

How does the adverse selection problem arise? How can it be addressed?

Abstract

In markets with definitive transactional costs, adverse selection is defined as pre-contractual opportunisms in which hidden characteristics of the informed party crucial to building accurate risk profiles is not revealed to the uninformed party in a timely manner (asymmetric flow of information). This paper examines the adverse selection problem in the insurance industry, noting the risk-bearing challenges of insurers under asymmetric information. I argue that firms are rationally bounded by their capabilities to reveal the hidden characteristics of the informed party, as such, the problem of adverse selection can lead to pareto-inefficient allocations.

1. Introduction

In the competitively free market with no entry or exit costs, firms exist to maximise total economic welfare. Adverse selection creates market failure where the heterogeneity of agent's private information induces inefficient and costly transactions. Adverse selection is a common problem in the health insurance industry as insurers are unable to differentiate high-risk individuals from low-risk individuals prior to contractual agreements. Common knowledge of insurance pricing structures reflects the burden of risk for insurers and the associated market inefficiencies of participation constraints, incentive compatibility constraints and private cost-benefits of adverse selection (Cutler and Zeckhauser (1998)). The challenge of diminishing the marginal cost of adverse selection has prompted economic theories of signaling (Spence (1973)), screening (Rothschild and Stiglitz (1970)) and government intervention (Akerlof (1970)) as intuitive solutions to informational asymmetries.

This paper is structured as follows: Section 2 details the transaction costs theory of incomplete contracting based on Coase' Theorem (1960) and the consequences of bounded rationality and opportunism. Section 3 describes how the preferences of individuals given the contracting design of premium induces adverse selection for agents and higher bid-ask spread for firms. Finally, Section 4 discusses the typical responses to the adverse selection problem, further discussing the feasibility of the proposed solutions.

2. Theory of Incomplete Contracts

For contracts to be complete, all possible contingencies must be foreseen, contracts are enforceable under common law, and parties should not want to renege the contract in the future. This static definition assumes perfect information and frictionless transaction costs, however, in reality, parties exert transactional costs arising from searching for relevant transactional information, enforcing costs from governing transactions and bargaining costs from writing contract terms (Coase 1937). Coase's Theorem assumes well-defined contracts are pareto-optimal if a small group of rational individuals is able to successfully bargain to solve the externality problem: internalising conflicting interests of individuals that cause market inefficiencies. In order to minimise transactions costs and achieve higher asset specificity, parties should gravitate towards a pareto-optimal state where the mutual gains from participating in a contract exceeds any transaction costs, and the commodity cost is equal to, or above the marginal costs of supplying the commodity (Adam and Yellen, 1976). Real-world transactions are voluminous and undertaken by a many different agents with different interest and different degrees of bargaining powers. The complex interaction within the competitive market exacerbates the realised costs of transactions and the difficulty in creating pareto-optimal contracts.

2.1 Bounded Rationality

Humans are bounded rationally by their limited cognitive capabilities and finite time. Rational choices about future uncertain consequences and preferences are unavoidably constrained, thus decision-making does not result in optimality, rather a result of sub-optimal sacrificing given imperfect information (Simon 1955). Bounded rationality presents a trade off between maximising utility functions and the marginal costs associated with processing relevant information. For firms, the impact of bounded rationality suggests that contracts cannot be complete due to bounded abilities to describe all possible contingences, thus markets are inefficient.

However, optimal trade can exist in the presence of bounded rationality under specific conditions of the irrelevance theorem (Maskin and Tirole

(1999))¹. In equilibrium, the certainty equivalent of risk-averse individuals is the same as the expected payoff if incentives (private benefits) is monotonic under each contingency, thus the incentive compatibility constraint is met. This solves the commitment problem if there is no fear of renege or renegotiation, although, participants forgo ex post optimality which could incur higher transactional costs for participants.

Evaluating the 'Irrelevance Theorem', Hart and Moore (1999) concludes that incomplete contracts does indeed result in optimal contracting as participants cannot be made worse off given new and relevant information. However, Hart and Moore notes that non-commitment of renegotiation, particularly in the case of adverse selection, describability of the state of trade matters greatly. Given the participant and incentive compatibility constraints, non-monotonicity of incentives reduces the feasibility of trade, hence, the investment hold-up problem arises and allocation is pareto-superior. Alternatively, if agents are weakly risk-averse, the incentive compatibility of engaging in trade is the expected utility of private benefits from informational asymmetries becomes pareto-improving (Morris (1997)).

2.2 Motivation and Incentive Problems

Under implicit specificities that common information is positive and socially desirable, diverse preferences between contracting parties motivates non-monotonicity of information. However, it is more desirable to obtain more relevant information, hence asymmetric flows of information between agents and principals undermine contractual completeness. This is especially true when agents are better informed of the transaction pre-contractually (adverse selection), or when agents actions are unobservable ex post contract (moral hazard), entailing a complimentary problem which bounds the firms ability to create complete contracts and efficient markets. In order to reduce the effects of adverse selection, firms have a responsibility to disseminate the private information of agents, hence reduce the strategic uncertainty behaviours in the market. Although, this very costly to the firm and may not improve the efficient allocation of resources if unsuccessful.

¹ (a) ex ante information is symmetric, (b) the contract specifies the distributed probability over contingencies that maximise the expected payoff for each party, (c) renegotiation welfare neutrality holds, and (d) actions can be described ex post

Addressing the consequences of dissemination, Dye (1985) suggests that revealing information may not be an optimal response to a risk-averse individual. Dye notes the motivations for hiding information may be unverifiable and may not reveal more about the agent's preference; the zero-sum game nature of information decreases the expected utility of agents and the cost of revealing information is indirectly or directly costly to the individual and therefore disclosure of information is preferred. Morris and Shin (2012) suggests that informational asymmetries increase the sensitivity of the uninformed principal's adversary to trade due to fears of opportunistic behaviours. With private information, the disbursement of negative private benefits from participating in trade exacerbates the coordination problem of contracting, where the expected losses of participating is below the level of market confidence. The general equilibrium under endogenous adverse selection would be for the uninformed principal to withdraw from the contract, although optimal, the expected payoff from engaging in trade outweighs the potential losses as long as there is market confidence.

3. Adverse Selection in the Insurance Market

Demand and Supply

Rationally, "given the same utility function, low-types tend to prefer less insurance than high-types" (Wilson (1977), Pp. 203), for example, high-risk individuals with known health difficulties would be offered insurance for a higher premium, and low risk individuals without known health difficulties would be offered insurance for a lower premium. The pre-contractual opportunity exploited by rational individuals with hidden information leads to insurers sustaining higher risk-burdens in light of informational asymmetries, the magnitude of which is overwhelmingly increasing. For firms, the supply of insurance is determined by the competitive equilibrium in the market and the "competitive advantage in risk bearing" (Kleffner and Doherty (1996), Pp 657) proportional to the firm's loss probability taking into account the degree of uncertainty and the total variance of the firm's risk-burden arising from adverse selection. For example, a larger firm with vertical integration is more likely to be risk-neutral with a higher ruin probability, compared to smaller, weakly risk-averse firms.

Equilibrium

The optimal policy response of the firm presents “a trade off between risk and incentives” (Pauly (1974), Pp. 49). With contractual incompleteness, the martingale equivalent probability is not unique relative to the assumed risk of the firm. This presents an arbitrage opportunity for adverse selection. If the marginal costs of differentiable selections provides incentives for agents to hide information, then inefficient allocation of resources results in market failure. Informational asymmetries allows high-risk individuals to hide their true current state of nature by self-selecting insurance aimed at low risk individuals. This is a direct consequence of the unobservability of private information (Doherty and Thistle, 1996). Under the expectation of zero-profits, a pareto-superior solution by firms to cover the expected welfare loss, given the probability of adverse selection and the magnitude of trade, is to negotiate a premium price higher market price than the cost of providing service (Glosten and Milgrom (1985). The feasibility of such action depends on the market equilibrium and the ability of the firm to disseminate private information and the capacity to assume additional risks. The increasing bid-ask spread arising from informational asymmetries is a function of the negative serial correlation in the transaction price, the effect of which can over-estimate the future expected profits of the firm during periods of high volatility.

4. Overcoming Adverse Selection

We have detailed the demand and supply function in the market, we attempt to establish equilibrium with adverse selection. We will examine three solutions to establishing a competitive equilibrium.

4.1 Signaling

Proposed by Spence (1973), signalling is a response to overcome the coordination problem where informed and rational agents undertakes costly actions revealing their risk-type. The cost of signalling is negatively correlated with the market price, allowing high-risk types to fulfil the incentive compatibility constraint. Firms’ interpret agents’ signals in order to align incentives and to offer the most optimal insurance options given the agents utility function. The informational equilibrium allows for price discrimination between high-risk agents and low-risk agents by signalling their preferred superior self-selection.

4.1.1 Pooling Equilibrium

Wilson (1977) suggests that pooling is a second-best optimal solution to adverse selection. High-risk agents face a flatter indifference curve than low-risk agents. This is consistent with the agents' willingness to pay given the probability of expected future value of insurance. Self-selected insurance options limits the incentive capability problem, if the proposed policy provides is strictly preferred and there are no incentives for high-risk agents to misrepresent their type.

4.1.2 Separating Equilibrium

The endpoint of repeated signalling games is to minimise implausible equilibria's resulting in a dominant equilibrium in which agents achieve higher utility levels. Assuming that agents are rational, low-type agents are not incentivised by an unprofitable deviation, this informational signal satisfies the incentive compatibility constraint allowing firms to identify different risk-types. Cho and Kreps (1987) called this the 'Intuitive Criterion'. In the knowledge that signals are costly, firms are confident that signals communicated by high-risk types are credible. The 'Intuitive Criterion' eliminates sequential separating equilibria only leaving a Pareto-superior dominate equilibrium. Additionally, given the condition that agents are risk adverse with hidden knowledge of medical problems, Signaling as a response to adverse selection abets strategic motivations of agents as a response to uncertainty aversion. The subjective probability of hidden pareto-superior information in repeated signalling games increases the bid-risk spread of insurers if agents' signals reveals the true willingness of agents to purchase premiums (Morris 1997).

4.2 Screening

Stiglitz (1975) proposes a hierarchical screening mechanism that incentivises individuals to their risk-type. The economic benefits of screening yields positive private returns, although the distributional effects of yields inequality, some of which are unambiguously pareto-inferior for high-type agents (full coverage) as compared to low-type agent (partial coverage). Screening allows firms to reduce the cost of uncertainty and create profitable transactions (increasing marginal returns) by eliminating informational asymmetries. The degree of screening is an important quantifiable point of discussion. Under-screening or

over-screening of the environment may not reflect the true state of the agent, instead may inflate informational externalities.

4.2.1 Separating Equilibrium

Adverse selection presents an externality problem that reduces the welfare of low-risk type agents, deterring these agents from purchasing premium in the presence of high-types under a single price structure. Assuming that the preferences of risk-adverse agents are convex and the compensated demand curve is such to maximise the agents' utility function, Rothschild and Stiglitz (1976) conclude that there can be no pooling equilibrium in the market as the incentive compatibility condition is violated for low risks agents. To meet the participation constraint, low-risk agents must prefer insurance to no insurance, yet, they must also expect to yield higher future expected payoff relative to the market price or they will leave the market. Simultaneous changes in the market dynamics as the proportion of profitable low-type decreases the proportion of unprofitable high-type increases, firms are at risk of negative profits. They suggests that the pareto-improving solution in the insurance market is a separating equilibrium as distribution of mutual welfare with adverse selection relative to the competitive equilibrium (see Rothschild and Stiglitz (1976) mathematical calculations).

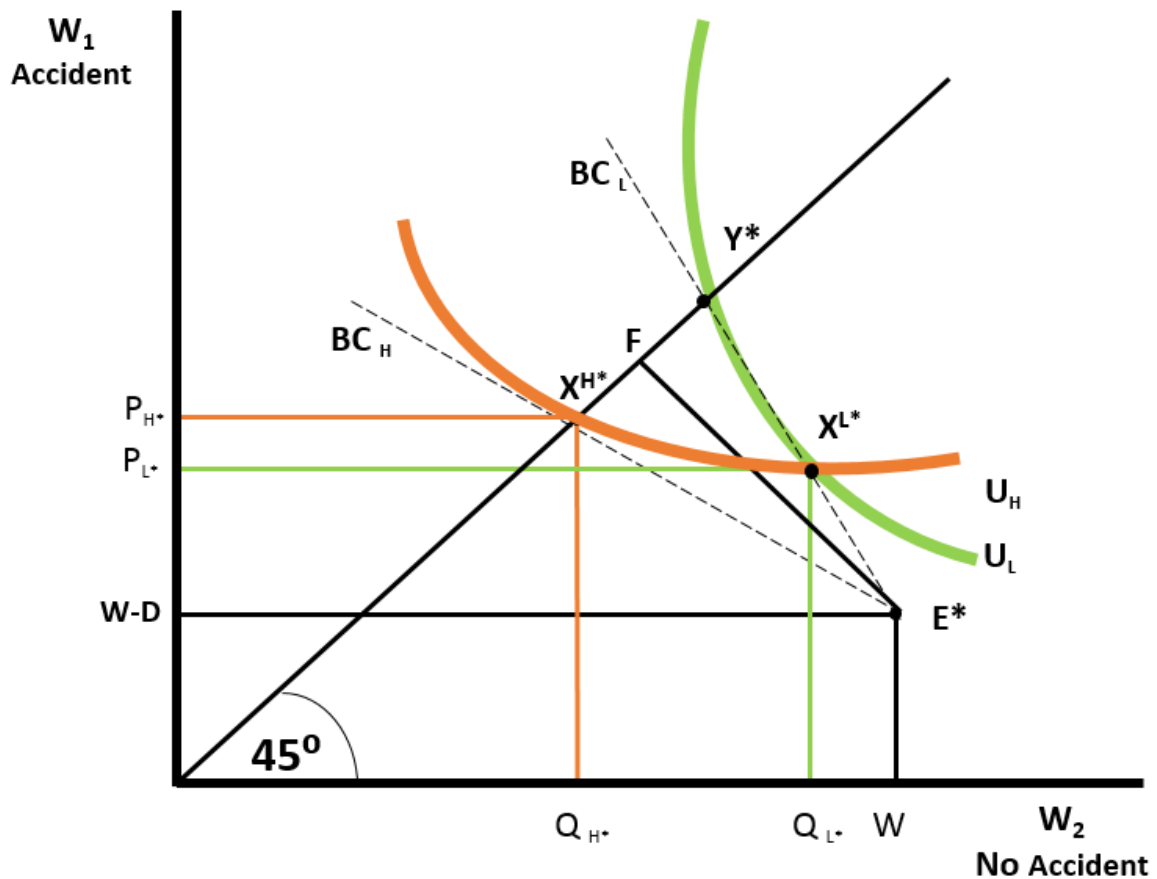


Figure 1: Separating Equilibrium adapted from Rothschild and Stiglitz (1976)

4.2.2 Pooling Equilibrium

On the contrary, Allard et al. (1997) confirms the existence of a pooling equilibrium if the cost distribution is fixed and high enough to cover potential losses from high-risk agents. This phenomenon parallels the market conditions for specific long-term insurance, especially where sticky consumption of low-risk agents is common. The pooling equilibrium is pareto-dominated by separating equilibria, weakly preferred by low-type agents and strictly preferred by high-type agents. However, Rothschild and Stiglitz disagree. If a pooling equilibrium was to exist, the costs of high-type agents outweighs the equilibrium price level and the share of risk pooling would create negative profits for the firm. They suggest a pooling equilibrium cannot exist as consumption preferences derives separating equilibria.

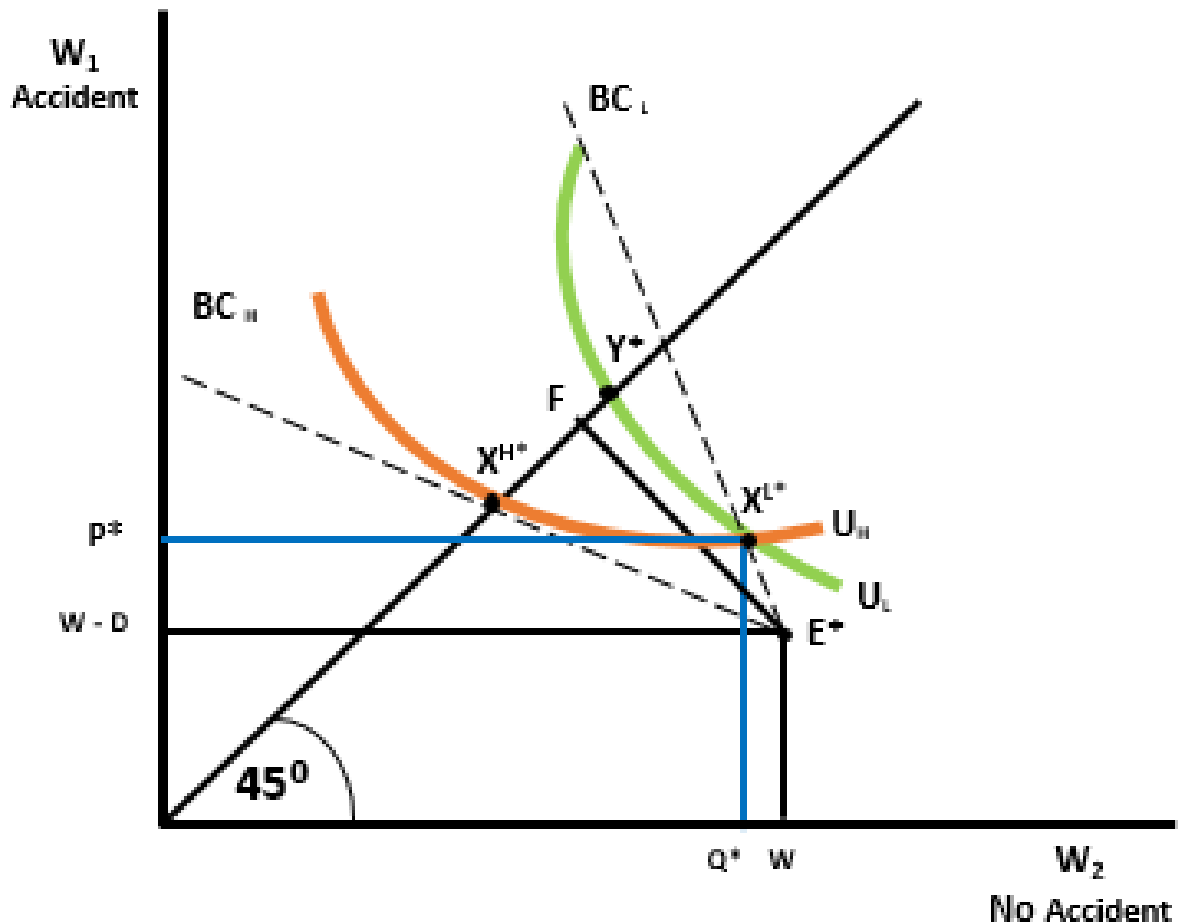


Figure 2: Pooling Equilibrium adapted from Rothschild and Stiglitz (1976)

4.3 Government Intervention

Acknowledging the cost of informational failure, Akerlof (1970) suggests that direct government intervention creates pareto-efficient market outcomes. The social benefit of government intervention is optimal as the incentive compatibility constraint is met for heterogeneous agents. This results in pooling equilibrium in which agents are indifferent between revealing private information as the contract fulfils the agents expected payoff. Government intervention would be the difference between the marginal costs and the market price, the welfare loss triangle loss is denoted in below in Figure 3.

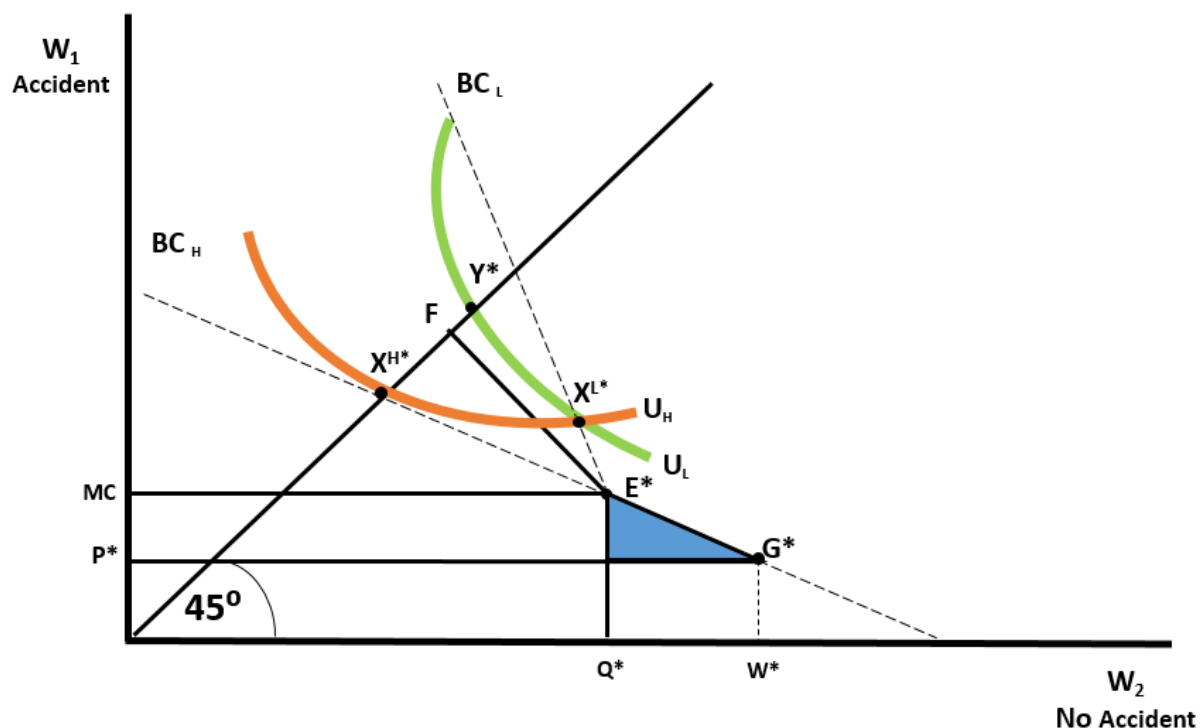


Figure 3: Pooling Equilibrium with Government Intervention

Conversely, Arrow (1963) suggests that government intervention is not a pareto-efficient outcome as it disregards the agents' risk aversion. In addition, Arrow noted the market imperfections that arise from government intervention, particularly the allocation of scarce resources and the unpredictable medical expenses that distort the supply of insurance, entailing diminishing returns of private benefits. The result of which questions the efficacy of medical treatments available for individuals to meet the needs of society. The rationale for insurance provision may intuitively solve the adverse problem in the short-run, enabling individuals to reveal their type. Nevertheless, as a long-term solution, actuarially fair insurance better accommodates the expected utility of agents.

6. Conclusion

I have addressed the adverse selection problem and discussed a variety of solutions to disseminate, and verify private information. It has been shown how firms can be bounded rationally by transaction costs, and the sub-optimum equilibrium that results. Risk-aversion diminishes the marginal utility of wealth, increasing the spread of risks that cannot be pooled. Adverse selection still remains a prominent problem, critical to the policy offerings and uncertainty probability in the insurance market. The efforts to isolate adverse selection has favored a solution that enables firms to profit in competitive markets without government intervention. However, perfect equilibrium can only be achieved with symmetric information ex ante where social and private benefits are positive.

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