

A MARGINAL COST MODEL OF REINSURANCE ATTACHMENT POINTS, CATASTROPHE RISK AND GOVERNMENT INTERVENTION

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EXECUTIVE SUMMARYⁱ

Financing of catastrophic risk is increasingly becoming a public policy issue at the state and federal level. The growth of residual markets in hazard prone areas increases the importance of finding the proper role and price for private market insurance. Our paper seeks to answer the following four questions regarding the market for catastrophe insurance. 1- What do insurers bring to the table if it is not capital and underwriting expertise? 2- Where are the optimal attachment and detachment points for reinsurance? 3- When should reinsurance be layered and when should it be proportional? 4- Should the different levels of government be involved in catastrophic risk financing and if so, how and at what level?

A Theoretical Model of Insurance/Reinsurance

This research paper presents a theoretical model of the minimum cost of providing catastrophic insurance coverage through the primary and the reinsurance market that includes an implicit (or explicit) presence of government entities as reinsurers of last resort. Using labor (underwriting and claims adjusting costs) and capital (risk financing) as the main inputs for providing insurance services, we show how reinsurance is optimally layered (with attachment and detachment points) for a given book of business. Even though attachment and detachment points are determined to minimize the cost of insurance protection, the cost of catastrophic insurance can nevertheless be extraordinarily high so that making the implicit government's guarantee explicit can reduce this cost and increases the policyholders' (and thus society's) welfare.

The model posits that the total premium is equal to **expected loss** plus **insurance service costs** (ISC), such as marketing, underwriting, claims handling, and the risk premium. The model assumes that the expected loss is a given that needs to be paid. What policyholders want to do then is minimize the ISC component of their premium. It is the relationship between the ISC's labor intensive component (marketing, underwriting, claims handling) and its capital component (risk premium) that determines the insurance/reinsurance contract structure.

In line with traditional insurance/reinsurance market observation, we show that an increase in the price of capital results in a higher cost of insurance (independent of the expected loss) and in higher reinsurance attachment points. If the market was to experience higher labor costs, the total cost of insurance would increase, but reinsurance attachment points would decrease.

The Role of Government as an Insurance Provider

The public policy question will be to assess whether government intervention increases welfare by reducing total ISC, and if so how. Given that the primary and working reinsurance layers are dominated by firms with better underwriting and claims adjusting capabilities than the government's, government intervention is not necessary at these levels. It is also possible that a government entity does not need to become involved (even as a reinsurer of last resort) if the maximum possible loss is low enough that the private market can handle it. As the maximum possible loss increases, however, it becomes more likely that a government entity as a reinsurer is needed to increase welfare, as its lower cost of capital begins to outweigh its inability to underwrite and manage claims.

The public policy implications of having different levels of government involved in the supply of insurance capital are not trivial since public intervention will have an impact on the price of insurance and on the wellbeing of insurers, reinsurers, and policyholders. With no government intervention, the optimal contract that minimizes ISC will differ from one portfolio of risk to the next as the attachment and detachment points are not the same for every contract. If a government entity can also provide contract-discrimination, the solution can be optimal as each agent would end up paying a total premium that is specific to his risk and his ISC. In reality, however, governments rarely treat heterogeneous agents differently. Instead, governments often rely on a one-size-fits-all approach in its policies (which may reflect its inability to discriminate properly). This results in a suboptimal solution. We consequently look at two types of government involvement that induce redistribution problems. If government intervenes at the same level of loss for all agent types by fixing the same government's attachment point for all, the result is suboptimal to having different attachment points for different agents. If instead government discriminates across agents but spreads its ISC across all agents, some agents benefit whereas others lose, again a suboptimal solution.

ⁱ This research would not have been possible without the generous financial support of the Florida Catastrophic Storm Risk Management Center, and of the Social Science and Humanities Research Council of Canada.