An evolutionary analysis of insurance markets with adverse selection

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Abstract

The equilibrium nonexistence problem in Rothschild and Stiglitz's insurance market is reexamined in a dynamic setting. Insurance firms are boundedly rational and offer menus of insurance contracts which are periodically revised: profitable competitors' contracts are imitated and loss-making contracts are withdrawn. Occasionally, a firm experiments by withdrawing or innovating a random set of contracts. We show that Rothschild and Stiglitz's candidate competitive equilibrium contracts constitute the unique long-run market outcome if innovation experiments are restricted to contracts which are sufficiently "similar" to those currently on the market. © 2002 Elsevier Science (USA). All rights reserved.

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> *Realized positive profits, not* maximum *profits, are the mark of success and viability. It does not matter through what process of reasoning or motivation such success was achieved. The fact of its accomplishment is sufficient. This is*

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> *the criterion by which the economic system selects survivors: those who realize positive profits are the survivors; those who suffer losses disappear.*

Armen A. Alchian (1950)

1. Introduction

Ever since Rothschild and Stiglitz's (1976) seminal work on adverse selection in insurance markets, the problem of nonexistence of competitive equilibrium in screening markets has been a puzzle. Whenever Rothschild and Stiglitz's (RS) competitive equilibrium exists, it consists of the pair of separating contracts which give the insurance takers the highest possible payoff under the condition that each contract makes zero profits. We call these the *RS contracts*. Often, RS's competitive equilibrium does not exist because each firm has an incentive to deviate from offering an RS contract by offering a profitable pooling contract instead. The nonexistence problem becomes even more severe in the variant of the RS model where each firm may offer several contracts simultaneously; here, pairs of cross-subsidizing contracts can be profitable deviations, too (see Mas-Colell et al., 1995, p. 460).

Existing responses to RS tackle the nonexistence problem by changing the original equilibrium concept, the firms' strategy spaces, or the sequential structure of the interaction. Dasgupta and Maskin (1986) show that a Nash equilibrium in mixed strategies exists. Wilson (1977) assumes that a deviating contract that would render some incumbent contracts loss-making will be introduced only if it stays profitable after the withdrawal of the loss-making contracts. In this model, an equilibrium always exists; it consists of a single pooling contract whenever RS get nonexistence. However, even if one follows Wilson in assuming that firms anticipate the reactions of other firms before offering a deviating contract, it is still not clear why a firm could not offer a deviating contract and make profits *until* the other firms react. Miyazaki (1977) and Spence (1978) extend Wilson's approach by allowing, in addition, for cross-subsidizing contracts. In these models, equilibria always exist, but may include loss-making contracts. Why does no firm withdraw the loss-making contract, letting the other firms carry the burden of cross-subsidization? Riley (1979) introduces the concept of *reactive equilibrium*. Here, it is the anticipation of further entry that deters firms from offering a deviating pooling contract, thus the RS contracts always constitute the unique equilibrium outcome. There exist a few models which vary the sequential structure of the interaction. In Grossman (1979), insurance takers first send a signal before firms make their contract offers, while in Hellwig (1987) firms can decline to serve contracts after the insurance takers have made their choices.