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Illustrating a Behaviorally Informed Approach to Antitrust Law: The Case of Predatory Pricing

BY AVISHALOM TOR

ONE OF THE CORE ASSUMPTIONS of the traditional economic approach to antitrust law is that competitors are perfectly rational, profit-maximizing, decision makers.¹ Sometimes this assumption serves as a useful simplification of business behavior, providing an effective foundation for antitrust doctrine. At other times, however, assuming strictly rational behavior on the part of competitors is not “approximately right” but, instead, “perfectly wrong.”² In these latter cases, the reliance on the perfect rationality assumption can lead scholars to mispredict market behavior and, possibly, advocate erroneous prescriptions for antitrust policy.

In contrast, a behaviorally informed approach to antitrust law is based on scientific findings regarding *actual* human behavior. The hallmark of behavioral law and economics is the replacement of *homo economicus*—the perfectly rational actor—with a “boundedly rational” decision maker who, apart from being affected by emotion and motivation, has only limited cognitive resources.³ To function effectively in a complex world, boundedly rational actors must rely on various simplifying cognitive heuristics. Even when they are, overall, beneficial and often correct, however, these mental rules-of-thumb inevitably lead people to make some systematic decision errors, such that their behavior deviates from rational actor models in predictable ways.⁴

Potentially, empirical findings on boundedly rational judgment and decision making can provide better descriptions of market behavior and more effective prescriptions for competition policy than those based on the often unrealistic theoretical assumptions of rational actor models.⁵ In the context

of antitrust law, moreover, systematic deviations of market participants’ behavior from neo-classical assumptions are especially important.⁶ Actual behavioral patterns of judgment and decision making reveal that certain anticompetitive practices are more or less likely to occur than the traditional economic approach deems. In considering Section 2 predatory pricing behavior, for instance, if managers of dominant firms were shown to be risk seeking—that is, engaging in negative expected value business practices—under certain circumstances, some costly predatory pricing could occur even where recoupment prospects are dim. With respect to antitrust law in general, a behavioral approach may reveal that some business practices are altogether more or less anticompetitive than previously thought.⁷

The Perfectly Rational Actor in Antitrust Analysis

Over the last few decades, law and economics scholarship has reshaped the theory and doctrine of antitrust law.⁸ By applying neoclassical microeconomics, scholars were able to rationalize and systematize antitrust law, which previously has been viewed as confused and paradoxical—lacking clear and tractable policy objectives and the means consistently to carry out such objectives. Law and economics has brought coherence to antitrust by relying on a rational actor model to predict the behavior of individuals and firms in the market.

Perfectly rational actors always maximize the utility of their decisions. In the context of antitrust law, rational actors are assumed to hold to an even narrower precept: they always maximize profits (i.e., the monetary value of their actions),⁹ making optimal decisions in furtherance of their businesses’ interests when engaging in their various market activities. Such hypothetical rational actors make no systematic errors when judging the risks, costs, and benefits of different business practices; nor do they ever shy from financially attractive but risky behaviors or engage in high-risk business practices with a negative expected value “against the odds.”

Joining the rational actor framework with the policy goal of promoting efficiency, practitioners of traditional antitrust law and economics determine whether the predicted market

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behavior will have anticompetitive efficiency consequences. Based on this approach, the leading proponents of the "Chicago School" have used neoclassical economic insights successfully to argue that only a limited number of cases rightly concern the antitrust laws.¹⁰ Chicago School scholars have made the case, for example, that predatory pricing would rarely take place in a world where all market participants—be they dominant firms, small competitors, or potential entrants—are strictly rational. In a rational world, these scholars have maintained, the difficulty of recoupment following predation makes predatory pricing extremely unlikely.

Despite the tremendous impact Chicago School scholarship has had on the courts and the enforcement agencies alike, however, many scholars and practitioners of antitrust law harbor reservations about this approach. They often find its specific applications unrealistic and divorced from observations in actual markets, tending to obscure the significance of dynamic considerations, asymmetric information, and strategic behavior.¹¹

The behavioral approach provides a foundation for antitrust law and economics capable of improving our understanding of real world behavior in markets and the policy prescriptions that follow from it. The potential contribution of the behavioral approach to antitrust analysis is also unique in important ways. First, it challenges traditional findings by building its analyses on more realistic behavioral foundations, instead of assuming an even greater degree of strategic sophistication on the part of business decision makers than that imputed to them in neoclassical economics.¹² Second, a behaviorally informed approach is, above all, empirically grounded; depending on the relevant evidence, advocates of a behavioral approach may find—even when solely considering the efficiency effects of different business practices—a greater degree of intervention in some instances and a lesser degree in others, when compared to more traditional economic analyses of antitrust law. For instance, while suggesting that predatory behavior may be more common than the rational actor models predict, the behavioral evidence also indicates that establishing either partial collaboration or collusion among oligopolistic rivals with no history of cooperation may be more difficult than otherwise recognized.¹³

Some Behavioral Basics

The behavioral findings on judgment and decision making relevant to antitrust analysis, overall, can be divided into two main categories: The first includes the evidence of systematic biases in judgments of probabilities, risks, costs, and benefits under uncertainty; the second encompasses those behavioral findings showing systematic violations of strict profit (i.e., expected value) maximization in decision making. While behavioral research has catalogued an extensive set of findings on errors in judgment and decision making,¹⁴ this article focuses on a smaller set of findings that apply to predatory pricing.

Biases in Judgments of Risks, Costs, and Benefits.

Systematic biases in judgments of risks, costs, and benefits may emanate either from purely cognitive processes or from any combination of motivational, emotional, and cognitive factors. This category includes situations where decision makers' judgments of the nature, likelihood, or magnitude of events systematically (and predictably) deviate from the normative standards of rational judgment. For example, decision makers judge events that are easier to imagine or recall from memory as more likely to occur—a heuristic known as *availability*. In most circumstances, availability is a reasonable rule of thumb for determining the probability of events, since more common events typically are better remembered and imagined. Availability, however, also leads to predictable biases because more vivid ("hero stories" and "horror stories") or recent experiences, for example, are easier to recall *regardless* of their frequency. Due to this availability bias, the dramatic success of a particular business venture will generate an upward bias in expectations regarding similar ventures because the "hero story" is better remembered than the less vivid fate of many other comparable ventures.¹⁵

Another important judgmental shortcut is the *representativeness* heuristic, by which decision makers categorize events and make judgments about them, based on the degree to which an observed outcome or event represents a model or a category. For instance, decision makers will tend to overestimate the likelihood that a manager who closely resembles the "successful manager" prototype will be successful in a very difficult task, while disregarding or giving *insufficient* weight to information about how difficult the task generally is.

Among its various effects on judgment and prediction, the representativeness heuristic also leads decision makers to extrapolate from their observations of small samples to the population at large. Market participants will thus tend to treat their limited observations as highly representative of the population, even though probability theory teaches that this "law of small numbers" is unreliable because small samples can display average characteristics that are very different from the mean of the population as a whole.¹⁶ To illustrate, if a new marketing strategy has been successful in a few cases, market participants will tend to overestimate its overall efficacy and likelihood of success on other future occasions.

While the heuristics commonly used to categorize events and judge their likelihood lead to predictable biases, decision makers also commonly overweight—that is, give too much importance to—small, *known* probabilities. This phenomenon is often reinforced when unlikely events are salient or dramatic and, therefore, highly available and overestimated.¹⁷

In addition to exhibiting biases due to reliance on cognitive heuristics, the empirical evidence from behavioral research shows that motivation and affect also impact business judgments. Exhibiting *optimistic overconfidence*, for example, market participants tend to overestimate their business ability, skill, and performance and their likelihood of experiencing positive events, and underestimate their per-

sonal vulnerability to certain risks. For instance, decision makers tend to overestimate the predicted performance of their investments relative to the market. They have even been shown to overestimate the actual past performance of their portfolios and to switch their investments too frequently (a behavior correlated with poorer performance).¹⁸

Boundedly Rational Choice Behavior. Cognitive heuristics, motivational forces, and affect can all bias decision makers' judgments of probability and value under uncertainty. After making such judgments (or where reliable and unbiased information is available) market participants must also choose a course of action. The empirical evidence shows, however, that decision makers exhibit systematic deviations from rational action when making decisions under uncertainty. Hypothetical, strictly rational, value-maximizing actors consistently make their choices on the basis of the ultimate consequences of these choices and their probability. What matters to rational actors is not how alternative future outcomes relate to their present position, but only the bottom line. Perfectly rational decision makers never bear a risk unless it promises a sufficient increase in expected value, never embark on a course of action with a negative expected value, and always choose that course of action with the highest forward-looking expected value, letting bygones be bygones.¹⁹

In contrast to the rational actor model, boundedly rational, real decision makers tend to make their choices as if the potential outcomes of these choices were gains and losses relative to a given reference point, commonly the status quo, instead of taking into account their overall wealth. Thus, any alternative could be more or less attractive to different decision makers whose current reference points differ from one another, appearing as an attractive gain to one but an aversive loss to another. Losses also loom larger than gains in people's minds, meaning decision makers are loss averse. However, in both the loss and gain domains, decision makers reveal a diminishing sensitivity, such that any difference in outcomes matters less and less as outcomes move away from the reference point (e.g., the difference between gains of \$10 and \$20 seems much more significant than the formally comparable difference between gains of \$100 and \$110, even when both sums are very small compared to the total wealth of the decision maker).

Therefore, market participants tend to be highly risk averse in choosing among possible gains, even in circumstances where rational actors would be risk neutral.²⁰ This boundedly rational risk aversion implies that some potentially profitable but risky opportunities will be rejected by real competitors, although rational actor models would expect competitors to be risk neutral (or less risk averse) and hence embrace these opportunities. Even more striking, the empirical findings showing aversive attitudes to outcomes below a reference point also suggest that decision makers will tend to be *risk seeking*—in clear opposition to rational choice precepts—when choosing among potential losses. Because loss

aversion generates risk seeking for losses, market participants will tend to take high-risk opportunities, such as predatory pricing strategies, against the odds, in the hope of winning a negative expected value gamble and eliminating a painful loss.

Boundedly rational decision makers' reliance on reference points also leads them to make inconsistent choices in comparable problems (i.e., two scenarios, each with the same expected value) if, in one situation, the outcome is presented as a possible loss and, in the other situation, as a possible gain. Thus, when an alternative is presented once as a gain and another time as a loss—that is, using different “frames”—there is a resulting shift in reference points and, consequently, a change in market participants' pattern of choice, known as “framing effects.” To illustrate, in making a decision between reorganization plans for a manufacturing firm in the face of financial crisis, managers will be risk averse if they think of the decision problem in terms of saving plants and jobs (a potential gain), but risk seeking if they think of trying to avoid losses of plants and jobs instead (a potential loss).²¹

Importantly, recent studies also reveal that the effect of framing depends not only on whether outcomes are perceived as gains or losses, but also on the probability that different outcomes will occur. The well-documented pattern—of risk aversion in the domain of gains and risk seeking in the domain of losses—holds for medium to high probabilities. Market participants thus tend to be risk averse when choosing, say, between a sure gain of \$800 and an 80 percent chance of gaining \$1000 (whose expected values are equal), preferring the former option to the latter. Similarly, they are risk seeking in the domain of losses, preferring an 80 percent chance of losing \$1000 to a definite loss of \$800. When the probabilities involved are small, however, decision makers exhibit the opposite pattern, making risk-seeking choices for potential gains and risk-averse choices for potential losses. For instance, when choosing between a 2 percent chance of gaining \$500 or a sure gain of \$10, decision makers tend to prefer the risky option. At the same time, they also prefer a sure loss of \$10 to a 2 percent chance of losing \$500.²²

Often, the reliance of business decision makers on reference points and their asymmetric attitude towards gains and losses also lead them to exhibit a bias in favor of retaining the status quo in the face of superior alternatives that require change. This phenomenon is also partly responsible for the common tendency to keep escalating commitments (i.e., resources) against the odds to a course of action into which significant costs have already been sunk. As with many other behavioral phenomena, taking past actions into account is sometimes reasonable; after all, a “tough guy” reputation has some clear economic benefits. The sunk cost effect, however, extends beyond the objective value of reputation, driven by factors such as concerns about regret and self-perception, as well as a strong desire to achieve the goal one has committed to. This latter factor, in turn, can sometimes even

transform such a significant goal or aspiration into a reference point (in lieu of the typical status quo reference point). In these circumstances, a failure to accomplish this goal will be perceived as a loss—a painful outcome below the reference point—as opposed to a neutral outcome of retaining the status quo.²³

Section 2 Predatory Pricing

Building on the behavioral findings described here, a more realistic approach to antitrust may arrive at different predictions of market behavior from those of models based on the rational actor hypothesis. As an example, we can consider the predictions of a behaviorally informed approach regarding some aspects of predatory pricing, such as the threshold recoupment requirement and the appropriate measure of cost that makes a pricing scheme predatory. In *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, the Supreme Court declared that conduct will not amount to predatory pricing unless the alleged scheme involved pricing below some measure of cost and the predator had a rational prospect of recouping its losses from such below-cost predation.²⁴

Emphasizing the importance of the recoupment requirement, the Court explained that “[r]ecoupment is the ultimate object of an unlawful predatory pricing scheme.”²⁵ In other words, the rational managers of a profit-maximizing firm would not engage in predation unless the monopoly profits they expect to charge in the future, after driving the competition out of the market, are sufficiently high to compensate for their firm’s certain losses from current below-cost predatory sales. Put more precisely, rational predation must bear a positive, risk-adjusted, net present value, like any other rational investment activity.²⁶

According to the Chicago School’s account, moreover, predatory pricing is almost never likely to take place since such conduct would be an irrational strategy in the face of highly unlikely recoupment (i.e., an ex ante analysis would result in a negative expected present value). In fact, for recoupment to be likely the predator must have a very large market share and barriers to entry must be high, to name but two important conditions. However, because few alleged predators meet the former condition and few markets meet the latter one—or so Chicago scholars tend to believe—price predation will rarely take place. This view has been adopted by the Court, which declared that predatory pricing allegations can be rejected summarily in the common case where recoupment is unlikely.²⁷

Risk-Seeking Predatory Behavior. In contrast with the accepted wisdom on the extreme rarity of predatory pricing, the behavioral evidence suggests that dominant firms and monopolists consciously may engage in high-risk, negative net present value predation under some circumstances.²⁸ Specifically, managers of dominant firms or monopolies, who find their market share and profits continuously eroded by the successful expansion of new entrants or small incum-

bents, are likely to use their long-term dominance in the market as the relevant reference point when evaluating different competitive strategies. The evidence on boundedly rational choice behavior reveals that decision makers perceive expected outcomes above the reference point as positive and those below it as negative. A negative change relative to the reference point—that is, a loss—looms large, so managers will try harder to avoid the threatening loss from an eroding market share. Therefore, a manager whose current competitive strategy is unable to stanch a market share slide may be inclined to engage in negative expected value predatory pricing (i.e., without a rationally sufficient likelihood of recoupment).²⁹ Such managers may be willing to take higher risks than rational profit maximizing justifies, hoping they will succeed in reestablishing the firm’s lost long-term market position.³⁰

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In addition, once a monopolist has committed significant resources, as well as its reputation, to a predatory campaign, backing out of the predatory move would not be easy. Unlike the hypothetical rational actor, who always ignores sunk costs and lets bygones be bygones, real world managers are far more inclined to hold to a course they have committed to despite dim prospects for success—as long as there are any prospects at all—and often exhibit a tendency to escalate commitments in the face of losses. Whether as a result of loss aversion due to a self-serving bias in overestimating the probability of the strategy’s success, or because of a general overconfidence in their ability to “beat the odds,” managers are unlikely to react to a predatory scheme’s lack of success in the short term by changing course and giving up. Only after a significant period of continuous losses without success will the reputational and economic costs of the patently failing scheme be likely to overwhelm managers’ commitment to the predatory strategy and make a painful retreat more attractive.³¹

Nevertheless, only when faced with a medium to high probability of painful loss (e.g., a substantial and continuing downward slide in market share) will managers be inclined to embark on high-risk predation campaigns. A small decline in market share that does not constitute a clear trend or a mere low-probability competitive threat typically will be insufficient to generate risk seeking market behavior; in such cases,

managers are more likely to exhibit risk aversion and limit themselves to lower-risk competitive efforts (e.g., a new marketing campaign).

The preliminary analysis here also suggests that while dominant incumbents that are losing market share may be prone to exhibit risk-seeking behavior, this is far less likely to be the case with stable incumbents. Managers of such firms will typically view the risky prospect of eliminating a small competitor as promising a small potential gain, compared to the status quo, and will not be prone to take risk-seeking gambles in pursuing this prospect.³² In between the two polar cases—of the stable incumbent on the one hand and the dominant firm losing ground on the other—will be the large and growing, though not yet indisputably monopolist, incumbent. Such firms will typically not exhibit risk-seeking behavior, viewing their improving market position as a gain. Nevertheless, a growing incumbent that is very close to reaching a monopoly position, for example, may tend to use its aspiration—of dominating the market—as a reference point.³³ In these uncommon cases, coming short of monopoly will be viewed as a painful loss that can generate the risk-seeking predatory behavior more typically associated with declining monopolists.

Recoupment, Barriers, and Deterrence. The apparent likelihood of boundedly rational, risk-seeking predatory pricing by some managers of dominant firms would be of little concern in a hypothetical market with low barriers to entry and strictly rational, perfectly-informed potential entrants. Most markets, however, do not have these characteristics.³⁴ Real entrants exhibit a higher rate of entry than rational entrants would, but perform more poorly than their hypothetical counterparts, typically failing and exiting without leaving a significant mark on the market.³⁵ In fact, the only entrants that appear to take into account some, though still not all, of those market characteristics affecting their future prospects are the few larger, often diversifying, entrants.³⁶ A dominant firm considering a predatory move against an expanding smaller competitor, therefore, could often expect the period of monopoly profits to be longer and the likelihood of recoupment greater than a cursory look at the rates of entry alone would imply.³⁷

Thus, although barriers to entry may appear low in many markets, barriers to survival typically are high and dominant firms often can ignore most new entrants except for those few that are large enough to impact the market in the short term. The ire of the predator will more likely be directed at the rare small incumbent (often yesteryear's successful entrant) who has been able to expand rapidly and gain an increasing, market share. The increasing success of this small, but now noticeable, competitor is likely based on innovation or maybe on a shift in consumer preferences, whereas the dominant incumbent is frequently heavily invested in and relying on extant technologies and products. Therefore, the winds of change created or facilitated by the presence of the expanding small competitor may threaten the dominant

firm's long-term prosperity and even survival.

The empirical data on incumbents' responses to entry and market share gain are limited, but appear to be in line with the present analysis, suggesting that incumbents tend to ignore entry on most occasions.³⁸ Additionally, predatory pricing cases frequently revolve around allegations made by a sizable but smaller competitor against one or a number of its larger counterparts. In *Brooke Group*, for example, plaintiff increased its share from 2 to 5 percent of the highly concentrated national cigarette market by pioneering the development of a new "generic" segment in the market. By the time the alleged predation occurred, four years after the introduction of the new segment, this segment had grown from a fraction of a percent of the market—a share typical of new entrants—to over 4 percent of the total market.³⁹

Last, boundedly rational predation occasionally may be more rational than it appears at first sight. The mere hypothetical knowledge that predatory pricing is likely not a rational investment strategy may not suffice to convince actual or potential competitors to expose themselves to a risk-seeking incumbent making credible, if boundedly rational, commitments to a predatory strategy.⁴⁰ Moreover, a risk-seeking predator may benefit from the fact that, in reality, its competitors are boundedly rational as well. For instance, the availability bias will tend to make highly publicized, colorful instances of predation stand out in the imagination and memory of market participants. This effect may sometimes be reinforced through the law of small numbers, which can lead potential entrants to overestimate the risks of predation based on a small sample of cases and without sufficiently taking into account the objective difficulties and costs facing the predator, as well as due to the pervasive tendency to overweight events of known, small probability. The resulting reputational benefit of certain predatory campaigns may therefore be significantly greater than a traditional account deems, making seemingly risk-seeking predation more rational than it appears.

The Need for Further Analysis. While the preceding sections illustrate how a behavioral framework can lead to different conclusions from those based on perfect rationality assumptions, the present analysis does not seek fully to resolve the predatory pricing debate. Specifically, a number of questions with important implications for policy and doctrine remain open for further inquiry. For instance, the "below cost" component of predatory pricing must also be examined, since a discrepancy between the subjective perceptions of market participants and objective tests may lead market participants—be it the predator, the target, or other competitors—to believe that predatory pricing is taking place in cases where objective measures show the pricing is above cost.⁴¹ Another related question is whether and, if so, when such subjective predation may be anticompetitive and harmful to consumers, as opposed to a phenomenon that merely leads to lower pricing for limited time periods.

In addition, the evidence on the impact of behavioral

forces, such as a limited tendency for risk-seeking predation among some monopolists, does not absolve us from the need to examine the recoupment question altogether. The commonly found risk seeking for perceived losses is not without limits; the greater the necessary investment in predation and the more remote its success, the less likely it is that even a desperate monopolist will use it to gain lost ground in an effort to re-establish the status quo. Consequently, the same economic factors that make rational predation more likely—such as the objective magnitude of barriers to entry, the potential to benefit from a predatory reputation across multiple markets, or the disciplinary use of predatory pricing to punish defectors in an oligopolistic pricing setting—remain significant for a behaviorally informed approach to predation as well.

That said, the behavioral approach to antitrust law and economics does reveal that predatory pricing may be more likely than rational actor models predict, at least in specific settings. Therefore, in these limited circumstances, summary judgment against allegations of predatory pricing may not be warranted even where the Chicago School account would lead one to believe that recoupment is unlikely. In these cases, a more careful examination of the factual evidence would be necessary to determine whether risk-seeking predation is at all likely and whether the behavioral economics of recoupment are at least such that a loss averse, risk-seeking decision maker would potentially find predatory pricing attractive.

Conclusion

The behavioral approach to antitrust law and economics is in its incipency, yet shows promise. By applying scientific

findings on human judgment and decision making, this approach provides better descriptions of market participants' behavior and potentially better prescriptions for antitrust policy. Even while retaining the traditional law and economics view—that antitrust law should focus on allocative efficiency—the behavioral approach can provide a more realistic grounding for determining the likelihood and competitive effect of different business practices.

However, a behavioral approach to antitrust law would still emphasize the need for administrability of doctrine, taking into account the costs of litigation and judicial error, which sometimes necessitate the adoption of more restrained antitrust doctrines even in the face of non-negligible anti-competitive effects in the real-world. Nevertheless, even in these cases a more accurate understanding of market behavior could benefit antitrust law by highlighting the significant tradeoffs involved.

Finally, a behaviorally informed approach must surmount a number of additional obstacles that are common to all behavioral applications concerning firm and market behavior in order to gain broad acceptance by antitrust scholars and courts. In market settings, traditional economists tend to believe market forces, arbitrage, institutional design, and learning can eliminate boundedly rational behavior from the market. If this were commonly the case, the behavioral insights on choice and decision making would be of little import for antitrust scholarship. Empirical evidence and simple logic reveal, however, that while the various mechanisms relied on by traditional economists often constrain boundedly rational behavior and mitigate its effects, the efficacy of these forces is limited in most real world markets.⁴² □

¹ See, e.g., 1 PHILLIP E. AREEDA & HERBERT J. HOVENKAMP, *ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION* ¶ 113, at 137 (2d ed. 2000) ("Business firms are (or must be assumed to be) profit maximizers"); RICHARD A. POSNER, *ANTITRUST LAW* ix (2d ed. 2001) (stating among the essential tenets of the economic theory underlying antitrust law "that business firms should be assumed to be rational profit maximizers").

² This statement paraphrases one of the favorite epigrams of the late Amos Tversky, whose joint research with Daniel Kahneman has reshaped the psychology of judgment and decision making and revealed many of the phenomena discussed in this article. For the impact of this work, Daniel Kahneman has recently been awarded the Nobel Prize in Economic Sciences "for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty." The Royal Swedish Academy of Sciences, *Press Release: The Bank of Sweden Prize in Economic Sciences In Memory of Alfred Nobel 2002* (Oct. 9, 2002), available at <http://www.nobel.se/economics/laureates/2002/press.html>.

³ The concept of bounded rationality was introduced by Herbert A. Simon, albeit originally denoting only the cognitive limitations of the human mind. See Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q. J. Econ. 99 (1955); Herbert A. Simon, *Rational Choice and the Structure of the Environment*, 63 PSYCHOL. REV. 129 (1956).

⁴ See, e.g., Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCI. 1124, 1124 (1974), reprinted in JUDGMENT

UNDER UNCERTAINTY: HEURISTICS AND BIASES 3 (Daniel Kahneman et al. eds., 1982) (stating, in an early formulation of the authors' highly influential "heuristics and biases" research paradigm, that "people rely on a limited number of heuristic principles which reduce the complex task of assessing probabilities and predicting values to simpler judgmental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors"). See also Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1477 (1998) ("people sometimes respond rationally to their own cognitive limitations . . . [b]ut even with these remedies, and in some cases because of these remedies, human behavior differs in systematic ways from that predicted by the standard economic model of unbounded rationality"). For instructive reviews of this vast literature, see, e.g., Colin F. Camerer, *Individual Decision Making*, in 1 THE HANDBOOK OF EXPERIMENTAL ECONOMICS 587 (John H. Kagel & Alvin E. Roth eds., 1995); Robyn M. Dawes, *Behavioral Decision Making and Judgment*, in THE HANDBOOK OF SOCIAL PSYCHOLOGY 497 (Daniel T. Gilbert et al. eds., 4th ed. 1998).

⁵ See, e.g., Jolls et al., *supra* note 4 (offering "a broad vision of how law and economics may be improved by increasing its attention to insights about actual human behavior" and replacing the assumptions of unbounded rationality, self-interest, and will-power); Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051 (2000) (examining the role of the rational actor in law and economics and suggesting replacing it with a behaviorally informed actor).

- ⁶ Although many of the behavioral findings discussed here have been replicated in market settings or with financial incentives for performance, the evidence largely refers to individual or small-group decision making. Therefore, further empirical studies of the complex interaction between robust individual-level phenomena and organizational forces would allow for a better analysis of a broader range of business practices than is currently possible.
- ⁷ For one recent application of behavioral insights to the analysis of market behavior in antitrust law and economics, see Avishalom Tor, *The Fable of Entry: Bounded Rationality, Market Discipline, and Legal Policy*, 101 MICH. L. REV. 482 (2002).
- ⁸ See, e.g., POSNER, *supra* note 1 (explaining the omission of the first edition's subtitle "an economic perspective" by saying that in the intervening years—from 1967 to the present—the other approaches to antitrust law have largely fallen away, and speaking of "a profound, a revolutionary change in law" where "[t]oday, antitrust law is a body of economically rational principles . . ."); Frank H. Easterbrook, *Allocating Antitrust Decisionmaking Tasks*, 76 GEO. L.J. 305, 305 (1987) ("Antitrust law has become a branch of industrial organization, itself a branch of economics.").
- ⁹ See *supra* note 1. The alternative would be for strictly rational market participants to be utility-maximizing without maximizing profits, and their behavior would not necessarily accord with the economic theories underlying much of antitrust law. Cf. Tor, *The Fable of Entry*, *supra* note 7, at 501-03 (discussing the difficulties involved in an attempt to reconcile the puzzling empirical findings on entry with the rationality assumption).
- ¹⁰ See, e.g., Herbert Hovenkamp, *Post-Chicago Antitrust: A Review and Critique*, 2001 COLUM. BUS. L. REV. 257, 266-67 (2001).
- ¹¹ See, e.g., THE ANTI-TRUST REVOLUTION: ECONOMICS, COMPETITION, AND POLICY 3 (John E. Kwoka, Jr. & Lawrence J. White eds., 3d ed. 1998). See generally Hovenkamp, *supra* note 10. Another important aspect of market behavior that is poorly understood in antitrust economics is the interaction between intra-organizational forces, especially in oligopolistic and monopolistic markets, and inter-firm competition. See, e.g., Thomas B. Leary, *Keynote Address: The Dialogue Between Students of Business and Students of Antitrust*, 47 N.Y.L. SCH. L. REV. 1, 11-14 (2003) (suggesting, inter alia, that organizational forces may well affect market behavior, and that competition in oligopolistic markets may follow a different dynamic from that commonly assumed in antitrust law and economics).
- ¹² This is not to say that real market participants do not behave strategically; business decision makers are often preoccupied with their competitors' behavior, but their strategic thinking—like their judgment and decision making more generally—are boundedly rational. See, e.g., Avishalom Tor & Max H. Bazerman, *Focusing Failures in Competitive Environments: Explaining Decision Errors in the Monty Hall Game, the Acquiring a Company Problem, and Multi-Party Ultimatum*, 16 J. BEHAV. DECISION MAKING (forthcoming 2003) (finding, inter alia, that decision makers are generally concerned about the behavior of their competitors but make systematic decision errors because they fail to focus on the interaction between the decisions of their competitors and their own decisions in light of the rules of the game). See generally Colin F. Camerer, *Progress in Behavioral Game Theory*, 11 J. ECON. PERSP. 167 (1997) (concluding that the behavioral phenomena found in non-strategic studies of judgment and decision making appear in strategic settings as well).
- ¹³ See Amital Aviram & Avishalom Tor, *Overcoming Impediments to Information Sharing*, 55 ALABAMA L. REV. (forthcoming 2003), draft available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=435600 (taking the first step in this analysis in the context of information sharing among rivals).
- ¹⁴ A full survey is available elsewhere. See Camerer, *supra* note 4; Dawes, *supra* note 4 (both reviewing the behavioral evidence). See also Sandhil Muthalath and Richard H. Thaler, *Behavioral Economics* (NBER Working Paper No. W7948, Oct. 2000), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=245733 (discussing the application of major behavioral findings to market settings).
- ¹⁵ See, e.g., MAX H. BAZERMAN, JUDGMENT IN MANAGERIAL DECISION MAKING 27-29 (5th ed. 2001). This effect will often be reinforced by the representativeness heuristic discussed below.
- ¹⁶ See, e.g., Tversky & Kahneman, *supra* note 4, at 4; see generally Dawes, *supra* note 4, at 534-37; Camerer, *supra* note 4, at 596-608 (both reviewing some of the evidence on the representativeness heuristic); see also Matthew Rabin, *Inference by Believers in the Law of Small Numbers*, 117 Q.J. ECON. 775 (2002) (modeling inference by decision makers relying on representativeness and discussing some of its potential economic effects).
- ¹⁷ See, e.g., Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263, 281 (1979) (suggesting that very small probabilities are generally overweighted, although occasionally disregarded, and that in many common life situations this phenomenon and the overestimation of the likelihood of uncommon events often reinforce one another). See generally Avishalom Tor & Dotan Oshur, *Incentives to Create Under a "Lifetime-Plus-Years" Copyright Duration: Lessons from a Behavioral Economic Analysis for Eldred v. Ashcroft*, in *Symposium: Eldred v. Ashcroft: Intellectual Property, Congressional Power, and the Constitution*, 36 LOYOLA L.A. L. REV. 437 (2002) (providing a detailed review of the behavioral findings on probability weighting and the shape of the weighting function that reflects the impact of probabilities on decisions).
- ¹⁸ For a review and application to antitrust law and policy of these and related behavioral findings, see Tor, *The Fable of Entry*, *supra* note 7, at 504-31.
- ¹⁹ See, e.g., ROBERT COOTER & THOMAS ULEN, LAW AND ECONOMICS 47 (3d ed. 2000) (noting that in decisions involving monetary outcomes economists assume decision makers are risk neutral or, at times, risk averse); A. MITCHELL POLINSKY, AN INTRODUCTION TO LAW AND ECONOMICS 51 (1983) (same); Amos Tversky & Daniel Kahneman, *Loss Aversion in Riskless Choice: A Reference-Dependent Model*, 106 Q.J. ECON. 1039, 1039 (1991) (rational actors make decisions based on overall asset position under the different options available to them).
- ²⁰ See Matthew Rabin, *Risk Aversion and Expected-Utility Theory: A Calibration Theorem*, 68 ECONOMETRICA 1281 (2000) (showing how the diminishing marginal utility of wealth—which economists believe underlies commonly observed instances of risk aversion—cannot explain risk aversion except for uncommon, extreme cases).
- ²¹ See, e.g., Kahneman & Tversky, *Prospect Theory*, *supra* note 17 (introducing a range of findings on risky decision making in violation of expected utility theory and offering what has become a leading alternative descriptive model); see generally Camerer, *supra* note 4, at 617-73; Dawes, *supra* note 4, at 499-530.
- ²² Amos Tversky & Daniel Kahneman, *Advances in Prospect Theory: Cumulative Representation of Uncertainty*, 5 J. RISK & UNCERTAINTY 297 (1992) (providing evidence of this four-fold pattern of choice and formalizing this and other findings in a cumulative utility function).
- ²³ See Hal R. Arkes & Catherine Blumer, *The Psychology of Sunk Cost*, 35 ORGANIZATIONAL BEHAV. & HUMAN DECISION PROCESSES 124 (1985).
- ²⁴ 509 U.S. 209 (1993) (rejecting claims of competitive injury in a price discrimination suit, which the Court determines to be of the same general character as the injury inflicted by predatory pricing schemes actionable under § 2 of the Sherman Act). For a discussion of the relationship between the different requirements for proving predatory pricing, see 3 AREEDA & HOVENKAMP, *supra* note 1, ¶ 725b.
- ²⁵ The Court declared that when pursuing predatory pricing allegations: Recoupment is the ultimate object of an unlawful predatory pricing scheme; it is the means by which a predator profits from predation. Without it, predatory pricing produces lower aggregate prices in the market, and consumer welfare is enhanced. Although unsuccessful predatory pricing may encourage some inefficient substitution toward the product being sold at less than its cost, unsuccessful predation is in general a boon to consumers. . . . The plaintiff must demonstrate that there is a likelihood that the predatory scheme alleged would cause a rise in prices above a competitive level that would be sufficient to compensate for the amounts expended on the predation, including the time value of the money invested in it.
- 509 U.S. at 224-25.
- ²⁶ See Matsushita Elec. Indus. Co. v. Zenith Radio Corp., 475 U.S. 574, 588-89 (1986) ("The foregone profits may be considered an investment in the future. For the investment to be rational, the conspirators must have a reasonable expectation of recovering, in the form of later monopoly profits,

more than the losses suffered."); see, e.g., 3 AREEDA & HOVENKAMP, *supra* note 1, ¶ 726a. ("No rational firm would bear the losses, difficulties, and possible legal troubles of trying to exclude or discipline rivals by predatory pricing unless it was [sic] reasonably confident of a payoff that exceeds the investment").

²⁷ E.g., *Matsushita*, 475 U.S. at 589 ("[P]redatory pricing schemes are rarely tried, and even more rarely successful").

²⁸ E.g., Kahneman & Tversky, *Prospect Theory*, *supra* note 17. See also Dan J. Loughhunn et al., *Managerial Risk Preferences for Below-Target Returns*, 26 MGMT. SCI. 1238 (1980) (providing evidence for risk seeking by actual managers over a broad range of experimental conditions where non-ruinous losses were involved, with a large minority of managers maintaining this attitude even for potentially ruinous loss situations).

²⁹ Cf. Harry S. Garia, *The Psychology of Predatory Pricing: Why Predatory Pricing Pays*, 39 SW. L.J. 755 (1985) (making a similar, framing-based, argument regarding the likelihood of predatory pricing). This conclusion does not contradict the many strategic models in the new industrial organization literature revealing that, under various circumstances, predation is rational. See, e.g., Patrick Bolton et al., *Predatory Pricing: Strategic Theory and Legal Policy*, 88 GEO. L.J. 2239 (2000) (reviewing much of this literature and developing a framework for its legal application); see generally Janusz A. Ordover & Garth Saloner, *Predation, Monopolization, and Antitrust*, in 1 HANDBOOK OF INDUSTRIAL ORGANIZATION 538, 538-71 (Richard Schmalensee & Robert D. Willig eds., 1989) (reviewing this literature). But see JOHN R. LOTT JR., ARE PREDATORY COMMITMENTS CREDIBLE? WHO SHOULD THE COURTS BELIEVE? (1999) (arguing that the courts should not take into account such models). Instead, the behavioral findings show that predatory behavior may well take place in an additional set of circumstances.

³⁰ See, e.g., Richard H. Thaler & Eric J. Johnson, *Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice*, in QUASI RATIONAL ECONOMICS 48 (Richard H. Thaler ed., 1991).

³¹ See Arkes & Blumer, *supra* note 23; Hal R. Arkes & Laura Hutzler, *The Role of Probability of Success Estimates in the Sunk Cost Effect*, 13 J. BEHAV. DECISION MAKING 295 (2000) (finding that making a decision to invest inflates probability estimates of the investment's likely success).

³² This typically will also be the case for formerly dominant incumbents that have lost ground but stabilized their new position and would therefore tend to make decisions based on their new position rather than the past status quo.

³³ For some evidence on specific circumstances under which reference points are likely to shift, or altogether be different from the long-time status quo, see Daniel Kahneman, *Reference Points, Anchors, Norms, and Mixed Feelings*, 51 ORGANIZATIONAL BEHAV. & HUMAN DECISION PROCESSES 296 (1992); Chip Heath et al., *Goals as Reference Points*, 38 COGNITIVE PSYCHOL. 79, 80-81 (1999). For instance, a formerly dominant incumbent who has lost ground but stabilized its new position would therefore be inclined to make its decisions based on its new position rather than the past status quo.

³⁴ See *Tor, The Fable of Entry*, *supra* note 7.

³⁵ See *id.* at 490-92 (reviewing the empirical evidence for the puzzle of excess entry), 504-14 (examining the psychological processes underlying entrant overconfidence).

³⁶ *Id.* at 492-96 (reviewing the puzzling evidence on entrants' insensitivity to economic predictors of future profitability and on the inferior average performance of higher risk startup entrants as compared to their diversifying counterparts).

³⁷ *Id.* at 550 & n.285.

³⁸ *Id.* at 555 n.300.

³⁹ 509 U.S. at 212-14. See also *Cargill Inc. v. Monfort of Colo. Inc.*, 479 U.S. 104, 106-07 n.2 (1986) (plaintiff, which was challenging a merger between two of its larger competitors in an oligopolistic market on the ground, inter alia, that the merger would be followed by predatory pricing, was the fifth-largest firm in the market with a 5-6% market share). Note also that two of the cases around which much of the discussion in the present issue of ANTITRUST revolves concern a similar pattern, albeit in claims of non-price predation. *LePage's Inc. v. 3M*, 324 F.3d 141, 144 (3d Cir. 2003) (plaintiff alleging that the defendant monopolist engaged in exclusionary practices fol-

lowing plaintiff's success in developing a new segment, which experienced growth partly at the expense of the monopolist's share, in the market for transparent tape); *LePage's Inc. v. 3M*, 1997 U.S. Dist. LEXIS 18501, 3 (E.D. Pa. Nov. 14, 1997) (citing the complaint's allegation that defendant reacted when plaintiff's successful expansion reached a market share of close to 10%); *Conwood Co. v. U.S. Tobacco Co.*, 290 F.3d 788, 773-74 (6th Cir. 2002) (affirming the denial of defendant's motion for judgment as a matter of law in a case where a smaller competitor alleged, inter alia, that a long-standing monopolist in a highly concentrated market engaged in exclusionary practices after experiencing a continual and rapid erosion of its market share).

⁴⁰ The credibility of some predatory commitments under uncertainty underlies many of the game-theoretic models in the new industrial organization that show how predation can occur even where all actors are strictly rational. See *supra* note 29 and the various sources discussed therein. See also ALEXIS JACQUEMIN, *THE NEW INDUSTRIAL ORGANIZATION: MARKET FORCES AND STRATEGIC BEHAVIOR* 107-29 (discussing the game-theoretical framework of this question and relating it to the problem of bounded rationality).

⁴¹ Thus, behavioral insights about the possibility of below-cost predatory pricing in themselves make no claim regarding the likelihood and effectiveness of above-cost predation, a topic of recent debate in the legal literature. See, e.g., Aaron S. Edlin, *Stopping Above Cost Predatory Pricing*, 111 YALE L.J. 941 (2002) (arguing that above cost pricing can be predatory); Einer Elhauge, *Why Above Cost Price Cuts to Drive Out Entrants Are Not Predatory—and the Implications for Defining Costs and Market Power*, 112 YALE L.J. 681 (2003) (reviewing the state of the law and scholarship and arguing against prohibiting above-cost price cuts).

⁴² See, e.g., *Tor, The Fable of Entry*, *supra* note 7, at 531-33 (showing how the bounded rationality of competitors can impact market outcomes even under intense competition), 561-63 (highlighting the limits of arguments relying on markets to eliminate bounded rationality); see generally ANDREI SHLIFER, *INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE* (2000); Nicholas Barberis & Richard Thaler, *A Survey of Behavioral Finance* 3-11 (unpublished manuscript, Sept. 2002, Univ. of Chicago), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=332266 (reviewing the evidence on the limits of arbitrage in disciplining financial markets), 58-59 (reviewing specific evidence on the presence of managerial irrationality in markets).