The Network Structure and Systemic Risk in the Global Non-life Insurance Market

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Abstract

This paper contributes to the literature on systemic risk by assessing the systemic importance of insurers in the global non-life insurance market. First, we estimate the bilateral reinsurance claims matrix using the aggregate reinsurance outstanding data from ISIS and theoretically analyze the interconnectedness in the global reinsurance network using network indicators. The robustness of the estimated matrix is fully assured by sensitivity analysis. Second, we theoretically analyze the contagious defaults introducing the Eisenberg–Noe framework. Reinsurers play a dominant role in the reinsurance network and most of them are included in our data sample. The network analysis finds that some reinsurers with large centrality measures are central in the hierarchical structure of the network. The default analysis shows the occurrences of many stand-alone defaults and only one contagious default via the global reinsurance network after the global financial crisis. In addition, one stress test based on a hypothetical severe stress scenario predicts a few occurrences of contagious defaults in the future. In conclusion, systemic risk via the global reinsurance network is relatively restricted in the non-life insurance market.

Keywords: systemic risk; interconnectedness; contagious default; network indicator; G-SIIs

1. Introduction

There has been growing interest in the systemic importance of insurers among regulators and hence the lack of both theoretical and empirical studies on the role of reinsurers[1] and their interconnectedness has been an issue to be solved. The purpose of this study is to analyze the systemic importance of the global reinsurance network to the global non-life insurance market. The network analysis plays a significant role in the analysis of systemic importance.

In May 2012, as the global systemic risk regulation in the insurance sector, the International Association of Insurance Supervisors (IAIS) issued a consultative paper proposing an assessment methodology for Global Systemically Important Insurers (G-SIIs), in which they adopted an indicator-based assessment approach consistent with the policy of the Basel Committee on Banking Supervision (IAIS, 2012b). The weight of each indicator for G-SIIs is as follows: size (5%),[2] global activity (5%), interconnectedness (40%), non-traditional insurance and non-insurance activities (45%), and substitutability (5%). Higher evaluation weighting was given to interconnectedness as well as non-traditional insurance and non-insurance activities.[3]

In July 2012, the IAIS released a policy paper entitled "Reinsurance and Financial Stability," a sequel to its 2011 policy paper "Insurance and Financial Stability." The paper addresses reinsurance-specific concerns and evaluates the reinsurance marketplace. It examines the relationship between reinsurance and financial stability and, more specifically, whether traditional reinsurance-related activities pose systemic risk.

"Reinsurance and Financial Stability" addresses reinsurance-specific concerns relating to market concentration rates, risks arising from accumulations and high-value risks, and issues associated with alternative risk transfer (ART), which include activities such as the underwriting of credit default swap (CDS) products. Traditional reinsurance is unlikely to cause or amplify systemic risk, but the case may prove to be different for non-reinsurance activities. In addition, although reinsurance establishes intra-sector connectivity, the mainly hierarchical structure of the insurance market dampens any propagation of shocks.

First, we analyze the interconnectedness in the global reinsurance network using network indicators such as degrees and centrality measures ("network analysis"). It is to be noted that reinsurers (including primary insurers engaged in reinsurance undertaking business) are dominant in the network.

Second, we conduct the model analysis of contagious defaults. For the analysis, we apply the Eisenberg–Noe framework (Eisenberg and Noe, 2001) to the global reinsurance network and set up the default mechanism ("default analysis"). In this framework, defaults are classified into stand-alone defaults and contagious defaults, which are defaults that trigger a domino effect.[4] Because contagious defaults can be caused in a specific setting, it is important to determine whether this framework is suitable for the theoretical analysis using real-world data. Strictly speaking, this framework only

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[1]In our study, they include both reinsurance companies and primary insurance companies who underwrite reinsurance.

[2]The number shown in parentheses indicates the weight.

[3]Using the IAIS assessment methodology and 2011 data, the FSB, in consultation with the IAIS and national authorities, has identified an initial list of nine G-SIIs—Allianz, American International Group (AIG), Assicurazioni Generali, Aviva, Axa, MetLife, Ping An Insurance (Group) Company of China, Prudential Financial (the United States), and Prudential (the United Kingdom).

[4]In the Eisenberg–Noe framework, multi-step defaulting events are not expressed.