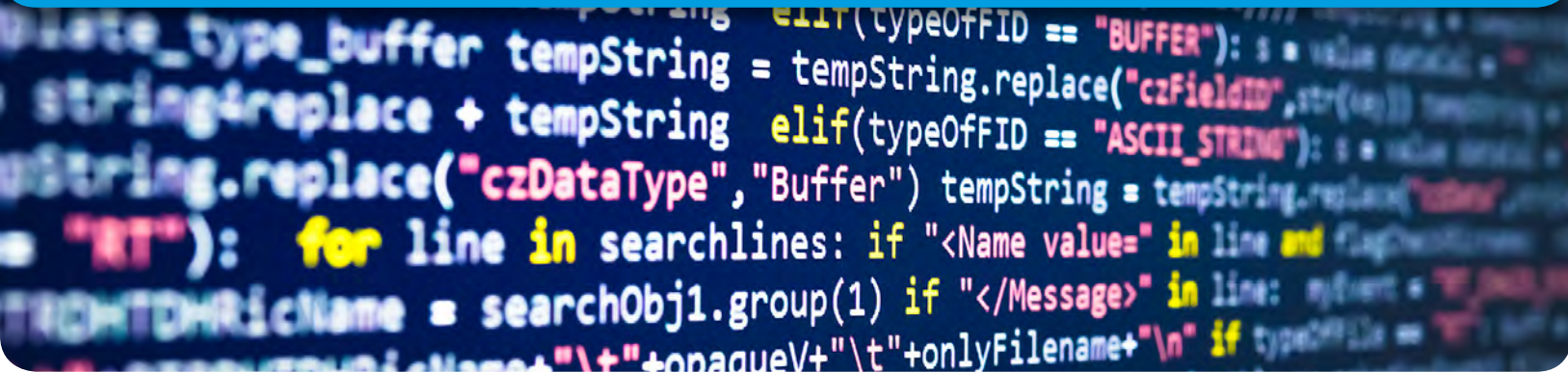


SHOULD WE BE CONCERNED THAT DATA AND ALGORITHMS WILL SOFTEN COMPETITION?



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I. INTRODUCTION

Firms have always used data and algorithms. A general store at the beginning of the nineteenth century did not have modern information technology but may have marked up the goods it sold by a constant percent (a very simple algorithm) over costs (data). The large American multi-divisional firms of the beginning of the twentieth century are another example in that they collected large amounts of information from their various divisions and used those data to allocate resources and control behavior.

But now some firms appear to be using new types of data in different and creative ways. Facilitated by advances in information technology, the data differ in their size and scope. And, as opposed to a focus on internal control of an organization (e.g. costs, divisional performance), these data frequently have more of an external focus. For example:

- The data may contain information on *competitors*. For example, many companies now develop and use some sort of customer relationship management data through software like salesforce.com to manage relationships with current and potential customers but also to understand the actions of their competitors, like the prices they have bid or whether they have actively pursued new business. Another example involves a third party collecting, organizing and publishing data sent by industry participants: some gasoline retailers in Australia and an information service “exchange site by site petrol prices covering most of Australia every 15 or 30 minutes.”⁴
- The data may contain information on *customers*. For example, for some time now, some supermarkets have been developing and maintaining shopping data from their loyalty card programs.⁵ On the basis of those data, supermarkets can (and do) make

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3 The views expressed in this article are my own and do not necessarily represent the views of Bates White, the Commissioner of Competition, The Bureau of Competition, Department of Justice, or the Public Prosecution Service of Canada. I thank many colleagues for their comments without implicating them in any errors.

4 The Australian Competition & Consumer Commission recently resolved its investigation into that use of data by requiring that consumers have the same access to the same information that the retailers have. Australia Competition & Consumer Commission. “Petrol price information sharing proceedings resolved.” MR 273/15, Dec. 23, 2015.

5 Stephanie Clifford, “Shopper Alert: Price May Drop for You Alone,” *New York Times*, Aug. 9, 2012.

offers to their customers that are personalized on the basis of their past shopping habits and even their current location within a store. Retailers may also combine customer data with other data like data on the environment. For example, Wal-Mart deployed algorithms that detected that purchases of strawberry pop-tarts increased seven-fold just before a hurricane. With this knowledge, Wal-Mart began placing strawberry pop-tarts at the checkout before hurricanes.⁶

Not only do the data differ, but the algorithms are more diverse and sophisticated than those used by the hypothetical old general store. One type of example involves use of algorithms by platforms — that is a firm that serves different distinct types of users. Uber uses data on both riders and drivers to adjust prices to ensure that demand and supply are balanced: “to ensure reliability and availability for those who agree to pay a bit more” as well as to encourage “more drivers to get back on the road.”⁷ Amazon uses an algorithm that makes it more likely that sellers who maintain low prices relative to their competitors will be featured prominently in a “buy box.”⁸ Other examples involve a platform’s efforts to create more valuable matches between different types of users. A perhaps trite example is a dating site that matches potential couples through an algorithm instead of allowing members to select potential partners.⁹ Other prominent examples include Google, which matches advertisers and users based on a variety of criteria including the context of the website and the interests and demographics of the website visitor,¹⁰ and American Express, which has developed targeted promotions leveraging investments “in information systems that studied the purchase habits and inclinations of cardmembers.”¹¹ This article will not address how platforms use data and algorithms; instead it will focus on firms that serve a single type of user. For example, a supermarket may use information on customers as input into an algorithm that promotes items that are complementary to items previously purchased; a customer who has previously purchased diapers might receive a promotion for baby formula. Alternatively, a third-party merchant selling on Amazon marketplace might use information on competitor prices as input into a pricing algorithm to maximize the chance that it is featured prominently in the buy box.

This article will address two main questions. First, is whether firms, which unilaterally develop, deploy and use data and algorithms, are likely to have their own incentives and abilities changed so that competition will be softened. Second, is whether such softening should be worthy of attention from antitrust authorities. The focus of the article is on unilateral development, deployment and use of data and algorithms and excludes “hard-core” cartel activity. The belief that such behavior lessens competition among competitors and is something worthy of the attention of antitrust authorities is not controversial.¹² That focus also excludes data and algorithms that are used by multiple firms within an industry, including unilateral disclosure of information by one firm, which may be viewed as a facilitating practice that softens competition.¹³ The focus on how adoption of algorithms and data affect the adopter’s own incentives and abilities excludes the possibility that data and algorithms might soften competition by eliminating competitors. Instead, the focus is on data that are collected and analyzed exclusively by a single firm for exclusive use of that firm to enhance its own products or knowledge about the industry in which it competes. It is meant to comprise technology that mimics the ability of one gasoline retailer to quickly see and react to posted prices of nearby gasoline retailers. It is also meant to comprise technology that mimics the ability of the proprietor of the old general store to know intimately the preferences and personal details of his or her clientele.

6 Dezyre.com, “How Big Data Analysis helped increase Walmart’s Sales turnover?” <https://www.dezyre.com/article/how-big-data-analysis-helped-increase-walmarts-sales-turnover/109>.

7 Uber. “Uber Surge Pricing.” <http://uberestimator.com/uber-surge-pricing>.

8 Le Chen, Alan Mislove, and Christo Wilson, “An empirical analysis of algorithmic pricing on Amazon marketplace,” In *Proceedings of the 25th International Conference on World Wide Web*, pp. 1339-1349. International World Wide Web Conferences Steering Committee, 2016.

9 John Tierney, “A Match Made in the Code,” *New York Times*, Feb. 11, 2013.

10 Google. “How ads are targeted to your site” <https://support.google.com/adsense/answer/9713?hl=en>.

11 John A. Quelch and Jacquie Labatt, “The American Express Card,” HBS No. 9-509-027, Boston: Harvard Business School Publishing, 2011, p. 8.

12 Assistant Attorney General Baer reflected his view of hard-core cartel activity in stating “We will not tolerate anticompetitive conduct, whether it occurs in a smoke-filled room or over the Internet using complex pricing algorithms.” U.S. Department of Justice. “Former E-Commerce Executive Charged with Price Fixing in the Antitrust Division’s First Online Marketplace Prosecution,” April 6, 2015, available at <https://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace>.

13 An illustrative case is Canada’s *Atlantic Sugar* case, where the evidence showed that one defendant’s competitors were immediately aware when it posted prices in its lobby and “in time were able to discover Redpath’s pricing formula by a process of deduction from available data.” *Atlantic Sugar Refineries Co. Ltd. et al. v. Attorney General of Canada*, [1980] 2 S.C.R. 644, 656. See also *US v. Airline Tariff Pub. Co.*, 836 F. Supp. 9 (D.D.C. 1993), where the Government alleged that several large airlines used the Airline Tariff Publishing Company’s fare dissemination service to reach agreements on prices.

II. SOFTENED OR SHARPENED – WHEN FIRMS COLLECT AND ANALYZE BETTER DATA

Economic theory instructs that competition can be softened or sharpened when firms collect and analyze more comprehensive data on their competitors or their customers. That ambiguity is not so much a weakness of theory, but recognition that effects may be diverse so that a measure of care should be taken to understand the relevant facts in each specific case.

First, consider data about competitors. Firms can analyze those data to gain insight into the fact of what actions competitors have taken as well as what strategies led to those actions. It is impossible to provide an exhaustive discussion of data that firms may collect and analyze. However, it is easy to provide plausible illustrations that show the diversity of effects.

On the one hand, data about competitors can soften competition. *Tacit collusion* is a softening of competition that stems from industry participants' recognition and reaction to the mutual interdependence of their decisions without any explicit agreement. A critical predicate to this recognition is that competitor decisions be visible; a firm cannot react to that which it does not observe. For example, suppose Firm A weighs the benefits of additional sales from a price cut against the prospect that Firm B will respond by cutting prices. By collecting and analyzing data on Firm B's responses, Firm A can better assess Firm B's strategy and can benefit if that strategy supports competition that is not "too vigorous."

On the other hand, data about competitors can sharpen competition. Firms seek out competitive intelligence to identify their own strengths and weaknesses, as well as to identify opportunities and threats of the environment in which they operate. For example, suppose Firm B has recognized and is exploiting a profitable segment of business about which Firm A has no knowledge.¹⁴ While developing and analyzing data on Firm B, Firm A learns about this segment, which it enters; competition in that segment is thereby enhanced. The practice of collecting and analyzing data for competitive intelligence is not new. For example, writing approximately 20 years ago, Larry Kahaner wrote that Mitsubishi's employees collected "more than thirty thousand pieces of business and competitive information *daily*. This data is filtered, analyzed, and disseminated to companies within the Mitsubishi family to be used as ammunition in the ongoing global war against competitors."¹⁵ The possibility that some of that information may have been used to soften competition through explicit agreement with competitors further underlines the ambiguity of this type of data.¹⁶

When firms analyze data about customers, competition may be similarly either softened or sharpened. Insight into those effects can be appreciated through the economic literature on advertising. And while that literature is vast and nuanced,¹⁷ perhaps a foundational insight of that literature illustrates clearly why analysis of data about customers can strengthen or lessen price competition: advertising may have different effects on price based upon whether it is *persuasive* or *informative*.¹⁸ A persuasive advertisement for a product changes consumer preferences for that product. As a result, demand for the product becomes more inelastic as consumers perceive substitutes to be less perfect substitutes. Ultimately, persuasive advertising can soften competition among competitors and lead to higher prices; it can also be a barrier to entry. In contrast, an informative advertisement does not change preferences, but educates consumers about aspects of a product (e.g. location, price). As a result, demand becomes more elastic as substitute products become prominent in the eyes of consumers. Ultimately, informative advertising can sharpen competition among competitors and lead to lower prices; firms can use informative advertising to support effective entry strategies. Both views of advertising are theoretically plausible and both views have found empirical support: "no single view of advertising is valid in all settings."¹⁹ When firms analyze customer data to inform marketing programs they do so to make those programs more effective. But because either persuasive or informative advertising programs may benefit from advanced analysis of data, the potential effects on competition can vary.

14 Michael Porter describes firms in the can industry that, when facing aggressive competitors and customers with strong bargaining power, "focus on the segments of the can industry where they can create product differentiation." Porter, Michael E. "How competitive forces shape strategy," *Harvard Business Review* (1979): 137-145.

15 Larry Kahaner, *Competitive intelligence: how to gather analyze and use information to move your business to the top*, Simon and Schuster, 1997, 17.

16 The European Commission found that Mitsubishi Electric, Hitachi and Denso fixed prices for certain automobile parts. The firms "exchanged commercially sensitive information such as price elements and market strategies." European Commission. "Antitrust: Commission fines car parts producers € 137 789 000 in cartel settlement," Press Release, January, 27, 2016, available at: http://europa.eu/rapid/press-release_IP-16-173_en.htm.

17 For a comprehensive review of the relevant literature see Kyle Bagwell, "The economic analysis of advertising," *Handbook of Industrial Organization* 3 (2007): 1701-1844.

18 Antitrust usually does not distinguish between socially efficient and inefficient competition. Thus, advertising regardless of its effects on price or welfare may be viewed as an important expression of competition.

19 *Id.* at 1706.

These illustrations are useful to keep in mind to avoid painting an evolving and complex practice like algorithmic analysis of data with an overly broad brush. It is perhaps instructive to remember how starkly some viewed the implications of commercialization of the internet two decades ago. Some thought that .com companies held immense promise for profitable growth and bid up stock prices. Others predicted that price transparency on the internet would leave no room for profits or innovation.²⁰ More nuanced views about the implications of the internet for business and competition have arisen since.

III. UNILATERAL ANALYSIS OF DATA THAT SOFTENS COMPETITION FACES CHALLENGES

The previous section argued against a blanket characterization of the competitive effects of unilateral collection and analysis of competitor and customer data. This section steps away somewhat from the difficulty of distinguishing between those practices that sharpen and those practices that soften competition and asks whether competition authorities should prioritize enforcement against the latter set of practices.

Firms have long collected information on their competitors. The *UK Tractor Registration Exchange* is an example from the mid-1980s where a trade association sought permission from the European competition authority to collect and promulgate detailed information on tractor sales including the producer, brand, serial number, sales agent and information about the buyer.²¹ The Commission and Court of First Instance denied the request on the grounds that such information sharing would soften competition. In 1879, the famous Joint Executive Committee (“JEC”) railroad cartel was formed.²² The JEC, which predated the Sherman Act, was a legal hard-core cartel that collected and published independently verified weekly statistics on the quantities of various commodities shipped by members. It also implemented a number of explicit cartel-enforcement devices such as the use of arbitrators. The result of this action was a significant softening of competition as rates were frequently at monopoly levels.

In both these examples, the information exchanged involved significant collective action by the firms. And while firms have undoubtedly always collected information about their competitors unilaterally, arguably the resulting information did not replicate the rich detail possible with collective action. It may be that advances in information technology will allow for the quality of information collected unilaterally to rival that of information derived from collective action; and to the extent that one exclusively considers examples like the UK tractor exchange or the JEC, this advance will result in softer competition.

Like the collection of competitive intelligence, firms have long engaged in marketing their products and services to their customers in innovative ways. For example, in the last decades of the 19th century, technological change like electrification enabled firms to exploit significant economies of scale and scope. And to run factories at sustained high levels of throughput necessary to achieve those economies, successful “first mover” firms integrated downstream into marketing to ensure a steady demand for their goods.²³ As the environment continues to change, firms of today and the near future will likely leverage advances in information technology to better target their customers in the pursuit of higher profits. And when marketing efforts that soften competition are the beneficiaries of such innovation, more powerful marketing will result in softer competition.

With that context, the question can now be framed: assuming that a competition authority could identify what analysis of customer or competitor data leads to a softening of competition, should enforcement against those practices be a priority?

The first part of an answer to that question is based on practicality. Simply put, could a court write an order that prohibits the behavior that softens competition?

In the case of unilateral collection and use of data on competitors that facilitates tacit collusion, the answer is that it may be very difficult because such an order would prohibit certain reflections and deliberations within a firm. Contracts (or court orders that proscribe a course of action) must reference observable and verifiable information to be enforceable. And while a facilitating practice like unilateral

20 Robert Kuttner, “The Net: A Market Too Perfect for Profits,” Bloomberg.com, May 11, 1998, available at: <https://www.bloomberg.com/news/articles/1998-05-10/the-net-a-market-too-perfect-for-profits>.

21 Kai-Uwe Kühn and Xavier Vives, “Information exchanges among firms and their impact on competition,” manuscript, Institut d’Anàlisi Econòmica, Barcelona (1994). Section 3.3.

22 Thomas S. Ulen, “The Market for Regulation: The ICC from 1887 to 1920,” *The American Economic Review* 70, no. 2 (1980): 306-310.

23 Alfred D. Chandler, “Organizational Capabilities and the Economic History of the Industrial Enterprise,” *The Journal of Economic Perspectives* 6, no. 3 (1992): 79-100.

disclosure of information is observable and verifiable, internal reflections and deliberations are seldom observable and verifiable. As then Judge Breyer wrote, the fact that (at least U.S.) courts do not condemn tacit collusion that softens competition and raises prices “is not because such pricing is desirable (it is not), but because it is close to impossible to devise a judicially enforceable remedy for ‘interdependent’ pricing. How does one order a firm to set its prices without regard to the likely reactions of its competitors?”²⁴

In the case of unilateral collection of data on customers, practical concerns also limit what a competition authority might do.²⁵ Simply put, it is difficult to distinguish marketing that softens competition from marketing that sharpens competition. In theory, a broad proscription on the use of customer data might remove risks. But a broad proscription is also likely to curtail significant innovative and socially valuable applications of the analysis of data.

The second part of an answer to that question depends on what one believes the appropriate role of an antitrust enforcer is. Enforcement actions against a cartel, merger or attempt to monopolize challenge some action believed to extend or preserve market power. Enforcement actions against “excessive pricing” do not require such an action; the challenge is to business practices that are expressions of pre-existing market power. In that context, consider enforcement targeting a firm’s analysis of data that attempts either to differentiate its products in the eyes of consumers or to study the strategies of competitors. Such enforcement could perhaps identify an action (the analysis of data), but unlike a cartel, merger or attempt to monopolize, the action concerns a business practice whose focus is on the firm’s own products or knowledge of the industry. This different focus, however, is the same as many practices firms regularly take when they change the characteristics of their products or revise pricing strategy. In this sense, enforcement against such an analysis of data seems more akin to enforcement against excessive pricing. Whether and when to take action against excessive pricing is controversial in antitrust; that debate has been articulated elsewhere.²⁶ Suffice it to say, that for some competition authorities, the relevant statutes do not permit any enforcement against excessive pricing.

IV. CONCLUSION

Firms are using data and algorithms in innovative ways and policy makers are now confronted with new technology whose implications can be ambiguous. But this is hardly the first time that policy makers are confronting such ambiguity. The eminent business historian Alfred Chandler described a second industrial revolution that saw significant increases in industrial concentration and the rise of conglomerates.²⁷ But that revolution also saw significant decreases in costs due to scale and scope economies. Ultimately, that ambiguity was resolved empirically by the enormous increases in output that resulted: the benefits of the second industrial revolution clearly outweighed the costs. Thus, while it is perhaps natural to regard the uncertain with some suspicion, that suspicion should be tempered by recognizing, as Maureen Ohlhausen has recently noted, that scholarship can be a messy process where many arguments may be made and it takes some time for the good ones to win out.²⁸ It should also be tempered by the fact that past innovations in technology and business practices have resulted in more benefits than costs.²⁹ The role of antitrust should begin by recognizing and addressing the benefits and costs associated with new technologies and business practices. Only by explicitly recognizing the benefits, along with the costs, can antitrust strive to maximize the difference between the two.

²⁴ *Clamp-All Corp. v. Cast Iron Soil Pipe Institute*, 851 F.2d 478 at 484 (1st Cir. 1998).

²⁵ It is perhaps useful to emphasize again that focusing on *unilateral* collection of data precludes collective action. One example of collective action is when a trade association collects data from its members. For example, in an application against the Toronto Real Estate Board (“TREB”), the Canadian Commissioner of Competition alleged that TREB restricted access to data (i.e. its multiple listing service system) to the detriment of competition. The Competition Tribunal concluded that the Commissioner had satisfied the three elements of section 79 of the Competition Act. *Commissioner of Competition v. The Toronto Real Estate Board*, 2016 Comp. Trib. 7 (Competition Trib.).

²⁶ Massimo Motta and Alexandre de Streel, “Excessive Pricing in Competition Law: Never say Never?” *The Pros and Cons of High Prices* 14 (2007).

²⁷ Alfred D. Chandler Jr., *The Visible Hand: The Managerial Revolution in American Business*, Harvard University Press, 1977, 20.

²⁸ Maureen K. Ohlhausen, “Shiny Baubles & Smooth Pebbles: The Role of Pragmatic Skepticism in Competition Law Jurisprudence,” Remarks at the 2017 Concurrences Antitrust Writing Awards, March 28, 2017, available at: <https://www.ftc.gov/public-statements/2017/03/shiny-baubles-smooth-pebbles-role-pragmatic-skepticism-competition-law>.

²⁹ The current political angst about international trade reminds us, however, that these innovations can be disruptive to individuals and society itself.