BEHAVIORAL ECONOMICS: ANTITRUST IMPLICATIONS

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"What we've got here is failure to communicate"

Cool Hand Luke (1967).

I. INTRODUCTION

Antitrust policy deals mostly with imperfectly competitive markets. Even when firms in such markets behave in ways consistent with antitrust laws, market performance will be less than ideal. But antitrust laws do not compel competition.[2] Courts are directed to consider evidence about "actual market reality" to evaluate whether firm conduct conflicts with antitrust rules.

Evidence rarely speaks for itself, however; it must be interpreted. Landmark Supreme Court antitrust decisions can be read as interpreting evidence about the reality of market competition using an implicit model akin to the classroom model of perfect competition. To the extent that this is the case, it reflects misunderstandings about both the place of the model of perfect competition within economic theory and empirical findings about departures of real-world markets from the perfectly competitive standard.

In Section II, I review the development of the model of perfect competition. In Section III, I discuss evidence on the behavior of economic agents and the implications of that evidence for firm conduct and market performance. In Section IV, I turn to the economic logic applied in two precedent-setting Supreme Court antitrust decisions. Section V concludes.

II. RATIONALITY AS AN ELEMENT OF COMPETITION: ECONOMICS

When George J. Stigler wrote that "Competition may be the spice of life, but in economics it has been more nearly the main dish,"[3] he had in mind Adam Smith's description of market processes. There, it is rivalrous conduct that drives the market to its "natural price." If there is excess demand, buyers will offer to pay more ("a competition will … begin among them"); if there is excess supply, sellers will accept to be paid less. The natural price is the lowest price that dealers will accept if they are to supply the good "for a considerable time." Entry conditions make an appearance: a dealer will not long accept a price below the natural price "where there is perfect liberty, or where he may change his trade as often as he pleases."[4]

For Smith and the classical economists who followed in his wake, the competition that determined the equilibrium allocation of resources was "rational" in the sense that it required economic agents to inde-

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2 *U.S. v. U.S. Steel*, 251 U.S. 417 (1920) at 451.

3 George J. Stigler (1968), "Competition," in David L. Sills, editor *International Encyclopedia of the Social Sciences*, Volume 3, The Macmillan Company & The Free Press, p. 181.

4 Adam Smith (1937 [1776]), *An Inquiry Into the Nature and Causes of the Wealth of Nations*, Edwin Cannan, editor. New York: The Modern Library, Book I, Chapter VII.

pendently maximize individual payoffs — profit for firms, satisfaction for consumers.[5] It also required that (Stigler, 1957, p. 2) "economic units … possess tolerable knowledge of the market opportunities."[6]

In the hands of Frank H. Knight,[7] this "competitive process" model flowered into the classroom model of perfect competition: many small buyers and sellers, all informed about all aspects of the market (and able to process that information), free-and-easy entry into and exit out of markets for homogeneous goods. In equilibrium, buyers and sellers individually maximize their own payoff functions. The rate of return on investment is the same in all markets, and resources are optimally allocated across markets.

It is an implication of these assumptions that buyers and sellers take the equilibrium price as given, provided they are infinitesimally small relative to the size of the market. An alternative approach — common in introductory classes — is to give up full rationality and require sellers to be "so small they ignore the impact of their output decisions on market price." But if a seller has complete and perfect information, it will be aware that it faces a downward-sloping residual demand curve, no matter how small its market share. If such a seller individually maximizes its own profit, it will act on that knowledge.[8]

In just such a model, Cournot observed that equilibrium price approaches marginal cost asymptotically from above as the number of firms increases.[9] He *defined* perfect competition by the condition that firms take price as given. This end run around Knight's assumptions is common practice.[10]

Read with modern eyes, the market adjustment process leads to a static equilibrium — an outcome that persists unless there is some exogenous shock to underlying conditions, some change in demand or in resource endowments.

As Knight emphasized, perfect competition equilibrium in this static sense is the antithesis of the Smithian competitive process.[11] There is no rivalry, indeed no personal interaction, in perfectly competitive equilibrium. Buyers and sellers make decisions based on equilibrium prices in all markets. Since transactions are intermediated by prices, buyers and sellers need to know equilibrium prices. That is all they need to know, an economy of information processing that is a merit of the competitive equilibrium approach.[12]

A quite different, dynamic, notion of competition also appears in *The Wealth of Nations*.[13] Here "the division of labor is limited by the extent of the market" is central to market processes: expanding markets permit subdivision of tasks and firms, leading to endogenous increases in productivity in pursuit of economic profit while permitting firms to lower prices, so further expanding markets in a virtuous cycle of endogenous growth. Limited knowledge is an inherent aspect of this activity:[14] "The essential feature of such activities is that they are problem-solving, which means that the result can never be fully predicted in advance." There is no static equilibrium; the allocation of resources across markets never settles down. Some argue that it was this dynamic model that captured the classical economic vision of "competition," not the resource allocation

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5 Henry L. Moore (1906), "Paradoxes of Competition," *Quarterly Journal of Economics* 20, p. 213.

6 George J. Stigler (1957), "Perfect Competition, Historically Contemplated," *Journal of Political Economy* 65, p. 2.

7 Frank H. Knight (1921), *Risk, Uncertainty, and Profit*, Boston: Houghton Mifflin.

8 Jan Horst Keppler & Jérôme Lallement (2006), "The Origins of the U-shaped Average Cost Curve," *History of Political Economy* 38, p. 737, fn. 1. That is, a bounded-rationality fudge is part of the standard undergraduate exposition of the model of perfect competition.

9 Augustin Cournot (1838 [1897]), *Researches into the Mathematical Principles of the Theory of Wealth*, Original Paris: L. Hachette, 1838. English translation by Nathaniel T. Bacon. New York: The Macmillan Company, reprinted 1927 by The Macmillan Company, New York with notes by Irving Fisher; reprinted 1960, 1964, 1971 by Augustus M. Kelley, New York.

10 See, for example, Joan Robinson (1934), "What is Perfect Competition?," *Quarterly Journal of Economics* 49:104-120.

11 Frank H. Knight (1946), "Immutable Law in Economics: its Reality and Limitations," *American Economic Review* 36:93-111.

12 See, for example Leonard E. Read (1958), *I Pencil: My Family Tree as told to Leonard E. Read*, Irvington-on-Hudson, New York: Foundation for Economic Education, Inc. (http://oll.libertyfund.org/titles/112).

13 *Op. cit.*, Book I, Chapter III.

14 Knight (1946), *op. cit.*, p. 105.

mechanism that developed into the model of perfect competition.[15]

The complete-contingency-market extension of the static competitive equilibrium model introduces "the concept of a state of the world, which is a description of the world so precise that it completely defines all initial holdings of goods and all technological possibilities. Uncertainty is not knowing which state will in fact hold."[16] With complete competitive markets for all goods in all possible states of the world, the strong welfare results associated with the equilibrium of the basic resource-allocation view of competition hold. In particular, the equilibrium is Pareto optimal: no economic agent can be made better off without making at least one other economic agent worse off.

There are an infinite number of Pareto-optimal outcomes. The Pareto outcome that holds in equilibrium is determined by the initial distribution of income. There is no presumption that the equilibrium outcome associated with a particular initial distribution of income is socially optimal.[17]

Economists have recognized that the assumptions required for the results of complete competitive contingency markets to hold are not met in practice. For this reason, the general equilibrium model of universal perfect competition serves as an ideal standard.[18] It is not intended to describe outcomes in real markets.

In what ways do actual markets fall short of the assumptions of the general equilibrium model? In real world markets, information is not complete and perfect. Nor is the limited information available uniformly distributed in the market. Some economic agents are better informed than others, and if they maximize their own payoffs, they will take advantage of their superior information. Other economic agents, recognizing their informational disadvantage, will engage in defensive strategies.[19]

Some states of the world are not foreseen — sometimes something happens that was not conceived of as being possible. Complete contingency markets do not exist. Where there are markets that serve some of the functions of contingency markets, for example, insurance markets, they will be plagued by the asymmetric distribution of information referred to above,[20] and they will not be supplied by many small firms, as required by the model of perfect competition.

The assumption of free-and-easy entry and exit — present *in embryo*, as we have seen, in *The Wealth of Nations* — is central to the nature of equilibrium in the competitive model. Entry and exit ensure identical equilibrium rates of return to investment in all markets, the identifying characteristic of general equilibrium. In the corresponding partial equilibrium of any one market, price equals marginal cost and the minimum value of average cost.[21]

For entry to be free and easy requires that entry involve no sunk investment, so that exit involves no loss of sunk entry costs. Entry, however, normally involves some sunk investment. Investment in tangible industry-specific assets, which could be sold only at a discount, if at all, in the event of exit, will be partially or entirely sunk. Investment in intangible assets — investment in information about market demand and production technology — will be largely sunk.

The assumption of the perfect competition model is that entrants, like incumbents, have complete and perfect information about all aspects of the market. This is decidedly unlike real-world entry. Much entry appears be followed by a learning period during which the entrant

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15 Allyn A. Young (1928), "Increasing Returns and Economic Progress," *Economic Journal* 38: 527-542; Hla Myint. (1948), "The Classical Theory of Free Competition (A Reinterpretation)," in *Theories of Welfare Economics*. New York: Sentry Press, Chapter IV, pp. 53-69; G. B. Richardson (1975), "Adam Smith on Competition and Increasing Returns," in Andrew S. Skinner & Thomas Wilson, editors *Essays on Adam Smith*. Oxford: Clarendon Press, pp. 350-360. Joseph A. Schumpeter conceived of competition in this way ((1943) *Capitalism, Socialism and Democracy*, London: Allen & Unwin.

16 Kenneth J. Arrow (1974), "General Economic Equilibrium: Purpose, Analytic Techniques, Collective Choice," *American Economic Review* 64:253-272.

17 Under the assumptions of the model, an allocation of resources in which one individual holds all resources is Pareto optimal.

18 *Ibid*, p. 268.

19 This has important implications for the nature of firms — nonmarket institutions for organizing economic activity — and for market outcomes. See Kenneth J. Arrow (1974), "Rationality: Individual and Social," pp. 14-29 in *The Limits of Organization*, New York: W.W. Norton & Co., Inc.; Joseph E. Stiglitz (1989), "Imperfect Information in the Product Market," in Richard Schmalensee & Robert D. Willig, editors *Handbook of Industrial Organization*, Volume I. Amsterdam: Elsevier Science Publishers, B.V., pp. 769-847.

20 Arrow cites health insurance as an example of such a market ((1974). "Limited Knowledge and Economic Analysis," *American Economic Review* 64:1-10).

21 As is customary, cost is defined to include a normal rate of return on investment — Adam Smith's "natural rate of profit."

acquires information about the market, information that it is assumed to already have in the perfect competition model. Often, what is learned is that entry is not profitable, and most entry is followed by exit. In real-world markets, entry is not an automatic equilibrating force that drives price to the minimum value of average cost.

In industries where entry requires substantial sunk investment, relative to the size of the market, the number of firms will be small, firms will not take price as given, and oligopolistic interactions will play a role in market outcomes. In intermediate-goods markets, sunk entry costs on the demand side of a market will give it an oligopsonistic aspect.

Importantly, general equilibrium theory speaks to the properties of equilibrium. There is no theory to indicate how the out-of-equilibrium behavior of economic agents might drive the market to equilibrium. There is a story, associated with the name of Walras, of notional price adjustments that take place in virtual time and lead to general competitive equilibrium. This story does not describe market processes.

The powerful welfare results of the competitive general equilibrium model hold if all goods are private, that is, if they benefit the user and only the user. This is not a necessary characteristic of real-world goods, for a couple of reasons. First, some goods are public — national defense, for example, or a well-functioning legal system. And second, in the presence of externalities, consumption of a private good may harm or benefit others. Coase shows that in the absence of transaction costs, bargaining over external effects will lead to Pareto-efficient outcomes.[22] But transaction costs are never completely absent.

III. BOUNDED RATIONALITY

"Rationality," then, entered economics simply as "maximizing." The full-blown "rational economic man" model of competitive market equilibrium adds a host of ancillary assumptions to the idea of maximizing behavior.[23] For the equilibrium characteristics of the rational economic man model to be a useful guide for the performance of real-world markets, those ancillary assumptions should be at least approximately satisfied. Economic agents should seek mainly to maximize their own payoff functions. They should have a high degree of information about the markets in which they operate, and the ability to analyze that information.

Not only does it appear that these assumptions cannot be assumed to automatically hold in real-world markets, but the findings of behavioral economics suggest that decision-makers depart from these assumptions in systematic ways.[24]

With unbounded analytical ability, an individual's selection in a choice situation would be independent of the way the choice is presented. But evidence shows that choices vary systematically with the way options are framed.[25] Rather than fully working out the best option, decision-makers employ rules-of-thumb — heuristics — that economize on decision-making efforts but may lead to choices that fall short of fully-rational outcomes.

In his model of entry deterrence, Reinhard Selten outlines a three-level hierarchy of decision-making.[26] In this framework, routine decisions are taken in a habitual way, without thinking. Decisions taken at the level of imagination invoke routine experience to anticipate the relation between actions and results. Decisions taken at the level of reasoning are made after complete analysis of a model of the decision. Decisions at the level of routine and imagination, therefore, involve rules of thumb.

In Selten's chain store model of entry deterrence, deterrence does not occur in fully rational equilibrium. Selten calls this result a paradox because he does not find it convincing as a guide to market outcomes. A boundedly rational potential entrant, making decisions at the level of imagination, might see an incumbent's threat to respond aggressively to its entry as plausible. The optimal response of a fully rational incumbent

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22 R. H. Coase (1960), "The Problem of Social Cost," *Journal of Law and Economics* 3:1-44.

23 Herbert A. Simon (1986), "Rationality in Psychology and Economics," *Journal of Business* 59:S209-S224.

24 Sendhil Mullainathan & Richard H. Thaler (2015), "Behavioral Economics," pp. 437-442 in Neil J. Smelser & Paul B. Baltes, editors *The International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Volume 2.

25 Amos Tversky & Daniel Kahneman (1986), "Rational Choice and the Framing of Decisions," *Journal of Business* 59:S251-S278.

26 Reinhard Selten (1978), "The Chain Store Paradox," *Theory and Decision* 9:127-159.

against a boundedly rational entrant can differ from the optimal response against a fully rational entrant.[27] Aware of the bounded rationality of potential entrants, it might be rational for an incumbent to respond aggressively to entry, if by so doing it would create a reputation that would deter future entry or entry into other markets.

It follows that in a world of boundedly rational economic agents, predatory conduct cannot be ruled out at the level of theory. Nor is there any shortage of real-world examples of strategic exclusionary conduct.[28]

The literature on loss-aversion suggests that decision-makers seek to maximize improvements from, or minimize losses from, an initial position, not to maximize net worth. Losses are disliked more than gains of the same magnitude are valued.

Nor are objective functions limited to an agent's own payoff. In the laboratory, the ultimatum game involves two players. One (the proposer) offers the other (the responder) a portion of a sum of money. If the responder accepts the proposal, each gets the proposed share. If the responder rejects the proposal, neither receives anything. Fully rational conduct would have the proposer offer the smallest possible finite amount which the responder would accept. In the event, proposers offer somewhat less than 50-50 divisions, and these proposals are accepted. Such outcomes may reflect a concern for fairness on the part of the proposer. They may also mean that the proposer anticipates a concern for fairness on the part of the responder, and so makes an offer not expected to lead to rejection.

Elinor Ostrom presents much case study evidence of the endogenous emergence of institutions, around the world, that aim to manage common-property resources.[29] This is real-world evidence of individual conduct that reflects a concern for group objectives. The empirical regularities of institutional design that she distills from this evidence have much in common with observations in the economics literature about the organization of cartels.[30] Findings in the economics literature make clear that while cartel success is not inevitable, neither is cartel breakdown.[31]

IV. BOUNDED RATIONALITY AND THE ECONOMICS OF ANTITRUST

The U.S. Supreme Court affirms the principle that antitrust policy should be based on "actual market realities."[32] In practice, it gives priority to the assumptions made by the model of perfect competition.

In *Matsushita*,[33] the economic theory of antitrust injury alleged a collusive, predatory scheme by Japanese television manufacturers seeking control of the U.S. market. The Supreme Court referred to "a consensus among commentators that predatory pricing schemes are rarely tried, and even more rarely successful."[34] It was not convinced of the possibility of collusion over long periods of time,[35] and seemed convinced

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27 Edward J. Zajac & Max H. Bazerman (1991), "Blind Spots in Industry and Competitor Analysis: Implications of Interfirm (Mis)Perceptions for Strategic Decisions," *Academy of Management Review* 16:37-56.

28 For a review, see Stephen Martin (2015), "Areeda-Turner and the Treatment of Exclusionary Pricing under U.S. Antitrust and EU Competition Policy," *Review of Industrial Organization* 46:229-252.

29 Elinor Ostrom (2001), "Reformulating the Commons," in Joanna Burger, Elinor Ostrom, Richard B. Noorgaard, David Policansky & Bernard D. Goldstein, editors. *Protecting the Commons: A Framework for Resource Management in the Americas*. Washington, D.C. and elsewhere: Island Press, pp. 17-41.

30 Stephen Martin (2018), "Behavioral Antitrust," in Victor J. Tremblay, Elizabeth Schroeder & Carol Horton Tremblay, editors: *Handbook of Behavioral Industrial Organization*. Edward Elgar, pp. 404-454.

31 Margaret C. Levenstein & Valarie Y. Suslow (2006), "What Determines Cartel Success?," *Journal of Economic Literature* 44:43-95.

32 *Eastman Kodak*, 504 U.S. 451 (1992) at 46. See also *Brooke Group*, 509 U.S. 209 (1993) at 229: "However unlikely that possibility may be as a general matter, when the realities of the market and the record facts indicate that [a predatory pricing scheme] has occurred and was likely to have succeeded, theory will not stand in the way of liability"; *GTE Sylvania*, (433 U.S. 36 (1977) at 58-59): "departure from the rule-of-reason standard must be based upon demonstrable economic effect rather than … upon formalistic line drawing." See earlier *Maple Flooring*, 28 U. S. 563 (1925) at 579, *White Motor*, 372 U.S. 253 (1963) at 263, *Monsanto v. Spray-Rite*, 465 U.S. 752 (1984) at 762, and *Business Electronics v. Sharp*, 485 U.S. 717 (1988) at 726, and later *American Needle*, 560 U. S. 183 (2010) at 191.

33 *Matsushita v. Zenith*, 475 U.S. 574 (1986).

34 475 U.S. 575 at 589.

35 For a sample of 81 international cartels that violated U.S. antitrust or EU competition law, Margaret C. Levenstein & Valarie Y. Suslow ((2011), "Breaking Up Is Hard To Do," *Journal of Law and Economics*. 54:455-492) report an average duration of 8.1 years, with two cartels lasting less than 1 year and one lasting 29 years (their Figure 2). Of necessity, their sample does not speak to the duration of undetected cartels.

that rapid entry would make predation, if successful, unprofitable. All of these positions might be plausible for markets that can be modelled as if they are perfectly competitive. Such markets are unlikely to attract antitrust attention.

There is, as noted above, much evidence of exclusionary strategic behavior in real-world markets. Nor is real-world entry as rapid as it is assumed to be in the model of perfect competition. Profitable collusive predation cannot be ruled out on *a priori* grounds in markets supplied by boundedly rational firms.

A District Court trial would have produced evidence of whether "the reality of competition in the market place" was consistent with such exclusionary conduct in *Matsushita*. The Supreme Court decided against such a trial, because the claim of antitrust injury through collusive predation "simply [made] no economic sense." That would be the case if the imperfectly competitive market in question were supplied by un-boundedly rational firms. Whether such a scheme made sense in the market as it was, we do not know.

In *Brooke Group*,[36] the economic argument was that the defendant, Brown & Williamson, engaged in predatory pricing of generic cigarettes to shore up the profitability of its branded products, which had lost market share to low-price generic cigarettes marketed by Liggett & Myers.

The U.S. cigarette market is a highly concentrated oligopoly, with a history of collusive antitrust violations.[37] There was evidence that Brown & Williamson had set prices below unit costs for 18 months — that is, that its conduct had satisfied the Areeda-Turner standard for predatory pricing.

The Supreme Court, however, regarded tacit collusion among the oligopoly suppliers of the cigarette market as essential to produce supracompetitive prices "in the generic segment,"[38] so allowing Brown & Williamson to recoup the profits lost during 18 months of selling below cost. Viewing such tacit collusion as implausible, it affirmed a lower-court decision setting aside a jury verdict in favor of Liggett & Myers.

Viewed through the lens of the model of perfect competition, perhaps tacit collusion in this market could be expected to be ephemeral. Yet, in a highly-concentrated market with a history of collusive behavior, it is difficult to reconcile such a position with the reality of competition in the market place. Even if the industry could not coordinate on supracompetitive prices in generics, pricing below cost for 18 months is consistent with the economic theory put forward by Liggett & Myers, which was that recoupment would take place in the branded segment of the market.

V. CONCLUSION

The economics profession, apparently, has failed to communicate the role and limitations of the perfect competition model. In that model, it is an assumption that firms seek to maximize only individual payoffs. It is an assumption that they have complete and perfect information about the market and understand fully the implications of that information. It is an assumption that entry and exit act as more-or-less automatic balancing forces that limit profits to a normal rate of return on investment. The model of perfect competition supports an equilibrium that is a standard of ideal market performance. It is not a description of the way markets work, not is it intended to be.

In markets as they are, firms sometimes recognize a collective as well as an individual interest; tacit or overt collusion may endure. Information is often incomplete and unevenly distributed; firms have limited analytical ability. It may be plausible for some firms to engage in strategic exclusionary behavior, and for boundedly rational target firms to think such conduct is plausible. Entry often requires sunk investments, and frequently turns out not to be successful, even if incumbents are making healthy economic profits.

This is not to say that collusion is always effective, that aggressive dominant-firm behavior always aims to exclude equally-efficient rivals, or that high incumbent profitability is never followed by successful entry. It is to urge that antitrust authorities should not routinely interpret evidence about the reality of competition in imperfectly competitive markets as if the assumptions of the perfect competition model were the norm, rather than the exception.

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36 *Brooke Group v. Brown & Williamson*, 509 U.S. 209 (1993).

37 *American Tobacco Co. et al. v. U.S.*, 328 U.S. 781 (1946).

38 509 U.S. 209 (1993) at 232-233.

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