Economics of information acquisition and disclosure

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Abstract

The economic phenomenon investigated in the first essay is the public provision of information through voluntary disclosures in asset markets. Mainly, it studies how seller uncertainty regarding whether her private information constitutes conclusive proof of the value of the asset for potential buyers affects the actions of the market participants and, through that, public information provision.

The second essay also concerns the public provision of information through voluntary disclosures. Specifically, it studies how seller incentives to acquire and disclose conclusive evidence depend on her informational advantage over the market.

The third essay revisits a classic model of the optimal search for the best alternative in Weitzman (1979). Weitzman considers a situation in which a decision-maker owns a number of boxes, each of which contains an unknown prize. At each time before she stops, the decision-maker chooses either to learn the value of the prize in some box or to stop for the payoff equal to the largest sampled prize. Weitzman assumes that the decision-maker can sample all the boxes on her own. The social phenomenon I study in the third essay is the mismatch between property rights and knowledge: the decision-maker owns the boxes but does not necessarily know how to investigate them and therefore has to hire intermediaries to do it on her behalf.
Preface

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Helsinki, November 9, 2020,

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#### 4. Optimal search for the best alternative

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This thesis consists of the introduction and the following essays.

1. Uncertainty about the credibility of private information in asset markets. *Unpublished manuscript.*

2. Regulating evidence acquisition and disclosure. *Unpublished manuscript.*

1. Introduction

What can economic institutions achieve when information necessary for the optimal decision-making is dispersed and privately held? Experts and academics from various fields, comprising financial regulation, insurance markets, contract theory, management science, and many others, have studied this question extensively. In the three essays included in my dissertation, I address this classical question, but unlike in most of the previous literature, my emphasis is on situations where information available to economic agents is itself an outcome of strategic deliberation and interactions rather than an immovable state over which decision-makers have no power.

In addressing the above question, as a point of departure, my dissertation takes the principle of methodological individualism as defined in Watkins (1952):

Social processes should be explained by being deduced from principles governing the behavior of participating individuals and from analyses of their situations, and not from super-individual, 'holistic', sociological laws.

Following this principle, each dissertation essay starts with describing the society as a collection of individuals who choose between available actions according to some consistent criterion. Then, it studies how factors beyond individual control affect the profile of actions taken, i.e., the social process. In my dissertation, these exogenous factors are policies institutionalized by the government, degrees of awareness about the environment in which an action must be taken, and even the set of available actions itself.

The economic phenomenon investigated in my first essay (joint with Julia Salmi) is the public provision of information through voluntary disclosures in asset markets. Mainly, it studies how seller uncertainty regarding

1Henceforth, individuals choosing actions according to some consistent criterion are referred to as economic agents, rational individuals, or rational decision-makers.
whether her private information constitutes conclusive proof of the value of
the asset for potential buyers affects the actions of the market participants
and, through that, public information provision.

My second essay (joint with Tsz-Ning Wong) also concerns the public
provision of information through voluntary disclosures. Specifically, it
studies how seller incentives to acquire and disclose conclusive evidence
depend on her informational advantage over the market.

These essays contribute to the existing literature on information provi-
sion through voluntary disclosure initiated by Grossman and Hart (1980),
Milgrom (1981), and Grossman (1981). These papers consider static games
in which a seller, with private information about her product quality, has
credible evidence that constitutes conclusive proof of quality for potential
buyers. They show that full disclosure of evidence obtains in equilibrium.
Such unraveling implies a puzzling prediction that no informational asym-
metries between sellers and buyers can persist. Dye (1985) and Jung and
Kwon (1988) address this puzzle by assuming that some sellers cannot
provide proof of quality. In this model, full disclosure does not take place
because low-quality sellers with conclusive evidence prefer to be pooled
with high-quality sellers who cannot present evidence rather than make a
disclosure that reveals their inferiority.

In Dye (1985), and Jung and Kwon (1988), it is the joint distribution
of product quality and evidence that determines how much information
is disclosed. My first two essays build on this model by allowing sellers
to take actions prior to the disclosure decision, thus endogenizing this
distribution at the disclosure stage.

My final essay revisits a classic model of the optimal search for the best
alternative in Weitzman (1979). Weitzman considers a situation in which
a decision-maker owns \( N \) boxes, each of which contains an unknown prize.
At each time before she stops, the decision-maker chooses either to learn
the value of the prize in some box or to stop for the payoff equal to the
largest sampled prize.

Weitzman assumes that the decision-maker can sample all the boxes
on her own. The social phenomenon I study in my essay is the mismatch
between property rights and knowledge: the decision-maker owns the
boxes but does not necessarily know how to investigate them and therefore
has to hire intermediaries to do it on her behalf.

Throughout the essays, the primary method of investigation is game-
theoretic analysis. It is maintained that, at the outset of a game, the
agents are symmetrically informed, share a commonly known belief on the
Nature moves, and use Bayes rule to update their beliefs. The key feature
of my dissertation is that the source for information updating is often
endogenous, i.e., arises from the actions of the other rational individuals.
1.1 Uncertainty about the credibility of private information in asset markets

Consider a start-up trying to raise funding for its project. Typically, the start-up has more information about its prospects than venture capitalists and tries to raise as much funding as possible, regardless of its potential. On the other hand, investors look to contribute more to promising projects but do not have access to start-ups’ private information about their quality.

The information of some start-ups is credible: it can be externally verified, disclosed to investors, and investors accept it as conclusive proof-of-concept. The information of other start-ups is not credible: any attempt at the verification fails, and whatever they disclose is not trusted.

A prominent feature of venture capital markets is that start-ups are uncertain about whether their private information is credible for investors. We study the role of this uncertainty for the information provision through voluntary disclosures.

To understand the implications of this uncertainty, we model markets for venture capital in two different ways. In both versions of the model, it takes time to verify private information, and start-ups can raise funding either before or after attempting the verification.

The first version models the prominent feature of venture capital markets and assumes that start-ups are uncertain about whether their information is credible. In this game, the choice the start-up has at the beginning of the game is either to accept the highest funding offer or to reject it and attempt the verification. If the verification is successful, then the start-up has the option of disclosing its private information. However, it does not know whether it will succeed at the verification.

In the second version, the start-up is certain about whether its information is credible. The start-up still decides whether to accept the highest offer at the beginning of the game or reject it and attempt the verification. If the verification is successful, then the start-up has the option of disclosing its private information. The key difference with the previous version is that the start-up knows if its attempt at the verification will be successful even before trying it.

At first glance, it may seem that there are fewer disclosures in the first model, because, being unsure that their information is credible, high-quality start-ups have weaker incentives to attempt the verification, and, therefore, are more eager to trade at the beginning of the game. This is the direct effect of the uncertainty. However, there is also the equilibrium effect acting through the endogenous source of information updating. If it is indeed the case, that all but the highest-quality start-ups trade at the beginning of the game, then the lower quality entrepreneurs benefit from attempting the verification and mimicking high-quality start-ups that failed to verify its information.
As high-quality start-ups attempt the verification, even the mediocre entrepreneurs would rather wait than trade at the beginning of the game and be pooled with the worst projects. Thus, the trade before the verification dries up, and even the worst projects attempt the verification, without any intent to disclose their information. This, in turn, forces more post-verification disclosure: even not-so-good start-ups disclose evidence in order not to be confused with still worse non-disclosing firms.

Our main insight is that uncertainty about the credibility of private information may lead to more information made available publicly through voluntary disclosures.

1.2 Regulating evidence acquisition and disclosure

We study markets where a seller can acquire conclusive evidence about the value of his asset for potential buyers by conducting costly tests. We address the question of how the optimal regulatory policy depends on the informational advantage of the seller over potential buyers.

The regulatory policy determines whether (i) the seller’s test activities are observable by the market, and (ii) the disclosure of evidence obtained is mandatory. The optimal regulatory policy maximizes the information available to buyers at the time they make decisions on whether to purchase the asset or not.

We find that overt testing and mandatory disclosure together enable signaling and maximize market information in the evidence acquisition environment, that is, if the seller is informed about the value of his asset for potential buyers before conducting the test.

If the testing is overt and disclosure is mandatory, then the informed seller can communicate all of his information to buyers through the scope of testing. Mandatory disclosure is crucial for signaling with the scope of testing. If the disclosure is voluntary, sellers with low-quality assets can engage in extensive testing and never disclose evidence, successfully mimicking high-quality sellers who failed to obtain conclusive evidence.

However, overt testing and mandatory disclosure destroy incentives to acquire information in the information acquisition environment, in which the seller does not have any informational advantage over buyers. The uninformed seller has incentives to acquire evidence only if she cannot avoid adverse inference about her asset quality in the absence of disclosure. If the testing is monitored, the seller easily avoids this adverse inference by not engaging in testing. If disclosure is mandatory, following its absence, buyers know that the seller does not have evidence, and do not revise their beliefs downwards. Therefore, covert testing and voluntary disclosure constitute an optimal policy.
1.3 Optimal search for the best alternative

I study a model of the optimal search for the best alternative, as in Weitzman (1979). Contrary to Weitzman, there are boxes a decision-maker cannot open on her own, and therefore has to hire a particular agent to do it on her behalf. The agent’s rents arise from the non-observability of the effort for which he must be reimbursed up-front. In the first-best, the decision-maker can inspect all the boxes on her own. Nonetheless, I find that eliminating agency and allowing the decision-maker to inspect a given box herself might have detrimental consequences for social welfare. Further, I show that social welfare is non-monotone in the cost of investigating an alternative and/or distribution of prizes in a given box (in the first-order stochastic dominance sense).


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