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# Do Antitrust Agencies Facilitate Meetings in Smoke-Filled Rooms?\*

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## Abstract

The theory of industrial collusion generally does not distinguish between tacit and explicit collusion. We show that if tacit collusion is not sustainable, firms may still be willing and able to collude explicitly when demand is viscous, the expected antitrust penalty is limited and antitrust agencies are sufficiently effective in detecting and prosecuting cartels.

*Keywords:* Tacit collusion; Explicit collusion; Antitrust enforcement.

*JEL Codes:* C73; D43; L13; L41.

One of the more challenging issues in the theory of industrial collusion concerns the difference between tacit and overt collusion. Under tacit collusion, firms manage to achieve collusive market outcomes without communicating directly, whereas under overt collusion there is an explicit coordination of actions. Unlike tacit cooperation, explicit collusion is typically prohibited. Competitors who fix prices, for example, act in breach of antitrust laws and consequently risk a fine or even a prison sentence. According to the standard model of collusion there is no real need for direct communication, because any collusive outcome can be explained as resulting from a tacit coordination of actions.<sup>1</sup> Yet, there is an abundance of evidence from antitrust practice revealing that a great many firms colluded explicitly.<sup>2</sup>

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<sup>1</sup>For a general discussion of this issue, see Chapter 4 of Motta (2004) and Chapter 2 of Whinston (2006).

<sup>2</sup>See Davies and Olczak (2008) for a recent empirical study indicating that the standard theoretical framework for collusion does not apply equally well to tacit and overt collusion.

Apparently, talking has an added value. In this paper, we provide an explanation for why firms may choose to explicitly coordinate their actions. We show that when tacit collusion is not sustainable, firms may still be willing and able to collude explicitly provided that demand is viscous, the expected antitrust penalty is limited and, counterintuitively, the probability of getting caught is sufficiently high.

The literature offers at least two reasons why firms may decide to collude explicitly. First, communication can play a vital role in forming a collusive agreement. For example, in absence of a natural focal point, it can be quite a challenge for firms to come to terms on a collusive price without talking. Also, it might help firms in establishing a more profitable arrangement.<sup>3</sup> Second, communication can be key in sustaining collusion. For instance, it may be used to increase price transparency so that secret price cuts can be observed quickly, thereby becoming less attractive.<sup>4</sup> This may be particularly important when prices or sales are not publicly observable.<sup>5</sup> In the following, we offer an alternative explanation for how communication can help firms to sustain collusion. We show that antitrust enforcement may effectively commit firms to abide by the collusive agreement. This potential adverse effect exists when buyers are inert and when the detection and prosecution of cartels is sufficiently successful. We thus show that antitrust agencies have the potential of facilitating ‘meetings in smoke-filled rooms’ in markets with demand inertia.<sup>6</sup>

Consider an industry with a given number of identical firms aiming to maximize the expected discounted sum of their profit stream, where  $\delta \in [0, 1)$  is the common discount factor. Time is discrete and firms interact repeatedly over an infinite time horizon. Let per period competitive and collusive profits be respectively denoted by  $\pi^n$  and  $\pi^c$ . If a firm deviates from the collusive agreement, it earns  $\pi^d$  in the period of defection and expects to make a profit of  $\pi^e$  in all subsequent periods. Collusion is either tacit or explicit and, in case of the latter, firms become subject to antitrust enforcement. If firms explicitly coordinate their actions, then there is a probability of being convicted  $\alpha$  after each period in which at least one firm operated collusively. Conviction leads to a fine  $F$  and we assume that, in the event of conviction, firms will act competitively in all future periods.<sup>7</sup>

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<sup>3</sup>Martin (2006) provides a theoretical analysis comparing the benefits of tacit and overt collusion. He finds that when communication is not too costly, explicit collusion may be more profitable as it has the potential to reduce the incentives to defect.

<sup>4</sup>A case study of the sugar-refining cartel performed by Genesove and Mullin (2001) clearly illustrates how communication may play an essential role in sustaining a collusive agreement.

<sup>5</sup>There is a growing literature studying the role of communication in collusion when part of the (history of) actions is private information. See Harrington and Skrzypacz (2010) and the references therein.

<sup>6</sup>McCutcheon (1997) argues that antitrust enforcement may also have adverse effects when it makes renegotiating the collusive agreement sufficiently costly. The idea that antitrust laws may facilitate collusion by making communication costly is confirmed experimentally by Andersson and Wengström (2007).

<sup>7</sup>This may be due to the fact that industries that are known to be prone to collusion are typically under

In this setting, collusion can be sustained as a subgame perfect equilibrium if and only if the following inequality is satisfied

$$\frac{1}{1-(1-\alpha)\delta} (\pi^c + \alpha [\frac{\delta}{1-\delta} \pi^n - F]) \geq \pi^d + (1-\alpha) \frac{\delta}{1-\delta} \pi^e + \alpha [\frac{\delta}{1-\delta} \pi^n - F]. \quad (1)$$

Observe that for  $\alpha = 0$ , (1) reduces to

$$\frac{1}{1-\delta} \pi^c \geq \pi^d + \frac{\delta}{1-\delta} \pi^e, \quad (2)$$

which is the familiar incentive compatibility constraint that must be met for tacit collusion to be feasible.

In the standard model of collusion, firms are assumed to face a prisoner's dilemma when attempting to fix prices above competitive levels, *i.e.*,  $\pi^d > \pi^c$ . In this setting, collusion is sustainable only when firms adopt a credible punishment strategy and put sufficient weight on future profits. One well-known punishment strategy is the so-called grim-trigger strategy, which prescribes firms to compete in all periods following a period of defection, *i.e.*,  $\pi^e = \pi^n$ . The next result shows that, in this case, communication has no effect on the sustainability of the collusive agreement.<sup>8</sup>

**Theorem 1** (standard model of collusion). *Assume  $\pi^d > \pi^c > \pi^e = \pi^n$ . If tacit collusion is not sustainable, then explicit collusion is not sustainable either.*

A crucial assumption underlying this result is that a firm can increase its sales instantly and significantly by cutting the collusive price, *i.e.*,  $\pi^d > \pi^c$ . In many industries, however, buyers are hesitant to switch suppliers in response to a price cut. This may be due to the fact that customers exhibit brand loyalty, switching costs or a lack of (or lag in) relevant information.<sup>9</sup> These types of consumer inertia directly affect the intertemporal trade-off that colluding firms are confronted with. In the standard model of collusion, firms compare short-term gains with future losses when deciding whether or not to defect from the collusive agreement. However, if buyers are inert, then undercutting the collusive price leads to a short-term loss, *i.e.*,  $\pi^c > \pi^d$ . This is so, because short-run sales are hardly affected and existing customers have to pay less for the product or service. Yet, deviating can still be profitable as it may lead to an increase in future market share and profits, *i.e.*,  $\pi^e > \pi^c$ .<sup>10</sup>

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closer scrutiny by antitrust agencies. In the theoretical literature on collusion, it is a common simplifying assumption. Assuming instead that convicted firms will compete for a sufficient but finite number of periods does not fundamentally affect the results.

<sup>8</sup>The proof is in the Appendix. It is noteworthy that the result of Theorem 1 also applies for  $\pi^e > \pi^n$  and might apply for  $\pi^e < \pi^n$ . However, the result does not hold when firms are allowed to renegotiate the collusive agreement and communication makes collusion 'costly, but not too costly'. See McCutcheon (1997).

<sup>9</sup>Many more explanations for consumer inertia can be found in Klemperer (1995).

<sup>10</sup>Notice that collusion is always sustainable when  $\pi^c \geq \pi^e$ .

The next result shows that in markets with demand inertia explicit collusion might be sustainable, whereas tacit collusion is not.

**Theorem 2** (collusion in markets with demand inertia). *Assume  $\pi^e > \pi^c > \pi^d \geq \pi^n$  and  $\delta > \frac{\pi^c - \pi^d}{\pi^e - \pi^d}$ . There exists an  $\underline{\alpha} \in (0, 1)$  such that explicit collusion is sustainable for all  $\alpha \in [\underline{\alpha}, 1]$ .*

Thus, if buyers are inert and antitrust agencies are sufficiently effective in detecting and prosecuting cartels, then explicit collusion can be supported as a subgame perfect equilibrium. It remains to be shown that overt collusion can be more profitable than competition. This is the case if the following inequality is satisfied

$$\frac{1}{1-(1-\alpha)\delta}(\pi^c + \alpha[\frac{\delta}{1-\delta}\pi^n - F]) > \frac{1}{1-\delta}\pi^n \iff \pi^c - \pi^n > \alpha F. \quad (3)$$

Clearly, explicit collusion is profitable if and only if the per period benefit of collusion exceeds the expected antitrust penalty.

In sum, if the probability of getting caught is sufficiently high and the fine is sufficiently low, then antitrust enforcement may effectively function as a commitment device in markets where demand is viscous. The intuition behind this result is as follows. The (expected) cartel life span is negatively related to the probability of conviction, all else equal. Anticipating that the market will be competitive in periods following conviction, firms will attach relatively more weight to collusive profits. Antitrust enforcement therefore has the potential of making firms become more short-term oriented. In the standard model of collusion, short-term profits are maximized by deviating from the collusive agreement. By contrast, if buyers are inert, then short-term profits are maximized by setting a high price as cutting the collusive price leads to an instant relative loss. Consequently, if antitrust agencies are sufficiently effective in markets with demand inertia and the antitrust penalty is not too severe, then the answer to the title may be in the positive.

## Appendix: Proofs

**Proof of Theorem 1.** Suppose that the incentive compatibility constraint is violated for  $\alpha = 0$ , *i.e.*,  $\delta < \frac{\pi^d - \pi^c}{\pi^d - \pi^e}$ . For  $\alpha = 1$ , (1) reduces to  $\pi^c \geq \pi^d$ , which, by assumption, does not hold. It remains to be shown that (1) is violated for all  $\alpha \in (0, 1)$ . To that end, observe that (1) can be rearranged to

$$A\alpha^2 + B\alpha + C \geq 0, \tag{4}$$

where  $A = \delta[\delta(\pi^e - \pi^N) + (1 - \delta)F]$ ,  $B = \delta[(1 - \delta)(\pi^e - \pi^d) + \delta(\pi^N - \pi^e) - (1 - \delta)F]$  and  $C = (1 - \delta)[\pi^c - \pi^d + \delta(\pi^d - \pi^e)]$ . The weak inequality (4) holds with equality for  $\alpha = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$ . Note that, under the assumptions made,  $A > 0$ ,  $B < 0$  and  $C < 0$ . Hence,  $AC < 0$  and therefore (4) holds with equality for some  $\alpha < 0$ . As (1) is quadratic in  $\alpha$  and violated for  $\alpha = 0$  and  $\alpha = 1$ , it follows that (1) is violated for all  $\alpha \in (0, 1)$ .  $\square$

**Proof of Theorem 2.** For  $\alpha = 0$ , the incentive compatibility constraint is given by (2), which does not hold as  $\delta > \frac{\pi^c - \pi^d}{\pi^e - \pi^d}$  by assumption. Thus, tacit collusion is not sustainable. For  $\alpha = 1$ , (1) reduces to  $\pi^c \geq \pi^d$ , which holds. As (1) is quadratic in  $\alpha$  (see (4)), there exists an  $\underline{\alpha} \in (0, 1)$  such that (1) holds for all  $\alpha \in [\underline{\alpha}, 1]$ .  $\square$

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