



Ambiguity, optimism, and pessimism in adverse selection models [☆]

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Abstract

We investigate the effect of ambiguity and ambiguity attitude on the shape and properties of the optimal contract in an adverse selection model with a continuum of types, using the NEO-additive model. We show that it necessarily features efficiency and a jump at the top and pooling at the bottom of the distribution. Conditional on the degree of ambiguity, the pooling section may be supplemented by a separating section. As a result, ambiguity adversely affects the principal's ability to solve the adverse selection problem and therefore the least efficient types benefit from ambiguity with respect to risk. Conversely, ambiguity is detrimental to the most efficient types.

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1. Introduction

Motivation. Regulation models with asymmetric information usually assume that the regulator knows the distribution of a natural monopoly's marginal cost. However, in some cases (Sappington and Weisman, 1996, p. 115), the information gathering process might be conflicting, even when the information providers are not biased. At a broader level, most principal-agent models with adverse selection share the assumption that the principal knows the probability distribution of the agent's type. In other words, in standard contract theory, the outcome of the information gathering process by the principal is a precise probability distribution. However, it is likely that this process will provide contradicting evidence.

In that case, the principal faces a trade-off:

- either summarize all the evidence by a single probability distribution, at the cost of omitting all conflicting evidence, however valuable it may be,
- or make do with a less precise representation of uncertainty so as to keep as much of the information as possible.

It might therefore be wiser to work with an imprecise probability distribution in order to keep more of the available information, even though it is potentially conflicting.

In this paper, our aim is to study the impact of an imprecisely known probability distribution on the second-best optimal contract in an adverse selection model with a continuum of types.

Poor knowledge of the probability distribution of efficiencies is an instance of the general concept of ambiguity (Ellsberg, 1961). Among the many models addressing it,¹ the NEO-additive model (Chateauneuf et al., 2007) has particularly appealing properties. It ties the concepts of ambiguity and ambiguity attitude to two additional parameters, without abandoning the probabilistic approach altogether. Comparison with the expected utility model is therefore made easier in this model.

Main findings. We consider a Baron–Myerson's model where the agent privately knows his type (i.e. his marginal cost), distributed over a real interval. The principal's beliefs about this parameter are ambiguous and modeled according to the NEO-additive model.

With no ambiguity, equivalently in the expected utility model, the contract exhibits the well-known rent extraction–efficiency trade-off: downward distortions from efficiency are imposed on production (except for the most efficient type) in order to reduce the adverse selection agency cost (i.e. the information rent). Moreover, under usual monotonicity conditions, the contract is smooth and separating.

By contrast, the optimal contract under ambiguity exhibits the following properties: there is still no distortion at the top, but a jump at the top and pooling at the bottom. These departures from the expected utility model arise because the presence of ambiguity, combined with ambiguity seeking, or optimism, (resp. ambiguity aversion, or pessimism), leads to the introduction of a mass point for the most (resp. the least) efficient agent. This has two consequences.

First, this places a positive weight on the principal's need to secure efficient production for those types. She is thus tempted to eliminate output distortions at the top and bottom. Second, this increases the agency cost of adverse selection with respect to the expected utility case. The principal is then induced to increase distortions for all types in order to limit the rent of the most efficient type.

¹ See Etner et al. (2012) for a survey.

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