Available online at www.sciencedirect.com

ScienceDirect

Journal of Economic Theory 160 (2015) 132–149

JOURNAL OF Economic Theory

www.elsevier.com/locate/jet

Notes

Communication with endogenous information acquisition

Harry Di Pei

Department of Economics, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA

Received 1 August 2014; final version received 20 August 2015; accepted 27 August 2015

Available online 12 September 2015

Abstract

I develop a theory of communication in which a sender gathers costly information before giving advice to a receiver. In a general setting, I show that the sender always communicates all her information to the receiver in every equilibrium. In the uniform-quadratic model in which the sender can choose any finite partition as her information structure, an upwardly biased sender can convey more precise information when recommending a larger action.

JEL classification: D82; D83

Keywords: Cheap talk; Information acquisition; Communication

1. Introduction

Experts often collect costly information before advising decision makers. Imagine an investment banker (she) persuading her customer (call him the CEO) on the acquisition of a firm, she has little idea about its value before mobilizing her research team to gather the relevant information. Needless to say, acquiring such information usually incurs cost. Similar situations arise when doctors diagnosing patients, lobbyists studying regulation policies, etc.

Motivated by these applications, I study the strategic information transmission problem in Crawford and Sobel (1982), with the innovation that the sender acquires her information en-

E-mail address: harrydp@mit.edu.

http://dx.doi.org/10.1016/j.jet.2015.08.011

dogenously before communicating with the receiver. I find that when information gathering is costly, the interaction between *moral hazard in acquiring information* and *adverse selection in reporting information* overturns many predictions in CS.

In my model, the sender chooses a partition of the state space as her information structure. This process is unobservable to the receiver and costly for the sender. My first result shows that the sender communicates everything she knows to the receiver in every equilibrium, with virtually no restriction on the state space as well as the players' preferences. Formally speaking, full communication is guaranteed whenever the sender can always coarsen her information partition, and a strictly coarser partition costs less to acquire. The intuition behind this result is simple: if the sender has an incentive to withhold information, then why does she acquire that information in the first place? By studying the problem in less detail, she achieves the same outcome at a lower cost.

Following this general result, I analyze the well-known '*uniform-quadratic*' model with an '*upwardly biased sender*' (her favorite action is always strictly larger than the receiver's), which has been the main focus of the strategic communication literature. When the cost of an information structure is proportional to its value (cubic cost),[1] I show that every equilibrium is characterized by an interval partition with *decreasing* interval lengths if information acquisition cost is large enough. This reverses the characterization result in CS, in which the interval lengths are increasing.

For some rough intuition, this '*reverse informativeness*' result is driven by the commitment effect of costly information acquisition. Our cubic cost function implies that given the number of elements in the partition, an information structure is more costly if the lengths of the intervals are more uniform. Since the sender is upwardly biased, and due to the covert nature of information acquisition, decreasing interval equilibria cannot be sustained when the cost of information acquisition is too small. This is because the sender strictly prefers the larger action at the partition point, so she has an incentive to move the partition point to the left, and to acquire an information structure which is more costly. However, when the cost of information acquisition is sufficiently large, this deviation is no longer profitable. Hence, higher information acquisition cost gives the sender more commitment power, which helps to sustain informative equilibria with decreasing interval lengths.

Related literature My work is closely related to a contemporaneous paper by Argenziano et al. (2014), in which the sender chooses the precision of her information by deciding how many rounds of Bernoulli Experiments to conduct.[2] They study equilibrium outcomes both when the sender's information structure is observable (overt) and when it is non-observable (covert), and apply their results to revisit the trade-off between delegation and communication. Both papers enrich the sender's informational choice comparing with earlier contributions, where the sender is either perfectly informed or completely ignorant.[3] When uncertainty is 1-dimensional, the

[1] Although this result is shown under the cubic cost function, the qualitative feature of the equilibrium is robust to more general cost functions. In Section 2 of the Online Appendix, I display a general cost functions under which '*reverse informativeness*' holds.

[2] In Argenziano et al. (2014), the state θ is uniformly distributed in $[0, 1]$, the outcome of a Bernoulli experiment is binary: either 0 or 1, and outcome 1 occurs with probability θ. In their framework, the sender chooses how many rounds of independent experiments to conduct.

[3] For example, Aghion and Tirole (1997), Austen-Smith (1994), Hellwig and Veldkamp (2009), etc.