ERM-II working group (including speakers and interested individuals) had a brainstorming session to identify key issues related to economic capital and to set up a research agenda to tackle those issues.

One proposed action is that a group of practitioners and academics jointly develop a framework to facilitate discussions on value creation and recognition between individuals from different backgrounds. This framework will enhance our understanding of issues in economic capital, fair value and group diversification, and will be of value to large financial institutions that have to deal with multiple definitions of economic capital and valuation systems across their organizations. ERMII might be able to sponsor a survey to capture relevant data from interested organizations (perhaps the CRO Forum, for example) that would be of value to researchers and then subsequently provide the research findings to the practitioners to reinforce issues with regulators on matters like diversification. Data could be collected anonymously. This effort would clearly need a committee of research oriented individuals to develop the data requirements, working with some volunteer companies regarding availability.

Another important research topic is how to harmonize the treatment of risks of different time horizons in a market-consistent way. Given the fact that insurers need to hold capital year over year to support long-term risks, there is a need for a framework that reflects time-correlation and diversification for long-tailed risks (e.g. liability or longevity) and produces a 1-year equivalent measurement.

A key issue is to study and understand the interplays between liquidity, market value and long-term value: there was a discussion of the valuation of a deposit, and series of deposits, as in a life policy, as well as on measuring the degree of liquidity and how to incorporate potential future changes that could impact liquidity. More generally, how to deal with illiquidity (by a risk transfer), or how to price illiquidity?

Other suggested research topics include benchmarks for correlation models, and methods for assessing diversification effect according to the liquidity and the mobility of capital at both local and group levels. Correlation is of first order importance for risk aggregation and risk capital assessment. It is also a complex issue, as stochastic dependence between multiple risks often features asymmetrical characteristics.

The discussion on benchmarks included questions like: how does one justify a

balance between judgment and more rigorous analytical approaches? How to factor in correlations for low probability events and/or scenarios that have not occurred? Given the fact that correlations are usually underestimated for extreme events, should one use an actuarial approach or an economic/causality approach? How to balance adherence to a benchmark (that might be provided by ERMII in the future) with internal judgment? How to calibrate this benchmark? In other words, research is needed to help the practitioner determine and then convince management regarding a selected correlation model.

Regarding the diversification effect assessment, the following questions arose: should diversification at the group level have an impact on pricing at the local business unit level? How would one treat marginal costs vs. fixed costs, and how might they be allocated to new business and/or ventures? Another aspect was the concept that the subsidiary implicitly had an "option" on the firm's capital, and this option should have a cost. How would one calculate this cost? And would this be allocated? Should the estimated cost be considered in the pricing of local policies? How would one make this case to a regulator? Would the cost be modified by changes in the liquidity of the parent organization? Practitioners making rate filings and/or completing solvency calculations are concerned with these practical issues.

An ERM-II working group will follow up on these research topics and welcomes any contribution from academics and practitioners. ERMII could well develop subjects for research papers and formalize an RFP process, provide grants, etc., to develop a larger body of ERM research. The presentations and additional detail may be obtained on the conference's website: http://isfaserveur.univ-lyon1.fr/ermii-research-workshop/ and on ERMII's website: http://www.ermii.org.

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