"Schumpeterian" Competition and Antitrust Policy in High-Tech Markets

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In this paper, we discuss an important movement in contemporary antitrust thinking, the Schumpeterian School. The School's fundamental argument is that antitrust enforcers can better preserve and promote the technological innovation that drives the modern economy by reducing their reliance on short-term indicia of product-market competition. Such arguments are of particular relevance to firms, and the lawyers who counsel them, in such high-tech regions as California's Silicon Valley, Boston's Route 128, and northern Virginia's Dulles corridor. We discuss the specific challenges to conventional antitrust enforcement that Schumpeterian arguments pose, and we examine whether available economic evidence supports the fundamental retreat from antitrust enforcement for which some members of the Schumpeterian School call in the name of promoting innovation.

Much has been said in recent years about "Schumpeterian" competition and its implications for antitrust. The U.S. Court of Appeals for the D.C. Circuit discussed Schumpeterian cycles of innovation-based rivalry in its 2001 *Microsoft*[1] decision; the concurring and dissenting opinion in the Federal Circuit's *Festo*[2] decision discussed the importance of Schumpeterian arguments for economic polices that promote investment in

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[1] *United States v. Microsoft* (D.C. Cir. 2001) 253 F.3d 34, 49.

[2] *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.* (Fed. Cir. 2001) 234 F.3d 558, 639.

new technology; officials of both the Antitrust Division of the U.S. Department of Justice and the Federal Trade Commission[3] have discussed Schumpeterian competition in speeches; and the term has appeared in scores of law review articles over the last decade.[4] So what is "Schumpeterian" competition, why has it become a prominent topic, and what does it mean for antitrust enforcement?

This article addresses those questions. Part I introduces the concept of Schumpeterian competition. Part II discusses several challenges for antitrust enforcement posed by Schumpeterian competition. Part III then examines Schumpeterian arguments that strike at the very foundations of conventional merger policy. Part IV concludes by assessing the Schumpeterian critique and its policy implications. This article finds that the Schumpeterian school offers important critiques that antitrust must take seriously but that the Schumpeterian analysis does not supply a basis for fundamental retreat from enforcement in the interest of innovation, as some have suggested.

I. What is Schumpeterian Competition?

When firms face competition, they seek to attract customers by offering lower prices and/or higher quality products and services than their rivals, thus benefiting consumers. Consequently, antitrust has long been focused on competition as a means of promoting consumer welfare.[5] When firms invest in research and development, they

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[3] *E.g.* Anne K. Bingaman, Assistant Attorney General, Antitrust Division, U.S. Dep't of Justice, speech entitled *Innovation and Antitrust* (July 29, 1994), <http://www.usdoj.gov/atr/public/speeches/innovate.htm> (as of Nov. 15, 2005); William J. Kolasky, Deputy Assistant Attorney General, Antitrust Division, U.S. Dep't of Justice, speech entitled *Comparative Merger Control Analysis: Six Guiding Principles for Antitrust Agencies – New and Old* (Mar. 18, 2002), <http://www.usdoj.gov/atr/public/speeches/10845.htm> (as of Nov. 15., 2005); Robert Pitofsky, Chairman, Federal Trade Commission, speech entitled *Antitrust and Intellectual Property: Unresolved Issues at the Heart of the New Economy* (Mar. 2, 2001), <http://www.ftc.gov/speeches/pitofsky/ipf301.htm> (as of Nov. 15, 2005) ; and Todd J. Zywicki, Director, Office of Policy Planning, Federal Trade Commission, speech entitled *How Should Competition Policy Transform Itself? Designing the New Competition Policy* (Nov. 20, 2003), <http://www.ftc.gov/speeches/other/031120zywickijapanspeech.pdf> (as of Nov. 15, 2005).

[4] *E.g.* Henderson, *Second Look at the Second City: Chicago Lawyers Changed a Lot in 20 Years*, (Nov./Dec. 2005) Legal Aff, and Jacobson & McCormick, *The Business of Democracy is a Democracy: A Review Essay on Richard A. Posner, Law, Pragmatism, and Democracy*, (Oct. 2005) 3 Int'l J. Const. L. 706.

[5] *See, e.g., FTC v. University Health, Inc.* (11th Cir. 1991) 938 F.2d 1206, 1222-23 and *United States v. United Tote, Inc.* (D. Del. 1991) 768 F. Supp. 1064, 1084-85. However, there are also strong economic

bring beneficial new products to the marketplace and reduce the costs of producing existing products. These activities also benefit consumers, and there has been an increasing recognition among antitrust enforcers of the importance of innovation for consumer welfare.

Early antitrust cases alluded to the importance of innovation without providing any clear blueprint for how it should relate to antitrust. For example, Judge Learned Hand wrote as early as 1916 that "the consumer's interest in the long run is quite different from an immediate fall in prices" and spoke of competition as a "proper stimulus to the maintenance of industrial advance."[6] By the 1960s, courts more expressly stated their need to "take into account the fact that the antitrust laws too are supposed, among other things, to protect and encourage progressiveness and innovation."[7] And by the 1990s, innovation became an important consideration in merger review.[8] One antitrust enforcement official went so far as to state that "as important as price competition is to us, a second major and possibly even greater concern is maintaining competition for innovation."[9]

But how should that concern actually be incorporated into antitrust analysis? Antitrust authorities have a keen interest in the answer to this question. Antitrust agencies face a large volume of mergers to review, many of which, like Oracle's recent and contentious takeover of PeopleSoft, are in industries characterized by high levels of innovation. The agencies and the courts also face challenging non-merger cases that hinge on innovative technology, such as the United States' case against Microsoft and the more recent antitrust suit that AMD filed against Intel.[10]

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arguments for the use of a total surplus standard (*see, e.g.*, Williamson, *Economies as an Antitrust Defense: The Welfare Tradeoffs* (1968) 58 Am. Econ. Rev. 1372.

[6] *United States. v. Corn Prods. Ref. Co.* (S.D.N.Y. 1916) 234 F. 964, 1012.

[7] *Am. Mfrs. Mut. Ins. Co. v. Am. Broadcasting-Paramount Theatres, Inc.* (S.D.N.Y. 1967) 270 F. Supp. 619, 641.

[8] See Katz & Shelanski, *Merger Policy and Innovation: Must Enforcement Change to Account for Technological Change?* in 5 Innovation Policy and the Economy, (Jaffee et al., eds., 2005) (discussing merger cases involving innovation).

[9] Robert Kramer, Chief, Litigation II Section, Antitrust Div., United States Dep't of Justice, speech titled Antitrust Considerations in International Defense Mergers (May 4, 1999), <http://www.usdoj.gov/atr/public/speeches/2649.htm>, at p. 3 (as of Nov. 15, 2005).

[10] See Complaint, *Advanced Micro Devices Inc. v. Intel Corp.* (D. Del., filed June 7, 2005).

One approach was to recommend a shift in the focus of merger review away from product markets and more directly to investment in research and development ("R&D"). Richard Gilbert and Steven Sunshine, then at the Department of Justice, developed the concept of "innovation markets" to provide a framework for determining whether a merger is likely to lessen innovation.[11] The central exercise in their framework is to identify overlapping R&D activities of merging firms, examine alternative sources of that R&D, and then assess how any increased concentration in R&D activities (or the assets required to undertake them) would affect investment in R&D in the post-merger market. Gilbert and Sunshine recommended limiting application of their analysis "to markets in which R&D directed toward particular new products or processes requires specific assets that are possessed by identified firms."[12] Their framework for assessing innovation is therefore, at root, a dynamic extension of the conventional, product-focused framework for merger analysis.

Adherents of the Schumpeterian School argue that dynamic, innovation-based competition provides grounds for great caution or even a systematic retreat in antitrust enforcement.[13] At the heart of the Schumpeterian argument is the assertion that, in important instances, competition primarily occurs through cycles of innovation, rather than through static price or output competition. Firms in such markets compete for temporary dominance of the market through the introduction of new generations of relevant technology. That is, firms do not compete simultaneously for a share of the market, but rather sequentially for the market as a whole. At any given moment, only one firm might dominate sales of the product at issue but other firms continue to innovate and prepare to knock the incumbent from the market by developing superior products.

The central implication of such dynamic competition for antitrust is that focusing on current sales and static price competition may cause enforcement agencies to miss the real force behind market performance: innovation. Intervention into dynamic markets

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[11] Gilbert & Sunshine, *Incorporating Dynamic Efficiency Concerns in Merger Analysis: the Use of Innovation Markets* (1995) 63 Antitrust L.J. 569.

[12] *Id.* at 596.

[13] See, e.g., Evans & Schmalensee, *Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries* in 2 Innovation Policy and the Economy (Jaffee et al., edits., 2002); Pleatsikis & Teece, *The Analysis of Market Definition and Market Power in the Context of Rapid Innovation*, (2001) 19 Int'l J. Indus. Org. 665; Antitrust, Innovation, and Competitiveness (Jorde & Teece eds., 1992).

might then have the unintended consequence of slowing innovation either by distorting the reward structure for risky R&D (*i.e.* by impeding temporary monopoly returns) or by preventing dynamically beneficial mergers (*i.e.* transactions that might speed innovation by aggregating complementary assets).

The Schumpeterian School traces its intellectual roots to the work of Austrian economist Joseph Schumpeter (1883-1950). Schumpeter argued that continual R&D leads to periodic waves of new technology that in turn lead to sweeping changes in the product-market positions of suppliers. Schumpeter coined the phrase "creative destruction" to express the idea that the entrepreneurial pursuit of profits is a creative and dynamic force that "incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one."[14] Schumpeter saw such rivalry as "the essential fact about capitalism."[15]

Creative destruction means that a firm's acquisition or possession of market power may be fleeting and that firms must protect such power through ongoing innovation efforts. Under constant pressure from actual and potential innovators, the incumbent firm itself produces better products on better terms for consumers or else loses its place in the market to a rival. The process of creative destruction, Schumpeter explained, "strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives."[16]

Schumpeter cautioned against a narrow focus on static price and output competition, lest that focus obscure the importance of innovation. In his classic discussion of creative destruction, Schumpeter wrote:

> Every piece of business strategy acquires its true significance only against the background of that process [of innovation] and within the situation created by it. It must be seen in its role in the perennial gale of creative

[14] See Schumpeter, Capitalism, Socialism and Democracy (1942) p. 83 (emphasis in original). For representative applications of Schumpeterian concepts to the assessment of market power in software markets, see Schmalensee, *Antitrust Issues in Schumpeterian Industries*, (2000) 90 Am. Econ. Rev. 192, 193 (arguing that "[t]raditional tests for monopoly power do not measure . . . [the] fragility" of market dominance in the software industry); Teece & Coleman, *The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries*, (1998) 43 Antitrust Bull. 801, 820–22.

[15] Schumpeter, Capitalism, Socialism and Democracy (1942) at 83.

[16] *Id*. at 84.

> destruction; it cannot be understood irrespective of it or, in fact, on the hypothesis that there is a perennial lull.
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> But economists who, *ex visu* of a point in time, look for example at the behavior of an oligopolistic industry—an industry which consists of a few big firms—and observe the well-known moves and countermoves within it that seem to aim at nothing but high prices and restrictions of output are making precisely that hypothesis. They accept the data of the momentary situation as if there were no past or future to it and think that they have understood what there is to understand if they interpret the behavior of those firms by means of the principle of maximizing profits with reference to those data. The usual theorist's paper and the usual government commission's report practically never try to see that behavior, on the one hand, as a result of a piece of past history and, on the other hand, as an attempt to deal with a situation that is sure to change presently—as an attempt by those firms to keep on their feet, on ground that is slipping away from under them. In other words, the problem that is usually being visualized is how capitalism administers existing structures, whereas the relevant problem is how it creates and destroys them.[17]

Thus, Schumpeterians warn against viewing the market in static terms.

II. Implications for Conventional Views of Market Power and Market Structure

The Schumpeterian view of competition and market performance has several important implications for antitrust policy.

Conventional antitrust analysis begins with the exercise of defining relevant markets. Product-market definition focuses on identifying which goods and services compete with each other because they are sufficiently close substitutes in the eyes of potential buyers. The usual next step is to calculate the market shares of the firm or firms whose conduct or transaction is under review**.** In unilateral conduct cases, antitrust enforcers often take "high" market shares as an indicator of significant market power. In merger cases, enforcement officials take an increase in concentration in the relevant markets as a proxy for a decrease in competition that—if large enough—can lead to a significant increase in the prices faced by consumers.[18] Broken down somewhat more

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[17] *Id*. at 83–84.

[18] For the most part, economic theory and antitrust policy have long favored more competition over less for the purpose of lowering prices, expanding output, and making consumers better off. There are, however, limited exceptions to this view. For example, certain industries in which per-unit cost declines as output increases to the point that it is most efficient to have just one firm producing all output in a given market have come to be known as natural monopolies. Historically, telecommunications networks were a leading

finely, the courts presume that higher concentration leads to less competition and that less competition leads to lower levels of consumer welfare; reasoning sometimes referred to as the "concentration-competition-consumer-welfare presumption."

Absent a presumption that market share and concentration levels affect market power and/or consumer welfare, the traditional rationale for antitrust approaches that depend on market definition weakens. And as we will now discuss, the Schumpeterian view raises difficult issues concerning the interpretation of current market conditions in technologically progressive industries.

A. Short-Run Market-Power and Long-Run Innovation

Schumpeterians argue that the process of "creative destruction" makes innovation the most important dimension of market performance for economic welfare. They argue that, in markets where innovation matters, antitrust analysis should focus more on how various practices (e.g., mergers or unilateral exclusionary conduct) affect the incentives and abilities of firms to innovate and less on apparent market power or short-term pricing and output decisions.

In some cases, there can be tensions between the objective of promoting innovation and the objective of promoting short-run price and output competition. A merger, for example, might increase prices in the short run but, by bringing together complementary assets needed to develop or exploit new technology, might increase firms' abilities to innovate. And those who favor permissive application of antitrust principles can find grounds in Schumpeter's work to argue that mergers or other practices that increase product-market profits will stimulate innovation. Higher profits can do so either by increasing internal financial resources or, more plausibly, by creating larger returns to innovation that succeeds in displacing the incumbent. In the latter case, the larger "prize" for successful innovation will attract additional R&D efforts that may succeed in displacing the incumbent or, even if they ultimately fail, still induce the incumbent itself to innovate in response to the threat they pose. Indeed, if firms are in fact competing by making risky investments in R&D, then the existence of high margins and apparent profits does not establish that the incumbent is earning excess returns as a

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example, and public policy actually served to limit entry. That view has changed. For instance, the Telecommunications Act of 1996, 47 U.S.C. §§ 151 *et seq.*, seeks to promote competitive entry.

consequence of market power. The apparent profits may simply be returns on past investments. The fact that, in the Schumpeterian view of the world, any profits and associated welfare losses due to unilateral practices or a merger are transitory reinforces the Schumpeterian theme that antitrust enforcers should focus on long-run innovation concerns rather than short-run price and output decisions.

In summary, Schumpeterian critics charge that, even if increased competition would bring short-term benefits of lower prices and higher output, it might do so at the expense of innovation that would yield yet greater payoffs for consumers over time. The nature of Schumpeterian competition thus suggests to some observers that antitrust policy should be less concerned with business practices that might generate increased monopoly profits through anticompetitive acts within a product market, or should at least be more circumspect about challenging such practices.[19] They argue that, in innovation-based industries, antitrust enforcement is likely to make costly errors that will have the unintended effect of slowing innovation. Therefore, the argument implies, firms in dynamic markets should be subject to relatively little antitrust oversight.

In some ways, these arguments are similar to those made in support of the patent system. And they are essentially the same reasons that antitrust policy typically imposes few duties to deal or share assets with rivals—there is a fear that doing so might increase competition in the short run but discourage investment in the long run. Nevertheless, the force of this argument is limited one. At some point, the benefits of an incremental increase in innovation incentives will be outweighed by the harms from the loss of static competition. Moreover, although exclusionary practices might yield profits that could finance R&D or strengthen R&D incentives by increasing the prize earned by a successful innovator, such practices may also reduce competitive pressures on incumbents to innovate. Importantly, such practices may also make it less profitable and more difficult for entrants to innovate so as to perpetuate the Schumpeterian cycle of "creative destruction." Indeed, the government argued that Microsoft engaged in such

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[19] For a discussion of antitrust policy toward single-firm conduct in markets characterized by Schumpeterian competition, see Evans & Schmalensee, *Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries*, *supra* note 13.

practices to thwart Schumpeterian competition from Netscape.[20] Even in markets with potentially very significant innovation, antitrust enforcement can play an important and beneficial role.[21] Hence, consumer interests may not best be served by enforcers who stand on the sidelines, despite what some members of the Schumpeterian School argue.

B. The Significance of Current Market Shares

Some members of the Schumpeterian School hold that, even if one wants to maintain antitrust law's concern with market power and concentration, conventional market share measures are of little use in understanding when market power exists or how it will be affected by various practices in innovative industries. Even in an industry with little innovation, the effective use of market shares to predict the existence of market power or the adverse competitive effects of a merger requires an empirically supported theory that market shares are informative of competitive conditions. Innovation complicates the interpretation of market shares in several ways.

One complication is to weaken the link between current and future market conditions. When reviewing mergers, for example, agencies have to make predictions about the future. And the future effects of unilateral practices will depend, in part, on future market power and the state of competition. Conventional market share measures, however, are backward-looking. This is one important reason why high market share is not, in itself, sufficient to establish market power. Most market share measures reflect where firms were in terms of market position (e.g., shares of installed base), or where they are (e.g., shares of sales to customers who are new to the industry), but not necessarily where they are going.[22] Even in the conventional, static setting, a strong consensus exists among economists that rival suppliers' capacities to enter and expand in a market must be considered in addition to current market share data. The *Horizontal*

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[20] For a discussion of exclusionary conduct and its harm to innovation in the *Microsoft* case, see Gilbert & Katz, *An Economists' Guide to U.S. v. Microsoft*, (2001) 15 J. Econ. Persp. 25.

[21] For a recent, theoretical exploration of conditions under which more stringent antitrust enforcement raises the rate of innovation, see Segal & Whinston, *Antitrust in Innovative Industries*, (October 2005) Stanford Law and Economics Olin Working Paper No. 312 <http://ssrn.com/abstract=834904> (as of Nov. 15, 2005).

[22] Of course, in some circumstances, firms' current positions are good predictors of their future positions and past positions can shed light on the extent of installed-base or related advantages.

Merger Guidelines accordingly recognize that, in changing markets, current market share may be an inaccurate measure of a firm's forward-looking competitive significance.[23]

Under the Schumpeterian view that competition consists of repeated waves of innovation that sweep aside "dominant" incumbents, current product-market shares may indicate very little about the future of the industry or about whether any given firm will possess significant market power. Moreover, firms conduct R&D with an eye toward the future. Thus, one can raise serious doubts about the value of current product-market shares as indices of the state of innovation-based competition.[24] In dynamic markets a firm's monopoly today may say little about the firm's prospects one, two, or five years from now, and the greater the level and rate of innovation in an industry, the less reliable a predictor of future events product-market share becomes.

In summary, innovation can raise important questions regarding the value of current product-market shares as predictors of future competitive conditions in a highly dynamic industry. It is important to note, however, that the lesser relevance of product-market shares in innovation cases does not necessarily imply lesser relevance for antitrust enforcement. For example, a merger might eliminate a rival innovator from the market. And, a firm with market power might engage in exclusionary or predatory conduct that raises entry barriers and deters other firms from innovating and challenging the incumbent.

Innovation also heightens concerns about the treatment of potential competition when using product-market data to predict the likely effects of either a merger or some form of unilateral conduct. The conventional merger review framework, for example, includes potential competitors in a product market only when certain conditions of imminence and probability are met. However, potential competition can have an important impact on future market conditions, and this importance is magnified when

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[23] DOJ and FTC, Horizontal Merger Guidelines (1992, with 1997 revisions) <http://www.ftc.gov/bc/docs/horizmer.htm> (as of Nov. 15, 2005) (hereafter, *Merger Guidelines*) Section 1.521. The extent to which the agencies are willing to adopt forward-looking views of competition is the subject of some debate.

[24] *See, e.g.*, Kamien & Schwartz *Timing of Innovations under Rivalry*, (1972) 40 Econometrica 43, 50 ("concentration reflects the current sellers of a product and may be quite unrelated to the extent of actual and potential rivalry in innovating new products"). However, current concentration can be related to innovation in some circumstances. In the case of process innovations that are used solely by the innovators in their own production, for example, firms with higher market shares have greater innovation incentives.

potential competition relates not just to product-market performance, but also to innovation by incumbents and potential entrants.

The threat of entry or potential competition may be a stronger spur to innovation efforts than to lowering current prices and increasing current output. Indeed, even R&D programs that never succeed in developing new products or processes may nonetheless benefit consumers by stimulating potential rivals to innovate. Schumpeter himself wrote that innovation-based competition "acts not only when in being but also when it is merely an ever-present threat. It disciplines before it attacks."[25] Accordingly, understanding the impact of potential competition in innovative industries requires gauging the effects of potential entry not just on product-market performance (and vice versa), but on incentives of incumbents and potential new firms to engage in development and deployment of new technology.

C. The Right Concentration Measure

One implication of the above discussion is that identifying actual and potential innovators—rather than just actual and potential product-market competitors—may be particularly important for understanding the likely welfare effects of practices and transactions. Where innovation is the key dimension of competition, and where it is possible that a practice or transaction will affect the development or deployment of new technology, direct measurement of concentration and market power as they relate to innovation would be preferable to the use of product-market shares as indirect proxies for those variables. Stated another way, the issue is whether one should consider concentration of product sales or concentration of R&D capabilities.[26]

Moving toward direct measurement of innovation effects was the motivation behind the innovation markets approach of Gilbert and Sunshine discussed above, which focuses attention on firms' innovation efforts and characteristics such as which firms possess assets that are relatively scarce and that are essential to successful innovation. Whether or not one applies the name "innovation markets" to the approach (and the name

[25] Schumpeter, Capitalism, Social, and Democracy, *supra* note 14, at 85.

[26] Under the process described by the *Merger Guidelines*, "Market shares will be calculated using the best indicator of firms' future competitive significance." *Merger Guidelines*, Section 1.41.

has proven to be controversial), the idea of focusing on the R&D capabilities of the relevant competitors is a sensible approach.

Importantly, a focus on the assets necessary for innovation can give rise to situations in which Schumpeterian arguments support what would appear to be more stringent antitrust enforcement, not less. Specifically, a merger may have substantial effects on competition even if the post-merger product-market share is permissible within conventional enforcement guidelines. If the merger brings together two imminent technologies that otherwise would have competed, or combines the only two enterprises with certain assets essential to undertaking successful R&D in the industry, then consumers may lose out on product-market rivalry that otherwise would have come to exist absent the merger. In fact, even if a merger involves firms that do not currently compete in any product market, innovation considerations could counsel scrutiny because these firms might nevertheless be the only two firms with the capabilities to undertake certain innovations essential for competing in a nascent product market. In other words, there may be reasons to think that innovation concerns warrant more, not less, scrutiny in merger review.

To be sure, there are practical problems in finding useful innovation-based measures of market share and of calculating such measures empirically. Identifying competitors can be difficult in the best of situations. Identifying actual and potential innovators can be even more difficult because the ability to innovate often hinges on the possession of certain skills and information assets that can be particularly hard to identify and measure. In the other direction, the existence of ongoing innovation efforts can render claims of potential product-market competition more readily verifiable because a firm that has made substantial and successful investments in R&D aimed at a specific product is more likely to enter the market for that product than is a firm that has the relevant technological capabilities for innovating but has invested nothing.

Ultimately, determining how innovation may affect future product-market shares, or what a given firm's share of ongoing innovation is, will be a more complex enterprise than calculating the product-market shares of actual competitors. But addressing that complexity is essential because the strength of the relationship between potential competition and innovation can limit the inferences one can draw from conventional

product-market shares in determining the welfare effects of mergers in highly innovative industries.

III. Merger Policy and the Concentration-Competition-Consumer-Welfare Presumption

As just discussed, the Schumpeterian notion of creative destruction poses a number of challenges for antitrust. Many of these challenges are also present to a lesser degree in markets with little innovation. In the case of merger policy, however, the Schumpeterian view challenges the very foundations. Specifically, merger policy is founded on the presumption that—absent offsetting efficiencies—an increase in concentration harms consumers or is, at best, neutral. That is, there is a presumption that greater concentration leads to less competition and, thus, to lower levels of consumer welfare.

Is concentration a reliable basis for predicting the strength of competition and resulting effects on consumer welfare? Although it is subject to some well-placed criticism, the concentration-competition-consumer-welfare presumption is on fairly sound footing for traditional price concerns in static markets with little innovation or entry. In markets in which innovation is significant, however, the traditional concentration-competition relationship is on a weaker or more nuanced empirical and theoretical footing.

Consider first the traditional presumption concerning short-run price or output competition. The law presumes, subject to rebuttal, that a high, post-merger level of concentration indicates a competitive problem with a proposed transaction.[27] No general theorem of economics proves that higher concentration leads to higher prices or lower output. However, absent innovation, one can expect this relationship for several reasons. First, many (but not all) formal economic models of markets likely to attract merger scrutiny (i.e., those markets in which only a few firms compete) indicate that equilibrium output falls and equilibrium prices rise as the number of firms declines. This situation is especially true in markets where firms cannot quickly and easily adjust output levels or where firms supply differentiated products and repositioning is difficult. Empirically,

[27] *United States v. Philadelphia Nat'l Bank*, (1963) 374 U.S. 321.

substantial evidence indicates that there is a correlation of equilibrium prices and market concentration.[28] Consumers in the U.S. have experienced the benefits of reduced concentration and increased competition in markets such as long-distance and wireless telephone services, air travel, and pharmaceuticals. It should also be recognized that increased concentration does not always lead to higher prices; market share is only a starting point for a sound analysis of market power and competitive effects.

The presumption that increased benefits come from an increased number of competitors is weaker when the policy goal is not just lowering prices toward more efficient levels for a given set of goods produced using a fixed set of technologies but also promoting efficient innovative activity by firms over time. Economic theory has long raised questions about the degree to which increased product-market competition or an increase in the number of firms undertaking R&D leads to an increase in overall R&D investment.[29] Both the theoretical and empirical bases for predicting that an increase in concentration will lead to less innovation are mixed.

The idea that the economic conditions that maximize innovation over time may not be the same conditions that allocate resources efficiently in the short run was suggested over fifty years ago by Schumpeter when he wrote that, for purposes of promoting economic welfare, "perfect competition is not only impossible but inferior, and has no title to being set up as the model of ideal efficiency."[30] Schumpeter's argument that most technological innovation would come from large corporations with market power and organized R&D operations implied that the ideal of competition under antitrust law could have substantial social costs over time.[31]

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[28] *See, e.g.*, Schmalensee, *Inter-Industry Studies of Structure and Performance* in 2 Handbook of Industrial Organization (Schmalensee and Willig, eds., 1989).

[29] For example, in their 1975 survey of work on innovation and market structure, Kamien and Schwartz stated that "[f]ew, if any, economists maintain that perfect competition efficiently allocates resources for technical advance." Kamien & Schwartz *Market Structure and Innovation: A Survey* (1975) 8 J. Econ. Literature 1, 2. Today, economists have a deeper appreciation for licensing and other forms of innovation diffusion, so there might be less agreement with such a sweeping statement because multiple interpretations of what is meant by perfect competition are possible in this context.

[30] Schumpeter, Capitalism, Social, and Democracy, *supra* note 14, at 106.

[31] Of course, the competitive ideal of antitrust policy has evolved over time. When Schumpeter was writing, the ideal was rivalry among small, atomized economic actors. Any cooperation or concentration deviating from that standard was inherently suspect. The Chicago School revolution did much to improve understanding of why different market structures might result in different contexts and thereby reduced

Schumpeter wrote mostly about large firms, their associated economies of scale for R&D, and their ability to attract capital and talented scientists. But his critique of perfect competition and discussion of the benefits of market power suggest that his ideal innovators were not only large but dominant as well. Early theoretical explorations of Schumpeter's claim found that, when the polar cases of monopoly and perfect competition were compared, the latter provided stronger incentives for cost-reducing innovations.[32] Subsequent theoretical research has shown that, depending on various conditions, either monopoly power or competition may lead to greater total innovation.[33] And other research suggests that oligopoly—competition among a few firms—is the market structure most conducive to development of new products and processes.[34]

Although many advances have been made in modeling market structure and innovation, much of the research on market structure and innovation has a straightforward logic underlying it.[35] As the economist John Hicks famously remarked, "[the] best of all monopoly profits is a quiet life."[36] In other words, the tumult of competition will drive organizations to be more innovative than will a protected monopoly position. Intuitively, one can think of offensive and defensive reasons to innovate. Starting with offense, there is the possibility of using innovation to steal business from a rival. This effect does not arise under monopoly, where the business one might steal comes only from one's self. Turning to defense, a firm may innovate because it fears that failure to do so would lead it to lose otherwise profitable sales to its more

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rigid adherence to the perfectly competitive model. Because of its benefits for allocative efficiency, competition nonetheless remained the touchstone of antitrust policy.

[32] Fellner, *The Influence of Market Structure on Technological Progress*, (1951) 65 Q. J. Econ. 556; Arrow, *Economic Welfare and the Allocation of Resources to Invention* in The Rate and Direction of Economic Activity (National Bureau of Economic Research ed., 1962).

[33] Scherer, *Schumpeter and Plausible Capitalism*, (1992) 30 J. Econ. Literature 1416.

[34] Scherer, *Market Structure and the Employment of Scientists and Engineers* (1967) 57 Am. Econ. Rev. 524; Scherer, *Research and Development Resource Allocation Under Rivalry* (1967) 81 Q. J. Econ. 359; Kamien & Schwartz, *Market Structure and Innovation: A Survey*, supra note 28; Kamien & Schwartz, *On the Degree of Rivalry for Maximum Innovative Activity*, (1976) 90 Q. J. Econ. 245. For a recent paper that provides a broad theoretical look at market structure and R&D, *see* Vives, *Innovation and Competitive Pressure*, unpublished manuscript, ICREA-UPF and INSEAD, September 19, 2005.

[35] See Scherer, *Schumpeter and Plausible Capitalism, supra* note 33; and Reinganum, *The Timing of Innovation: Research, Development, and Diffusion* in 1 Handbook of Industrial Organization, (Schmalensee and Willig eds., 1989).

[36] Hicks, *Annual Survey of Economic Theory: The Theory of Monopoly*, (1935) 3 Econometrica 1, 8.

innovative product-market rivals. In short, a firm facing strong product-market rivalry has an incentive to develop new products and processes that will help it improve or defend its market position.

On the other hand, the possibility of sudden and sweeping entry, combined with large, up-front investment demands, can necessitate high initial returns to allow costs to be recouped before the next innovator supplants the incumbent investor. A firm with a large market share and significant market power may better amortize the fixed costs of R&D and appropriate a high percentage of the R&D benefits. Suppliers with many product-market rivals may have less ability to appropriate the gains from innovation that make the investment worthwhile either because their innovations are readily copied or invented around by rivals or because atomistic competitors lack the other assets needed to exploit their innovations fully (e.g., a firm with a small share of the product market may not amortize its cost-reducing innovation over many units of output).

Strong intellectual property rights can reduce some of the risks from innovation, specifically those associated with rapid imitation. And licensing may make it possible and profitable to diffuse an innovation throughout an industry with many firms. But even if intellectual property rights give the innovator a temporary monopoly, other firms may develop similar or better advances and may circumvent the originator's patent. Although this risk exists for competitive firms and product-market monopolists alike, it may grow stronger with the number of firms competing in the relevant product market, at least initially.

Similar issues arise with respect to R&D competition. R&D can be motivated by business stealing in competitive situations. In a race to obtain a patent, for example, preempting rivals by a day can mean the difference between obtaining valuable intellectual property rights for one's self or seeing the gains go to a competitor. Thus, firms may have sizable incentive to invest in R&D in order to innovate quickly. This effect would not arise if there were only one potential innovator. On the other hand, if many firms are racing to obtain a patent, each firm may conclude that its chances of winning the race are sufficiently small that it is not profitable to invest as much in R&D as it would without so many competitors.

In summary, economic intuition suggests an overarching presumption that innovation will be most intense in firms with a mix of competitive incentives and supracompetitive returns. And the academic literature indicates that the theoretical balance could swing toward either greater or fewer number of competitors in a given case depending on assumptions.

Empirical data do not resolve the ambiguous theoretical relationship between competition and innovation. Many analyses supported the Schumpeterian view by finding a positive correlation between market concentration and R&D investment.[37] Other analyses, however, found data to show concentration to have a negative effect on innovation.[38] An early and influential study by F. M. Scherer indicated that both could be correct over a sufficiently large range of market structures because the relationship between innovation and concentration is nonlinear. His study, which corroborated the theoretical intuition discussed above, found the relationship between market structure and innovation to follow an inverted-U pattern: innovation is observed to be low at high levels of competition, reach its peak at intermediate levels of oligopoly (where the four leading firms control roughly half the market), and then fall off as market structure approaches monopoly.[39] Several studies replicated and confirmed Scherer's results.[40] Later work, however, raised serious doubts about these findings. Indeed, in their review of the empirical literature, Cohen and Levin concluded that "[t]ogether, these results leave little support for the view that industrial concentration is an independent, significant, and important determinant of innovative behavior and performance."[41]

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[37] See, e.g., Mansfield, Industrial Research and Technological Innovation; An Econometric Analysis (1968).

[38] Williamson, *Innovation and Market Structure*, (1965) 73 J. Pol. Econ. 67; Bozeman & Link, Investments in Technology: Corporate Strategy and Public Policy Alternatives (1983); Mukhopadhyay, *Technological Progress and Change in Market Concentration in the U.S. 1963-1977* (1985) 52 S. Econ. J. 41.

[39] Scherer, *Market Structure and the Employment of Scientists and Engineers*, *supra* note 34.

[40] Levin et al., *R&D Appropriability, Opportunity, and Market Structure: New Evidence on Some Schumpeterian Hypotheses* (1985) 75 *Am. Econ. Rev.* 20; Scott, *Firm Versus Industry Variability in R&D Intensity* in R&D, Patents and Productivity (Griliches ed. 1984).

[41] Cohen & Levin, *Empirical Studies of Innovation and Market Structure* in 2 Handbook of Industrial Organization (Schmalensee & Willig eds., 1989)(citing Wesley Cohen et al., *Firm Size and R&D Intensity: A Re-Examination*, (1987) 35 J. Indus. Econ. 543).

One should be cautious in the interpretation of the empirical literature for several reasons. First, questions surround the statistical significance of the parameter estimates leading to a U-shaped relationship and whether they are, in fact, picking up the effects of omitted variables such as technological opportunity.[42] Second, extreme care must be taken in interpreting cross-sectional studies because the causality between market structure and innovation rates can run in both directions.[43] One detailed analysis of British data found that the higher profit expectations in concentrated markets increased innovative activity but that, over time, innovation reduced concentration levels in the sample industries.[44] Many empirical studies fail to account for the fact that market structure itself might be affected by the perceived possibilities for innovation and that market structure might therefore be a result, rather than a cause, of innovation incentives. The literature addressing how market structure affects innovation (and vice versa) in the end reveals an ambiguous relationship in which factors unrelated to competition play an important role.

The theory and data that support the systematic presumption in favor of increased competition for purposes of static pricing and output efficiency thus have no analog when it comes to understanding the optimal conditions for innovation. By the same token, it should be observed that any claim that antitrust policy should favor increased concentration as a means of promoting innovation equally lacks firm empirical grounding. Meaningful general presumptions have not been identified in either direction: innovation is affected by a variety of market factors other than concentration (as well as variables related to a firm's regulatory status, products, and technologies). Although

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[42] *See* Kamien & Schwartz, *Market Structure and Innovation: A Survey*, *supra* note 29, at 20-22. Kamien and Schwartz summarized their survey of the empirical literature as follows: "In reviewing the diverse findings on research efforts and concentration, we find little consensus" (*Id.* at 22), and "[o]ur review of the impact of market structure on innovation has netted little more than reaffirmation of the early observation that both competitive pressures and market opportunity seem important." (*Id.* at 24). Somewhat surprisingly, they then concluded their survey with "[a] new empirically inspired hypothesis has emerged to the effect that a market structure intermediate between monopoly and perfect competition would promote the highest rate of innovative activity." (*Id.* at 32).

[43] In terms of theory, a recent demonstration of this possibility is provided in a paper by Jan Boone, which finds that an increase in the intensity of competition can drive a leading firm to increase its innovation by relatively more than its rivals and thus increase future concentration. Boone, *Intensity of Competition and the Incentive to Innovate*, (2001) 19 *Int'l J. Indus. Org.* 705).

[44] Geroski, *Innovation, Technological Opportunity, and Market Structure*, (1990) 42 Oxford Econ. Papers 586.

more rivals rather than fewer will often promote consumer welfare in a particular case, enforcement authorities cannot as confidently presume as a matter of economic theory or experience that more competitors are beneficial or that market power is detrimental for R&D. (One exception is the limited case of merger to monopoly, where the evidence supports a moderate presumption of harm.) Importantly, however, nor can antitrust authorities reasonably presume that increased concentration, firm size, or market power will be beneficial for R&D. What is needed is a careful, fact-based, case-by-case analysis.

IV. Conclusions and Policy Implications

So, are the Schumpeterians right? The answer is: yes and no. The Schumpeterians are right that significant innovation complicates the use of current market shares to determine market power and future market performance and that antitrust enforcers must be sensitive to these complications. The Schumpeterians are also right that a proper understanding of innovation-based competition means that, in some markets, antitrust enforcement cannot rely on its long-established presumptions that increased concentration or market power will reduce innovation or harm consumer welfare. A merger from four to three firms, or even from three to two, while raising a presumption of increased short-run power over price and output, does not so easily raise a presumption of reduced development and deployment of new technology. This finding complicates application of the innovation markets approach discussed in part I above, and it poses an important challenge to using antitrust policy to preserve and promote innovation.

The Schumpeterians are wrong when they assert that the process of innovation-based competition and the relevant economic evidence counsel the presumption that concentration and market power promote innovation and consumer welfare and that a systematic retreat from antitrust enforcement is warranted. When it comes to mergers, the evidence shows that high concentration could harm firms' incentives to innovate, especially in the case of a merger to monopoly. Even if a merger would increase the merging parties' ability to innovate, the transaction could at the same time—by reducing R&D rivalry—reduce the parties' incentive to do so. Similarly, the evidence lends little

support to the argument that intervention to block strategies that appear anticompetitive will necessarily deter firms from innovating. The case for a presumption against antitrust enforcement is thus not grounded in the economic theory or data.

The challenge facing antitrust enforcement is therefore to refine its tools to account for and promote technological innovation more effectively through a fact-intensive and multi-dimensional analysis. Fortunately, the challenge has been taken up. Through special reports, [45] enforcement actions,[46] and research,[47] enforcement agencies, practitioners, and scholars are working toward improving antitrust policy's ability to address and adjust to the Schumpeterian critique. The relationship between antitrust and innovation is thus likely to remain one of the most important topics in competition policy for the foreseeable future.

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[45] Federal Trade Commission, To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy (October 2003), <http://www.ftc.gov/os/2003/10/innovationrpt.pdf> (as of Nov. 15, 2005).

[46] *See, e.g.*, Genzyme/Novazyme Acquisition ,Fed. Trade Comm'n, File No. 021-0026 (2004).

[47] Katz & Shelanski, *Merger Analysis and the Treatment of Uncertainty: Should We Expect Better?* (Sept. 29, 2005) <http://ssrn.com/abstract=821234> (as of Nov. 15, 2005); *See, e.g.*, Evans and Schmalensee, *Some Economic Aspects of Antitrust Analysis in Dynamically Competitive Industries, supra* note 13; Pleatsikis & Teece, *The Analysis of Market Definition and Market Power in the Context of Rapid Innovation, supra* note 13.