

The authors conclude that students who learn online instead of in-person receive lower grades and are less likely to stay enrolled in school. If one were not to have read Payson and simply pored over the data in the *American Economic Review* article, one might possibly be convinced that online education is, in fact, inferior. The strength of Payson's text is that the reader becomes more skeptical of the generalizability of such conclusions.

It is critical nature of Payson's text that inspires criticism about the strength of the in-person lecture and merits the attention of readers who, if they are economists, must confront the changing nature of their profession. But perhaps the understated strength of reading Payson's text is that it distinguishes the free college initiatives that emphasize a transfer of the expense to taxpayers from initiatives where college tuition costs are free for students because the cost of education has been reduced through the use of technology. When economists advocate for only the former rather than the latter, they seem preoccupied with stalling change in higher education. Payson's text encourages readers to reconsider the roles attributed to faculty members, rethink how faculty members teach, and redesign the research agenda and expectations of faculty members.

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The Theory of Competition and Collusion Policy. JOSEPH E. HARRINGTON, JR. Cambridge, MA: The MIT Press, 2017. Pp. x, 133. \$35.00.

This monograph covers illegal collusion, and how antitrust laws and litigation impact the incentive to collude. While the book centers on examining these issues mostly in a game-theoretic manner, it does offer interesting insights into competition policy both in the United States and elsewhere, especially the European Union (EU). Harrington teaches at the University of Pennsylvania.

Harrington in Chapter 1 defines collusion when “firms in market *coordinate* their behavior....to [create] a *supracompetitive outcome*” in terms of price, relative to what would be seen in a Nash equilibrium of an oligopoly game (p. 1). The author notes that the resulting collusive agreements could also allocate quantities, geographic markets, or other

variables. Harrington writes that a collusive strategy has three parts: a collusive outcome (in terms of price charged, quantities allocated, and/or other measures); a monitoring protocol to police enforcement; and a set of “punishments” if one or more firms cheat. Monitoring may involve examining measures other than prices charged by firms if those are difficult to ascertain (say, along supply chains for intermediate goods). The book goes on to state that while “mutual understanding to constrain competition is unlawful” (p. 5), the U.S. Supreme Court has ruled that such activity has to be overt, and the existence of a “process” has to be proven, usually through showing channels of communication. These can include “explicit collusion,” where firms “speak” to each other; “tacit collusion” where one firm announces an action (say a price increase) and others follow suit without communicating back; and “conscious parallelism”, where one firm (say) raises price without prior announcement, and other firms eventually do the same. The last alternative is not illegal.

In Chapter 2 Harrington begins to address some issues in modelling illegal behavior and its consequences. He notes that the process of deciding whether firms have violated the law involves three stages: (1) detection; (2) prosecution; and (3) conviction (p. 13). Detection can come from customers; from (disgruntled?) employees; or from a government’s “competition authority” (CA). The probability of being convicted (σ) is the product of the probability of investigation (ω) times the probability of conviction (ρ). Firms might respond by avoiding “direct” communication, even if this lowers expected profits. The chapter concludes with a brief discussion of how penalties are assessed in the US and the EU.

The third chapter examines the impact of competition policy on cartels and other collusive agreements. In deciding whether to collude, a firm has to consider the possible penalty (F) it would pay if caught and convicted. As F rises, the incentive to leave the cartel (or otherwise cheat) becomes greater. As such, competition policy can be considered successful if it makes cartels “unstable.” Cartels thus become more unstable the higher σ is, as well as the higher profits are gained by cheating (measured by η).

Harrington continues this chapter looking at stability. A stable cartel is where all cartel members prefer to be in the cartel, and all noncartel members prefer to be outside (p. 30). He argues that large firms (in terms of capacity) will prefer to be in the cartel, but not small firms.

Additionally, the more member firms a cartel has, the greater the chance that the cartel will be “caught.” Thus competition law tends to reduce the size of cartels.

Focusing on price, the author argues that a cartel will maximize profit minus the expected penalty (the latter σF). The result of this is that competition policy will induce the cartel to lower price, as σ or F are raised (p. 34). One consequence is that there will be few cartels with low price markups (above cost). Conversely, legal cartels should have higher markups than illegal ones (p. 36). Illegal cartels will raise price only gradually in order to avoid detection, especially by customers (p. 42). As production costs rise, similarly, cartels are less likely to change price quickly, again to prevent detection (p. 49). Harrington continues the chapter by discussing how firms can communicate with each other, particularly on information such as sales and prices. This can include at one end “cheap talk” (“costless messages”), and private monitoring of one another on the other end (p. 51). Firms know their own data at “high frequency” (say monthly) but know about others maybe only at “low frequency” (quarterly or annually); the latter include public reports. Firms in illegal cartels are more likely to engage in price wars than otherwise (p. 55). Harrington ends Chapter 3 by noting that competition policy has a direct effect of shutting down cartels, an indirect effect of discouraging cartels, and an indirect price effect of inducing existing cartels to charge lower prices.

Chapter 4 centers on competition policy. Harrington writes that antitrust enforcement involves detection, prosecution and penalization. He sets out to investigate how much enforcement is “socially optimal”, much of it based on earlier work by David Besanko and Daniel Spulber. In particular, the competition authority (CA) chooses σ and F so as to maximize expected social welfare (p. 65). If the CA lacks information on production cost, low cost industries might end up colluding in “small amounts” (p. 67). If CA enforcement cost (K) is low, then high cost industries will not collude, and small cost industries will act close to competitive levels. Similarly, if K is high, the CA may tolerate some low levels of collusion (p. 71).

Harrington goes on to discuss penalty designs in case of price collusion. Three possibilities exist: a revenue based formula; an incremental profit based formula; and an overcharge-based formula. The first two are used in practice, but not the third. Ironically, in terms of welfare maximization, Harrington argues the third penalty design is the

best (p. 74).

Harrington continues examining penalties by noting that in the United States, only “direct purchasers” can sue for damages, while in Europe both “direct purchasers” and “indirect purchasers” are allowed to collect. A direct purchaser might be a manufacturer buying components from a cartelized industry; an indirect one would be a customer of the manufacturer. The chapter concludes by looking at “leniency” programs in the United States and Europe, which allow a firm in a cartel to face a lower F if it agrees to “rat out” the cartel.

The last (fifth) chapter outlines potential future research, includes looking at political and other incentives facing a CA, and incentives facing managers in cartels. Earlier Harrington writes that not only firms, but also executives in those firms can face civil or criminal penalties if convicted.

Harrington in his preface notes that this short tome is written for economists with good game theoretic backgrounds (this reviewer is not one of them). However, by focusing on assumptions and conclusions, and skipping over the math, a reader can still glean a lot of information on this facet of oligopolies. One weakness of the book is it has very little discussion of empirical research on the impact of antitrust enforcement on collusive behavior. Still, the book will be of interest not just to microeconomists and industrial organization economists, but also to legal scholars involved in antitrust research, and to international economists and international business specialists looking for contrasts in American and European antitrust enforcement.

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