# Delegated information acquisition with moral hazard ☆

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## Abstract

We analyze a principal–agent problem with moral hazard where a principal searches for an opportunity of uncertain return, and hires an agent to evaluate available options. The agent's effort affects the informativeness of a signal about an option's return. Based on the information provided by the agent, the principal decides whether to exercise the option at hand. We derive properties of the optimal contract in both static and dynamic versions of the problem. We show that there are intermediate values of the prior probability that the option is of high quality at which positive effort cannot be sustained. We also show that if the prior is below a threshold, then the agent is rewarded for delivering 'bad news' about the option's quality. We derive distortions (relative to the first best) on the implemented effort level and optimal stopping decision. For some parameter values, it is optimal for the principal to commit to an ex-post suboptimal stochastic decision to exercise an option.
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## 1. Introduction

Many situations of economic interest feature a client (principal) who searches for an opportunity/option whose return is uncertain, and hires an expert (agent) to evaluate potential options. The agent's effort, which he chooses privately, affects the quality of information he receives about the options. Based on the information the agent provides, the principal compensates him and decides whether to exercise an option or continue the search.

Interactions of this sort abound in real-world applications. For instance, consider an individual seeking to purchase a house, who hires a home inspector to provide her with information about houses that become available. Or take an uninformed investor who hires an expert to evaluate potential investment opportunities. Although other features may be present in these applications, information acquisition certainly plays an important role.

The purpose of this paper is to analyze how to structure incentives in these environments, where the quality of information is endogenous and hidden, and to shed light on the main distortions that this moral-hazard problem impinges on information acquisition and on the principal's decision to exercise an option.

To focus on the main trade-offs involved in this problem, we build a tractable principal–agent model with risk-neutral parties, moral hazard, and limited liability. The agent's role is to acquire information about the unknown quality of an available opportunity, which can be high or low. Information consists of a binary signal whose informativeness depends on the agent's effort. We assume that the signal realization is publicly observable, and thus the agent cannot misreport it. The principal conditions her decision to accept or reject an opportunity on the information acquired by the agent. We also assume that contracts can only be conditioned on the signal and the principal's decision to exercise an option. That is, although the quality of the option may potentially be observable ex post (after the option is exercised), it is not contractible.

The above assumptions are not far-fetched, for instance, in the context of the home-inspector application. Regarding quality being non-contractible, that a house is of bad quality might be revealed several years after the purchase, making it hard to incorporate that event into the contract. For example, a house may have a problem with the roof, which might not be detected during an inspection and will cause leakages, but only during a very long and heavy rain that seldom occurs. As for the signal being publicly observable, many tests—as well as their results—that home inspectors perform on a house are verifiable and are difficult to misreport. Also, even when misreporting is possible, it does not seem to be a particular concern in this business (at least if the inspector is independently hired by the potential home buyer as opposed to being recommended by the real-estate agent). At the same time, overlooking an important problem due to a careless inspection is certainly a big issue, and we focus on it in this paper.

We first derive the optimal contract in the static case, with only one option to evaluate. Then we tackle the dynamic case, where there is an option in every period that is evaluated before the principal decides to stop the search. As a benchmark, and also to highlight the drastic effect that moral hazard and information acquisition have on the optimal contract, we show that without informational problems the solution is trivial. Indeed, in the first-best case, depending on the prior belief about the option quality, the principal either does not hire the agent and always/never buys, or she implements a constant level of effort (signal precision) over time and exercises the first option whose signal realization is high.

Results are radically different under moral hazard. We show that there is a threshold value of the prior belief that an option is of high quality such that the agent is rewarded for a high signal realization if and only if the prior is above this threshold. This cut-off value is higher when