Available online at www.sciencedirect.com

ScienceDirect

Journal of Economic Theory 166 (2016) 334–361

JOURNAL OF Economic Theory

www.elsevier.com/locate/jet

Informationally robust trade and limits to contagion ☆

Gabriel Carroll

Department of Economics, Stanford University, 579 Serra Mall, Stanford, CA 94305, United States

Received 14 April 2015; final version received 2 September 2016; accepted 13 September 2016

Available online 16 September 2016

Abstract

Two agents can each accept or reject a proposed deal, whose value for each agent depends on an unknown state, and may be positive or negative. The deal takes place only if both accept. Each agent can be imperfectly informed, in an arbitrary way, about both her own value and the other agent's. In such environments, contagious adverse selection may prevent the deal from being reached even when it is mutually beneficial ex post. We give an upper bound on the ex-ante expected welfare loss in equilibrium due to such contagion, valid for any information structure. The welfare loss is small if negative values are unlikely ex ante; and under an assumption of known aggregate gains from the deal, our bound is sharp. The bound has a succinct description, even though the equilibrium itself, in any given information structure, may be hard to describe explicitly.

JEL classification: C72; D82; D83

Keywords: Adverse selection; Contagion; Information structure; Robustness

1. Introduction

Imagine two agents contemplating a proposed agreement. The value of the agreement for each agent depends on an unknown state of the world, and each of them may have some private

☆ Thanks to (in random order) Paul Milgrom, Alp Simsek, Stephan Lauermann, Heski Bar-Isaac, Alex Wolitzky, Matthew Jackson, Anton Tsoy, Benny Moldovanu, Nathan Hendren, Daron Acemoglu, Jean Tirole, Brett Green, Richard Holden, and anonymous referees for helpful comments. Previous versions of this paper circulated under the titles "Robust Trade in Lemons Markets" and "Informationally Robust Trade Under Adverse Selection."

E-mail address: gdc@stanford.edu.

http://dx.doi.org/10.1016/j.jet.2016.09.003

information about this state. Ex ante, with high probability, both parties stand to benefit from the deal, but each also foresees some nonnegligible probability that the deal will turn out badly for her. Each agent may accept or reject, and the deal takes place only if both accept.

Many kinds of interactions can be described by this simple setup:

- The agents may be a buyer and seller of a good. Since our model assumes the only options are accept or reject—no bargaining over the price—the applications would be ones where the price is fixed in advance.
  For example, the agents may be a manager and a potential employee, deciding whether to begin an employment relationship. The manager has private information about the nature of the work, and the employee has superior knowledge of her productivity, both of which affect both agents' value for the relationship. The salary is fixed by corporate policy, government pay scale, or union contract, and cannot be negotiated.
- The agents may be representatives of two countries, deciding whether to finalize a trade agreement.
- The agents may be two members of a hiring committee, voting on an offer to a job candidate; the candidate is hired only if the vote is unanimous.

In such a situation, the deal may fail even if its total value to the two agents is positive. Such failure can occur for several reasons. First, of course, either agent can reject the deal if she expects its value to her is negative. Second, there may be *adverse selection*: agent 1 may realize that agent 2 accepts the deal only if it is likely to be favorable to agent 2, which could be an indication that it is unfavorable to agent 1. This can motivate agent 1 to reject, even when her expected value based on her own information alone is positive. A long literature in information economics since Akerlof (1970) has emphasized this possible reason for breakdown of trade.

Third, and more subtly, this breakdown can be exacerbated by *contagion*: Once agent 2 realizes that agent 1 may sometimes reject due to adverse selection as above, this can in turn make 2 reject for other realizations of her private signal, and so forth. Thus, higher-order beliefs can play an important role in breakdown of trade. A recent literature has started to explore the importance of this contagion in economic outcomes (Rubinstein, 1989; Morris and Shin, 2012; Angeletos and La'O, 2013).

It seems, then, that we cannot predict the outcome of the interaction without knowing the details of the information structure: whether one agent is perfectly informed and the other completely uninformed; or each receives a conditionally-independent noisy signal of the state; or perhaps something much more intricate. Unfortunately, information structures (and especially higher-order information) can be complex, and very hard for an outside observer to model accurately. In this paper, we show that we can nonetheless give a bound on the extent of informational contagion, valid across all information structures. In particular, the effect of contagion goes to zero as the measure of states where either agent is hurt by the deal goes to zero. Moreover, under an assumption that the deal is beneficial in aggregate, our bound is sharp, and identifies the information structure that is most harmful to trade. Perhaps surprisingly, in this worst case, contagion is not a factor at all.

A numerical example will help illustrate our results. Suppose that it is commonly known in advance that the proposed deal produces an aggregate net benefit of 2, but the distribution of this benefit is uncertain. Ex ante, there is a 80% chance that each agent's value is 1; but there is also a 10% chance that agent 1 gains 3 from the deal and agent 2 loses 1, and a 10% chance of the reverse payoffs. In brief, the payoffs from the deal are