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RISK MEASUREMENT AND MANAGEMENT OF OPERATIONAL RISK IN INSURANCE COMPANIES UNDER SOLVENCY II

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Nadine Gatzert
Andreas Kolb (corresponding author)

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Contact:
Chair for Insurance Economics
Lange Gasse 20
D-90403 Nuremberg
University of Erlangen-Nuremberg (Germany)
Tel.: +49/911/5302-387
Fax: +49/911/5302-888
Email: nadine.gatzert@wiso.uni-erlangen.de, andreas.kolb@wiso.uni-erlangen.de
Risk Measurement and Management of Operational Risk in Insurance Companies under Solvency II

In the context of new risk-based capital requirements for banks and insurers imposed by Basel II/III and Solvency II, respectively, the discussion about operational risk intensified and especially large insurers are now confronted with the need to develop and implement adequate risk measurement and management instruments to deal with operational risk. Broadly defined, operational risk includes all risks, which are not considered in market and credit risk (see Cummins, Wei, and Xie, 2011). In Solvency II, operational risk is defined analogously as in Basel II/III as “the risk of loss arising from inadequate or failed internal processes, personnel or systems, or from external events. Operational risk […] shall include legal risks, and exclude risks arising from strategic decisions, as well as reputation risks” (see European Parliament and the Council, 2009, Article 13, No. 33, Article 101, No. 4).

Besides the new regulatory requirements, cases of high operational losses in the recent past also strongly emphasize the importance and considerably risk associated with operational loss events. One of the most mentioned events in this context is the bankruptcy of Barings Bank in 1995, which was followed by a $1.3 billion loss caused by its rogue head derivatives trader in Singapore. The potential impact of operational losses on an insurer’s risk situation is also stressed by figures regarding potential insurance fraud by policyholders, which in the German insurance market, for instance, is estimated to about €4 billion per year (see Hiebl, Roedenbeck, and Kiefer, 2012). In the third party liability insurance only, 25% of all claims are suspected to be fraudulent and for an average motor liability insurance company, losses due to fraud are estimated to €32.5 million per year (see Hiebl, Roedenbeck, and Kiefer, 2012). The magnitude of these operational loss events in the past strongly demonstrates the need for an adequate measurement and management of operational risks, which is also required according to the new framework Solvency II.

The aim of this paper is to model and quantify the effects of operational risk from an enterprise perspective by focusing on an insurer’s pricing and solvency capital requirements under Solvency II. We thereby compare the Solvency II standard formula with a partial and a full
internal model and further study the effectiveness of reinsurance against operational risk for reducing solvency capital requirements.

In this paper, we contribute to the literature by modeling and studying operational risk from an enterprise perspective and thereby focusing on the impact of operational risk on an insurer’s pricing and capital requirements under Solvency II. We thereby compare the Solvency II standard model with a full internal model using the risk sensitive loss distribution approach and a partial internal model that only focuses on the operational value at risk, i.e. without taking into account diversification effects. To model the operational risk of an insurer the loss distribution approach is used, where the severities of the operational losses in the upper tail of the loss distribution are described by means of extreme value theory (see Gourier, Farkas, and Abbate, 2009). As extreme value theory focuses on the tail area of a distribution, it provides a possibility to approximate extreme events that exceed a high threshold \( \mu \) by the Generalized Pareto Distribution.

The analysis allows the identification of key characteristics that increase or decrease capital requirements above or below the static risk-based factor used for the Solvency II standard model. For insurers, these considerations are also of special relevance in the context of their Own Risk and Solvency Assessment (ORSA) as required according to Solvency II’s Pillar 2. We also assess the impact of operational risk on pricing and in turn study the effect of fair premiums on solvency capital requirements and shortfall risk. In addition, to date, operational risk reinsurance is still at the beginning and not widespread, mostly being purchased by banks; however, risk-based capital standards that also account for operational risk may imply that such reinsurance opportunities will be of increasing importance in the future (see Peters, Byrnes, and Shevchenko, 2011) if they are accounted for in Solvency II and thus help to reduce capital requirements. Thus, we also examine the effectiveness of reinsurance against operational risk and in the analysis also take into account dependencies between operational risk and the insurer’s loss distribution, amongst others, using the concept of copulas.

One main finding is that diversification plays an important role in the quantification of operational risk and that insurers should closely monitor and manage operational risk. In particular, our results reveal that the capital requirements of the Solvency II standard model may severely underestimate operational risk. In contrast, a partial internal model that only focuses on the
Operational value at risk, i.e. without taking into account diversification effects, tends to over-estimate the capital requirements for operational risk. In any case, operational risk measurement and management is highly relevant for insurers and should be integrated in an enterprise risk management in order to adequately control and steer an insurance company.

References


