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**Favoring Dynamic over Static Competition:  
Implications for Antitrust Analysis and Policy**

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## **Abstract**

This paper asks how competition policy should be shaped if it were to favor Schumpeterian (dynamic) competition over neoclassical (static) competition. Schumpeterian competition is the kind of competition that is engendered by product and process innovation. Such competition not only brings price competition - - - it tends to overturn the existing order. A framework that favors dynamic over static competition would put less weight on market share and concentration in the assessment of market power, and more weight on assessing potential competition and enterprise level capabilities. By embedding recent developments in evolutionary economics and the behavioral theory of the firm into antitrust analysis, a more robust framework for antitrust economics can be developed. Such a framework is likely to soften remaining tensions between antitrust and intellectual property. It is also likely to lead to less confidence in the standards tools of antitrust economics when the business environment is associated with rapid technological change.

## I. Introduction

In 1988, in anticipation of the centennial of the Sherman Act, my Berkeley colleagues and I held a conference on campus which led to the 1992 volume titled Antitrust, Innovation, and Competitiveness, with contributions from many of the leading scholars in antitrust law and economics. The conference was designed to alert the law and economics community to a set of emerging issues on antitrust and innovation. With hindsight, we believe it was a watershed event, and a slow and reluctant awakening to antitrust and innovation issues is now underway.

In the introduction to the proceedings of the conference, Thomas M. Jorde and I as editors endeavored to reframe antitrust questions. The issue, we asserted was that scholars and practitioners needed to take a more dynamic approach to competition declaring that: “as Schumpeter (1942) suggested half a century ago, the kind of competition embedded in standard microeconomic analysis may not be the kind of competition that really matters if enhancing economic welfare is the goal of antitrust. Rather, it is dynamic competition propelled by the introduction of new products and new processes that really counts. If the antitrust laws were more concerned with promoting dynamic rather than static competition, which we believe they should, we expect that they would look somewhat different from the laws we have today”.

We further proclaimed that our “antitrust laws may be at odds with technological progress and economic welfare. We do not by any means wish to assume that all the authors of the various chapters follow our point of view. Indeed, we are confident that several of them do not” (p. 3). In three subsequent papers, efforts were made to move the original agenda forward (Hartman et. al., 1993; Teece and Coleman, 1998; Pleatsikas and Teece, 2001).

Over the last decade, the intellectual winds have slowly begun to come around. Innovation and dynamic competition are on the radar screen. There is no doubt that the agencies are now taking innovation issues more seriously. FTC and DOJ staff and FTC

commissioners understand that innovation is important to competition. My colleagues Michael Katz and Howard Shelanski at Berkeley in 2005 published a provocative piece titled “Schumpeterian Competition and Antitrust Policy in High-Tech Markets”. The Intellectual Property Guidelines make the exercise of the Intellectual Property rights more confident, and the FTC-DOJ joint venture guidelines outline acceptable forms of cooperation amongst competitors. While these guidelines do not constitute law, the courts seem to have accepted the revised principles that the agencies have advanced.

## **II. Economic Theory and the Structuralist Tradition**

We remain bereft of evidence that antitrust intervention has benefited the consumer. Indeed, Crandall and Winston (2005) conclude that “we find little empirical evidence that past interventions have provided much direct benefit to consumers” (p. 4). Amongst the causes for this unfortunate state of affairs they cite “substantial and growing challenges of formulating and implementing effective antitrust policies in a new economy characterized by dynamic competition, rapid technological change, and important intellectual property” (p. 23).

The lack of compelling evidence indicating that antitrust isn’t aiding consumers is a matter of concern, and motivates inquiry here. The working hypothesis of this paper is that the employment of static analysis to address antitrust issues in a dynamic economy is unlikely to improve consumer welfare, and that the chances of helping more than hurting go up if antitrust analysis can create and apply a more dynamic framework.

The problem may be that (a) much of economic theory is still permeated with static analysis (b) the antitrust practitioner community seems unaware of what is now a substantial literature, much of it now quite robust, on evolutionary theory and the economic, organizational, and behavioral foundations of innovation (c) while this new literature has generated meaningful general descriptions of market and organizational behavior, these have only recently caught the attention of antitrust scholars. Because of this (d) the enforcement agencies aren’t confident about discarding “conventional

wisdom”, despite that fact that many of them are aware that much of it is deeply discredited.

This paper endeavors to help explain why static analysis appears to dominate, even though thoughtful policy makers are aware of dynamic competition. Unfortunately, policy makers are left wielding static analysis in part because of a wrong perception that scholars haven’t yet filled the intellectual void. Indeed, until this perception changes, not much is likely to happen. As Richard Posner has observed, “antitrust doctrine has changed more or less in tandem with changes in economic theory, albeit with a lag” (2001, p. 942). If scholars don’t embrace the now robust behavioral/evolutionary approaches, economists are unlikely to analyze dynamic considerations properly.

Unfortunately, many economists seem to be stuck in a well traveled and largely irrelevant debate, now half a century old, as to what form of market structure favors innovation, labeling this as the “Schumpeterian” debate. Regrettably, this is all that many have absorbed from the rich work of Schumpeter, the Austrian School, and extensive development in behavioral and evolutionary economics. This so called “Schumpeterian debate” casts Schumpeter too narrowly and is not of much interest anymore. However, it can still bog discussions about competition policy and innovation.

A more careful reading of Schumpeter will reveal at least three Schumpeterian propositions relevant to antitrust policy. (The first two are discussed in this section, the third in the next). The first proposition relates to the impact of market structure on innovation. On this topic, Schumpeter himself articulated conflicting and inconsistent perspectives. In The Theory of Economic Development (1911) he spoke of the virtues of competition fueled by entrepreneurs and small enterprises. By the time he wrote Capitalism, Socialism, and Democracy (1942), Schumpeter’s revised (second) proposition was that large firms with monopoly power are necessary to support innovation. This transformation was no doubt in part a reflection of the transformation that had occurred with respect to the principal sources of innovation in the American economy.

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So with respect to the impact of market structure on innovation, Schumpeter seems to have maintained two almost diametrically opposite positions. We will call his first position Schumpeter I, and the second position Schumpeter II.

Schumpeter I is perhaps more appealing today than Schumpeter II. Indeed, I believe that the debate over whether to favor competition over monopoly (as the market structure most likely to advance innovation) was won long ago in favor of some form of rivalry/competition.

However, the line of causation which is most commonly discussed runs only from competition to innovation. Indeed, as noted by the FTC:

“competition can stimulate innovation. Competition amongst firms can spur the invention of new or better products or more efficient processes...”<sup>1</sup>

While this is undoubtedly correct, it does not recognize that innovation may impact competition and market structure. Nor does it suggest what type of market structure is desirable - - - only that competition can drive innovation.

Unfortunately, we don't appear to have found a great deal of evidence that market concentration has a statistically significant impact on innovation, despite 50 years of research. The main take away is probably that this is not a useful framing of the problem, in that market concentration alone doesn't stack up even theoretically (let alone empirically) as a major determinant of innovation.

In short, framing competition issues in terms of monopoly vs. competition appears to have been unhelpful, at minimum inconclusive. Rivalry matters, but market concentration doesn't necessarily determine rivalry.

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<sup>1</sup> To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, Report of the FTC, October 2003.

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In briefly reviewing the theory, one can note that some industrial organization theories suggest that innovation is bound to decline with increasing competition, since the monopoly rents for new entrants will decline with increasing competition (Dasgupta and Stiglitz, 1980; Kamien and Schwartz, 1982).

Other studies, following Arrow (1962) hypothesize a positive relationship between competition and innovation. But Arrow sets aside the appropriability problem (i.e. how to capture value from innovation) and posited a perfect property right in the information underlying a specific production technique.

One can perhaps interpret Arrow's property right as a clearly specified and costlessly enforceable patent of infinite duration. The principal focus of Arrow is on how the (pre-invention) structure of the output market affects the gain from invention. Competition wins out because competitive output is larger than with monopoly. Hence, a given amount of unit costs reduction is more valuable if the market is initially competitive. Protected by a perfect patent, the inventor simply licenses the invention at a whisker below the cost saving that the invention makes possible. Put differently, competition will win out and advance innovation when the business environment is characterized by what I call elsewhere a strong appropriability regime (Teece, 1986).

Absent strong appropriability, the presumption that (perfect) competition is superior to alternative arrangements cannot be built on Arrow (1962). In fact, it is important to note that despite how Arrow's paper is usually interpreted (to claim that competition spurs innovation), Arrow's general position in his writings is, much like Schumpeter, that competitive markets provided inadequate incentives to innovate.

As Sidney Winter points out, Arrow's analysis also sidesteps business model choices (Winter, 2006). The producer and the inventor are one in the same.

Of course, one must also recognize that business (model) innovation is important to economic welfare, along with technological innovation. But the economics literature

(theoretical or empirical) does not seem to address whether market structure is important to this type of innovation.

Empirical evidence is equally murky. Cohen and Levin (1989) review the literature and conclude that there isn't a strong linkage between market concentration and innovation. The endogeneity of market structure is perhaps one reason why a robust statistical relationship between concentration and innovation is yet to be found. Nor is there any significant relationship between market concentration and profitability. As Joskow (1975) notes "we have spent too much time calculating too many kinds of concentration ratios and running too many regressions of these against profit figures of questionable validity" (p. 278).

### **III. Static and Dynamic Competition**

As discussed earlier, there is a third (usually overlooked) but very important proposition embedded in Schumpeter: dynamic competition should be favored over its poorer cousin, static competition. I will describe both static and dynamic competition in turn. In doing so, I recognize that these styles of competition sometimes do not have bright lines separating them. Certainly, Schumpeter didn't provide crisp delineation.

In this paper I try to give some substance to Schumpeter's intuition. Unfortunately, static competition is frequently favored unwittingly by antitrust economists. Dynamic competition is a style of competition which relies on innovation to bring forth new products and processes and concomitant price reductions. It improves both productivity and consumer welfare. Promoting it may well mean recognizing that competitive conduct may involve holding short run price competition in abeyance<sup>2</sup>.

Dynamic competition is not embraced as widely as it needs to be in part because the overwhelming focus in economic research is (implicitly) inside the paradigm of static competition. Indeed, a major contribution can come from simply revealing to judges,

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<sup>2</sup> The argument against generic drugs may be of this kind.

juries, the enforcement agencies, and legislators that most economic analysis is static, when it should be dynamic, and as a consequence innovation may well get harmed by superficial answers derived from implicitly held static notions about desirable forms of competition. This bias stems merely from the analytical tools used, as most every economist recognizes the importance of innovation, then usually proceeds to apply analytical approaches that ignore it. Recognizing this state of affairs should deflate the hubris with which many antitrust scholars approach issues. To the extent they wield analytical tools of static competitive analysis, antitrust analysts are quite likely to make prescriptions which harm both innovation and competition, and sap productivity.

In order to come up with prescriptions that do more good than harm, it is necessary to inquire about the determinants of innovation, and the impact of antitrust activity on innovation. Dynamic competition is advanced by rapid technological change. And this is where the problem starts. The analytical framework most commonly used by economists stubbornly adheres to the view that market structure and little else determines the rate of technological change. This framework is grossly inadequate.

For instance, in merger analysis, as in many other forms of antitrust analysis, one is required to define a market and look at market shares. If a merger augments concentration above an accepted threshold, it may be blocked. Merger analysis usually proceeds this way, even though there are a growing number of economists who are beginning to think otherwise, particularly in differentiated product contexts<sup>3</sup>.

More often than not, however, avid antitrust economists (perhaps inadvertently), adopt the mantle of static competition. Because of its familiarity, they (unwittingly and inappropriately) use the apparatus of static microeconomics to analyze contexts where innovation is important. Innovation is at best an afterthought in static microtheory. The presence of innovation complicates the analysis, destroys equilibrium, and debases the value and utilities of the tool bags that most economists carry. This is unsettling, and

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<sup>3</sup> In these contexts, that emerging consensus seems to be that what matters are the particular firms one is dealing with.

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tends to be resisted by the profession. Thus, dynamic analysis is shunned either because it isn't known, or if known it is feared that recognizing it will be too hostile to well accepted and well practiced analytical frameworks. Competition policy advocates should not accept this state of affairs any longer.

To preview what is to follow, this paper recognizes that dynamic competition is associated with the change in external circumstances and/or the generation of new products, new processes, and new business models. As Schumpeter said, competition fueled by the introduction of new products and processes is the more powerful form of competition: “competition from the new commodity, the new technology, the new source of supply, the new type of organization - - - competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the output of existing firms, but at their foundations and their very lives” (Schumpeter, 1942, p. 8).

In today's vernacular, dynamic competition is heavy-weight competition; static competition is the “lite” version. Advocates of strong competition policy must surely favor the former. Static competition is anemic compared to dynamic competition. More on this below.

### *a. Static Competition*

Static competition reflects an intellectual framework, generally not a state of the world. Absent innovation, (static) competition manifests itself in the form of existing products offered at low prices. No new products are introduced, and rapid price reductions driven by innovation simply don't exist. There's no hurly burly competition. Without innovation, all firms have the same technology and the same business models. Markets are in a comfortable equilibrium. Nobody makes any money of course, but nor do they innovate. Price gets squeezed down to marginal cost.

Agents are nevertheless rational and well informed. Prices are drawn down to the floor of long run marginal cost; but that floor becomes their resting place. Firms just make

their cost of capital and cover long run marginal costs, and consumers are bereft of new products and true bargains. They never get overcharged, but there's nothing to charge them up.

While the framework has a simple theoretical simplicity and elegance, the industrial dynamics behind it are uninteresting. Absent innovation, there is unlikely to be much or any new entry - - if incumbents can satisfy demand, new entrants aren't needed. Absent scale economies, no firm is likely to become dominant, and the ecology of firms is unchanging.

The static economics paradigm is what infuses, at least the undergraduate economics textbooks. It is not a recognizable state of the world, except perhaps in a few local markets somehow insulated from competition. Unfortunately, it is what tends to spill over into antitrust economics as a normative paradigm. However, it is not and has never been a good abstraction of the economy. Nor has it ever been a state to which we should aspire.

### ***b. Dynamic Competition***

Dynamic competition is driven by innovation, but not exclusively. The term dynamic is a short hand for a variety of rigorously competitive activities such as significant product differentiation and rapid response to change, whether from innovation or simply new market opportunities ensuing from changes in "taste" or other forces of disequilibrium. Dynamic competition is in fact more intuitive and much closer to today's everyday language view of competition than is the (textbook) notion of static competition.

Dynamic competition is of course embedded in the Austrian economics framework of Carl Menger and his fellows (e.g. Kirzner). The Austrian treatment is quite different from neoclassical economics. The focus of the latter is on a static equilibrium in which there are a minimum number of known exogenous variables. Austrian economics does not purport to compute any equilibrium, because the essence of competition is taken to be

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the dynamic pattern by which it comes about, not the equilibrium itself. The truth is, Hayek argued, that “competition is by its nature a dynamic process whose essential characteristics are assumed away by the assumptions underlying static analysis” (Hayek, 1948, p. 94). The wishes and desires of consumers cannot be regarded as given information to producers but ought to be regarded as problems to be solved by the process of competition.

With dynamic competition, new entrants and incumbents alike engage in new product and process development and other adjustments to change. Frequent new product introductions followed by rapid price declines are commonplace. New innovations stem from investment in R&D, and/or the improvement and combination of older technologies. There are continuous introductions of product innovations, and from time to time dominant designs emerge. With innovation, there are explosions in the number of new entrants; but once dominant designs emerge implosions are likely and markets become more concentrated. As with dynamic competition, innovation and competition are tightly linked.

The model of dynamic competition recognizes that competition is a process, and that entrepreneurs and entrepreneurial managers are essential to it. Stagnation is defeated by perennial gales of competition. Maintaining innovation depends upon the existence of entrepreneurs and institutional structures that support innovation.

Technological innovation comes in waves, based on different technologies. These waves cause what Schumpeter called “creative destruction” (Schumpeter, 1942, p. 83). A large fraction of new (radical) technologies are introduced by enterprises new to an industry; however, incumbents do sometimes pioneer, and if not are often able to imitate or improve on the new entrants products. The benefits of creative destruction may not come immediately; changes takes time. Innovation drives competition, and competition is in turn driven by innovation.

This paradigm of industrial change has been refined by Abernathy and Utterback (1978) and given some theoretical motivation by Burton Klein (1977). There is now considerable evidence supporting it over a wide range of technologies (Klepper and Grady, 1990; Utterback and Suarez, 1993; Malerba and Orsenigo, 1996). It implicitly recognizes inflexion points in technological and market evolution. The advent of new technological ensembles or paradigms is usually marked by a wave of new competitors entering an industry to sustain success. Incumbents must master discontinuities as well as incremental change and improvement.

There are many other complementary “models” of innovation. At their core, most can be related to an evolutionary theory of economic change and a behavioral theory of the firm. As Sydney Winter once said, the methodological imperative of evolutionary theories is “dynamics first”; the methodological imperative of behavioral theory is that internal firm structure (not market structure) and internal processes such as learning, diffusion, sensing, seizing, reconfiguring impact firm behavior.

Evolutionary theory in economics is sometimes understood to be economic Darwinism; but the logical structure of an evolutionary theory is much broader than its biological versions. Evolutionary theory draws attention to what went before. As a general principle, novelty comes about by changing and combining existing artifacts and structure. “Descent with modification” crystallizes this key point<sup>4</sup>. Selection leaves behind variants that are unfit according to the selection criterion at work.

Selection processes include not only birth and deaths of individual firms (Hannan and Freeman, 1989), but also the ability to adapt to the changing environment by changing strategies and structures (Teece, 2007; Augier and Teece, 2008). Scholars disagree on the amount of adaptation that is possible. Some evolutionary economists see firms as strongly constrained; strategic management scholars claim much greater capacity for

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<sup>4</sup> Durham (1991, p. 22) sets out five requirements for an economic theory of change: units of transmission (e.g. ideas, values); sources of variation (e.g. invention); mechanisms of transmission; processes of transformation; sources of isolation.

change effectuated by managers. All recognize that the advance of change in the context of changing markets and technologies will lead to diminished prospects for the enterprise.

Another common thread to behavioral/evolutionary mechanisms is that they are probabilistic rather than determinative (Aldrich, 1999, pp. 33-50). Rigorous evolutionary theories will make probabilistic statements like “there is a Z probability that individual Y will not replicate (die when the entity has a limited life span) under the selection environment X” (Murmman, 2003, p. 15).

Because business enterprises are guided by routines that interact in highly complex ways, managers more often than not find it difficult to figure out what makes the enterprise successful. This ambiguity around causation becomes a problem when the environment changes, as causal ambiguity makes it difficult to figure out what the enterprise should do differently. When Japanese auto manufacturers started to take large share away from the U.S. manufacturers in the 1980s, a string of explanations were put up by the U.S. auto industry to explain the phenomenon, including a view that the cost of capital was lower in Japan, that unfair trade barriers in Japan prevented exports from the U.S., to concerns that the U.S. firms were falling behind in the use of robotics etc. It took nearly two decades for the U.S. auto industry to figure out for itself that labor-management issues, and management itself, were key causal factors associated with decline.

Once causation was more accurately diagnosed, management and organizational changes were made that began to make a difference. As explained in Teece (2007), often it is necessary to create breakout structure to unshackle the new from the old.

There are a number of assumptions and propositions that characterize dynamic competition. Many of them are rooted in an evolutionary theory of economic change. As Schumpeter said, “in dealing with capitalism, you are dealing with an evolutionary process”. Features of evolutionary theory are outlined in the next section.

#### **IV. Relevant Aspects of Evolutionary/Behavioral Economics**

Evolutionary economics and the behavioral theory of the firm are separate but related frameworks. Both have been in existence for half a century or more. Both embrace firms and markets as we see them. Both recognize a capability to discover new technologies and business models in the economic system. Entrepreneurial activity by individuals and enterprises is critical to this capability.

Some endogenous generation of innovative opportunities is likely. Evolutionary theories recognize some process of imperfect (mistake-ridden) learning and discovery on the one hand, and selection on the other. Whereas neoclassical theory can recognize bad outcomes due to bad luck and uncertainty, evolutionary theory accepts the systematic mistakes associated with ignorance or wrong headed understanding. Clearly, the canons of rational choice theory and equilibrium economics provide only a very limited basis for the study of innovation.

Neoclassical theory almost completely neglects the specificities of competencies and skills that each firm possesses. The relatively tacit and organizational capabilities which cannot be imputed to individuals are especially neglected. This neglect impedes any satisfactory analysis of the innovative capabilities of firms.

Bounded rationality is assumed as agents have an imperfect understanding of the environment they live in, and what the future will deliver. Because of limits to rationality, enterprise behavior is often rule guided/based. There are relatively invariant routines shaped by the learning history of the enterprise.

Adaptation and learning generate variety. Managerial action inside firms (at headquarters)<sup>5</sup> and market and factor market competition between firms act as selection mechanisms, leading to the disappearance of some firms and the rapid growth of others.

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<sup>5</sup> Managers act as the proximate agent of selection when they pull resources from underperforming units and reallocate them to growing units.

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Knowledge of specific technologies determines how technology is going to advance. Technological paradigms shape the direction of future change. There is no innovation possibility frontier.

Technologies develop along relatively ordered paths (or trajectories) shaped by specific technical properties, search rules, technical “imperatives”, and cumulative expertise. As a consequence, diversity between firms is a fundamental and permanent characteristic of environments undergoing technical change.

Firms differ because of different technological capabilities with respect to innovation, differing degrees of success in adapting technologies developed externally, and different cost structures. They may also differ because of differing search/sensory procedures and capabilities, and differing strategies (behaviors).

One should expect path dependencies when there are increasing returns of some kind. This will be especially true for (a) information goods and (b) cumulative technological advances. How strong path dependencies are is mainly an empirical question.

Market concentration is a function of two opposing forces: (a) selection mechanisms which tend to increase the standing of innovating firms, while (b) learning and imitation mechanisms spread innovations/new knowledge throughout the potential adapters, thereby reinforcing existing disparities via cumulative mechanisms internal to the firm.

Abilities to innovate and imitate are firm specific and depend on a firm’s past innovative record - - - learning is cumulative. Chance matters, but chance favors those firms which are prepared.

Although some of the economic benefits from innovation and the adaptation of new products and processes can be appropriated by the innovators themselves (Teece, 1986), there are learning externalities. The ease of imitation depends on the intellectual property regime (strong or weak) with the nature of the relevant knowledge (codified or tacit).

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Skills and know-how almost always leak out from individual generators/first adapters to the whole industry.

Innovation in products and processes is nevertheless to a fair degree endogenous via in house R&D, technological acquisition (e.g. in licensing) as well as by learning mechanisms.

There is considerable dispersion in costs and profitability and growth rates inside an industry. Asymmetries in capabilities are a direct consequence of the cumulative, idiosyncratic, and appropriable nature of technological advances. The more cumulative are technological advances at the firm level, the higher the likelihood of success breeding success.

Moreover, the higher the opportunity for technological progress, the higher the possibility of differentials between innovators and laggards. High technological opportunity associated with a high degree of appropriability provides incentives to innovate for a firm on or near the frontier; but possibly low incentives for firms with relatively lower technological capability.

“Normal” technical progress proceeds along trajectories defined by an established paradigm and extraordinary technical advance associated with the emergence of new paradigms. As shown by others (Dosi, 1984) market processes are generally weak in directing the emergence and selection of radical technological discontinuities. Put differently, when the process of innovation is highly exploratory, its direct response to economic signals is weaker and its linkage with scientific knowledge is greater. Institutional and scientific contexts are more important than the market.

Institutions and markets coevolve. Industrial, technological, and institutional factors interact. In particular, research and training bodies and the Intellectual Property system helps shape industrial outcomes. The competitive strengths of individual enterprises as well as the industry depend on such factors. For instance, according to Murmann,

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German firm's achieved global superiority in dyestuffs by 1914 not because they had superior strategies and organization, but because there were a large number of new entrants, and a large number of exits, giving the German dye industry more room to experiment with different firm strategies and structures. By 1900 the leading dye firms had all developed in house R&D capabilities and could match new product introductions by competitors in the U.K. and the U.S., as well as in Germany. The German firms also patented heavily in the U.K., and their innovative efforts at home were built upon an extremely strong university system in chemistry. "Germany had it easier than Britain in bringing forth competitive firms" (Murmann, 2003, p. 51). The British government also imposed higher tariffs on industrial alcohol, and important input in dye making. Strong organizational capabilities in R&D, manufacturing, marketing, management, and strong patent portfolios, allowed the German dye industry to capture 70 – 90% of world market share (Murmann, 2003, p. 92). Strength in both the supplier industry and in supporting institutions aids innovation. The German firms actively shaped their selection environment - - - particularly education and training, tariffs, and patents. German firms not only benefited from governmentally supported education and training; they helped upgrade them.

Indicators of dynamic competition include heterogeneous firms engaging in experimentation and innovation. New products and processes are developed and introduced, and internal processes are reworked and adjusted. Firms constantly battle unanticipated events. Rivalrous behavior is the norm.

An evolutionary approach underscores the importance of maintaining variety in the economic system. Competition policy authorities as well as other agencies must be concerned with protecting economic diversity and meaningful variety in organizational forms. The focus need not be a particular market - - - it should be broader as what's outside the market tends to be amongst the best candidates for Schumpeterian entry and radical innovation.

These propositions, derived namely from behavioral and evolutionary theories of firms and markets, promise to expand our understanding of firm behavior particularly in domains of rapid innovation. Following Joskow (1975, p. 278). I would like to believe that the field of industrial organization to which antitrust economics owes so much, can “play an important leadership role in the extension and revision of the conventional theory of the firm rather than be its prisoner”.

## **V. Implications**

### **a. General**

Static and dynamic competition have elements in common. Current law embraces both<sup>6</sup>, although in my view when it relies on economic theory to inform it, the law gets a larger injection of static analysis than dynamic analysis. But dynamic analysis has always been embraced to some degree by the law.

Traditional static analysis focuses on detecting market power in product markets. Dynamic analysis views competition through a broader lens and focuses less on outcomes and more on process. It favors maintaining rivalry but it also protects property. The working assumption is that intellectual property rights are desirable institutional/legal arrangements providing necessary appropriability mechanisms to promote and reward innovation.

The framework also recognizes that the benefits of dynamic competition do not arrive immediately; some short run static inefficiencies may have to be tolerated to support innovation. Wooden policies blind to innovation and fixated on short run efficiencies and likely to hurt innovation, and thereby hurt competition.

If policy is to favor dynamic over static competition, a role for vigorous antitrust enforcement still remains, but it proceeds less self confidently. Uncertainty and

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<sup>6</sup> As noted by Katz and Shelanski, Judge Learned Hand wrote as early as 1916 that “the consumers interest in the long run is quite different from an immediate fall in prices” and spoke of competition as a proper stimulus to maintain “industrial advance” (Katz and Shelanski, 2007, p. 48).

complexity are hallmarks of dynamic market environments. In particular, the tools of static analysis should be used sparingly, if at all. Simple rules based on static analysis may well stand in the way of competition. In particular, concentration analysis should be deemphasized, as Ordover indicates (perhaps for different reasons). To prohibit mergers merely to manage concentration is unlikely to help consumers.

More generally, the presumption that more competitors is always better is overturned - - - once the goal is not just lowering price but also protecting innovation.

Barriers to entry may need to be examined over a longer time period and must be examined at the firm level<sup>7</sup>. The role of supporting structures and government funding for research also affect entry conditions. They may purely reflect capabilities that incumbents have developed that newcomers shouldn't expect to possess. Capabilities are likely to reflect the search for unique advantages. Their possession drives competition.

In stark contrast to the basic assumption of the Structure-Conduct-Performance paradigm, in dynamic contexts conduct in this framework is not a function of market structure. Market conduct is driven more by internal organizational factors: standard operating procedures; investment routines, and improvement routines. Performance depends on the (relative) organizational capabilities and behavioral traits of the enterprise. Enhanced industrial performance also stems from the improvement in individual technologies, and the expansion in the use of more productive technologies.

As discussed above, some typical evolutionary patterns to industry dynamics can be observed - - - perhaps one can call it an industry life cycle. In the early stages of the evolution of an industry, firms tend to be small, and entry relatively easy, because of the diversity of technologies being employed. However, as the dominant design emerges, costs of entry rise as an established scale for competition activity becomes apparent.

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<sup>7</sup> The firm level analog is what is referred to in the strategy literature as “isolating mechanisms”.

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Learning becomes cumulative, and established firms are somewhat advantaged over the new entrants. After an industry shakeout, established firms settle into a more stable industry structure. This may sooner or later be overturned by a new technology that has the promise of being superior. Under normal circumstances, with entry and exit, the life of firms tends to be short (Geroski and Schwalbach, 1991; Geroski, 1995).

New technologies can be competency enhancing or competency destroying. The essence of the dynamic competition approach is that technological change itself shapes industry structure. Also path dependencies and dynamic increasing returns are likely to be present in many circumstances.

Put differently, the rate and direction of innovation at the level of the firm does not depend on market structure but on the competences of the firm, the internal and external knowledge the firm can draw on, the IP regime, and its complementary assets. Entry conditions are a function of appropriability and cumulateness. Learning and innovation will also shape the boundaries of the firm.

Market concentration is likely to be an outcome of market selection, which in turn depends on the uneven exploitation of learning opportunities; i.e. concentration has little to do with market power.

“Moreover, if the degrees of selection are interpreted as a proxy for how well markets work - - - in the sense that they quickly reward winners and weed out losers - - - then more efficient markets tend to yield, in evolutionary environments, more concentrated market structures, rather than more ‘perfect’ ones in the standard sense”<sup>8</sup>.

The possibility of innovation rests on the permanent existence of unexploited technological opportunities. A growing body of evidence from the microeconomics of innovation (Rosenberg, 1976, 1982; Freeman, 1982; Dosi, 1988) supports the notion that

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<sup>8</sup> Dosi et al. “Learning, Market Selection and the Evolution of Industrial Structures”, Small Business Economics, p.411-436, 1995.

unexploited opportunities permanently exist and that what firms actually explore is a small subset of what's available. Accordingly, firms aren't constrained by nature, but by their own capabilities - - - there is therefore almost always opportunities to be sensed and seized.

**b. Market Definition**

Market definition issues typically play a central role in antitrust analysis, especially as it relates to Sherman Section II and Clayton Act issues. Defining the boundaries of one or more markets is the first step under the Merger Guidelines.

Economists recognize that market definition is merely an analytical tool. As Janusz Ordover put it "Arguments for and against a merger that turn upon distinctions between broad and narrow markets definitions are, to an economic purist, an inadequate substitute for, and a diversion from, sound direct assessment of a merger's effect".

While Ordover is undoubtedly correct, in practice the courts and agencies seem to require market definition.

An evolutionary/dynamic competition perspective would appear to support Ordover's position, as market share/concentration is unlikely to have much power in explaining conduct decisions, including those surrounding pricing. There is no general theorem establishing that higher concentration leads to higher prices or less output. There may be some theoretical support in static models to show that equilibrium output falls and equilibrium prices rise as the number of firms decline.

There is a modicum of empirical work in some markets like telecom and airlines to support the S-C-P paradigm. But the evidence supporting it is weak, and when innovation is significant, theoretical connections and empirical correlations become even weaker.

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Fortunately, the Merger Guidelines are clear that at least in the merger context, market share is only a starting point - - - market definition is merely a tool. But it may not be even a good starting point or a good tool when the industry is characterized by rapid technological change. As discussed earlier, high market share may simply indicate that selection/competition processes are working well.

Also, as Katz and Shelanski note, in practice the hypothetical monopolist test is hard to apply in the context of innovation. Hartman et. al. (1993) note that when innovation is present, products are likely differentiated in quality, and price isn't the main or only competitive weapon. Furthermore, we note that innovation can make it difficult to define relevant product markets because business executives and government officials alike may not yet know what the future products will be.

The hypothetical monopolist test to establish relevant markets may be better suited for quasi commodity products than for high tech companies. With innovation, value disparities are likely to exist amongst substitute products. In the context of the earlier discussion, before the emergence of the dominant design, competition takes place on features, not price. Hence, the hypothetical monopolist test might not be applicable before the emergence of a dominant design. In the case of autos, an application of the test circa 1910 may have put steam cars, electric cars, internal combustion engine cars in separate markets, despite the fact that competition amongst these technologies was already fierce, and over the next few years led to the obliteration of producers who were not able to transition to the design and production of internal combustion engine autos.

More importantly, if one is to adopt a future looking posture, then neither the agencies nor the courts are likely to know which products are likely to be good substitutes in the future. Since innovation produces new product and lowers the cost of existing products, it is necessary to include in the market such future products; but this is quite difficult to do in many instances.

**c. Market Share and Actual vs. Potential Competitors**

In traditional analysis, a market is first defined, and then actual competitors within it are identified and allocated a market share. In conventional analysis, actual but not potential competitors are included in the market. Potential competitors are recognized only when certain conditions of probability and immediacy of entry are met.

In dynamic contexts, potential competitors can be of very considerable importance. As discussed, what today may be thought of as a potential competitor can obliterate incumbents tomorrow in acts of Schumpeterian creative destruction. To exclude such competitors from the boundaries of the market would clearly be a mistake.

As discussed earlier, what is required is an assessment of capabilities. These are difficult to quantify; but a very large literature now exists in the field of strategic management (Teece, Pisano, and Shuen, 1997; Teece, 2007). This provides many clues with respect to how to assess the capabilities of both actual and potential competitors.

Furthermore, snap shots on market shares, whether present or forward looking, won't tell you much if markets are in turmoil, as they frequently are in dynamic contexts. Moreover, high market share by no means suggests market power. Not only are today's market shares a poor indicator of the future, but as already noted a high market share may indicate not just superior performance, but strong selection (competition) at work in the industry<sup>9</sup>.

Accordingly, in both merger analysis and in section II cases, when dynamic competition is at work, one must look beyond market share data. Serious consideration of potential

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<sup>9</sup> Katz and Shelanski (2007) "Even absent innovation, there are reasons to be cautious about the interpretation of market share data. In order to generate sensible predictions of the effects of a merger, the measurement and analysis of market shares should always be tied to a coherent theory of competitive effects that fits the facts of the industry under consideration. Put another way, the analysis of market shares can most confidently be used to predict adverse competitive effects of a merger when one has an empirically supported theory that market shares are informative of competitive conditions and that an increase in concentration will harm competition and consumers".

competitors is required. After all, studies show that new entrants almost always drive innovation in established industries.

A focus on potential competition will help ensure that market analysis is forward thinking. Market share is likely to be irrelevant in regimes of rapid change, competition for the market is likely to be as significant as competition within it (Teece and Coleman, 1998; Pleatsikas and Teece, 2001).

Katz and Shelanski likewise note that market share may be altogether irrelevant in some cases because there may be markets in which innovation is so characteristic and sustained that firms compete not just for market share, but for markets as a whole. A firm's monopoly today may say little about the firm prospects one, two, and five years down the road (Katz and Shelanski, 2007).

One should note that there have already been efforts to come up with new analytic approaches to market definition in recognition of the fact that defining the market at the level of the product is difficult when successful future products cannot be predicted with any degree of certainty. I refer to Gilbert and Sunshine's proposal for innovation markets (Gilbert & Sunshine, 1995). They put potential competition to one side, and focused instead on what they call "innovation markets", by which they seem to mean R&D markets. Although this concept was used in *U.S. vs. G.M.*, the concept seems to have been forgotten.

Despite its shortcomings, the innovation market approach did shift the attention away from product markets to activity upstream. This required antitrust authorities to determine what skills and assets are needed to innovate, and determine who possesses those skills. This can be a fundamentally different inquiry from examining demand side substitution, which is now quite familiar to economists and many courts. The innovation market approach might have been pushed to its logical conclusion, which is the analysis of capabilities, which we now discuss.

**d. Analyzing Capabilities to Assess Competitor Positions and Economic Power**

As was noted by Edith Penrose (1959), an enterprise should be defined not by its current products, but by its (upstream) “resources”, or what some prefer to call capabilities.

Penrose defined the internal resources of the firm as “the productive services available to a firm from its own resources”, particularly those from management experience. “A firm is more than an administrative unit; it is a collection of productive resources” (p. 149 – 150). She saw that “many of the productive services created through an increase in knowledge that occurs as a result of experience gained in the operation of the firm as time passes will remain unused if the firm fails to expand” (p. 54). Penrose saw the capabilities of management – not exhaustion of technologically based economies of scale - - - as determining whether a firm could expand to take advantage of opportunities. In reality of course, the resources/capabilities of the firm are defined by other assets too - - - like innovation capabilities - - - but it is important to note that Penrose laid out a model which implicitly eschewed market shares as a measure of how a firm is “positioned” to compete.

Subsequent research has established that firms exhibit more stability in their capabilities than in their products. In this sense, capabilities are easier to analyze than products. Capabilities are a proxy for those interrelated and interdependent aspects of the enterprise that govern its competitive significance. They are arguably a better proxy for competitive position than (downstream) market share.

Strategy refers to the broad set of commitments made by the firm that define and rationalize its objectives and how it intends to pursue them. Some of this may be explicit, and some implicit in its culture and values. Strategy is often more a matter of faith and determination, not one of calculation. Structure refers to how a firm is organized and governed and how decisions are made and implemented. Strategy and structure shape capabilities; but what an organization can do well is likely to be partly function of what it

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has done in the past. However, its R&D activities and success at acquiring external technologies can mold its going forward capabilities. Strategy helps determine what capabilities one should own and protect.

The world is too complicated for a firm to have “an optimal strategy”, and while its capabilities are always in a state of flux, existing capabilities are a good guide to what a company can do in the future.

The capabilities approach would be quite a break from standard analysis. It would calibrate a firm's competitive standing not by reference to products but by reference to more enduring traits.

In a dynamic context a firm will have a changing kaleidoscope of products - - - yet its underlying capabilities are likely to be more stable. For instance, rather than analyzing Honda's market share in outboard motors, lawnmowers, and small electric generators, perhaps a more meaningful approach for antitrust analysis would be to look at a capability “market”. Here the relevant capability might be around small four stroke internal combustion engines. A capabilities approach may lead to “markets” defined narrower or broader than product markets.

The tools for assessing capabilities may not be well developed yet, but they are developed enough to allow tentative application. Clearly, product market analysis can be unhelpful and misleading in dynamic contexts. Using the right concepts imperfectly is better than a precise application of the wrong ones.

The question arises as to whether simply doing a better job on analyzing potential competition would help. Clearly it might. In the end, however, one would be forced to look at the capabilities of potential competitors - - - so there is probably no escape from developing the analytics of a capabilities approach.

The innovation market approach introduced by Gilbert and Sunshine (1995) implicitly recognize that focusing on product market analysis is inadequate. But it too narrowly focuses on R&D as the arena for measuring innovation competition. Even if it is defined quite broadly, R&D is usually just one element of the resources and problem solving that goes into innovation. The resources that must be committed - - - and the skills that must be employed - - - to succeed at innovation are usually much greater than that needed for just R&D. Furthermore, R&D concentration has little to do with innovation outcomes, except possibly in industries characterized by cumulative technological change - - - and even here, the linkage can be expected to be weak. The widespread adoption of elements of an open innovation<sup>10</sup> model - - - whereby elements of the innovation process are outsourced - - - makes this point even more compelling.

**e. Merger Analysis**

Despite the misgivings of an increasing number of economic scholars, in practice merger policy in the U.S., the European Union, and most other jurisdictions where there are competition law focuses on how the merging party's combinations will effect concentration in one or more product markets. In effect, an increase in concentration is taken as a proxy for a decrease in competition that if of sufficient size will lead to an increase in the prices faced by consumers.

Focus on dynamic competition is likely to be especially relevant in high technology industries. The evolutionary/behavioral economics approaches outlined here are not ones that lead to the abandonment of antitrust, or even necessarily to its restriction. But it does lead to a more careful approach that recognizes uncertainty and complexity and relentlessly asks: does this practice support/discourage innovation? Will this merger assist or burden dynamic competition?

The evolutionary/behavioral economics framework which we advance suggests a number of modifications in the way that some analysts may view a particular merger:

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<sup>10</sup> See Chesbrough et. al., 2006.

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1. Market structure is not a meaningful concern, at least not until a dominant design has emerged, and the evolutionary paradigm is established and likely to remain for quite some time.
2. If the analysis is to be deflected away from products in the market, the natural place to look is at capabilities. These transcend products.
3. Only if the merger entities are the only ones with the necessary capabilities to innovate in a broad area should concerns arise. Katz and Shelanski suggest that if new product development efforts are underway to create or improve products and processes, and these products are not yet in the market, then harm arises from a merger because it may cripple future product market competition in a market that does not exist. A capabilities approach would soften such concerns - - - the question should be framed not in terms of whether product market competition will be impaired - - - as that is too much of an immediate concern - - - but whether capabilities will be brought under unitary control, thereby possibly thwarting future variety in new product development.

### **f. Intellectual Property Issues**

Favoring dynamic (over static) competition does double duty. It also softens the patent-antitrust debate. Static analysis looks upon patents with considerable awkwardness - - - and fuels tension between the patent system and antitrust.

The DOJ-FTC intellectual property guidelines have endeavored to reconcile the tension between intellectual property and antitrust, by declaring intellectual property just another form of property, and by noting that patents only imply market or monopoly power if they enable control of a relevant market, which is rarely the case. Still, justifying the exclusivity provided by the patent system is not easy for many competition policy advocates. In practice, neoclassical economists are often hostile to patents, believing that

the appropriability problem is naturally solved by other mechanisms, which is often not the case.

Embracing dynamic competition causes tension between intellectual property and antitrust paradox to soften. The patent system provides some amount of exclusion; and some amount of exclusion is required to foster innovation, particularly in more competitive market environments.

Of course, once antitrust doctrine sees the promotion of innovation as its major goal, innovation and competition snap into greater harmony. But the harmony isn't perfect, as questions remain with respect to the degree of intellectual property protection needed to foster innovation and competition. The cumulative/sequential nature of innovation means that intellectual property protection needs to be calibrated in a careful manner. There will almost always be more users of intellectual property than generators of it; so the danger particularly is that the users will try to crimp the scope of intellectual property rights provided to the generators.

## **VI. Conclusion**

Antitrust scholars must confront an inconvenient truth: innovation drives competition as much as competition drives innovation. This requires that antitrust analysis recognize that advancing dynamic (non static) competition will benefit consumers most, certainly in the long run if not in the short run. The law has already begun to move in this direction, as have the agencies. The pace is glacial, however, in part because antitrust economics has trouble grappling with dynamic concepts. The Chicago school in large measure inadvertently (by embracing static micro theory) ignored it; the post Chicago economics have been almost as reluctant because their tools are inadequate too. Fortunately, a large body of research in evolutionary economics, the behavioral theory of the firm, and corporate strategy has emerged which can be exploited to hasten the transition towards an enlightened approach to antitrust which has a better change of minimizing the unintended negative consequences of (static) antitrust analysis. If nothing else, the recognition of

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dynamic issues will temper the hubris which the uninformed sometimes bring to antitrust analysis.

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