

BOOK REVIEW

ERIC BRIYS (1990). *Demande d'assurance et microéconomie de l'incertain*. Presses Universitaires de France, Collection Finance, 151 pages, 118 FF.

For a long time, economists have seemingly been uninterested in insurance, leaving the field to actuaries and jurists. However, since the development of the economic theory of risk and uncertainty, and the pioneering works of Arrow and Borch in the early 1960s, the situation has drastically changed. A steady flow of papers now fill in the pages of journals like *Econometrica*, the *Journal of Risk and Insurance*, and the *Journal of Financial Economics*. The publication of a quality booklet that surveys this new approach to insurance problems is therefore most welcome.

Broadly speaking, the contributions of economists to insurance can be subdivided into two large categories. The first one considers the design and pricing of the insurance policy to be exogenous to the consumer, and analyses the policyholder's behaviour when faced with the insurer's proposals. The second category includes the consumer in the initial decision process and attempts to determine the conditions of a Pareto-optimal risk exchange between insurer and insured. Recent analysis of this exchange incorporate the problems of adverse selection and moral hazard.

Eric Briys' work pertains to the former category. It presents a unified treatment of the theory of optimal demand in individual property insurance. One drastic assumption had to be made in order to unify widely diversified results. A two-state world is considered throughout the book: a risk can only lead to no claim, or to a total claim of known amount. In addition, it is assumed most of the time that the insurer computes premiums according to the expected value principle.

The first part of the book is a short summary of the main tools of economics of uncertainty: utility theory, of course, but also stochastic dominance, mean-variance analysis, and the main decision criteria of statistical decision analysis.

Part Two studies the demand of insurance as an isolated financial decision. An individual, with a known and non-stochastic initial wealth, faces a random loss. Classical conditions for the optimality of full or partial coverage are first obtained under the expected utility assumption. Several interesting extensions are then developed, among which: state-dependent utility functions (for instance damages that result in a sentimental loss in addition to the monetary loss), policyholder-dependent claim parameters (influence of activities that modify the claim probability and/or the claim amount: sprinkler systems, seat belts, reduced speeds, ...), and moral hazard (the propensity of policyholders to

reduce their level of care, as long as their property is fully insured). The final chapter of Part Two sketches the main models that introduce alternative objective functions, such as the stochastic dominance, minimax regret, and Hurwicz criteria (the latter being a linear combination between extremely optimistic and pessimistic attitude). The results often contradict those obtained under the expected utility hypothesis. They are less convincing, and often counter-intuitive. For instance, the optimal deductible computed using the minimax regret assumption is in all cases independent of the policyholder's wealth.

All models of Part Two make use of the common assumption that individuals only face one source of uncertainty in their life: the possibility of a claim. Or, equivalently, the selection of an optimal insurance policy is considered to be totally independent of other portfolio decisions. The more recent models, presented in Part Three, attempt to consider all aspects of the consumer's portfolio decisions simultaneously. They assume that individuals face multiple sources of risks, among which insurable risks, and that insurance is only one of the possible tools to reduce risk. Hence, demand for insurance cannot be considered as a independent decision; it interacts with the consumer's other portfolio assets and risk diversification opportunities. Several models are presented that simultaneously consider insurance, portfolio, and consumption decisions, in a dynamic optimisation framework. Conditions of separability of the insurance demand decision are investigated. Many results of Part Two do not carry over to the case of multiple risks. For instance, it is not true any more that, out of two individuals, the more risk-averse will be willing to pay a higher insurance premium for a given risk, if initial wealth is assumed to be non-deterministic. Positive correlations between the risk and the yield of other assets might create substitution effects and induce a policyholder to partially self-insure. Even investing in a risk-free asset might constitute a worthwhile substitute to insurance.

One of the advantages of the book is that it is entirely self-contained; even the axiomatic of utility theory is mentioned in an introductory chapter. Eric Briys' work is very easy to read. High-level mathematics are nowhere used, with the important exception of the last chapter, where Wiener and Itô processes are used, in conjunction with optimal stochastic control theory, to generalise preceding models to a multi-period case. Otherwise, the mathematics of most models amount to little more than writing down the insured's expected utility, and taking its first two derivatives. All results are proved in detail, interpreted, and followed by a sensitivity analysis that varies the parameters: wealth, claim cost, risk aversion, ... Hence this booklet is to be recommended to all readers of the ASTIN Bulletin, from the casual member who wishes to gain insight into the economics of insurance, to the mathematically inclined academic researcher, who will find many simplifying assumptions in the models waiting for a generalisation.

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