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The relative efficacy of price announcements and express communication for collusion: Experimental findings[☆]

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ABSTRACT

This study conducts experiments to determine the modes of communication that are able to produce and sustain collusion and how the efficacy of communication depends on market structure. Two communication treatments are considered: non-binding price announcements and unrestricted written communication. We find that price announcements are conducive to coordinating on a high price but only under duopoly and when firms are symmetric. The standard experimental finding that collusion without communication is rare when there are more than two firms is shown to be robust to allowing firms to make price announcements. When firms are asymmetric, price announcements do result in higher prices but there is little evidence that firms are coordinating their behavior. When firms are allowed to engage in unrestricted written communication, coordination on high prices occurs for all market structures. We find that the incremental value to express communication (compared to price announcements) is greater when firms are asymmetric and there are more firms.

1. Introduction

For firms to successfully collude, they must coordinate their behavior, and coordination requires some form of communication. In practice, this communication can involve tacking on a few digits to a multi-million dollar bid as in the FCC spectrum auction (Cramton and Schwartz, 2000) or announcing future intended prices as in the market for air travel (Borenstein, 2004) or unilaterally announcing a pricing strategy as in the truck rental market[1] or sitting in a hotel room and talking about prices

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[1] Federal Trade Commission, *In the Matter of Valassis Communications, Inc.*, File No. 051 0008, Docket No. C-4160, April 28, 2006.

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and sales quotas as in the lysine market (Eichenwald, 2000). While the last mode of communication is presumably the most effective, it is also the most clearly unlawful. Firms interested in jointly raising prices face a tension in that communication which is more likely to result in coordination may also be more likely to result in prosecution. Hence, they may choose to more indirectly communicate when it is sufficient to produce at least some collusion.

This trade-off raises two questions that we examine here. First, what are the various forms of communication that can produce coordinated collusive outcomes? In particular, how indirect can communication be and still be reasonably effective? This question is central to antitrust and competition law and, in spite of a legion of legal cases that speak to what practices are and are not lawful, there remains a large gray area where legality is unclear.[2] Second, how does the answer to the first question depend on the structure of the market?

These questions are notoriously difficult to examine theoretically because the equilibrium framework cannot speak to the issue of how firms coordinate in moving from one equilibrium to another which is exactly what is at issue here: What forms of communication will result in firms coordinating a move from a static equilibrium with competitive prices to a dynamic equilibrium with supracompetitive prices? Experimental methods offer a comparative advantage in that subjects engage in exactly the dynamic process of coordination that we are trying to understand. While the subjects are college students and not managers – and thus extrapolating from experiments to market behavior is always a precarious leap – experimental methods have more promise than other methods for shedding light on the effectiveness of various communication practices in producing collusion.

The specific form of those two questions are addressed here as follows. In practice, two commonly observed methods of communication for coordinating firm behavior are advance price announcements (as arose in the ATPCO airlines cases) and unrestricted communication using natural language (as practiced by hard core cartels; for example, lysine, vitamins, and fine arts auction houses).[3] To assess the relative efficacy of different modes of communication, the research plan is to compare outcomes when sellers can make price announcements with when they cannot, and to compare unrestricted communication (through online chat) with price announcements. When are price announcements effective at producing collusion? When is unrestricted communication particularly effective in producing collusion relative to price announcements? Answers to these questions will shed light on when we can expect firms to engage in the most egregious form of collusion – involving unrestricted communication – and when they will instead choose less express methods. In considering the relative efficacy of these different forms of communication, market structure is varied in terms of the extent of firm heterogeneity and the number of sellers. While unrestricted communication is surely expected to be more effective than price announcements, less clear is how the incremental value of unrestricted communication depends on market structure.

Our main findings are that firms are able to coordinate on a high price with price announcements but only for duopoly and when firms are symmetric. When there are more than two firms, it is a widely-documented experimental finding that collusion is rare without communication and we find that result robust to allowing firms to make price announcements. While price announcements do result in higher prices for an asymmetric duopoly, there is little evidence that they are coordinating their behavior in the sense of acting consistent with a collusive equilibrium. When firms engage in unrestricted communication, coordination on high prices occurs whether firms are symmetric or asymmetric and regardless of the number of firms.

Section 2 provides a brief summary of experimental work pertinent to the current study. Section 3 describes the experimental design as well as the theoretical model underlying the experiment. The results from the experiments are described and discussed in Section 4.

2. Literature review

Pertinent to this paper are past studies that experimentally examine how the frequency and extent of supracompetitive outcomes depend on: (1) the method of communication between firms about price or quantity intentions; and (2) firm heterogeneity. There is a voluminous literature addressing the first issue, while the set of experiments addressing the second issue is relatively sparse. There are no experiments that address the interaction of communication and firm heterogeneity, which is the primary focus of the current study. We provide here a brief summary of results from previous experiments, and an extensive review is available in our working paper (Harrington et al., 2013). Previous surveys of the experimental literature on communication of intentions in an oligopoly include Cason (2008), Normann (2008), Haan et al. (2009), and Potters (2009).

The communication protocols used in past oligopoly experiments can be partitioned into four categories. In all of these cases, the announcements made by subjects are non-binding. A Simple Price Announcement protocol involves one or more subjects announcing a price and, in some experiments, subjects responding to an announcement by affirming or rejecting it. An Iterative Price Announcement protocol has multiple stages where price announcements made in an earlier stage restrict the announcements that can be made in the current stage. A Strategy Announcement protocol has subjects announce not a price but a strategy for the game or, more generally, some set of contingency plans. Finally, a Chat protocol allows for either

[2] Kaplow (2013) delivers an excellent discussion of the boundaries of unlawful collusion.
[3] The ATPCO case is covered in Borenstein (2004), while many hard core cartels are discussed in Harrington (2006) and Marshall and Marx (2012).