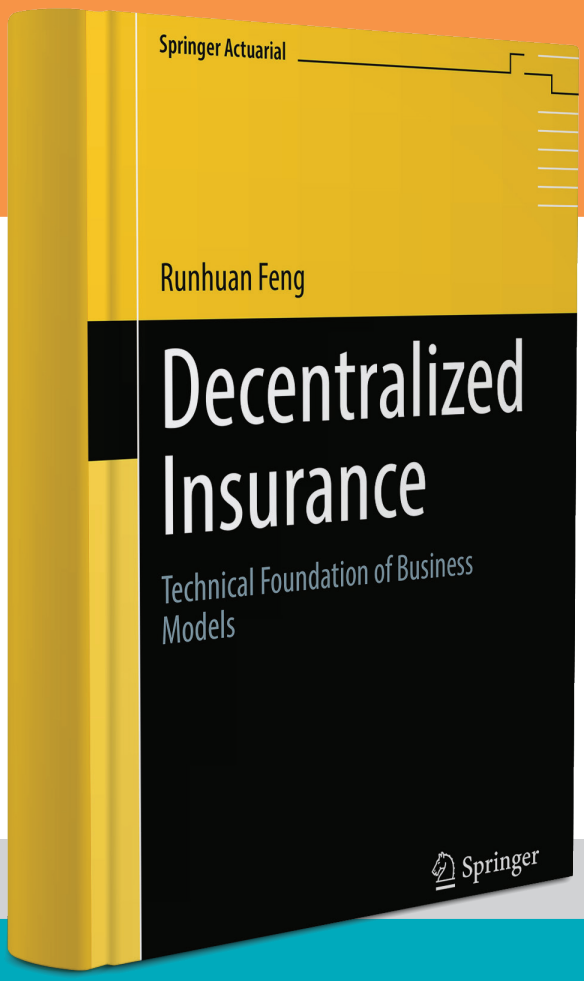

فراخوان ترجمه کتاب

پژوهشکده بیمه

پژوهشکده بیمه، به منظور کمک به گسترش دانش بیمه‌ای، ترجمه کتاب

Decentralized Insurance

Technical Foundation of Business Models

را در دستور کار خود قرار داده است. لذا از کلیه اساتید، پژوهشگران، صاحبنظران و کارشناسان دعوت می‌شود که در صورت تمایل به ترجمه کتاب مذکور، کاربرگ درخواست ترجمه پیوست را به همراه سوابق علمی و اجرایی خود و ترجمه صفحات ذکر شده با ذکر عنوان کتاب، حداکثر تا تاریخ ۱۴۰۲/۰۶/۱۰ به آدرس ایمیل nashr@irc.ac.ir ارسال فرمایند.

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Chapter 5
Decentralized Insurance

Traditional insurance is based on a centralized approach of risk transfer from the insureds to an insurer. A traditional insurance contract is a bilateral contract between an insured and an insurer. As the same contract is sold to millions of insureds, the insurer serves as a central service provider to all insureds. In contrast, decentralized insurance is organized in a community of participants where risks are transferred and shared with each other. A decentralized insurance scheme can be treated as a multi-lateral agreement among all participants. Instead of a central authority that sets the terms and conditions of financial arrangements, decentralized insurance is formed on the basis of mutual support. In this chapter, we introduce and examine the basic mechanisms for a range of decentralized insurance schemes developed in different parts of the world, including online mutual aid in China, peer-to-peer insurance in the West, takaful in the Middle East, and catastrophe risk pooling in Caribbean countries. To further illustrate the variety of innovations in the market, we shall also briefly touch upon other business models that can be broadly considered under the framework of decentralized insurance.

5.1 Background

Mutualization is a process that allows members of a community to bring together the resources and means of each for the benefit of all. The fundamental concept of mutualization for risk management has been practiced for centuries around the world where members in a society care for each other's financial needs in the event of misfortune. The roots of modern insurance date back to many early forms of risk sharing such as burial societies well documented in ancient Rome and Egypt, brotherly associations, frith, and religious guilds in Middle Ages Europe. The rise of modern insurance is an industrial revolution that transformed community-based

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mutual agreements for risk sharing into bilateral insurance contracts between an insurer and many policyholders that are protected by civil laws. While there is no direct cash payment between policyholders on the surface, insurers effectively play the role of intermediaries collecting payments from policyholders to pay for those who make legitimate claims, in a way similar to the early forms of community-based risk sharing.

Modern insurance is a centralized form of risk sharing, where an insurer serves as the central authority that provides insurance coverage and services to all policyholders. The standardization of insurance contracts enables insurers to sell them to tens of thousands of policyholders and scale up the risk pool, making the cost of insurance predictable and manageable. As an intermediary to facilitate the transfer of resources among policyholders, the insurer has a concentrated market power to price and design products, to set complex contract terms, and to decide to whom and when to pay claims. There is often mistrust by policyholders that insurers overprice products, fail to keep good on promises, and try everything to deny claims. The failure of an insurer can affect tens of thousands of policyholders, creating a rippling effect on the financial system. As such, the insurance industry is also tightly regulated to protect the interests of mass policyholders. While regulation is a solution to address the issues with centralized insurance, it also imposes heavy administrative costs to stay compliant with licensing, product regulation, market conduct, financial regulations, etc. The inhibiting cost increases entrance barriers for newcomers and reduces market competition, further exacerbating the centralization of the market with a small number of big insurers.

Decentralized insurance is a revival of the concept of mutualization with modern technology. A variety of innovative business models have emerged with the potential to disrupt the traditional insurance industry using telecommunication technologies such as smartphones, blockchain, and Internet of Things. These new tools could address some challenges facing the current insurance industry and improve efficiency in underwriting, risk pooling, and claims management. Along with this changing landscape of technology, the sharing economy, a socio-economic system built around the sharing of resources, is quickly evolving and gaining popularity in a wide range of industries. In contrast with the traditional server-client model in which a central authority provides services to all, the peer-to-peer nature of the sharing economy enables the exchange of goods and services among users without the heavy cost of intermediaries. The rise of the sharing economy brings a new channel for individuals to share their underutilized assets and receive financial rewards. Decentralized insurance is also gaining traction as the manifestation of the sharing economy in insurance coverage. By returning to a community-based mutual support model, decentralized insurance aims to reduce the role of a centralized insurer, or as many argue, “cutting out the middleman”.

In this chapter, we consider a wide range of risk sharing schemes which have been observed in many parts of the world, including online mutual aid originating in China, peer-to-peer insurance in Europe and North America, takaful in the Middle East, and catastrophe risk pooling organized by many international organizations for African, Caribbean, and Central America countries, as well as various risk sharing

schemes developed in the academic literature. *Online mutual aid* is a business model derived from crowdfunding, largely practiced in the area of critical illness coverage. In contrast with crowdfunding where donors pay but do not expect to receive a benefit in return, online mutual aid is a reciprocal agreement where participants collectively pay for benefits to those with legitimate claims in exchange for the same coverage for themselves. Unlike traditional insurance, online mutual aid does not require any ex-ante premium, and all payments are made ex post based on the total claims in each period. *Peer-to-peer insurance* arises when policyholders of traditional insurance, typically renter's or automobile insurance, participate in a pool of family and friends to share the costs of claims below their insurance deductibles. In other words, small claims below deductibles are paid out of a common fund to which each member contributes and large claims beyond the capacity of the policyholders' common fund are covered by traditional insurance policies. Any remaining surplus returns to participants. Such models are known to reduce the cost of insurance in comparison with traditional insurance with full coverage. *Takaful* is an Islamic alternative to traditional insurance developed by the West, as the latter is perceived as inconsistent with the Sharia law. Members make contributions to a takaful fund, which is managed by a financial institution as an operator and used to pay members' claims. When the fund is insufficient, an interest-free loan is provided by the operator to cover the rest of the claims. When the fund maintains a balance, the surplus is used to repay previous loans, and the rest is split between the takaful operator and members. Unlike a traditional insurer, a takaful operator does not own the takaful fund or take on the underlying risk. Takafuls have been developed for both property/casualty and life coverage. *Catastrophe risk pooling* is a financial arrangement among sovereign states to gain access to financial resources in the aftermath of catastrophes. While insurers can provide coverage for disaster payouts with some deductibles and policy limits, the participating countries also have to share some financial burdens with each other. Such a risk sharing arrangement among sovereign states bears close resemblance to community-based insurance strategies among individuals.

5.2 Online Mutual Aid

The online mutual aid model was developed in China around 2011 and derived from crowdfunding models. In fact, the very first online mutual aid platform was created to provide a crowdfunding channel for cancer patients. Instead of relying only on charity, the platform offered a way for participants, mostly cancer patients, to provide financial support to each other. Participants committed to sharing the cost of medical expenses up to some limit of those who went through expensive medical treatments. Each member is not only a donor to someone's causes but also can be a recipient of others' donations. In essence, mutual aid is a way of turning one-way charitable acts from one member to another into bilateral mutually beneficial financial agreements among peers. It was not until 2016–2018 that online mutual aid rose to public attention as large capitals from big tech firms started to pour into

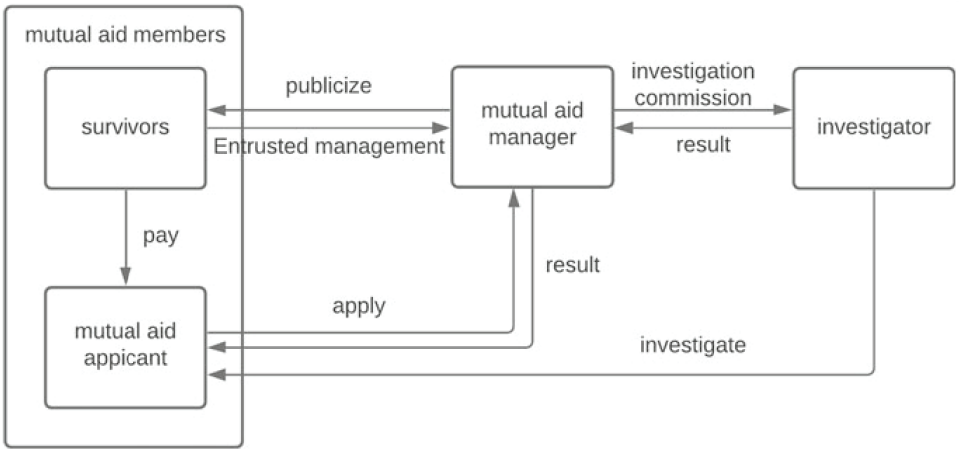

Fig. 5.1 Dynamics of mutual aid participation

the health insurance market. China's insurance industry was tightly regulated, and the regulator had not issued any insurance career licenses for many years. As the mutual aid model closely resembled mutual insurance, tech firms viewed this as an opportunity to enter the insurance industry. While its long-term success is yet to be seen, this innovative model provides a new tool for decentralized risk transfer and management.

As described in the white paper by Ant Group Research Institute (2020), the common practice of a mutual aid model involves three parties—mutual aid members, the platform, and a third-party claims investigation agency. Their interactions are shown in Fig. 5.1. Upon entering the platform, each member is required to disclose their health conditions and to sign a community agreement outlining their benefits and obligations. There is no underwriting procedure as with commercial health insurance. When a member is diagnosed with a covered critical illness, he/she can submit a claim for mutual aid. The platform calls in an investigation agency to verify the validity of claims in reference to the conditions stipulated in the agreement. Once a claim passes through the initial investigation, the platform publicizes the results to all mutual aid members. If there is any public dispute, a jury consisting of selected mutual aid members is formed to vote on an "accept/deny" decision. The public disclosure procedure is viewed by practitioners as an effective deterrence of fraudulent claims, which is not possible for traditional insurers due to regulations. It is typical that the platform levies an 8% management fee for each accepted claim, which is partly used to pay commissions to the investigation agency. The mutual aid model is largely a pay-as-you-go system. All accepted claims and associated management fees are aggregated at the end of each month and passed on to all members.

Online mutual aid is an innovative and collaborative coverage mechanism, different from traditional insurance in several ways. Firstly, online mutual aid is often much cheaper and financially more inclusive than health insurance. Unlike traditional insurance which often requires expensive premiums paid in advance, most mutual aid

platforms require little to no fees to enter their platforms. The monthly shared costs among members vary by the actual number of claims but are often very affordable. The study by Chen et al. (2023) shows that the per-dollar coverage cost for comparable health insurance in China can be 500 times more costly than that of a mutual aid platform. The products have been quite popular with middle- to low-income people in small and medium-sized cities. The model fills a gap between the national health insurance program and the commercial health insurance industry. Secondly, online mutual aid promotes transparency and self-governance, which enables members to develop a sense of community and to provide the resources necessary to address members' financial needs. Unlike traditional insurance riddled with opaque operations, online mutual aid platforms offer public disclosures on claims and involve members in the decision-making process. Thirdly, online mutual aid platforms often do not have funding pools to avoid being perceived by the government as illegal fundraising. They often work with third-party banks to facilitate payments in members' escrow accounts. As mentioned earlier, the costs of all claims are shared among all members in each period. In contrast with traditional insurance, there is no necessity for reserves or risk capital. Hence, they are not regulated by the government. The reduction of compliance costs also contributes to the cost-effectiveness of such a funding mechanism.

To understand the underlying quantitative principles, we formulate the online mutual aid model with the following notation. For simplicity, we start with a homogeneous risk pool. Assume that there are a total of n members. Let I_i be the indicator for the claim status of member i, i.e. $I_i = 1$ if member i makes a claim in a given period; $I_i = 0$ otherwise. Denote by p the probability of loss for each member and by N the number of claimants out of all members in the period. The losses of all members are mutually independent. Hence, $N = \sum_{i=1}^{n} I_i$ follows a binomial distribution, i.e. $N \sim \mathsf{Binom}(n, p)$. Let b be a lump sum benefit payment to each member with a legitimate claim. Therefore, each member brings in his/her risk into the pool, i.e. $X_i = bI_i$. Suppose the platform imposes a fee on all claims at the percentage rate ρ. Therefore, the total cost of claims is given by $S = \sum_{i=1}^{n} X_i = bN$ and the total cost of claims and expenses is given by $(1 + \rho)S$.

There are several ways in which the total cost is allocated among members. Let Y_i be the cost of participation allocated to member i. Note that, in the case of homogeneous risks, all members are allocated the same cost. We do not distinguish payments by different individuals and hence drop the subscript when no ambiguity arises.

1. *All to claimants*: All members pay for the costs associated with claimants:

$$Y = \frac{(1+\rho)S}{n}.$$

In the frictionless model, i.e. $\rho = 0$, we observe the conservation of losses,

$$\sum_{i=1}^{n} X_i = \sum_{i=1}^{n} Y_i.$$

2. *Survivors to claimants*: Only survivors, those who do not have legitimate claims, are asked to pay for the costs with claimants

$$Y = \frac{(1+\rho)S}{n-N}.$$

3. *Capped cost*: To avoid unlimited liability for participants, the platforms often assure them by imposing a maximum cost to pay each period. Let d be the cap on cost:

$$Y = \frac{(1+\rho)S}{n-N} \wedge d.$$

It is often the case that the number of N is very small in comparison with n in practice when the pool size is very large. Therefore, the distinction between "all-to-claimants" and "survivors-to-claimants" is negligible for practical purposes.

A detailed account of online mutual aid and issues regarding cost reduction, fairness, and adverse selection can be found in Chen et al. (2023).