Guest Editorial

Special Issue “New Developments in the Economics of Insurance Markets with Adverse Selection” of the *Geneva Risk and Insurance Review*

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Seminal papers by Rothschild and Stiglitz¹ and Wilson² contemporaneously developed a now-canonical framework for the theoretical study of insurance markets in the presence of adverse selection. In this framework, firms design menus of contracts to “screen” potential insurance buyers with private information about their individual risk. There is now a vast literature that employs this screening framework for the theoretical study of and, more recently, for empirical work on insurance markets. This special issue of the *Geneva Risk and Insurance Review* pulls together six papers from leading insurance scholars to bring readers to the frontier of this literature.

Rothschild and Stiglitz¹ demonstrate that imperfect and asymmetrically held information has several important implications for insurance market equilibria. First, asymmetric information can undermine *existence* of a Nash equilibrium. Second, even when equilibrium does exist, it may be *inefficient*. Third, the *structure* of equilibrium, if it exists, is characterised by screening, whereby firms offer menus of contracts to induce lower-risk individuals to self-sort into contracts that provide less insurance at a lower price, while higher-risk individuals self-select into higher-price higher coverage contracts. All three findings have spawned significant and intertwined subsequent research.

The literature stemming from Rothschild and Stiglitz’s equilibrium non-existence result began within their paper—and Wilson’s² and Riley’s³ contemporaneous work

¹ Rothschild and Stiglitz (1976).

² Wilson (1977).

³ Riley (1979).

—and continues to this day. The first essay in this special issue, by *Wanda Mimra and Achim Wambach*, provides a concise review of three broad directions that the literature has taken to “resolve” the non-existence issue, all three of which involve altering Rothschild and Stiglitz’s approach to modelling firm behaviour while maintaining their non-cooperative game-theoretic approach.⁴ The first is to allow firms to randomise, that is to use mixed strategies. The second is to introduce a dynamic element to firm strategies, for instance by explicitly modelling possible reactions by firms to their competitor’s choices. The third is to retain Rothschild and Stiglitz’s static-Nash modelling approach but to modify the “game” firms play against each other, for example by considering underwriting or financial constraints or by expanding the space of contracts that firms can offer.

Mimra and Wambach’s review focuses particularly on a quite recent burst of contributions on the strategic foundations of equilibrium in competitive markets with adverse selection. Interestingly, most (but not all) of these recent contributions have identified the so-called Miyazaki⁵–Wilson²–Spence⁶ (MWS) allocation as the “natural” outcome of these markets.

The second essay, by *Pierre Picard*, is a particularly clean example. Picard’s paper investigates the consequences of extending the strategy space of firms in the basic Rothschild and Stiglitz¹ framework by allowing them to offer participating as well as non-participating contracts. Participating contracts introduce externalities among different individuals who participate in the same contract pool and thereby interlink the contract choices of different risk types. These linkages can limit firms’ ability to “cream-skim” low-risk types. Picard’s paper shows, in fact, that—by limiting these cream-skimming opportunities—this simple and natural expansion of firm’s strategy space is enough to ensure the existence of a competitive equilibrium that coincides with the MWS allocation. Moreover, participating and non-participating contracts provide an interesting connection to the organisational form of insurance firms.

The third essay, a note by *Nathaniel Hendren*, clarifies the non-existence result and its ongoing debate. Specifically, Hendren illuminates the relationship between non-existence of equilibrium in the sense of Rothschild and Stiglitz to market unravelling in the sense of Akerlof⁷—that is when the market equilibrium *exists* but involves no trade. To that end, Hendren maintains Rothschild and Stiglitz’s binary risk environment but considers more general distribution of risk types. Since Akerlofian unravelling implies the existence of a (no-trade) competitive equilibrium, the two types of unravelling are mutually exclusive. More interestingly (and as largely anticipated by Riley³) under a regularity condition on the distribution of

⁴ As they note, there are also literatures replacing the non-cooperative game-theoretic approach with a cooperative or general equilibrium approach.

⁵ Miyazaki (1977).

⁶ Spence (1978).

⁷ Akerlof (1970).

types, they are also *exhaustive*: the Rothschild–Stiglitz equilibrium exists *only* if it involves no trade.

This regularity condition—that either there is an interval of possible types or else there is a type with a 100 per cent accident probability—might seem strong from the point of view of theorists who are used to working with models with discrete-type distributions. But, as Hendren points out, this assumption is basically generic, since discrete-type distributions can be approximated arbitrarily closely by distributions satisfying this condition. As such, Hendren’s analysis can also be understood as pointing to a deep fragility in the Rothschild–Stiglitz equilibrium concept: arbitrarily small changes in the type distribution fundamentally change the nature and existence of this type of equilibrium. With generic-type distributions, trade *requires* some degree of cross-subsidisation—of the sort found in some MWS allocations—across distinct risk types.

As mentioned above, the *efficiency* of a competitive equilibrium in insurance markets with asymmetric information (given it exists) is a second major theme of the literature following Rothschild and Stiglitz. There are two types of inefficiencies in Rothschild and Stiglitz’s basic framework. First, there is the inefficiency intrinsic to informational asymmetries. Second, the Rothschild and Stiglitz equilibrium may (under certain modelling restrictions) fail to be second-best efficient.

In so far as it points to the second-best efficient MWS allocation as the equilibrium allocation, the existence literature discussed by Mimra and Wambach’s essay (and exemplified by Picard’s) largely addresses the second of these inefficiencies. The essays by *Georges Dionne and Casey Rothschild* and by *James Garven, James Hilliard, and Martin Grace* address two distinct ways markets can potentially mitigate the more fundamental inefficiencies intrinsic to asymmetric information.

Dionne and Rothschild’s essay reviews the literature on *risk classification*, whereby insurers use observable characteristics of potential customers for pricing or structuring insurance policies. They demonstrate, within a broad class of settings, that employing risk classification will reduce the inefficiencies by reducing the extent of informational asymmetries. Conversely, government-imposed limits on risk classification technologies will typically cause inefficiencies. Of course, permitting risk classification involves accepting that individuals with different observable characteristics—for example of different genders—may be charged different prices for, or else be afforded different access to insurance. Thus, permitting vs limiting risk classification may involve a *trade-off* between efficiency and equity. Equivalently (in some cases), in so far as the different characteristics emerge over time, such limits may involve trade-offs between efficient provision of insurance against accident risk at the interim stage when information is asymmetric and the efficient provision of *ex ante* insurance against the risk of ending up in a high-risk class and facing high prices or limited insurance access. Dionne and Rothschild identify settings under which such trade-offs are or are not present, and they point to several places in the literature where additional work remains.

Garven, Hilliard, and Grace's essay empirically investigates a second route by which markets might potentially mitigate the intrinsic inefficiencies associated with asymmetric information: long-term relationships. If new information is revealed over time, then repeated contracting through contingent pricing enables the inclusion of this new information, reduces the informational asymmetry, and thereby improves the efficiency of risk sharing. In the context of reinsurance, Garven, Hilliard, and Grace provide empirical support for the positive association between the length of the contractual relationship of the cedant insurance firm to its reinsurance firm, on the one hand, and its reinsurance demand, profitability, and solvency level, on the other.

Garven, Hilliard, and Grace's essay adds to a rich and growing empirical literature testing for asymmetric information in insurance markets. Much of this literature relies on the so-called *positive correlation property* inspired by the structure of the Rothschild–Stiglitz equilibrium (and other screening equilibria), namely the property that higher-risk individuals, in equilibrium, purchase more insurance coverage than lower-risk individuals.

Empirical methods for testing for the positive correlation property took a significant leap forward in the early 2000s with work by Chiappori and Salanié,⁸ and Dionne *et al.*⁹ A potential weakness of these approaches, as they have been applied in practice, is that they typically rely on parametric functional and distributional forms such as probit models—with the associated data-coarsening via discretisation—for identification. *Martin Spindler's* essay describes a recently developed non-parametric version of this type of test. Spindler illustrates this technique by applying it to the German market for hospital daily benefit insurance. Moreover, he compares his non-parametric estimates from that market to analogous estimates using more-standard parametric tests to show that the tests can yield non-trivially different results.

This set of six papers highlights that the economics of insurance markets with adverse selection continues to be a highly active research area. The papers bring the readers up-to-date in this research field and point to numerous open issues in both the theoretical and empirical literature. We hope that this special issue of the *Geneva Risk and Insurance Review* inspires scholars to further advance the frontier of this research field and thereby improve our understanding of the functioning of insurance markets with informational frictions.

This special issue would not have been possible without the help of several knowledgeable external referees who took the time to review, evaluate, and constructively comment on the papers efficiently and effectively. We owe them our gratitude. We also owe a debt of gratitude to Michael Hoy and Achim Wambach, the co-editors of the *Geneva Risk and Insurance Review*, both for

⁸ Chiappori and Salanié (2000).

⁹ Dionne *et al.* (2001).

inviting us to co-edit this special issue and for providing us with countless hours of patient guidance along the way. Last, but not least, we again thank the various authors for their contributions. We hope that you will enjoy—and will be inspired by—their work.

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