

CONVERGENCE OF CAPITAL AND INSURANCE MARKETS: CONSISTENT PRICING OF INDEX-LINKED CATASTROPHIC LOSS INSTRUMENTS

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ABSTRACT

Alternative risk transfer (ART) has become increasingly relevant in recent years for insurers and investors, especially due to a considerably growing risk of extreme losses from natural catastrophes caused by value concentration and climate change, as well as the limited (and volatile) capacity of traditional reinsurance markets. In this context, ART intends to provide additional (re)insurance coverage by transferring insurance risks to the capital market. This offers considerably higher capacities and can thus help satisfy the high demand as well as reduce the market power of reinsurance companies. Among the most commonly used ART instruments are index-linked catastrophic loss instruments such as index-based cat bonds or industry loss warranties (ILWs), for instance, whose defining feature is their dependence on an industry loss index and which may also depend on the company-specific loss resulting from a natural catastrophe. However, the current degree of liquidity of the various index-linked instruments considerably differs. While the market for cat bonds is fairly well developed with an increasingly relevant secondary market, for instance, the secondary market for ILWs is less liquid and limited. In this paper, we focus on how these products are priced in a consistent way and discuss under which assumptions (e.g., regarding a liquid underlying market) risk-neutral valuation can be used. This procedure can considerably simplify pricing and enhance transparency, making the market as a whole more efficient. In addition, risk-neutral valuation is of great relevance for the inclusion of such instruments in enterprise risk management strategies as it provides a mark-to-market valuation approach, allowing for partial hedging, versus the

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traditional mark-to-model approaches with the associated model risk (which is very hard to quantify). We develop new pricing approaches by means of approximations and replication techniques and apply them to industry loss warranties (ILWs) as a representative of index-linked catastrophic loss instruments under the assumption of a liquid cat bond and stock market, while carefully addressing the necessary prerequisites and limitations. We study binary ILWs, whose payout depends on the index only, and indemnity-based ILWs, where the payout depends on both the industry index and the individual company losses, thus representing a double-trigger product. The approaches derived in this paper can also be transferred to the consistent pricing of other index-linked catastrophic loss instruments.

Keywords: Alternative risk transfer; index-linked catastrophic loss instruments; industry loss warranties; pricing approaches; risk-neutral valuation; cat bonds.

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