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Understanding Dynamic Competition

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UNDERSTANDING DYNAMIC COMPETITION: NEW PERSPECTIVES ON POTENTIAL COMPETITION, "MONOPOLY," AND MARKET POWER

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1. INTRODUCTION

This paper is an effort to further advance what has come to be known as the dynamic competition paradigm, which prioritizes innovation over efficiency and favors the dynamic over the static and the future over the present.[2] Moreover, it recognizes that, with digitization (what some call the

[2] This paper draws in part and builds upon the author's earlier work including David J. Teece, "The Dynamic Competition Paradigm: Insights and Implication," *Columbia Business Law Review* (2023); Nicholas Petit and David J.Teece, "Innovating Big Tech firms and competition policy: favoring dynamic over static competition," Industrial and Corporate Change (2021); and David Teece and Mary Coleman, "The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries," *The Antitrust*

4th industrial revolution), the nature of innovation itself has changed, and along with it the nature of competition. To better understand the evolving nature of competition, enforcement agencies, courts, and the legislature must develop and apply new economic models of innovation and competition. As Richard Posner has observed, "Antitrust doctrine has changed more or less in tandem with changes in economic theory, albeit with a lag."[3] The purpose of this paper is to outline a dynamic competition economic theory / paradigm that I have been endeavoring to launch for 30 years, which I call dynamic competition. As will become evident, there isn't yet universal agreement on what this framework entails and how to apply it. I will elaborate on a framework which I claim is a coherent framework… one that is not selectively appealed to when it suits the enforcement agencies or analysts wishing to find a new way to support old shibboliths.

It is well recognized, and appropriately so, that competition is a key enabler of a thriving private enterprise economy. It can arise from firms engaging in cost-saving and cost cutting-activities, enabling them to deliver lower prices to consumers. More importantly, it can stem from innovation and entrepreneurship, resulting in new and better products and services that delight customers and save them money. Both big and small companies can drive this second type of competition, known as dynamic competition, in contrast to static competition, which is efficiency-enabled. Static competition does not rely on creativity and innovation and can only dribble out small price reductions. Both types of competition matter; but dynamic competition is the more powerful, more exciting, and the more important, as it brings about dramatically different and/or improved products and services that customers enjoy and that nations also require for economic growth and national security. It also brings significant productivity improvements, while supporting higher wages and social mobility.

Notwithstanding the rather obvious superiority of dynamic over static competition, competition authorities in many countries have nevertheless

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Bulletin 43:3/4 (Fall–Winter 1998), 801–. "Competing Through Innovation: Implications for Market Definition" (with Thomas Jorde), *Chicago-Kent law Review* 64:3, Symposium on Antitrust Law and the Internationalization of Markets (1989), 741-744; "The Analysis of Market Definition and Market Power in the Context of Rapid Innovation" (with Christopher Pleatsikas), *International Journal of Industrial Organization* 19:5 (April 2001), 665-693; "Dynamic Competition in Antitrust Law" (with J. Gregory Sidak), *Journal of Competition Law and Economics* 5:4 (December 2009), 581-631; "Innovation, Dynamic Competition, and Antitrust Policy" (with Thomas Jorde) *Regulation* 13:3 (Fall 1990), 35-44; "Antitrust, Innovation, and Competitiveness", Thomas M. Jorde and David J. Teece (eds.), Oxford: Oxford University Press (1992).

[3] See Richard A. Posner, "Antitrust and the New Economy," *Antitrust Law Journal*, 68 (2001): 925-944.

favored the static over the dynamic. Some might claim otherwise, as the rhetoric has certainly begun to change over the last three years and dynamic competition is now receiving overdue attention. However, a static efficiency mindset, a failure to recognize endogeneity between innovation and competition, adherence to a linear view of innovation, and the absence of an organizational capabilities framework to buttress the understanding of dynamic competition has nevertheless deflected competition authorities from properly understanding today's competitive landscape, particularly where digital transformation is in progress.

Unfortunately, many seem to be stuck in a well-traveled and less relevant debate, now half a century old, as to what form of market structure favors innovation, (competition or monopoly) labeling this as the "Schumpeterian" debate, or the "Arrow-Schumpeter" debate. It is often forgotten that Schumpeter seems to have maintained two almost diametrically opposite positions; but he is nevertheless remembered mainly for his later views that big firms with some amount of monopoly power were necessary for innovation. Arrow hypothesized a positive relationship between competition and innovation, while setting aside the appropriability problem (i.e., how to capture value from innovation) by positing a perfect property right in the information underlying a specific production technique. Regrettably, these highly stylized scenarios are all that many have absorbed from the rich work of Schumpeter, the Austrian School of economics with its heavy focus on entrepreneurship and innovation, and disequilibrium in the economic system, together with extensive recent developments in behavioral and evolutionary economics. This so-called Schumpeterian debate casts Schumpeter too narrowly and ought not be of much interest anymore. However, it still seems to color and bog discussions about competition policy and innovation.

With respect to competition policy and innovation, some commentators, particularly the so-called Neo-Brandiesians[4], believe that there has been an epic failure with respect to Big Tech. That failure supposedly comes from allowing Big Tech to flourish, get big and, in the eyes of some, wield monopoly power. With only fragmentary supporting evidence this new narrative has emerged, often driven by (or at least tacitly accepted) by many competition economists, too many of whom seem quick to advance the view that digital platforms enjoy inexorable winner-take-all economics, which

[4] Neo-Brandiesians represent a movement in the USA that is critical of Big Tech and antitrust enforcement as it has evolved over the last 50 years. Justice Brandeis didn't have time for innovation or efficiency believing that big business was a curse standing in the way of American social democracy. However, efforts to use antitrust to solve broader societal problems could easily deflect antitrust from its true mission of promoting economic competition which is the enabler of many other societal goals… and particular innovation and with that, economic property and national security.

generate antitrust risks. It is simply assumed that network effects and switching costs not only complicate but effectively block new entry. The reality is that network effects can often be overcome by superior business acumen and innovative activity–what I call dynamic capabilities. Also, demand heterogeneity leaves considerable room for niche plays that can sometimes explode into major competition with incumbents.

More importantly, in a world of rich technological opportunity and deep uncertainty, market share is a very poor proxy for market power. "Unseen" competition has important disciplinary powers, in some cases more so than known competition from known competitors. This reality needs to be brought out of the closet and factored into competition analyses, lest enforcement mistakes be made.

Recent inquiries into Big Tech competition in both Europe and the United States suffer from a lack of deep and fundamental research into monopoly power issues. Monopoly power has a precise meaning under U.S. antitrust law: the power to profitably raise price or exclude competitors in a correctly defined (relevant) market. Monopoly power in regimes of rapid technological change needs to be analysed anew[5]. Merely asserting monopoly and advancing industrial age shibboleths as to how the monopoly was acquired or maintained does not provide a solid foundation for antitrust enforcement or for legislative proposals to attack problems. Reference to industry concentration and even relevant markets is highly problematic when there is heterogeneous demand and radical, ongoing shifts in the organization of business and the economy, driven by new technology and / or geopolitical disturbances. The very concepts of industry and relevant markets are themselves problematic with the digital revolution and the appearance of broad-spectrum competitors.

This paper does not directly address the question of whether new legislation is needed, and whether it needs to be sector specific. Rather, it sees the opportunity for improving competition policy within existing legal frameworks if economic and business analysis can become more dynamic,

[5] I began this process in David Teece & Mary Coleman "The Meaning of Monopoly" *The Antitrust Bulletin* (Fall – Winter 1998). Other relevant research includes "The Analysis of Market Definition and Market Power in the Context of Rapid Innovation" (with Christopher Pleatsikas), *International Journal of Industrial Organization* 19:5 (April 2001), 665-693; "Favoring Dynamic over Static Competition: Implications for Antitrust Analysis and Policy" in G. Manne and J. Wright Competition Policy and Patent Law Under Uncertainty: Regulating Innovation, *Cambridge University Press* 2011

"innovation first" in orientation,[6] and grounded in a deep understanding of innovation… something which a well-constructed dynamic competition framework or paradigm can provide.

In this paper, I will put forward the thesis that monopoly is not a situation of high market share; nor is it simply characterized by high profits or prices above marginal cost. The monopoly of concern should be those circumstances where profits are high, there is an absence of innovation and dynamic competition, and the focal company is shielded from new entry, i.e. insulated from competition from other innovators. Such a monopolist could stay ahead without innovating or lowering prices and ought to be investigated.

A short-run orientation with respect to theories of harm must also be avoided, as it necessarily squeezes out consideration of innovation. Unwillingness to take a longer run-view quickly morphs into an unwillingness to consider innovation, which often takes longer than the cost-cutting associated with the efficiency paradigm.

The next section lays out two contrasting paradigms of competition, the static and the dynamic, and claims that the static paradigm has been dominant for far too long. A dynamic competition paradigm is long overdue and may now be partially accepted, albeit in emasculated form. Hence, the need for additional research and a reaffirmation of basic principles.

COMPETITION PARADIGMS AND THE CHANGING NATURE OF COMPETITION

COMPETITION PARADIGMS

Putting specific models of competition to one side and looking at a more general level, it is helpful to collapse different paradigms of competition into two very large categories: static and dynamic. This taxonomy cuts across different schools of thought. What is labeled below as "static" is not an unfair description of many elements of the Harvard, Chicago, post Chicago schools, and neo Brandeisian schools.[7]

[6] This innovation first approach is, paradoxically, not completely out of line with Justice Louie Brandeis who understood to some degree the importance of progress and industrial innovation. See "Brandeis and the Willingness to Innovate" Jonathan Sallet, *Benton Institute*, Mar. 6, 2019

[7] See Yoo, Christopher S., The Post-Chicago Antitrust Revolution: A Retrospective. University of Pennsylvania Law Review, Vol. 168, p. 2145, 2020, U of Penn, Inst for Law & Econ Research Paper No. 21-02

Static Competition

Static competition reflects an intellectual framework, not a state of the real world. It is a world where innovation is absent. Strong (static) competition manifests itself in the form of existing products offered at low prices by existing competitors using the same or similar technologies. No new products are introduced, and rapid price reductions driven by innovation simply do not occur. There is no hurley-burly competition. Without innovation, all firms have the same or very similar technologies and business models. Markets are in a stable equilibrium.

The static approach tends to accept narrow definitions of markets and pays great attention to market structure at a single point in time. It equates high share with monopoly power while ignoring strong actual and potential competition and their disciplining effects. Competing explanations for high share are ignored and the true nature of competition with rapid innovation and deep uncertainty is caricatured in simple models of pricing and output. With digital platforms, scale and network effects lead to inexorable market lock-in with high prices and reduced output.

While the framework can have a simple theoretical elegance and lends itself to the employment of game theory and intermediate and advanced price theory, the industrial dynamics behind it are uninteresting. In fact, they don't even exist. Absent innovation, there is unlikely to be much or any new entry. The ecology of firms is unchanging. The whole supply-side story of marketplace dynamics is too often squeezed out through the employment of an oversimplified view of the firm and vapid models of strategic competition that are caricatures of real-world business enterprises and competitive circumstances.

Dynamic Competition

The idea of dynamic competition probably dates back to Schumpeter: As he noted

"[What counts is 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."[8]

I believe I (with Thomas Jorde) may have been the first to use the term dynamic competition in competition/antitrust economics[9]; and the UK

[8] "Joseph Schumpeter "Captialism, Socialism, and Democracy" (1942) p.84-85.
[9] See Jorde and Teece (1990, 1992) cited in footnote 2.

appeals tribunal in the Giphy case seems to believe so too.[10] Now for the first time, scholars[11] are referring to the existence of a "dynamic competition school" heralding that some progress has been made.

Dynamic competition is more intuitive and much closer to an everyday business view of competition than are many of the textbook notions of (static) competition. Professionals in the agencies accept some part of it; but then they often abandon key elements and implications as they reach out for metrics to simplify their tasks.

With dynamic competition, new entrants and incumbents alike engage in R&D, and the development of new products and processes and new business models. Firms seek to create entirely new markets and product categories. Businesses are not just looking sideways and over their shoulder to rivals, but ahead to try and satisfy user/customer needs and unlock latent demand. Frequent new product introductions followed by rapid price declines are commonplace.

Competition is usually for the market, and sometimes to create entirely new markets as much as it is for competition within markets. The supply side of the market, which has been neglected with oversimplified theories of firm behavior is brought back into focus with the dynamic competition paradigm, anchored in part by the adoption of the concept of organizational capabilities.

Maintaining innovation and strong competition depends on the existence of entrepreneurs and entrepreneurial managers, and external institutional structures and policy environments that support innovation. Innovation may come in waves, based on the development and deployment of different technologies. These waves cause what Schumpeter called "creative destruction."[12] With innovation and strong IP protection for entrants as well as incumbents, new entrants can tap into latent demand, compete with incumbents, and win over customers.

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[10] The UK Competition Appeals tribunal in the Meta-Giphy merger matter cited Jorde and Teece (1992), and Sidak and Teece (2009) for its definition of dynamic competition. See Case No: 1429/4/12/21 Meta v Competition and Markets Authority (14 June 2022), paras 35-36, available at: https://www.catribunal.org.uk/sites/cat/files/2022-06/20220614_1429_Judgment_FINAL%20%5B2022%5D%20CAT%2026.pdf

[11] *See:* Padilla, Jorge, Ginsburg, Douglas, Wong-Ervin, Koren, *Dynamic Competition and Antitrust: Quick-Look Inferences from the Analysis of Big Tech's R&D Expenditure Ratios*, contained in this Symposium "Beyond Dynamic Competition" 2024.

[12] Hayek, Friedrich A., *The Meaning of Competition in Individualism and Economic Order*, Chicago: Chicago University Press (1948).

The creation of new technological ensembles 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. New innovations may stem from heavy investment in research and development (R&D) and/or the improvement of older technologies. Sometime invention is serendipitous and requires little resources; but bringing inventions to market is usually a much more difficult challenge requiring deployment or access to complementary assets[13]. In today's digital economy, new business models and new platforms are also very much a part of the process.[14]

Dynamic competition can be thought of as heavyweight competition; static competition is the "lite" version. Dynamic competition is engendered by both big and small companies, that live in symbiotic association, along with potential competitors from known and unknown sources.[15] Advocates of strong competition must surely favor dynamic, as static competition is anemic in comparison. Within the dynamic competition paradigm, competition is recognized as a process, not an outcome. Entrepreneurs and entrepreneurial managers are essential to it.

When it comes to competition policy, those that adopt (rather than corrupt) the dynamic competition framework place minimal weight on traditional structural criteria for assessing monopoly power such as market shares and HHI's.[16] They accept long run consumer welfare standard (LRCWS)[17] as a suitable goal for antitrust and claim that advancing a robust innovation ecosystem, vibrant at both the center and the edges, will serve consumers in the long run, and hence is a good proxy for the consumer

[13] See David J. Teece "Profiting from technological innovation" Research Policy 1986 and "Profiting from technological innovation in the Digital Economy" Research Policy 2018.

[14] "Business Models, Business Strategy and Innovation" *Long Range Planning* 43, Amsterdam: Elsevier Science (2010), 172-194.

[15] *See* Williamson, Oliver E., *Markets and Hierarchies*, Free Press (1975).

[16] The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration and is used to determine market competitiveness, often pre- and post-merger and acquisition (M&A) transactions. https://www.investopedia.com/terms/h/hhi.asp

[17] A long term consumer welfare standard seeks to assess the impact on both efficiency and innovation (or their absence) on consumers. Quantitatively, it's the area under demand curves… and in the context of a long term standard, it would require assessing impacts not just on levels of consumer welfare in existing markets, but also on future markets. Seen this way, it's able to capture the effects of innovation and improvement. This isn't always easy to operationalize; but it's better to be conceptually correct in ones measurement rather than spuriously accurate. I suggest later on that in the context of digital platforms, the robustness of the innovation ecosystem may often be a good proxy for long run consumer welfare.

welfare standard in very many contexts.[18] The LRCWS advanced together with dynamic competition does not just focus on price and output as indicia of competition; it also embraces innovation, product availability, privacy, supply reliability, and excitement around new products and services.

Core to the dynamic competition perspective is accepting that innovation enables competition and shapes market structures; not just that competition assists innovation, which of course it does.[19] This is what economists call an endogeneity issue. In mainstream analysis, there is occasional recognition that innovation is the main driver of competition, but it is usually a quite reserved endorsement. Breakthroughs in exogeneous science and technology are also major factors helping to drive innovation and competition.

Within the paradigm, rivalry that is not innovative but purely imitative and constitutes free riding on another's investment should not be strongly encouraged. Even if such behavior is not actionable under Intellectual Property (IP) law, it shouldn't be given equal weight by competition authorities. When IP isn't honored, including the IP of new entrants and complementors, dynamic competition is impaired. Accordingly, a pro dynamic competition stance is likely a pro intellectual property stance. Weak intellectual property regimes favor those incumbents who have already assembled the necessary complementary assets.[20] Life cycle considerations can also impact how business conduct is evaluated. The need for innovators (both incumbents and new entrants) to capture value to allow R&D and other discovery and creative activities to be fully supported is recognized.

While there is now considerable recognition that innovation is important to competition, the primary concern in mainstream frameworks is how competition impacts innovation. Thus in the context of mergers, attention is paid to changes in market concentration and how a merger might dent

[18] And particularly so in the context of n-sided platforms.

[19] An important feature of dynamic competition is that change is endogenized. Firms generate strategic variety and drive the economy towards new and better outcomes, not just in price and output, but in the nature and quality of new goals and services. Firms and technologies also coevolve in new and interesting ways. Heterogeneous firms routinize elements of innovation and create and capture economies of scale and scope. They generate strategic variety which in turn drives competitive dynamics and evolutionary processes. Different firms have different views on how to advance… and this variety feeds progress. Market engagement leads to learning and resource redeployment and enhanced performance. Dynamic competition sees open-ended processes at work that are not predetermined by industry structure or equilibrium processes. It's not just the price system that allocated resources; it's the business enterprise which does so led by entrepreneurial managers seeking fully virtuous innovation supporting Schumpeterian profits.

[20] See D Teece "Profiting from innovation: in Research Policy (1986, 2018) cited earlier.

incentives for the merging parties to take away market share from each other. This is sometimes referred to as "business stealing." It fails to give proper attention to how the merging parties might together open up new markets. This omission is a defect in the analytic framework. Furthermore, it is often the case that so called "business stealing" effects are trivial because bold innovators don't see business "stealing" as the major goal as there is a much bigger goal: to build the capabilities required to create and expand new markets. When the analysis ignores broader strategic issues and organizational capabilities, innovation and future competition tend to get ignored too.

The dynamic competition paradigm has taken a long time to emerge, and it is by no means fully developed. While the core is based on economics, it is not mainstream economics but multi-disciplinary (heterodox) economics with Austrian overtones. Think of it as innovation economics writ large. In the main it eschews the (non-robust) game theoretic proclivities of the post Chicago school which put strategic behavior (not innovation) center stage. The numerosity of such models in antitrust economics suggests a warped perspective of real-world competition. Harvard economist Ed Mason, a founder (with Berkeley economist Joe Bain) of the field of industrial economics and the structural school of antitrust, noted over three quarters of a century ago that attacks on the static economic analysis as an intellectual framework for a public anti-monopoly policy is highly salutary and profoundly correct "but difficult" if not impossible to administer.[21] Despite considerable difficulties, progress is finally being made with respect to this important endeavor.

Dynamic Competition in the Digital Era

The migration of the economy from its traditional industrial, electro-mechanical and analog foundations to the digital age is fundamentally transforming the nature of the business enterprise—not only with respect to its raison d'être, but also with respect to business behavior and the foundations of enterprise success and failure. The organizational "machines" of the digital world are characterized by flexibility, adaptability, and the ability to learn. Industrial age innovation involved repetitive routines and automation.

In today's digital economy, firms create and capture value in different ways, and organizational and business model innovation looms as large as technological innovation in understanding enterprise level performance and market outcomes. Moreover, there is considerable heterogeneity in the

[21] Mason, Edward S., *Schumpeter on Monopoly and the Large Firm*, 33 Rev. Econ. & Stat. 139 (1951). While the structural (Harvard) School changed a lot over recent decades, many vestiges of it are still alive and well and seem to have come back in the 2023 DOJ-FTC merger guidelines.

performance of business firms in the digital era, with the emergence of a few "superstar" firms.

Firms born near digital or digital (e.g., Netflix, Amazon) often display rapid growth and harness Artificial Intelligence (AI) to scale their operations.[22] While there has been considerable research on information economics[23] and network effects have been thoroughly explored, we still have only a primitive understanding of how firms compete and how markets evolve. This needs to be remedied, especially since it is now better appreciated that network effects are powerful explanators of business success only when there are high switching costs, the absence of multihoming, and consumers are relatively homogenous, which we know is not always the case. Management matters just as much, if not more so, than scale and network effects. To better understand the nature of competition, it is important to understand the role that R&D and innovation and technological and organizational capabilities play in digital competition.

NEW DRIVERS OF COMPETITION IN THE DIGITAL ECONOMY: A QUICK LOOK

DIGITAL TRANSFORMATION AND THE REDUCTION OF "FRICTIONS"

As noted, there are important differences in the nature of competition between the industrial economy of the 20th Century and the digital economy of the 21st Century. While dynamic competition has been around since the beginning of commerce, the digital revolution is amplifying its importance. Competition frameworks need to be consonant with such developments. These differences are very often misunderstood, or mischaracterized, particularly by adherents of the static paradigm. This results in the strength of competition in today's economy being understated.[24]

Before the railroad and the telegraph in the mid-19th century, there was no big business in America or elsewhere.[25] The largest institutions tended to

[22] For a discussion on how AI is affecting organizational capabilities, see: Fausto Gernone and David J. Teece. "Artificial Intelligence and Competition Policy." In *Artificial Intelligence and Competition Policy*, edited by Alden Abbott and Thibault Schrepel. Concurrences, 2024.

[23] See Arthur, W. Brian. "Increasing Returns and Path Dependence in the Economy." *Ann Arbor: University of Michigan Press*, 2009. muse.jhu.edu/book/6343 and Carl Shapiro and Hal R. Varian. 2000. Information Rules: A Strategic Guide to the Network Economy. *Harvard Business School Press*, USA.

[24] The dominant narrative in many quarters is that Big Tech firms are monopolists shielded from competition by their bigness which is simply due to scale and network economies and control of big data.

[25] Glenn Porter "The Rise of Big Business," 1860–1910. New York, Thomas Y. Crowell Company, 1973.

be the church, the army, and the navy. Governments were otherwise generally rather small. Industrial activity was mainly local and occasionally regional, except where it was located next to ports and associated easy water (rivers, canals, oceans) transportation. However, as the business historian Alfred Chandler explained[26], the railroads and the telegraph enabled big business to arise, first in America, and later in Europe, and later still in Asia. The telegraph was important because it enabled timely intercontinental and transcontinental communication within and between business enterprises. The railroad was important because it enabled continental scale markets to be served by manufacturers from one or a few key production facilities. Together with the telegraph, the birth of transcontinental railroads enabled the growth to giant size of companies like US Steel, Pittsburgh Plate Glass, Dupont, General Motors, Ford, and Swift, companies that competed nationally, and then internationally.[27] In the industrial era, business models were relatively stable. It was against the backdrop that competition economics evolved.

The internet and new digital technologies are now the enabler of a different genre of businesses that are very different, requiring rather different analytic models and understandings. With the digital economy and the commercial internet, it is not classical production economies which explains bigness. It is, in part, the reduction of contractual/transactional frictions between business and between and amongst businesses and consumers enabled by the internet. New constellations of contracts enable new products and services that bring customer delight. Because of microprocessors, integrated circuits, and more powerful software, digitization today is low cost and getting cheaper; and where broadband internet communication is available, supports communications and transactions and business engagements that are timely, efficient, dynamic, and global in scope. In the digital world, business models are often unstable and can change rapidly, bringing a whole new dimension to competition.[28] This is because information technologies have enabled new, modular production arrangements that entail complex interactions that can engender strong feedback loops.

Successful technology firms are likely to be agile even as they grow. They often curate multisided platforms and are highly networked. Third party complementors are often very important to successful tech firms as they help create and capture value. Users themselves can be complementors too. For

[26] Alfred Chandler "Scale and Scope" *Belknap Press*, Harvard University, 1994; Alfred Chandler "The Beginnings of Big Business in American Industry," *Business History Review*, Spring 1959

[27] ibid

[28] See David J. Teece "Business Models, Business Strategy and Innovation" *Long Range Planning* 43, Amsterdam: Elsevier Science (2010), 172–194.

instance, users create posts on Instagram, and upload content onto the internet which makes search more valuable.

While in the industrial economy competitive advantage flowed from scale and scope and the more effective utilization of the company's own assets, in the digital economy, scale and scope (along with increasing returns) are important, but great gains in value often come from better utilization of assets that are not on the tech firms own balance sheet. e.g., Airbnb enables the better utilization of (third party) housing stock; Uber & Lyft allow gig economy drivers to achieve better utilization of their own automobiles.

Moreover, increasing returns[29], not diminishing returns, are more amplified than in the industrial economy. As complexity economist Brian Arthur has taught us, when there is a very large amount of fundamental uncertainty, you don't know who the other competitors will be, how your product will be accepted, what regulations will apply, or what the odds of success are.[30] You can position, be smart, observe; but given that the game is not fully defined, you cannot optimize. "Rationality" is of limited help. The rewards go to the players who are early to make sense of the new possibilities looming out of the technological fog, and this calls for foresight, intelligence gathering, imagination, and courage… what I call dynamic capabilities, discussed later.

Today the digital economy is both displacing and augmenting the industrial economy. It displaces it when autonomous cars are substituted for driver operated cars; it augments it when apps like Google Maps is able to suggest the fastest route to a destination with live traffic updates.

As noted, new business models enabled by digitization and by the creation of platforms have changed the business and organizational logic of the economy. Today's business operations are enabled by low cost (digital) computing, software tools, mobile telephony, and of course the internet itself. These technologies are not just productivity enhancers for existing activities; they lower costs, improve services and allow new customer needs to be calibrated and met. They also make incumbents more likely to be attacked by firms with new business models, just as they can attack others with new and better business models. The alacrity with which some business models can be invented and modified represents a fundamental change in the nature of competition and makes market positions more vulnerable.

An additional reason why the market position of Tech firms enabling digital transformation can be more fragile than that of industrial age

[29] Increasing returns are not just because of scale. Learning can also be a factor.

[30] Brian Arthur "Increasing Returns and the New World of Business" Harvard Business Review 1996

companies is because technology is changing faster and new entrants don't necessarily need big balance sheets. That's because the internet not only allows new business models, it allows easy and better use of third party assets. Those that get ahead don't stay ahead, absent significant innovation and astute management. Even with increasing returns, the ability to profit "is only as good as the ability to see what's coming in the next cycle.[31] Furthermore, there are other factors at work, some of them geopolitical, which are creating uncertainties and challenges for Big Tech and Small Tech alike.

Couple the internet with other technologies like AI that enable new business models,[32] and it is easy to see that Big Tech firms have economies of a different kind. They are relatively asset-light, and the assets employed to provide new digital goods and services are far flung and usually outside of the enterprise itself. Good management and new organizational arrangements and new digital technologies enable firms to grow rapidly, harnessing assets already in position. Uber and Airbnb are classic asset-light technology firms; but so are Amazon and Apple. While asset-light, many spend heavily on R&D and product development, especially software development. In short, the nature and texture of competition has changed, and antitrust economics have got a way to go to catch up.

BIG TECH R&D INVESTMENTS AND RIVALRY

In the assessments of competition in the tech sector, it is perhaps quite disturbing that little if any consideration is given to R&D, despite the obvious fact that R&D investments are critical enablers of strong dynamic competition. Moreover, Big Tech firms spend an amount on R&D that is about 30%-40% of total US private sector R&D spending, which on its face is inconsistent with lack of competition.[33]

Of course, industrial age firms also built R&D labs that were important to their success. Dupont, GE, Kodak, Merck, Chevron, and ESSO (later Exxon in North America) are well known examples. Such activities help anchor the endogeneity of innovation and competition. When linked to universities, business enterprises were also able to tap into exogenous developments and breakthroughs in science and technology, further stimulating innovation and competition.

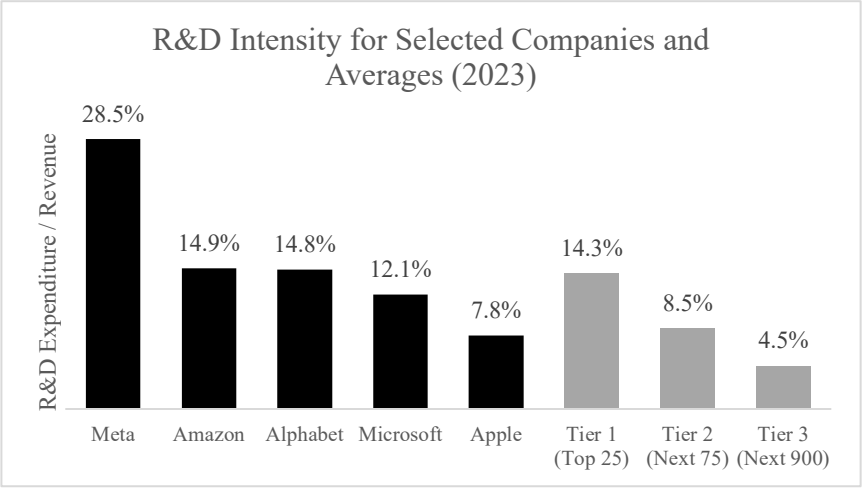
[31] Ibid.

[32] Supra note 22.

[33] The top 5 tech firms (Amazon, Alphabet, Meta, Apple, and Microsoft) spent about $230 on R&D in 2024. Of course, monopolists spend money on R&D too but in most models of monopoly it's to lower costs, not to open up new markets and turbo charge competition.

Today's Big Tech firms are even more research intensive than their industrial age counterparts. Rarely mentioned is that each "Big Tech" company has different sources of competitive advantage, and all are sustaining their competitive positions in part because of very large R&D expenditures (see Figure 1). With the exception of Apple, Big Tech firms invest double-digit percentage of their sales in R&D. Apple is also a huge R&D investor in absolute terms, but it tends to make more focused investments in R&D.[34] In all the discussions of bigness and monopoly power, this high R&D spend is ignored; the paper by Padilla et al. in this special issue being a notable exception.[35]

FIGURE 1. R&D INTENSITY FOR SELECTED COMPANIES AND AVERAGES (2023)[36]



[34] The company has traditionally been lower than the other FANGAMs – Facebook (Meta) Amazon, Netflix, Google (Alphabet), Apple, and Microsoft - on R&D as a percentage of sales, but this ratio has recently been increasing, growing from 5% in 2018, to almost 8% in 2023. Indeed, Apple's R&D spending has for some years been growing at a rate faster than its revenues.

[35] *See* Padilla, Jorge, Ginsburg, Douglas H., Wong-Ervin, Koren W., *Dynamic Competition and Antitrust: Quick-Look Inferences From the Analysis of Big Tech's R&D Expenditure Ratios*, Antitrust L.J. (forthcoming 2024), 25 pages (Feb. 8, 2024).

[36] The authors elaborated data from the Capital IQ S&P database to update figures in: Ashish Arora & Sharon Belenzon, *American Innovation Under Threat: Restrictive Legislation and Global Competition,* Innovation Frontier Project (Nov. 2021), https://innovationfrontier.org/wp-content/uploads/2022/05/American-Innovation-Under-Threat-UPDATED-51622.pdf.

Heavy investment in R&D and data analytics and AI enable tech firms to enter new markets and deliver strong competition to other incumbent as well as to new entrants. This phenomenon is not simply driven, as some observers seem to assume, by defensive efforts to hold onto market share.

Maintaining and enhancing the technological leadership required to address existing and future customer needs is the long-run vision of many tech firms, and their R&D investments and associated innovation undergirds their success. This quest drives innovation, and innovation in turn drives competition.

Put differently, it is not just fear of losing shares in existing markets that drives Big Tech R&D investment as many competition economists commonly assume. What most powerfully animates Big Tech is more likely the need and desire to stay competitive by creating new and better digital goods and services and opening up new markets. Serving existing customers is not where the growth will come from; the biggest profits in the long term come from servicing new customers and expanding services to existing customers and creating new markets. That's where Big Tech is usually focused.

Indeed, Jeff Bezos at Amazon says that he pays no attention to competitors.[37] Rather, Amazon is focused laser-like on servicing the needs of consumers. Such viewpoints don't fit the static model, and would tend to choke most competition economists. However, they are entirely consistent with the dynamic competition framework. Likewise, Zuckerberg at Meta is seeking to help shape and build the metaverse, if his shareholders will let him.

Such considerations are often the mindset in Silicon Valley, and it is what helps energize dynamic competition. It's a very forward-looking perspective supported by large R&D outlays and focused on the customer experience and solving customer problems, expressed and latent.

NICHE STRATEGIES, NEW ENTRANTS, AND COMPETITION

Strategic management scholars and the investment community alike recognizes that Big Tech Platform firms are exposed to strong competition not just from each other but from niche players. The monopoly power narrative rings hollow to those in the front line, and to those carefully observing competition on the front line.

Consider Meta. In 2022, Meta's market value declined because of strong competition from TikTok and Apple's privacy changes with respect to

[37] "*We're not competitor obsessed, we're customer obsessed. We start with what the customer needs and we work backwards."* Jeff Bezos (2016)

tracking users. Apple has made it harder for Facebook to collect data on Apple phones, potentially laying the ground for an assault on the mobile advertising market. Meta also faces stiff competition from Snapchat, LinkedIn, and Twitter. Importantly, niche competitors can often break even at low usage levels. It's hard, but not impossible, to imagine Facebook going the way of MySpace, a once dominant social site that is now a footnote in the history of the internet. Meta's ambitious move to develop the metaverse is risky but aims to establish itself as a pioneer in a whole new suite of technologies which will define the future of the internet. This is a bold bet. Meta must at the same time contend with the fact that younger Americans are favoring TikTok and Snapchat for much of their social media interaction.[38]

Microsoft is challenging Google on many fronts. It has aggressively been enhancing Bing with advanced AI capabilities, aiming to provide a more sophisticated search experience, directly challenging Google's position with its own AI initiatives, like Bard. Microsoft's Azzure is a significant competitor to Google Cloud. Microsoft Teams challenged Google's Workspace. Through its strength in AI and Cloud computing and enterprise services, Microsoft is a formidable competitor to Google across multiple technology sectors.

Other Big Tech face similar hurdles. Apple confronts very strong competition from Samsung, Google and a potpourri of Android phone manufacturers. Meanwhile, Amazon's web services business is contested by Microsoft and Google. At the same time, Amazon is challenging Google's and Meta's position in digital advertising.

Network effects are likely not the major factor sustaining any existing Big Tech firm.[39] They are not even applicable to Netflix, as witnessed by the emergence of a plurality of film streaming platforms. While network effects undoubtedly helped at Meta and Microsoft, alone they are not enough. Thus, MS Word and MS Office compete with office productivity tools for which network effects supposedly exist, yet Google is gradually gaining share in this space. If network effects and first mover advantage were so strong, why isn't eBay, the pioneer in ecommerce, no more than a bit player today? There are many reasons why the pioneers don't always capture the lion's share of the

[38] Meta's user base of approximately 2 billion dwarfs MySpace which peaked at around 75 million.

[39] Jonathan A. Knee, *Network Effects Are Overrated,* N.Y. TIMES (Sep. 4, 2021), https://www.nytimes.com/2021/09/04/business/dealbook/network-effects.html.

profits[40] and network effects and scale haven't overturned other fundamental considerations.

Contrary to common assumptions, the original success of Amazon, Apple, Google, and Netflix was not primarily due to network effects. Apple's advantage came from superior products: the iPod, the iPhone and the iPad that were software-enabled and internet-connected. Google started with a better search engine. Netflix has had very limited network effects throughout its history. Amazon's initial foray into books did not have significant network effects either.

Furthermore, entry costs are quite small in most digital markets if what is attempted is an "opening wedge" or "niche" strategy. Because of heterogeneity in user's needs, new entrants can focus on developing a small community; then the niche community/user group can explode into something bigger. For example, TikTok had a specific identity and a niche strategy (promoting the creative talent of users) and then broadened it to take on Facebook, which responded with Reels. The success of new entrants with niche strategies is evidence that network effects are not inexorable.

As any management scholar or executive will explain, network effects alone will not protect a profitable business. In the absence of high fixed costs, any company temporarily trying to shelter from competition without continuously upgrading products and services will attract new entry, and there are almost always plenty of niches for new entrants to exploit. Absent continuous innovation and superior client service, leadership positions are lost, and incumbents will fall behind. Big bets have to be made time and time again by big tech to increase the odds of continued growth and profitability. Meta's Reality Labs virtual reality business has lost many billions for many years as they company tries to effectuate an ambitious transformation to a metaverse company, all while Meta was suffering from a drop in advertising revenues."[41] Apple's ability to develop elegant, customer friendly revolutionary devices depend on high performance from its design and management teams. New products like AirPods and the Apple Watch are getting significant traction, as are data servers.

[40] See: Teece, David J., *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 Res. Pol'y 285, 285-305 (1986); Teece, David J., *Reflections on Profiting from Innovation*, 35 Res. Pol'y 1131, 1131-1146 (2006) and Teece, David J., *Dynamic Capabilities and Entrepreneurial Management in Large Organizations: Toward a Theory of the (Entrepreneurial) Firm*, 86 Eur. Econ. Rev. 202, 202-216 (2017).

[41] For Q2 2022, Meta reported its first ever drop in ad revenues.

However, there is no guarantee of future success even for Big Tech. Microsoft missed the mobile revolution but is now doing well in cloud services. Intel, likewise, missed the mobile processor markets, missed the communications chip market, and for a long time the GPU/parallel processing market to Nvidia. There is torrid competition, often from unexpected sources. Google failed with Google Glass and Nexus smartphones. Google, with Google+, tried to challenge Facebook but failed. In cloud computing, Google Cloud lags behind Amazon Web Services (AWS) and Microsoft's Azure. Amazon faces competition from online as well as bricks and mortar establishments such as Walmart, Target, and Safeway. Amazon has not been able to obliterate Today, both companies are strong competitors to each other. Netflix's competitive position is likewise fragile. Its success is due to operating excellence, not network effects. It faces strong competition from incumbents including HBO, Disney, Paramount (NBC) as well as from new entrants like Apple and Amazon. Shopify has challenged Amazon. Spotify competes with Apple and Google in music streaming. Zoom competes with Microsoft Teams.

It's worthy of note that much of the dynamic competition one observes comes less from competition within established markets and more from creating new markets for both products and services. Competition by new entrants is not initially about "beating" the incumbent competitor. It's often more about carving out a niche, building a loyal customer base, and waiting for a misstep by the megacompany. It's not always wise for a new entrant to set out to be a broad-spectrum competitor; it's far better to focus on specific customer needs and to avoid head-to-head competition at the outset.[42] Delivering exceptional customer service remains a tried and true way to enter a niche market and build trust and customer support. At other times, it is about looking ahead to figure out the next big thing and getting there ahead of Big Tech, as with Open AI and ChatGPT. Thus, and contrary to popular folklore, small firms can evidently compete with Big Tech especially if they begin with niche "strategies."[43]

In summary, innovation and superior management, not just network and scale effects, give large platform firms the chance, but never the guarantee, of staying ahead. Whereas it is sometimes assumed that Big Tech firms dominate a particular market (or markets), the reality is that they do compete vigorously with each other, as well as with many niche players, many of

[42] John Kay calls this strategy "obliquity" and made that the title of a book (2010). Goals are often best achieved by achieving them through side doors or back doors, and not necessarily front doors.

[43] Peter Thiel has popularized this. *See* Thiel, Peter, Masters, Blake (2014). "Zero to one: notes on startups, or how to build the future." *New York: Crown Business*.

whom have the potential to deliver bigger and broader competitive challenges.

BIG DATA AND BROAD-SPECTRUM COMPETITION

Big Tech firms not only face strong competition from de novo entrants, but also from their own ranks. The ability for technology-based firms to compete across industries stems from significant economies of scope and learning effects derived from generating, possessing, and curating customer behavioral data. In earlier research,[44] I developed a model that shows the circumstances under which economies of scope require expansion in the scope of the enterprise. Transaction cost considerations often require integrated rather than contractual ways of expanding the boundaries of the enterprise into new product lines or even new industries where traditional business analysis might not see any basis for an advantage.[45] Amazon's foray into film and TV production is a case in point.

An alternative path involves repurposing an existing platform, as exemplified by Zoom Video's venture into specialized fields like telemedicine. In economic terms, there are economies of scope from data re-use across industry lines and there aren't readily available contractual mechanisms always available to easily share such data, while also protecting it.

Economies of scope also result from combining heterogeneous data into aggregated pools.[46] Firms often seek large quantities of data and then recombine and redeploy that data to develop new lines of business. This phenomenon is consistent with my earlier analysis of diversification and economies of scope and the scope of the enterprise cited above; but back then the focus was on the leveraging of specialized physical assets and transitions across markets. Now data is often an important factor.

Besides big data, the competitive positioning of US Big Tech are underpinned by technological assets that have been built through immense investment in R&D, sometimes spanning many decades, as in the case of Apple and Microsoft. Table 1 shows the average number of patents granted per year that are held by FANGAM firms compared to peer companies.

[44] David J. Teece, "Economies of Scope and the Scope of the Enterprise," 1 J. ECON. BEHAV. & ORG. 223 (1980), and "Towards an Economic Theory of the Multiproduct Firm" Journal of Economic Behavior and Organization 3:1 (Mar. 1982), 39–63.

[45] David J. Teece, "Innovation, Governance, and Capabilities: Implications for Competition Policy," *Industrial and Corporate Change*, Vol 29 No.5 (2020)

[46] Bertin Martens et al., *Business-to-Business Data Sharing: An Economic and Legal Analysis* 4 (European Commission, JREC Digital Economy Working Paper, May 2020).

FANGAMs include Facebook (Meta), Amazon, Netflix, Google, Alphabet, Apple, and Microsoft. This table shows that the identified companies have a relatively larger share of the more highly cited patents and are considerably better acknowledged by patent grants than their peers. There are also significant differences amongst them, but also important overlaps.

Patent statistics can be used as a window into the technological strengths of big platforms. Figure 2 displays yearly granted patents to the FANGAMS. It's clear that all have been very active in innovation and patenting since almost 2000. Patent data also provide insights into areas of overlap, based on technological prowess. For instance, Google clearly has great strength in search; but Microsoft is not bereft of such capabilities, and nor is Amazon. The Amazon store itself uses a sophisticated search engine. Google must keep upgrading its search capabilities to stay ahead on search, even if it has high share in some narrowly defined search "market."

The patent portfolios of certain Big Tech firms are summarized below and then juxtaposed (in Table 1) against close peer[47] companies that the Big Tech firms[48] themselves determine to be their competitors, and identify them as such in their annual reports and 10K-filings with the SEC. For purposes of this descriptive exercise, "Big Tech" is considered to be the FANGAMs. Using data from Kogan et al.,[49] their patent histories can be quantified.

Table 2 summarizes data that reflects the technological overlaps of Google (Alphabet), Facebook (Meta), Netflix, Apple, Amazon, and Microsoft. These patent statistics suggest considerable capacity for head-to-head across the board competition amongst (American) Big Tech companies.

For each technology class and year, patents were ranked by forward citations. The top 5 percent (i.e., highest quality) patents were then marked. The count of patents owned by FANGAM firms was then calculated as a share of their patent portfolios (for instance, Amazon has 1239 patents per year on average, and 16 percent are in this set of highly cited patents).

[47] The peer group used is determined by the companies listed in SEC form 10K disclosures for purposes of benchmarking executive compensation. Close peers are the subset this is technologically comparable (*e.g.*, Best Buy and Walmart are excluded).

[48] This analysis was done by Matteo Tranchero, Ph.D. candidate, U.C. Berkeley, and supported by Berkeley Research Group Institute, Emeryville, CA.

[49] L. Kogan, D. Papanikolaou, A. Seru, and N. Stoffman. Technological innovation, resource

allocation, and growth. The Quarterly Journal of Economics, 132(2):665–712, 2017.

FIGURE 2. YEARLY GRANTED PATENTS TO FANGAM[50]

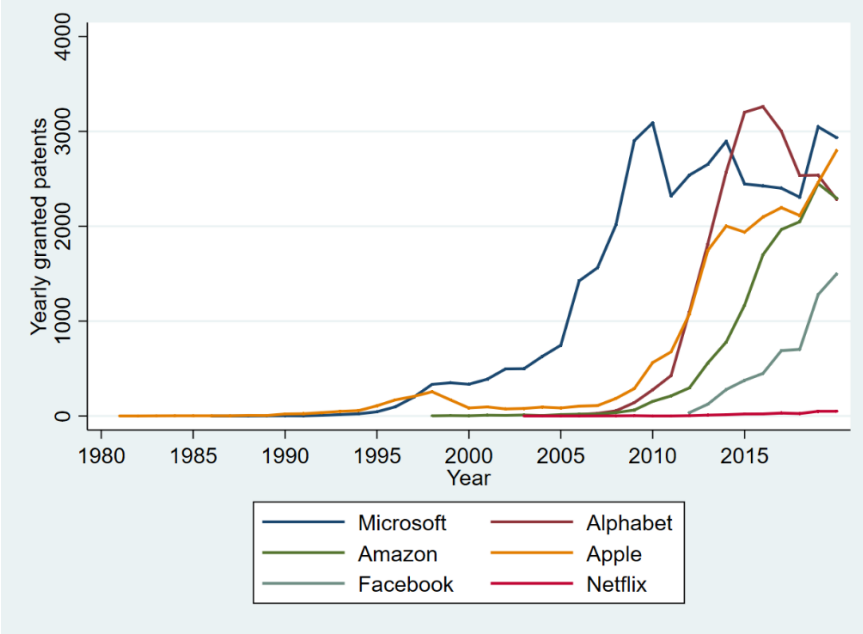


TABLE 1. PATENT CITES FANGAM COMPANIES (2010–2020) AND THE PEER GROUP[51]

	Facebook	**Apple**	**Amazon**	**Alphabet**	**Netflix**	**Microsoft**	**Peer group**	**Close peers**
Total patents	5432	19662	13629	23011	230	29054	264757	28513
Average per year	493.8	1787.5	1239.0	2091.9	20.9	2641.3	24068.8	2592.1
Share of top 5%	5.47%	10.10%	16.16%	8.88%	5.22%	5.58%	4.40%	5.80%

[50] KPSS data.

[51] These charts were created by DR Matteo Tranchero, Institute for Business Innovation, UC Berkeley.

Put succinctly, Table 2 shows substantial patenting (and by inference technological) overlaps amongst FANGAM firms. This can be seen by looking at CPC codes.[52] While these technological classes are aggregated, they illustrate common technological capabilities, which indicates at least the potential for what Nicolas Petit and I call "broad spectrum" competition.[53] This potential is a result of a deep financial commitments to R&D by American Big Tech firms. Corporate research underpins differentiation, growth, innovation, and competition. Scientific research leads to technical breakthroughs which can lead to innovation, which in turn fuels competition. Indeed, it is American Big Tech firms which are now the primary drivers of corporate R&D in the USA.

[52] Cooperative patent classification is a coding system jointly managed by the European Patent Office and the US Patent and Trademark Office. It is divided into nine sections.

[53] Petit & Teece, *supra* note 2.

TABLE 2. MOST FREQUENT CPC SUBCLASSES AMONG FANGAM'S PATENTS (FULL COUNTING).

CPC Code	G06F	H04L	H04N	G10L	H04W	H04W	G09G	G06T
Description	Electric Digital Data Processing	Transmission of Digital Information	Pictorial Communication[54]	Speech[55]	Wireless Communication Networks	Arrangements or Circuits For Control of Devices	Means To Present Variable Information	Image Data Processing or Generation
Facebook	32.01%	20.34%	5.63%	10.35%	0.85%	3.28%	1.47%	3.33%
Apple	32.39%	7.53%	5.83%	1.38%	1.41%	7.48%	3.84%	3.40%
Amazon	34.67%	20.71%	3.92%	11.24%	3.45%	1.82%	1.06%	2.17%
Alphabet	36.36%	10.10%	8.30%	6.56%	3.56%	3.49%	0.77%	3.37%
Netflix	20.08%	30.96%	35.15 %	7.11%	0.00%	0.00%	0.00%	2.09%
Microsoft	49.63%	15.28%	6.09%	4.12%	1.88%	1.85%	0.91%	4.36%
Peers	27.93%	12.58%	3.31%	3.03%	0.67%	4.22%	0.59%	1.57%
Close Peers	34.29%	34.37%	3.61%	6.62%	0.39%	4.13%	0.28%	2.77%
							Others	46.10%
								13.54%

[54] For example, Television Data Processing Systems or Methods, Specially Adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes.

[55] Analysis or Synthesis; Speech Recognition; Speech or Voice Processing; Speech or Audio Coding or Decoding

This suggests that one reason, and perhaps the main reason, Big Tech firms are successful is because their founders and successive executives and boards chose to not only to build and curate big data assets, but to invest big in R&D. Much of the R&D spending helps manage and mine big data but some of it is invested in "blue sky" projects that can enable entirely new products and services. Several Big Tech firms are relentless in making big bold bets to maintain their commercial success.[56]

Some claim that large digital players are "very difficult to dislodge."[57] It was noted earlier that niche strategies can be an opening wedge, and there is greater vulnerability than is often assumed. Notwithstanding, it is often true that when firms invest heavily and wisely in R&D they become resilient. It's always difficult to dislodge strong and resilient competitors. However, that's usually a matter to rejoice about, not complain about.

The focus on R&D here is in juxtaposition to standard static competition economics which ignores the fact that R&D investments and the innovation that it enables impacts competition. This is in part the endogeneity issue discussed earlier. Failure to recognize this linkage reflects an unfortunate blind spot in static analysis. The paper by Padilla et al. in this volume underscores this point too.[58]

INVESTMENTS IN BIG DATA ACQUISITION AND ORCHESTRATION

Many tech companies also invest in aggregating customer behavioral data to seize opportunities which are distant from their core business. Apple, for example, has been augmenting the health monitoring capabilities of its Apple Watch devices.[59] At one level, Amazon can today be thought of as a retailer; Apple a hybrid hardware maker and platform service provider; Google as a search and advertising company; and Facebook more like a publishing and advertising company. Both Google and Facebook compete for digital advertising dollars, and Apple is now entering the fray too and beginning to compete in this domain against by displaying advertisements on

[56] Google put it as follows in their 2004 IPO letter: "Our business environment changes rapidly and needs long term investment. We will not hesitate to place major bets on promising new opportunities. We will not shy away from high-risk, high-reward projects because of short term earnings pressure." 2004 Founders IPO letter: "An Owner's Manual" for Google's Shareholder, Alphabet Investor Relations

[57] Jacques Cremer et al (2019, p3)

[58] *Supra note* 35.

[59] *See* K. Fukuoka and N. Shimizu, "Apple's Patent History Reveals a Major Push into Autos" *Nikkei Asia* July 25, 2022.

its App Store and its finance and news apps. It has embarked on the difficult task of growing its advertising business while also prioritizing privacy.

However, it's important to recognize that the competitive advantage of Big Tech platforms lies not only on their R&D but also on data aggregating and processing capabilities, which yield value to users and content providers alike. Users benefit from being able to connect with each other and being shown more relevant content, while content providers can reach a broader audience. Advertisers increase returns by targeting ads to potential customers, enhancing efficiency and reducing unnecessary informational noise to uninterested users. Advertisers often, but not always, find that their advertising spend has the most impact when they partner with Google and Facebook and other platforms.

As more companies embrace digital transformation, the circle of potential cross-industry entrants widens. Traditional hardware businesses are now becoming software intensive. Tesla, for example, renowned for its electric vehicles, is considered by many to be a software company.[60] Its in-car software is praised by customers, and it pioneered the idea of 'over-the-air' software updates to upgrade vehicle functionality Tesla is a serious contender in the race to develop autonomous driving software and it has acquired companies to augment its factory automation capabilities. In addition, it has launched new software called Autobidder that it claims will allow owners of utility-scale battery installations (a growing part of its business) to trade and manage energy across the electric grid. Each of these aspects of its business is able to improve rapidly by processing the data generated by users. Early deployment of autonomously driven vehicles will help its AI systems learn faster and get better, potentially yielding a commanding lead. Each Big Tech company operates as an asset-light "data factory," leveraging data centers to support their operations and improve their products.

MONOPOLY POWER IN DYNAMIC ENVIRONMENTS?

MYTHS ABOUT DIGITAL COMPETITION

With the emergence of digital platforms, there has been a rush by some observers to draw (false) conclusions about the new nature of competition. As already noted, here are several implicit assumptions which have become commonplace in antitrust circles. Central pillar to this conventional wisdom is the belief that network effects and scale and scope economics are strong and inexorable. This is despite the fact that it is dynamic competition which

[60] Yarrow Bouchard, *Tesla is a Software Company,* SEEKING ALPHA (Nov. 10, 2017), https://seekingalpha.com/article/4123319-tesla-is-software-company. Today, Tesla has a highly sophisticated self-driving system called Full Self Drive. This indicates it is as much, if not more, a software company than a hardware company.

lies at the core of competition in the digital space.[61] The competitive narratives in the prior section blows asunder any notion of inexorable market leadership.

More careful scholars will recognize that there are several conditions that undermine the conclusion that scale, scope, and network economics lead inexorably to monopoly. First, the monopoly mantra assumes that switching costs are high and that multihoming does not exist. With respect to the latter, it's clear that many users can and do use multiple platforms. The evidence indicates that consumers have a rich array of choices. Even Google, commonly viewed as an entrenched incumbent in "general" search, faces competition from Microsoft's Bing, TikTok, and of course Amazon (for shopping). ChatGPT also challenges Google, as users increasingly turn to generative AI for certain queries. Each niche entrant has the possibility to expand and conquer elements of general search, which itself is being challenged as a category. It is by no means clear that there is a meaningful general search market.

Of course, one should also recognize that Google search is free. It seems almost farcical to be concerned about monopolization of a market where the price is zero. Of course, there is the opportunity to leverage search for advertising revenues; but it is economically little different from being concerned that the Red Cross is dominant in the activity ("market") for blood donations.

Economies of scale, particularly when AI assisted, may well be considerable in the world of digital technology. However, this has social benefits inasmuch as it leads to efficiencies and generally results in lower prices and better services.

Perhaps the great paradox of digital services is that entrepreneurial and future-oriented leaders like Jeff Bezos are willing to build great enterprises and accept quite low margins, not with a total recoupment strategy (since it's not at all clear that one is available) in mind but with a desire to do good and build customer goodwill, which is what policy makers and antitrust officials should hope for in the best of circumstances. The presumption that high concentration (in some poorly defined markets) causes consumer harm that requires antitrust intervention is highly problematic. There are new and different forms of competition at work requiring one to almost completely rethink the above-mentioned orthodox Mason-Bain's structural presumptions from the old industrial economy.

[61] See Evans, David S. and Schmalensee, Richard, Debunking the 'Network Effects' Bogeyman (Dec. 2017). Regulation, Vol. 40, No. 4, Winter 2017-2018, Available at SSRN: https://ssrn.com/abstract=3148121

Another assumption that is rarely spelled out is that demand is homogeneous. Henry Ford could sell a standard Model-T Ford that was available in only one color (black) for almost a decade. Demand in today's world of plenty is much more heterogeneous and changes daily. Accordingly, there is a lot of room for niche players, a phenomenon discussed earlier. The big platforms are often not able to serve special requirements well, leaving competitive openings, and exposing vulnerabilities.

Consider whether Amazon could supply a comprehensive range of auto parts. Auto parts differ by make and model and it seems exceedingly unlikely that Amazon can compete effectively against niche players. For consumables such as windshield washer detergent, it's perhaps well positioned; but for the left headlight assembly on a 1975 Honda Civic, it is a more difficult challenge. Highly specific knowledge is required. AI may eventually help Amazon get there. In the meantime, specialist providers thrive.

In short, the populist paradigm has weak foundations. Accounting for managerial capabilities unveils a whole raft of other dimensions that are required for marketplace success. The weakness of competitors without strong dynamic capabilities then becomes apparent.[62]

Accordingly, identifying monopoly that is (antitrust) policy relevant is an important exercise.[63] One step in the direction of identifying pure monopoly rents is to look at indicia of dynamic competition. If the indicia of strong dynamic competition are present, the likelihood of monopoly power is low.

The competitive landscape is different in high-technology industries, so it is important to recognize that the traditional hallmarks of monopoly, such as reduction in output or increases in prices, are rarely seen. This is either because: (1) monopoly power is so difficult to acquire in high-technology industries, or (2) the traditional hallmarks or indicia of monopoly are no longer operational because the benchmarks (the competitive levels of price and output) are unobservable and very difficult to estimate.[64] This raises anew the question of how to identify monopoly, and how to measure market power. This is obviously one of the most basic questions in antitrust. Answers to it leave much to be desired. It requires one to go back to the first principles.

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[62] See David J. Teece, "The Dynamic Competition Paradigm: Insights and Implications" Columbia Business Law Review, (2023)

[63] Policy relevant means that its power that enforcement agencies ought be concerned about. As discussed later, not all forms of market power, even when properly measure, are troublesome.

[64] Adherents to the static model will commonly assert, when they observe an industry expanding rapidly and prices falling fast, that output would be yet higher still and prices yet lower still. This position is audacious and usually highly speculative.

Relatedly, competition in tech and knowledge-based industries is not, in the first instance, profit oriented, but "mission oriented, as Brian Arthur pointed out 30 years ago.[65] Focusing solely on profit maximization can be misleading and counterproductive. It distracts more than it helps. This perspective, of course, leaves many economic theorists in an awkward position. Profits matter, but so does mission. In dynamic environments and in emerging industries it's not helpful to have too narrow a view of the goals of the enterprise.

RETHINKING THE MONOPOLY CONCEPT

A century ago, Irving Fisher defined monopoly as an "absence of competition."[66] Subsequent treatments have done little to improve upon Fisher's process-oriented view which is nevertheless consistent with the framework advanced herein.

Consider other definitions of monopoly provided in modern textbooks. Pindyck and Rubinfeld define it structurally: "a monopoly is a market that has only one seller"[67] and "[f]irms may be able to affect price and may find it profitable to charge a price higher than marginal cost."[68] Carlton and Perloff point out that a "monopolist recognizes that the quantity it sells is affected by the price it sets."[69] The emphasis is on whether a firm can profitably raise price. These traditional explanations are consistent with the static model and seem somewhat out of context, when innovation is defining the competitive landscape.

Implementation of a dynamic competition framework requires a proper assessment of supply-side factors, including capabilities, entry barriers, "isolating mechanisms"[70] and incumbency. Rather than highlighting incumbency as a shield, the dynamic competition paradigm sometimes exposes incumbency as a liability. Nascent and peripheral threats over the horizon can energize competition and investment in R&D. Incumbents often appreciate that, their portfolio of ordinary and super-ordinary capabilities may be poorly matched to future competitive circumstances, making them

[65] See Brian Arthur "Increasing Returns and the New World of Business" Harvard Business Review July – Aug 1996.

[66] IRVING FISHER, ELEMENTARY PRINCIPLES OF ECONOMICS The Macmillan Company, 329 (1913).

[67] ROBERT S. PINDYCK & DANIEL L. RUBINFELD, MICROECONOMICS Pearson 8th ed., 357 (1992).

[68] Pindyck & Rubinfeld (1992)

[69] DENNIS W. CARLTON & JEFFREY M. PERLOFF, MODERN INDUSTRIAL ORGANIZATION 1st ed., 97 (1990).

[70] For a discussion of isolating mechanisms, see Richard Rumelt "Theory, Strategy, and Entrepreneurship" in D Teece (ed) The Competitive Challenge: Strategies for internal innovation and renewal (Cambridge: Ballinger 1987)

incredibly vulnerable, despite high market shares in some (likely poorly defined) relevant markets.

What ought be abundantly clear, but often is not, is that profits and cash flow help fuel R&D and innovation,[71] and along with it the competitive process. In the digital platform context, the goal over time is to win profits from the ecosystem; and competition for those profits has horizontal, vertical, and lateral elements. Because of the multisided nature of platforms, it makes no sense in that context to focus on competition in just one relevant market. It is simultaneous competition across and within traditional domains that are relevant.

As noted earlier, the zero-profit world of (static) perfect competition is anything but perfect. It is not just a dull regime; it would leave the economy stagnant and there is nothing for the consumer or society to look forward to. Marketplaces that are perfectly competitive, yet have technological opportunities available should be of more concern to antitrust enforcement agencies. The absence of any market power or the possibilities for it could be the problem.

Monopoly Power That Warrants Policy Attention

In a market circumstance where innovation is ubiquitous, a monopolist cannot be readily identified by traditional (textbook) marginal cost pricing tests, such as the Lerner index, or by market share. Market share is a highly questionable proxy for market power in single sided markets, even more so with multisided markets. Clearly, price cost margins on one side of a multisided market provide minimal insight into overall profits/market power. The SSNIP test by design only looks at existing markets. It is not tuned to encapsulation the effect of the creation of new products that don't currently exist. The combined effect of multisided markets and product innovation considerations is such the market definition is a highly problematic analytical tool to use in the digital economy. Market share sheds little light on market power. An assessment of capabilities of all firms (whether in the product market or not) that are potential contenders will help. What's really needed is a thorough review of competitive constraints, both seen and unseen.

[71] Many studies in many industries show that R&D expenditures are very much driven by cash flow, which is closely related to profitability. See, for example. Armour and Teece "Vertical Integration and Technological Innovation" *Review of Economics and Statistics* 62:3 (Aug. 1980), 470–474. In the early stages of enterprise development, government subsidies and other support programs assist R&D. Except in biotech, institutional venture capital doesn't usually support deep tech until it is close to market.

Perhaps a more meaningful approach to monopoly power and monopoly pricing, which is conceptually correct but hard to quantify, is to ask whether consumers are paying a price higher than is needed to draw forth the investment required to develop, design, and provide the new products and services they desire. If not, then the observed price is the right (socially correct) competitive price. Such a (dynamic) test is admittedly complicated to administer.

A more operational approach for the assessment of market power is to ask whether the firm at issue is able to hold on to its market leadership position in dynamic markets without innovating. The answer to this question ought reveal whether undesirable market power is being exercised. Table 3A and 3B summarizes indicia of policy relevant market power, according to the static and the dynamic competition paradigms.

TABLE 3A. INDICIA OF (POLICY RELEVANT) MONOPOLY POWER

Mainstream (Static Competition) Paradigm	Dynamic Competition Paradigm
High HHI	---
---	Sustaining high market share without innovating
High prices and output restriction	Stagnant sales
High monopoly profits, high Ricardian profits, high Schumpeterian profits	High non-Schumpeterian or non-Ricardian profits
"Easy life"	"Easy life" with little to no investment in future innovation
High value for Lerner index (P-MC)/P[72]	---

Key: (---) means generally irrelevant

Competition agencies and courts are often presented with allegations of monopoly power, unfair competition and anticompetitive business conduct which has supposedly been detrimental to competitors or to consumers. The competition economist is left to assess whether the identified conduct actually took place, whether it is anticompetitive, and if so, what is the impact. This exercise cannot be properly done in the context of innovating firms in the

[72] The index can take the range 0-1

digital economy without first understanding innovation itself, the contractual arrangements and business decisions needed to both create and capture value from innovation. The latter is as important as the former.

As indicated, in the dynamic competition paradigm the crucial difference between monopoly and competition is that with competition market forces both compel and invite improvement in the product offerings available to the customer. Actionable monopoly likely exists when there is no compulsion from the marketplace to contest its position. In short, with monopoly, a firm in the tech sector is able to hold a position of market dominance without innovating.

Thus, policy-relevant monopoly is not a situation of high market share; nor is it a situation where profits are high, or where prices are above marginal cost. The monopoly of concern is one where profits are high and there is an absence of innovation and dynamic competition, and the company is somehow shielded from new entry, i.e., insulated from competition from other innovators and potential competitors. Such a monopolist could stay ahead without innovating.

A market that is experiencing strong dynamic competition is economically and socially more appealing than a market characterized by strong static competition. Whereas the latter may experience occasional price wars and minor competitive skirmishes (often due to business cycle/overcapacity issues), it is not particularly exciting for consumers. They get to pocket discounts but never see or experience new, innovative goods and services.

Market conditions are quite the opposite with strong dynamic competition. There are robust innovation ecosystems and vigorous ecosystem-to-ecosystem competition. Firms spend heavily on R&D, new products and services get launched, firms enter and exit, even successful firms are constantly renewing and restructuring, employees are usually paid well but work very hard; and there is excitement in the air as growth is likely taking place. There may also be a fog around what is happening on the competitive fringe, impenetrable to some, clearer to others. Venture capital and private equity firms are engaged in providing financing alongside public capital markets. Outside capital is further fuel for dynamic competition. Fortunes are won and lost, and deals are made, jobs are created and destroyed all at once. Profits due to innovation and entrepreneurial risk taking can be referred to as Schumpeterian; quasi-rents/profits from the employment of scarce resources (assets) can be referred to as Ricardian.[73] Table 3B summarizes some of the

[73] See D.J. Teece and M. Coleman "The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries," *The Antitrust Bulletin* 43:3/4 (Fall–Winter 1998), 801–857.

more traditional characteristics or indicia from the static paradigm, and juxtaposes them against dynamic competition indicia.

TABLE 3B. INDICIA OF COMPETITION

MAINSTREAM (STATIC) COMPETITION	**DYNAMIC COMPETITION**
Unconcentrated markets	Robust innovation ecosystems
New entry	New entry/ and associated competency-enhancing and destroying innovation
Price competition	Price competition and performance improvement
Competition for shares of existing markets	Competition to create new (future) markets and competition for and in those markets
-	High R&D/expenditures and other investments in innovation
-	Active asset orchestration
-	Constant repurposing (repositioning) of assets , and active M&A
-	Disruption and renewal/restructuring both manifestations of competition
-	Variety and experimentation in business methods and models
-	High rates of new enterprise formation
Cost-reducing, efficiency-focused organizational culture	Organizational culture that favors innovation
Homogenous competitors	Heterogenous competitors / complementors as incipient competitors
Markets in equilibrium	Markets in disequilibrium

Zero economic profit	Positive Ricardian, Knightian/ Schumpeterian profits

To summarize, using the lens of the dynamic competition paradigm/ framework, the hallmark of a monopolist is that it can continue to earn steady rents from an ecosystem without innovating. From the perspective of dynamic competition, the homogeneity of firms and fragmentation of markets is not a virtue. Nor are low profits. Low profitability not only makes R&D difficult to support; it also reduces enterprise resilience and tends to be associated with low wages and unreliable supply. Through a dynamic competition lens, the situation of perfect or near-perfect competition is, as already noted, anything but desirable. Markets are populated by a large number of lackluster firms… what are sometimes called "the living dead" or "zombie" firms. This ought to be where competitive agencies focus some of their attention.

The idealized state of competition through the dynamic competition lens is one in which innovation ecosystems are robust and there is strong growth in the market and cooperation and competition within a broad ecosystem (e.g., mobile wireless) and/or one in which there is ecosystem-to-ecosystem competition. Monopoly power can be recognized where a firm holds a very high share for several years without innovating.

In the static model, a hallmark of monopoly power, as noted, is a restriction in output. However, it is often very unclear what the right "but for" output level should be. With respect to dynamic competition, projects are canceled routinely as most innovations don't work out. However, this ought not generally be considered as an anticompetitive restriction in output. Using the language of error costs, if the cancellation of projects is classified as output restriction, then the chance of false positives is high. One is hard pressed to argue that each cancelation represents "suppression" or that there is some optimal level of innovation which is not being achieved.

With an innovating monopolist,[74] there is no equivalent analog to the normal mantra that monopoly leads to high prices and the restriction of output, other than (possibly) the arguments that monopoly power leads to the suppression of innovation. Hence the need to develop new indicia.

The methodologies often employed by competition economics anchored in the static paradigm often focus on the number of competitors, entry barriers and other structural issues. Market share is considered a good proxy for

[74] Of course, if one accepts the old adage of Professor John Hicks… that the monopolist leads the easy life (mentioned earlier and below) then the notion of a "dynamic monopolist" is an oxymoron.

market power. Market power in turn leads to economic rents which result in overcharges to consumers. Too often anything that competitors don't like is deemed an exclusionary practice. [75] With the dynamic competition paradigm, these traditional concepts are relegated to secondary importance. Competition agencies can take comfort that dynamic competition is alive and well when they observe the Table 3B right hand column hallmarks. When these hallmarks are evident, there is likely no "quiet life" for the incumbents. That's not to say that there cannot be anti competitive conduct at issue. Rather, it suggests a low likelihood, thereby allowing enforcement agencies to allocate their scarce resources elsewhere.

Moreover, it is important to recognize that with digital competition, temporary high profits ae the reward for innovation and accepting the requirement and risks of competing under deep uncertainty. Complexity economist Brian Arthur warned 30 years ago that there is a temptation to single out dominant players and hit them with an antitrust suit. As he noted, this reduces antitrust regulation to a brawl in an old west saloon: "if you see a head, hit it." [76] This temptation has clearly not been resisted in the EU, and now the US has fallen victim too with suits against Apple, Google and others.

DYNAMIC COMPETITION: RE-EMPHASIZING POTENTIAL COMPETITION AND REINVIGORATING SUPPLY SIDE CONSIDERATIONS

POTENTIAL COMPETITION MORE IMPORTANT THAN ACTUAL?

One of the most radical points of difference between static and dynamic competition is that dynamic competition sees potential competition as the primary driver of competition, rather than actual competition and associated market shares. The most (dynamically) capable executives are focused less on actual market competition and more on the next round of innovation and figuring out "the next big thing," and how to create the markets of the future. This perspective aligns with recognizing that competition for future markets is more powerful and important than competition within the market. However, in the dynamic context, markets must first be developed, so

[75] Anti big business sentiment has been imbedded in the American antitrust tradition since the Sherman Act of 1890. Antitrust emerged because of the public's fear of "trusts." The concern went beyond the wealth effects and included fear of interference with the institutions of democracy. These sentiments have never led to bigness itself being illegal. (Monopoly power, of course, is not about absolute size of the enterprise. It's about control of markets.) That said, Supreme Court Justice Louis Brandeis was a champion of small business. He wrote an essay in Harper's called "The Curse of Bigness;" at the same time he did not believe the antitrust laws should encourage "ruinous competition."

[76] Brian Arthur "Increasing Returns and the New World of Business" *Harvard Business Review*. July-Aug 1996.

business firms must incur those costs as they endeavor to win leadership positions in such markets.

It must be recognized that in the tech sector, firms face deep uncertainty. Every day, "management becomes redefined as a series of quests for the next technological winner."[77] Management is forward-looking and mission-oriented and on high alert. As former Intel CEO Andy Grove put it, "only the paranoid survive."[78]

In dynamic environments, the rules of competition are constantly changing. Tech companies constantly compete with each other and with new entrants to create new markets. Enforcement agencies can easily fall into the trap of focusing on the present while neglecting the future. In regimes of rapid technological change, which is often the norm in dynamic environments, potential competitors are, as noted, not only ubiquitous; they exert disciplining forces on incumbents, perhaps even more so than actual competitors. This is in line with Hovenkamp's statement that:

> Defining a market more broadly or narrowly might instantly transform a firm from a "potential" to an "actual" competitor, or vice versa[79].

Since potential competition is as important, if not more important, than actual competition, it receives great attention in the dynamic competition paradigm. Yet the potential competition doctrine has been remarkably stagnant for over a century in antitrust economics, and perhaps for half a century in American antitrust law too. (See the excellent survey in this special issue by Herbert Hovenkamp). As Prof. Hovenkamp points out, under US law, potential competition is expressed primarily in the Clayton Act as it relates to mergers, where he notes that "many of the theories involve considerable speculation about future events." However, from an economics perspective, potential competition is equally relevant to the assessment of monopoly power. Strong potential competition will discipline and animate an incumbent with high share. The 2023 merger guidelines re-emphasizes the power of potential competition and states that "mergers can violate the law when they eliminate a potential entrant in a concentrated market."[80] There is

[77] ibid

[78] Andy Grove "Only the Paranoid Survive" Doubleday 1996. See also Evans, David S., Why the Dynamics of Competition for Online Platforms Leads to Sleepless Nights But Not Sleepy Monopolies (July 25, 2017). Available at SSRN: https://ssrn.com/abstract=3009438 or http://dx.doi.org/10.2139/ssrn.3009438

[79] *See* Hovenkamp, Herbert, *Potential Competition*, U. Pa., Inst. for L. & Econ. Research Paper No. 23-36, 64 pages (Jan. 15, 2024) (Antitrust L.J. forthcoming 2024).

[80] U.S. DEP'T OF JUST. & FED. TRADE COMM'N, MERGER GUIDELINES § 2.4 (2023), www.justice.gov/d9/2023-12/2023%20Merger%20Guidelines.pdf [hereinafter 2023 MERGER GUIDELINES].

more than a hint that potential competition should be considered as powerful; but the guidelines seem reluctant to recognize that the number of potential competitors, in a diverse and vibrant economy such as the US, are likely numerically large; so the loss of a potential competitor when there are others is of little concern, and may be very positive for innovation and competition if it results from a merger that actually strengthens the merging firms in a way that enhances dynamic competition.

Potential competitors, as the merger Guidelines note, are those firms that have the "capabilities and the incentives to enter or expand their presence in response to changing conditions." Determining this under the Guidelines involves assessing factors like technological advancement, access to distribution channels and barriers to entry. The timeframes used by the agencies are usually 1–2 years, far too short if a proper assessment of competition is sought. This is because even the prospect of entry, not just the actuality of entry, is a galvanizing factor in the technology space where an entire market can be lost in short order.

Economists often use econometrics to try to identify the strength of potential competition through the estimation of supply elasticities. However, such approaches are hallmarks of the static model, as price is not the main competitive instrument used by new entrants in dynamically competitive industries. Features and performances are often more powerful. Moreover, the product has to exist and be sold before it can generate the data needed for the estimation of econometric models. Accordingly, and perhaps inadvertently, the desire of economists and others to be data-driven leads to a silent bias towards static approaches and equilibrium analyses. The dynamic competition paradigm counsels a more old-school approach, giving equal weight to the supply side of the market.

The dynamic competition "school," identified earlier, perhaps showed its first signs of life in debates over the Clayton Act. As Hovenkamp put it:

> One camp, which was more influenced by classical political economy, tended to see potential competition as a powerful force that was always present to discipline firms who attempted to assert monopoly control. As a result they were not particularly concerned about monopoly. At the other extreme were those who had almost no faith in potential competition, believing that only actual rivals could effectively discipline a firm bend on monopoly.

Today's dynamic competition school has considerable faith in potential competition as a very powerful force especially in the regimes of rapid technological change, digital or otherwise, where "unseen" competitors are likely ubiquitous, although not universally so.

U.S. case law distinguishes between actual and perceived potential competition. The Supreme courts distinction (made in the 1974 Marine Bancorporation decision) between actual and perceived potential competition is appropriately analyzed by Hovenkamp.[81] (Actual focuses on a merger eliminating the possibility of procompetitive entry by the acquiring firm; perceived focuses on eliminating a significant present competitive threat that is currently constraining the behavior of firms already in the market). Hovenkamp asks "whether a half century later these two doctrines continue to provide an accurate and complete picture of the potential competition merger landscape" (p27). He notes that the 2023 merger guidelines "restate robust actual and perceived potential entrant theories with little change from foundations in the 1960s and 1970s."

Adherents to the (authentic) dynamic competition school see potential competition as likely quite powerful, due in part to the numerosity of potential competitors, but also to their unorthodox strategies and capabilities. Strategies are unorthodox because when there is deep uncertainty, there is no dominant strategy. Chances of a "surprise" to incumbents is thus much higher. There are two implications of importance:

i. The disciplinary power of potential competition and "unseen" competitors is likely a major factor in limiting any monopoly power.

ii. The agencies can and should do a better job of properly ascertaining the depth and breadth of such competition. Most have legal authority to make civil investigatory demands for information from potential competitors. This gives them information that incumbents don't have. Special analysts from outside the industry and, in the case of deep tech, scientists at universities and from government labs and elsewhere can often be helpful too. The author's experience is that such inquiries by the agencies is anything but exhaustive, despite their special powers to peel away (secondary) uncertainty.[82, 83]

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[81] *Id.*

[82] Consider Illumina's decision to divest Grail after a US Court of Appeals decision supporting the FTC. The FTC seemed to believe that Illumina's DNA sequencing instruments are a bottleneck with respect to early cancer detection/ cancer screening. This assumption is wrong and there are (potential) competitors not using DNA sequencing for cancer detection which have technologies that are protein based and far superior. One company that has such technology is Milagen, based in Emeryville, CA. (This author is chairman of the board.) Milagen technology is about to be commercialized and will make a mockery of the FTC case. The FTC did not bother to contact Milagen.

[83] The Nobel Laureate economist T. Koopmans (Three Essays on the State of Economic Science, Cowles Foundation, Yale University, 1957) distinguished

Of course, to the extent that potential competition is relevant to mergers, it is also relevant to any assessment of market power, including Sherman Section II cases. Put differently, consistency requires the agencies to recognize the importance of potential competition in both contexts. And as the guidelines recognize, both incentives and capabilities are relevant to the assessment of potential competition.

Unfortunately, competition economics has only just begun to gain an understanding of the importance of capabilities to the performance of both incumbents and potential competitors (and as discussed below, to what some call nascent competitors). This is subject matter that today's dynamic competition "school" has taken seriously[84], and basic elements are outlined below. Absent an understanding of capabilities, there is a high likelihood that market outcomes will be attributed to monopolistic practices when much deeper and more subtle dynamic forces are at work. Moreover, M&A analyses and the assessment of potential competition will be inadequate unless capabilities are understood and taken into account. Accordingly, they are outlined in the next subsection.

CAPABILITIES AND THE FOUNDATIONS OF FIRM LEVEL COMPETITIVE ADVANTAGE

General

"Capabilities" theory and capabilities thinking are still alien concepts in the field of competition economics. However, the dynamic competition school sees capabilities as a central pillar to the understanding of the foundations of firm level competitive advantage. Competitive advantage, which places a company in a favorable business/market position, is often attributed to superior managerial foresight, skill, acumen, and execution—referred to here as (dynamic) capabilities. Capabilities theory can potentially help provide a competing explanation for high market share. Without an understanding of capabilities, the probabilities that the agencies and the courts together with the economists that advise them will get it right is quite low. There is always a compelling need to keep Ronald Coase's admonition in mind:

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between (a) primary uncertainty which is unforeseeable, consisting of random changes in the state of the world and (b) secondary uncertainties, arising from lack of coordination across decision making centers within an organization or a network. This second type of uncertainty can bend to deep factual inquiry.

[84] See, for instance, N. Petit & D. Teece "Innovating Big Tech firms and competition policy: favoring dynamic over static competition", *Industrial and Corporate Change*, Vol 30, Issue 5, Oct. 2021 & D. Teece "The Dynamic Competition Paradigm: Insights and Implications", *Columbia Business Law Review*, Vol 2023, No. 1, 2023.

> "if an economist finds something—a business practice of one sort or other—that he does not understand, he looks for a monopoly explanation."

For this reason alone, we need a theory of capabilities in competition economics to give the profession a wider choice of explanatory variables to examine when observing competitive and/or monopoly outcomes. We also need capability frameworks and thinking for economic science more generally. Noted London school of Economics professor John Sutton was likely correct when he remarked:

> "The proximate cause [of differences in the wealth of nations] lies, for the most part, in the capabilities of firms."[85]

Once one studies the capabilities of firms, popular competition/antitrust economic explanations for business success and failures in the tech sector often ring a bit hollow. Success often has less to do with scale, scope, increasing returns or network effects, these being the main factors considered by adherents to static frameworks. Rather, technology, innovation, capabilities, and management are usually more important drivers of observed market outcomes.

I focus on the capabilities of firms in general but particularly in the tech sector not because the sector is entirely unique, but because it illustrates the importance of "capabilities" theory to understanding enterprise performance. Moreover, it is the superior capabilities of business firms that drive dynamic competition and can help overturn the existing market structure. If the concept of capabilities had been developed earlier in economics, Schumpeter would surely have used it in his work.

I place "capabilities" in quotation marks because they cannot be reduced just to the intangible talents of managers. Rather, "capabilities" embrace a mixture of organizational and individual attributes[86] depending on their type, as discussed later. Relevant metrics include R&D spending, patents, product development success, investment levels to support innovation, decision making protocols, and corporate culture. The planning documents, product development, activities, the decision making methods and leadership styles of the executive team reflect management's attitude and skill regarding risk,

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[85] John Sutton, Fellow of the Acad., Keynes Lecture in Econ. at the British Acad.: Rich Trade, Scarce Capabilities, Industrial Development Revisited (Oct. 26, 2000), *in* PROCEEDINGS OF THE BRITISH ACAD., 2001, at 265.

[86] *See* Mie Augier & David J. Teece, *Dynamic Capabilities and the Role of Manager in Business Strategy and Economic Performance,* 20 ORG. SCI. 410 (2009).

innovation, and competition. These factors collectively underpin dynamic capabilities.

As noted, the longer-term success or decline of Meta, Amazon, Alphabet, and other Big Tech firms are not as dependent on current market shares or network effects, as many assume. The single most important facet is likely their mastery of new technologies (including, for example, artificial intelligence) and their development of new capabilities.[87]

As will be shown below, capability theory is the portmanteau that allows strategic management[88] concepts to inform both a deeper understanding of firm-level competitiveness and associated business conduct (both competitive and anticompetitive) that impacts innovation and the functioning of competitive marketplaces. A capability theory of the business enterprise goes beyond textbook models of firms and provides economic substance to historian Alfred Chandler's concept of the "visible hand" of management.[89] This visible hand of management is as important as the markets invisible hand but has so far been given short shrift in antitrust economics.[90]

The "visible hand" of managers impacts innovation and competition in many ways. The essence of the firm is its ability to allocate non-priced assets or resources to high-value uses, repurposing them if necessary.[91] Capability theory thus leads to a better understanding of the distinctive contributions that different enterprises can make to competition and innovation, especially in highly dynamic sectors. It needs to be an integral part of a dynamic competition paradigm.

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[87] *Big Tech Moves Generative AI To Center Stage*, COMPETITION POL'Y INT'L (Mar. 1, 2023), https://www.competitionpolicyinternational.com/big-tech-moves-generative-ai-to-center-stage/ [https://perma.cc/2695-X8F4]; *From Apple to Google, Big Tech is Building VR and AR Headsets,* THE ECONOMIST (Apr. 9, 2022), https://www.economist.com/business/2022/04/09/from-apple-to-google-big-tech-is-building-vr-and-ar-headsets [https://perma.cc/9HQH-HWHP].

[88] *See* Richard P. Rumelt, Dan Schendel & David J. Teece, *Strategic Management and Economics*, 12 STRATEGIC MGMT. J. 5 (1991). The field of strategic management was once known as business policy. The two terms can be used interchangeably.

[89] ALFRED D. CHANDLER, THE VISIBLE HAND: THE MANAGERIAL REVOLUTION IN AMERICAN Business (1977).

[90] With the exception of strategic behavior

[91] The essence of the business firm is its ability (using the visible hand of management) to allocate non-priced assets/resources to high value uses, repurposing the asset if necessary. *See* David J. Teece, *Technological Innovation and the Theory of the Firm: The Role of Enterprise-level Knowledge, Complementarities, and (Dynamic) Capabilities,* in HANDBOOK OF THE ECONOMICS OF INNOVATION 679, 694–98 (Bronwyn H. Hall & Nathan Rosenberg eds. 2010).

Despite their obvious importance, firm-level capabilities have hitherto barely been mentioned in competition economics—and when they are, the extensive and sometimes quite helpful literature in strategic management is ignored.[92] That said, the DOJ and the FTC in the US and the EC in Europe have made casual references to the concept. The 2010 FTC-DOJ guidelines explained that in merger analysis, the agencies would focus on *capabilities* and incentives to innovate (italics added). However, nowhere do the agencies explain what they mean by capabilities and how they will analyze and assess them. The 2023 DOJ-FTC also noted (rather confusingly, perhaps nonsensically) that "the incentive to compete aggressively depends on the capabilities of firms… development of new factors depends on having the appropriate expertise and resources."

Better stated, it is capabilities (more so than incentives) that enables firms to compete aggressively. Incentives are necessary but not sufficient. Competition agencies conducting merger analysis focus a lot on pre and post-merger incentives to innovate. They pay less, or no attention, to pre and post merger abilities to innovate, which is far more important.

Capability Taxonomies and Supply Side Implications

It is important to delve deeper to discover the omitted variables in the innovation-competition nexus, as employed by competition economists in the US the EU and elsewhere. As noted, the most glaring omitted variable is firm-level capabilities, and there is a considerable body of research on this topic in the field of strategic management which can inform competition economics.[93]

Capability theory respects basic principles from evolutionary and complexity economics and strategic management while at the same time recognizing the role of technical knowhow, management (and boards of directors), business models, and strategy.[94] Economists Nicholas Bloom and

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[92] For example, Frederico et al refer in passing to "overlaps in capabilities" when examining R&D issues in the mergers and acquisitions context, but their use of the concept is perfunctory, and confined to R&D. However, it's a helpful beginning and an acknowledgement that capabilities matter. See Giulio Frederico, Fiona Scott Morton & Carl Shapiro, *Antitrust & Innovation: Welcoming and Protecting Disruption*, Innovation and the Economy. UNIV. CHI. PRESS 125, 146 (2020).

[93] *See* David J. Teece, *Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance*, 28 STRATEGIC MGMT. J. 1319 (2007); David J. Teece, *Towards a Capability Theory of (Innovating) Firms: Implications for Management and Policy*, 41 CAMBRIDGE J. ECON. 693 (2017); CONSTANCE E. HELFAT, SYDNEY FINKELSTEIN, WILL MITCHELL, MARGARET A. PETERAF, HARBIR SINGH, DAVID J. TEECE & SIDNEY G. WINTER, DYNAMIC CAPABILITIES: UNDERSTANDING STRATEGIC CHANGE IN ORGANIZATIONS (2007).

[94] David J. Teece, *A Capability Theory of the Firm: An Economics and (Strategic) Management Perspective,* 53 NEW ZEALAND ECON. PAPERS 1, 29 (2019).

John Van Reener have now discovered, and ironically received recognition for what business scholars have known for 100 years: namely, that management capabilities matter. The fact that their important research on the role of management has only recently crept into the field of economics speaks to the remoteness of the economic theories of the firm to reality. Antitrust economics in the United States and around the world has suffered as a consequence.[95]

The management literature also accepts that the market and ecosystem success that a firm is able to achieve depends on its capabilities, some of which may be fungible, and some of which may be latent. The exigencies of the Second World War showed that General Motors, an enterprise that had not previously made weapons, could switch from making cars and trucks to making tanks—the Cadillac division of General Motors made the tanks, and Buick made airplane engines.[96] The Ford Motor Company, which had dabbled in aircraft manufacturing, most notably with the Ford Trimotor (which was discontinued in 1933),[97] within months began manufacturing B-24 Liberator bombers using a one-mile-long assembly line at Willow Run.[98] The line produced an airplane every sixty-three minutes.[99] In more recent times, Amazon moved from selling books to selling a panoply of products online, then leveraged its information and computing capabilities to offer web services.[100]

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[95] *See* N. Bloom et al "Does Management Matter" *Quarterly Journal of Economics* 2013

[96] A. J. Baime, *U.S. Auto Industry Came to the Rescue During WWII*, CAR AND DRIVER (Mar. 31, 2020), https://www.caranddriver.com/news/a31994388/us-auto-industry-medical-war-production-history/ [https://perma.cc/385Q-RBFM].

[97] Mark Vaughn, *Fabulous Flying Ford: The Tri-Motor Changed Flying Forever*, AUTOWEEK (Oct. 5, 2003), https://www.autoweek.com/news/a2102781/fabulous-flying-ford-tri-motor-changed-flying-forever/. [https://perma.cc/X92A-734A].

[98] *Willow Run Bomber Plant*, HENRY FORD, https://www.thehenryford.org/collections-and-research/digital-collections/expert-sets/101765/ [https://perma.cc/84TX-BKDF].

[99] *Willow Run Bomber Plant*, HENRY FORD, https://www.thehenryford.org/collections-and-research/digital-collections/expert-sets/101765/ [https://perma.cc/84TX-BKDF].

[100] Yun Yu, *Amazon: From a Book Store, to the Everything Store, to Running the Internet,* HARV. BUS SCHOOL (Feb. 1, 2017), https://d3.harvard.edu/platform-digit/submission/amazon-from-a-book-store-to-the-everything-store-to-running-the-internet/ [https://perma.cc/LX2W-AVM6].

Clearly, the underlying resource base and capabilities of some organizations can be quite fungible[101], with strong implications for the assessment of potential competition. As examples above show, when market conditions change, capabilities can be reoriented and equipment and systems repurposed for different products and services. Such supply-side responses are too often ignored, or viewed as an afterthought in static competition analyses.

Given that policymakers and enforcement agencies need to understand how firms compete, competition economics must address resource capability fungibility issues directly. Those issues lie behind the elasticity of supply, which needs capability theory to make it tractable.

Econometric analysis attempting to measure supply side elasticity, if conducted, won't enable inferences with respect to the likely responses to uncertain and not previously experienced future scenarios. More fundamentally, the concept of elasticity of supply is too narrow, and as developed to date, is bereft of an understanding of organizational capabilities and behaviors, preventing it from capturing the nature and variety of supply side responses experienced in the economy. Market shifts can and do trigger the repurposing of capabilities, as the above examples demonstrate. To rely on historically estimated supply elasticities is thus likely a fools errand when technologies are changing rapidly.

To explain or predict business behavior, static frameworks too often focus on incentives and little else. Supply responses are almost always confined to just responses to price signals. The use of incentives to explain and predict firm behavior has been overloaded by old paradigm economists. Incentives are always important; but too often they have been tasked to do double and triple duty in antitrust analyses because competition economics is narrow in its scope thereby yielding too few explanatory variables to help understand complex business structures and behaviors.

Clearly, incentives alone did not bring us the iPhone—it was software and design capabilities that Apple had that incumbents didn't have, coupled with the drive of Steve Jobs and others around him to "make a small dent in the universe."[102] One has to ask why was it not Nokia, Motorola, IBM, or Rim

[101] *See* David J. Teece, *Economies of Scope and the Scope of the Enterprise*, 1 J. ECON. BEHAV. & ORG., 223 (1982). However, its not just the resource base that matters. It's having a management team with the nouse to recognize opportunities and the passion and skill to get the job done.

[102] Steve Jobs, Commencement Address at Stanford University (June 12, 2005). Jobs and the organization he cofounded was driven by purpose. Financial incentives were decidedly secondary for cofounder Steve Wozniak in particular, but also for

that created the iPhone and the iOS platform? Each company had great scale and strong incentives to create an internet-capable smart phone. However, these companies lacked the software capabilities of Apple with its iOS platform. Likewise, the emergence of Tesla as an electric vehicle designer and manufacturer is not well-explained by incentives and supply side elasticities. If incentives were all that mattered, Toyota and GM (with larger market shares) would have less incentives than, say, tiny Mazda to innovate with new products. Clearly, this is not the behavior we observe, as both GM and Toyota are making great progress with electric and autonomous vehicles, more so than Mazda.[103]

To first understand then assess the capabilities of a firm, one must step outside of traditional (static) paradigms and the neoclassical theory of the firm. One must look beyond factors of production, production functions, and "production sets" to recognize the importance of the choices managers make to innovate, organize, and render resources more productive. Strategic games are largely irrelevant. One must investigate how the firm has met or plans to meet customer demand, whether existing or latent, and recognize that technology and know-how do not fall like manna from heaven. Creating value results from research and investment, all oriented, amidst uncertainty, to solving customer problems and reducing frictions in the marketplace.

If a dominant position is created and maintained by superior capabilities, the observed outcomes are laudatory and ought not be condemned. This "capability prowess," like superior foresight, skill, and acumen is quite different in nature from naked market power, as it can be deployed across many markets and be used to create new markets. The fungibility of certain technologies is often highly desirable, not only to the enterprise but to society, because it can lead to the better utilization of assets in place. Application of superior technological and managerial capabilities to different use cases ought not be thought of as anticompetitive "leverage." Rather it's procompetitive use of capabilities, which is economically desirable. However, capability prowess may not last long, absent continued upgrading. No one can patent or monopolize organizational "capabilities." Given the

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cofounder Jobs as well. For some of the early years of the Apple Computer Company, IBM was framed as the nemesis; but the broader goal was to assist individuals and groups in their creative activities. Economic incentives are often a poor proxy for understanding the behavior of such management teams. This is hard for economists to understand as there is little in economic theory to suggest otherwise.

[103] *See Mazda Faces a Steep Uphill Road to EVs*, AUTOWEEK (Dec. 2, 2022), https://www.autoweek.com/news/green-cars/a42137180/mazda-plan-for-evs-by-2030/ [https://perma.cc/GTZ5-BHHS]. This article notes that Mazda is "well behind the rapidly accelerating move from internal combustion to BEV power." It doesn't have many of the relevant capabilities and is relying on a partnership with Toyota to narrow its capability shortcomings.

importance of capabilities to market outcomes and analyses, a brief description of the types of capabilities is outlined below and highlighted on Table 4.

TABLE 4: SUMMARY OF CAPABILITIES

Type	Nature
Ordinary (Operational) Capabilities:	Doing things right (best practices)
Super Ordinary Capabilities:	Beyond best practice for particular specialized technological tasks/activities
Dynamic Capabilities:	Doing the right things, and figuring out the next big thing.

"Ordinary" (and "Super-Ordinary") Capabilities

Ordinary capabilities, which encompass operations, administration, and the regular governance of the firm's activities, allow the firm to produce and sell a defined set of products and services. Ordinary capabilities are embedded in some combination of (1) skilled personnel, including, under certain circumstances, independent contractors; (2) facilities and equipment; (3) non-proprietary processes and routines operating inside the organization; and (4) the administrative coordination needed to accomplish a well-defined but unchanging set of activities.

A firm's ordinary capabilities can be thought of as supporting technical efficiency (and hence productivity) in performing a defined set of activities, regardless of how well- or ill-suited the products and services are to the market's needs.[104] Production and quality control methodologies, order entry, performance measurement, and payroll execution are examples of ordinary capabilities. The corresponding managerial modes include cost control and (static) optimization. High level performance of ordinary capabilities (i.e. strong ordinary capabilities) is very close to the Chicago School concept of (static) efficiency, and it is what economists tend to focus on. Firms with

[104] David J. Teece, *The Foundations of Enterprise Performance: Dynamic & Ordinary Capabilities in an (Economic) Theory of Firms*, 28 ACAD. OF MGMT. PERSPS. 328, 331 (2014); *see also* David J. Teece, *Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance*, 28 STRATEGIC MGMT. J. 1319, 1321 (2007).

strong ordinary capabilities can help energize (static) competition, though not dynamic competition.[105]

The development of excellence with respect to ordinary capabilities leads to the enablement of "best practices" which in turn can lead a firm into competitive complacency. A trap is sprung when market conditions change and/or new technological opportunities emerge, as the single-minded pursuit of efficiency and productivity can compromise the willingness or ability to effectuate change, on a timely basis, towards the new suite of products and processes the market requires.[106] Indeed, O'Reilly and Tushman and many other scholars, as well as senior managers, point to how the pursuit of efficiency can stand in the way of innovation and change.[107]

Further, some "ordinary" capabilities can be referred to as "super-ordinary" and can be reflected in the development of "signature" processes[108] that rest upon application or market-specific knowledge, together with specialized proprietary technological knowhow. Such "super-ordinary" capabilities can allow a manufacturer to make say super high quality and reliable cars, but not necessarily the ones with high demand. They might nevertheless help a particular firm make the world's best polymer membrane, or the world's most high-quality spark plugs.

Dynamic Capabilities

Dynamic capabilities has been defined as "the firm's ability to integrate, build, and reconfigure internal and external [resources and competencies] to address and shape rapidly changing [business] environments."[109] Dynamic

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[105] *See* Paul S. Adler, Mary Benner, David James Brunner, John Paul MacDuffie, Emi Osono, Bradley R. Staats, Hirotaka Takeuchi, Michael L. Tushman, & Sidney G. Winter, *Perspectives on the Productivity Dilemma*, 27 J. OPERATIONS MGMT. 99, (2009).

[106] Henry Ford learned this the hard way. The Ford Motor Company used vertical integration to optimize the production process for the Model T. This worked well until the market shifted. Bringing a follow-on product, the Model A, to market was a long and arduous process that allowed General Motors to get ahead of Ford, a leadership position, GM held for decades. *See* Richard S. Tedlow, *The Struggle for Dominance in the Automobile Market: The Early Years of Ford and General Motors,* 17 BUS. & ECON. HIST. 49, 51-60 (1988).

[107] *See* Charles A. O'Reilly, III & Michael L. Tushman, *Organizational Ambidexterity: Past, Present, and Future,* 27 ACAD. MGMT. PERSPS. 324 (2013). See also footnote 82 and 83 above.

[108] Lynda Gratton & Sumantra *Ghosal, Beyond Best Practice*, 46 MIT SLOAN MGMT. REV. 49, 49 (2005).

[109] David J. Teece, Gary Pisano & Amy Shuen, *Dynamic Capabilities and Strategic Management*, 18 STRATEGIC MGMT. J., 509, 516 (1997).

capabilities animate dynamic competition and must be a focus of future scholarship in competition economics.

Sometimes an enterprise can transfer its ordinary capabilities to new applications and markets and thus lean toward demonstrating dynamic capabilities, discussed below. For instance, Honda took its capabilities in small internal combustion engines from motor scooters into motor bikes and then into small cars and on into outboard motors for the boating industry. Such redeployment requires dynamic capabilities. Apple has gone from the iPod to the iPhone, the iPad, and the Apple Watch, in many cases to consumers' delight. Harley Davidson's unsuccessful foray into perfume and Intel's failure to advance WiMAX and smartphone modems[110] provide opposite examples of the wins and losses of innovations due not to technological failure but to managerial decisions. Redeploying to the wrong opportunities can be fatal, but that is the risk inherent in innovation, a risk that we should applaud a firm for taking. This modality is risky, but it undergirds dynamic competition discussed below.

Doing ordinary things right (technical efficiency) is no substitute for doing the right things. The latter requires dynamic capabilities. As John Chambers, former CEO of Cisco Systems, has observed, companies must be willing and ready to change from doing "the right thing too long" to "the next big thing."[111] Because of failures of competition economists to grasp the importance of capabilities, efficiencies (e.g., scale and network effects) are often over-weighted, and innovation is under-weighted, in terms of their competitive significance.[112]

However, dynamic capabilities do not require one to invent the next big thing. Dynamic capabilities allow a manufacturer of household refrigerators to, say, make refrigerators for nautical use. Pisano refers to the extent to which application capabilities are specific as "the degree to which knowledge is transferable across tasks". Thus, a potential competitor not in a current line of business would be a candidate to be an actual competitor if it has (or can readily develop) the necessary task- or content-specific capability and if market conditions were right. Determining the likelihood of such mobility, as

[110] On July 25, 2019, Apple and Intel announced the sale of Intel's mobile modem business to Apple. This announcement came after Intel's failure to get significant traction for its smartphone modems in the market.

[111] John Chambers, *Turning Setbacks into Success*, LINKEDIN (Apr. 19, 2017), https://www.linkedin.com/pulse/turning-setbacks-success-john-chambers/ [https://perma.cc/E4FD-D4HS].

[112] *See* Paul S. Adler, Mary Benner, David James Brunner, John Paul MacDuffie, Emi Osono, Bradley R. Staats, Hirotaka Takeuchi, Michael L. Tushman, & Sidney G. Winter, *Perspectives on the Productivity Dilemma*, 27 J. OPERATIONS MGMT. 99, 100 (2009).

well as a realistic time frame within which the mobility is likely to occur, lies at the heart of accurately assessing supply elasticities and dynamic competition.

The key clusters of activities that constitute dynamic capabilities can be categorized as sensing, seizing, and transforming.[113] These activities are the domain of the organization, under the guidance of management and boards of directors, and are described below. In the language of econometrics, one can think of "sensing, seizing, and transforming" as the "reduced form" version of a more complicated structural/systems model of enterprise performance.

"Sensing," in the dynamic capabilities context, is the ability, under Knightian uncertainty, to either recognize opportunities before they are fully apparent or, in some cases, create new ones.[114] While there are underlying routines to developing effective R&D programs,[115] dynamically capable management recognizes "signals" from near and far and will demonstrate over time an intuitive capability to make sense of the signals and develop effective product-development strategies. Early as well as later Big Tech success stories are obvious examples.

In the dynamic capabilities framework, "seizing" involves execution and the deployment (or redeployment) of corporate resources, human, physical, and financial. That, in turn, involves the astute implementation of business models, the orchestration of big data, the achievement of strategic alignment, the setting of firm boundaries, and the making of investment commitments.[116]

Dynamic capabilities allow and require proactive managers to effectuate organizational "transformation" in anticipation of environmental change, in a proactive, rather than reactive, fashion. The evolution of firms and the development of capabilities are not completely path-dependent, or limited to best practices or the selection among strategies that all lead to the same given

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[113] *See* David J. Teece, *Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance*, 28 STRATEGIC MGMT. J. 1319, 1319 (2007); David J. Teece, *Dynamic Capabilities: Routines Versus Entrepreneurial Action*, 49 J. MGMT. STUD. 1395, 1396 (2012).

[114] Constance E. Helfat & Margaret A. Peteraf, *Understanding Dynamic Capabilities: Progress Along a Developmental Path,* 7 STRATEGIC ORG. 91, 96–7 (2015).

[115] Organizational routines are often expressed as "standard operation procedures." *See* David J. Teece, *Dynamic Capabilities: Routines Versus Entrepreneurial Action*, 49 J. MGMT. STUD. 1395, 1395–1400 (2012).

[116] Aspects of these activities can be found by reading between the lines of the evolutionary economics literature, but they are certainly not given the full attention they merit in terms of their strategic importance. More importantly, evolutionary economics gives too little attention to the dimension of time, particularly the urgency needed for effective seizing for purposes of competitive response.

end.[117] Instead, the dynamic capabilities that lead to organizational transformation depend upon leadership and entrepreneurial decision making and bold bets and some of them losing ones.

Strong dynamic capabilities enable high performance in new product and process development. They are undergirded by a change-oriented organizational culture, and a prescient assessment of the business environment and technological opportunities. The corresponding managerial modes include asset orchestration, entrepreneurial agility, and forward-looking leadership. These modalities, coupled with technological innovation, drive the revolutionary change that in turn drives dynamic competition. Competitors that have strong dynamic capabilities generally have better competitive and financial performance.[118]

Excellence not only in search ("sensing" in dynamic capabilities terms) but also in sense-making[119] affords the firm the opportunity to stay ahead of competitors and to animate dynamic competition in one-sided or multisided marketplaces. When static factors do not explain competitive outcomes or are subject to multiple interpretations, the dynamic capabilities of the management, as established by company documents, executive narratives, and the record of product development and supporting investments, may clarify those factors and become central to understanding business behavior or assessing competition and future effects, including in the merger review process.

Static competition analysis often mistakenly imputes market power to a weak competitor with a high share of a narrow market but that, in fact, lacks the competitive robustness that sustaining a market position requires.[120] Such

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[117] In an open system, equifinality is the principle that a given end state can be reached by several different means. In the business context, it means that different strategies can sometimes result in similar market positions.

[118] *See* Dan Lovallo, Alexander L. Brown, David J. Teece, & David Bardolet, *Resource Re-allocation Capabilities in Internal Capital Markets: The Value of Overcoming Inertia*, 41 STRATEGIC MGMT. J. 1365 (2020).

[119] David J. Teece, *Capturing Value from Knowledge Assets: The New Economy, Markets for Know-How, and Intangible Assets,* 40 CAL. MGMT. REV. 55, 73–74 (1998). As a quite general matter, it is easy to agree with Winston Churchill when he noted that "True genius resides in the capacity for evaluation of uncertain, hazardous, and conflicting information".

[120] The antitrust case against IBM, eventually dropped, was one such foray. *See* John E. Lopatka, *United States v. IBM: A Monument to Arrogance*, 68 ANTITRUST L.J. 145, 145–47 (2000).

a firm might well be on its way down and possibly out. One cannot assess genuine competitive robustness without assessing dynamic capabilities.[121]

DYNAMIC EFFICIENCIES AS AN OXYMORON

Competition economists sometimes resort to the term "dynamic inefficiency" (or occasionally "dynamic efficiency") perhaps to avoid criticism for neglecting innovation and to maintain the notion that an efficiency logic is sufficient to address capabilities and innovation. The term suggests that an efficiency-based static assessment can account for dynamic considerations.[122] In my view, this "patch" to the traditional framework is insufficient; yet it is a quiet admission of inadequacies in the basic framework.

The references to "dynamic inefficiencies" or "dynamic efficiencies," highlight the tensions between an efficiency model (static competition) and an innovation model (dynamic competition). Innovation almost always compromises efficiency at least in the early stages of product lifecycles. If both are conducted together in the same organizational subunit, prioritizing efficiency will almost always inhibit (if not destroy) the chances for innovation.[123] Definitionally, efficiency and innovation do not fit comfortably in the same organizational subunit.[124] Nor should they belong together in

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[121] In the framework advanced here, capabilities are partly endogenous and partly exogeneous. The trajectory set by the company's founders matters (the exogeneous component) and board selection of top management has exogeneous elements too.

[122] *See* Paul S. Adler, Mary Benner, David James Brunner, John Paul MacDuffie, Emi Osono, Bradley R. Staats, Hirotaka Takeuchi, Michael L. Tushman, & Sidney G. Winter, *Perspectives on the Productivity Dilemma*, 27 J. OPERATIONS MGMT. 99, 104-105 (2009).

[123] *See also*, Pankaj Ghemewat & Joan E. Ricart I Costa, *The Organizational Tension Between Static and Dynamic Efficiency*, 14 STRATEGIC MGMT. J. 59 (1993).

[124] Clayton M. Christensen, THE INNOVATOR'S DILEMMA, 98 (1997) ("The very decision-making and resource allocation processes that are key to the success of established companies are the very processes that reject disruptive technologies: listening to customers; tracking competitors' actions carefully; and investing resources to design and build higher-performance, higher-quality products that will yield greater profit. These are the reasons why great firms stumbled or failed when confronted with disruptive technology change. [Paragraph break] Successful companies want their resources to be focused on activities that address customers' needs, that promise higher profits, that are technologically feasible, and that help them play in substantial markets. Yet, to expect the processes that accomplish those things also to do something like nurturing disruptive technologies – to focus resources on proposals that customers reject, that offer lower profit, that underperform existing technologies and can only be sold in insignificant markets– is akin to flapping one's arms with wings strapped to them in an attempt to fly. Such expectations involve

innovation economics. The upshot is that innovation is qualitatively different from efficiency and should have priority over efficiency, both in management and in policy analyses. It's less about efficiencies and more about effectiveness. Innovation is not just something to protect; it is something which should be given free rein, even if it upsets other competitors.

THE SUPPLY SIDE: "DISRUPTION AND COMPETITIVE DISTANCE"

The dynamic competition framework requires a renewed focus on the supply side of the market. This requires a better understanding of the business firm, which in turn requires an understanding of technological, organizational (and managerial) capabilities. This is the embarrassing lacunae in antitrust economics. In part because of there is a void, too many have started walking away from antitrust economics believing that it is no longer useful for helping to understand competition. This paper disagrees with that position, but does believe that repair work must be done. There seems to be convergence in the issue that innovation really matters with respect to competition policy… both as an enabler and a goal. The task is now to just "get it right", and that's impossible to do without incorporating findings from an extensive literature on innovation which is published outside of mainstream economics journals which are unfriendly to the research styles of other disciplines.

As noted, Joseph Schumpeter, with the concept of creative destruction, was early in drawing attention away from price competition to the supply side and to innovation "which strikes not at the margins of the profits and outputs of the existing firms but at their foundations" Others have explored these issues too.

On closer examination, theories of disruption can be categorized into demand side (where the incumbent had the technological and organizational resources but missed demand shifts… or failed to recognize unsatisfied customer needs) or supply side shifts (they understood the market but didn't have strong superordinary and dynamic capabilities to address a need that they understood).[125] This implicates the notion of capabilities and "competitive distance,"[126] i.e., how hard is it to build or modify the

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fighting some fundamental tendencies about the way successful organizations work and about how their performance is evaluated.").

[125] See D Teece and M Kuyterink "Organizational Capabilities and (Platform) Disruption: Towards a Predictive Model for Management and Competition Authorities", forthcoming in Industrial and Corporate Change, 2025.

[126] David J. Teece, "The Foundations of Enterprise Performance: Dynamic and Ordinary Capabilities in an (Economic) Theory of Firms" *Academy of Management Perspectives* 8(4) (2014), 328-352; "Dynamic capabilities and entrepreneurial management in large organizations: Towards a theory of (entrepreneurial) firm"

capabilities of the business enterprise to support a shift in the company's competitive activities.[127] When assessing market competition and evaluating potential competitors, it is not uncommon for competition economists to talk about "distant players" as being out of the relevant market. For example, Maserati is a distant competitor to Toyota and Ford in automobiles, having a small market share compared to both,[128] and also occupying a distinctive market niche (with styling and performance being essential elements). Each company's sales and market position are quite different, and their price points are different too. To conclude that Maserati and Toyota or Ford are only distant competitors, however, is to misunderstand competition and the competitive process. A proper assessment requires understanding the supply side; and understanding organizational capabilities is necessary if one is to understand supply side opportunities and responses. Particularly in the digital context where products can often be reconfigured with alacrity, the assessment of capability distance helps one better understand potential competition, and supply elasticities, within and across markets.

Despite its obvious importance to the understanding of the supply side of a market and to supply elasticity, the assessment of capability distance (and mobility barriers) is rarely attempted in any systematic way by antitrust enforcers or competition economists. This leads to overemphasis on demand side issues where competition economists feel more comfortable. Needless to say, an unbalanced approach can lead to wrong answers.

Consider how a lack of understanding of capabilities might contribute to the failure of industry analysts and competition economists alike to understand entry conditions in the automobile industry.[129] The automobile

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European Economic Review (2016); "Towards a Capability Theory of (Innovating) Firms: Implications for Management & Policy" *Cambridge Journal of Economics* (2017); *A Capability Theory of the Firm: An Economics and (Strategic) Management Perspective,* 53 NEW ZEALAND ECON. PAPERS 1, 11–12 (2019).

[127] Traditional textbook microeconomics assumes that isoquants are smooth and twice differentiable and that firms can move around with respect to technologies employed at zero cost and with alacrity. For a sense of what a neo-Schumpeterian theory of the firm would look like, see Sidney G. Winter, T*oward a Neo-Schumpeterian Theory of the Firm*, 15 INDUST. & CORP. CHANGE 125 (2006); and David J. Teece, *Technological Innovation and the Theory of the Firm: The Role of Enterprise-level Knowledge, Complementarities, and (Dynamic) Capabilities,* in HANDBOOK OF THE ECONOMICS OF INNOVATION 679, 694–98 (Bronwyn H. Hall & Nathan Rosenberg eds. 2010).

[128] Recent estimates show the worldwide market shares for passenger cars at Toyota (12.0%), Ford (7.3%) and Mazda (2.0%). *See, e.g., Mazda – Market Data Analysis & Forecast*, STATISTA 9 (Dec. 2022).

[129] I am not faulting any agency decision but merely explaining why traditional frameworks are not adequate. If there had have been competition issues to evaluate, this author is skeptical that the agencies would get it right.

industry had been considered to have high barriers to entry; yet Tesla spent only $140 million and $650 million respectively to develop its Roadster and Model S, which were not just new traditional models but new innovative, electric-vehicle models.[130] Tesla relied heavily on alliances with Lotus, Daimler, and Toyota to access components and designs.[131] It built capabilities and an ecosystem for distribution and found partners to install charging stations.[132] Tesla overcame the supposed network effects that the incumbents enjoyed (e.g., relationship with distributors) by employing a business model that didn't need them.[133] In addition, they pursued an "open innovation" model to crowd-source new technology.[134] In short, Tesla quickly built capabilities to take on the incumbents and, in the process, blew a big hole in the conventional wisdom about competition in the automobile industry.[135] However, Tesla is yet to demonstrate that it can make cars at 5,000,000 per year, even though it seems to have scaled better than many thought. Asking such questions brings forward the question of capability distance, which depends not only on the destination, but also on the starting place.

Assessing dynamic competition and the competitive landscape requires a wider lens than what is commonly utilized. It is insufficient to limit competitive assessments to the boundaries of "relevant markets" as they have been traditionally defined. Suppliers, distributors, and peripheral firms must be included in those assessments, which should focus on the capabilities of incumbents and potential entrants if the supply side, the locus of dynamic competition, is to be analyzed in a meaningful manner.

A deeper understanding of capabilities and how they are developed and maintained can assist antitrust analysis.[136] For instance, capability development often requires M&A, which may provide useful explanations for the acquisition of "nascent competitors," as described in the following sections.[137]

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[130] Edward Peter Stringham, Jennifer Kelly Miller, and J.R. Clark, *Overcoming Barriers to Entry in an Established Industry: Tesla Motors*, 57 CAL. MGMT. REV. 85, 91 (2015).

[131] *Id.* 92–93.

[132] *Id.* at 94–95.

[133] *Id.*

[134] *Id.* at 95–96.

[135] *See* David J. Teece, *Tesla and the Reshaping of the Auto Industry*, 14 MGMT. AND ORG. REV. 501 (2018).

[136] *See* David J. Teece, *Capability Development*, *in* Mie Augier & David J. Teece (eds.), THE PALGRAVE ENCYC. STRATEGIC MGMT., 192-194 (2016).

[137] *See infra* Section VI.

A failure to consider capabilities in competitive assessments means that economists and competition agencies have a large omitted variables problem. The understanding of the origins and possible existence of alleged monopolies and monopoly power cannot be complete without a systematic understanding of important factors such as firm-level capabilities and the business models implemented by the business enterprise. Such considerations are not yet the stock in trade of competition economists, although this may now be changing.

Implementation of a dynamic competition framework requires, as already noted, a proper assessment of supply-side factors, including capabilities, entry barriers, "isolating mechanisms"[138] and incumbency. Rather than highlighting incumbency as a shield, the dynamic competition paradigm sometimes exposes incumbency as a liability. Nascent and peripheral threats over the horizon can energize competition and investment in R&D. Incumbents often appreciate that their portfolio of ordinary and super-ordinary capabilities may be poorly matched to future competitive circumstances, making them vulnerable, despite high market shares in some (likely poorly defined) relevant markets.

THE RELEVANCE OF CAPABILITIES TO THE ASSESSMENT THE COMPETITIVE EFFECTS OF MERGERS

The focus of this section will be on the impact of a dynamic competition assessment on mergers. The subject is timely, as the enforcement agencies are expanding the scope of their anticompetitive concerns to consider both horizontal and non-horizontal interactions between the merging companies and with other market participants.[139] The enforcement agencies are also concerned about the acquisition of nascent competitors[140] and this may result in the adoption of new presumptions of illegality.[141]

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[138] For a discussion of isolating mechanisms, see Richard Rumelt "Theory, Strategy, and Entrepreneurship" in D Teece (ed) The Competitive Challenge: Strategies for internal innovation and renewal (Cambridge: Ballinger 1987

[139] *See, e.g.*, *FTC Seeks to Block Microsoft Corp.'s Acquisition of Activision Blizzard, Inc.*, FTC (Dec. 8, 2022), https://www.ftc.gov/news-events/news/press-releases/2022/12/ftc-seeks-block-microsoft-corps-acquisition-activision-blizzard-inc [https://perma.cc/AS8Y-F2PZ].

[140] *See, e.g.*, *FTC Sues Facebook for Illegal Monopolization*, FTC (Dec. 9, 2020), https://www.ftc.gov/news-events/news/press-releases/2020/12/ftc-sues-facebook-illegal-monopolization [https://perma.cc/ZRW7-GLS4].

[141] *See, e.g.*, Fed. Trade Comm'n v. Facebook, Inc., 560 F. Supp. 3d 1, 4 (D.D.C. 2021) ("[Facebook] has allegedly maintained their monopoly . . . by acquiring firms [WhatsApp and Instagram] that it believed were well positioned to erode its

A wider lens is needed to recognize a broader range of competitive factors, including the organizational and managerial capabilities of the incumbents and firms on the fringe of the market. Exogenous developments in science and technology must also be considered to assess whether incumbency implies durable market power. It also requires an understanding of new and potential entrants and their likely competitive viability, both of which are primary subjects of study in the dynamic competition framework.

Risk-taking is necessary on the part of the enforcement agencies too. They cannot limit their time horizon to today and tomorrow. Innovation takes a while to incubate, and a threatened or actual enforcement action can preclude that innovation before it is given a chance to develop. In addition, not all innovation justifications are speculative. The enforcer must develop expertise in identifying innovation goals that are plausible in light of the merging parties' capabilities, objectives, and prior development track records.

Generally, US law prohibits mergers and acquisitions when the effect "may be substantially to lessen competition, or to tend to create a

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monopoly."); Fed. Trade Comm'n v. Meta Platforms, Inc., 2023 WL 2346238, *1, *22 (N.D. Cal. 2023) (noting that the FTC sought to block "Meta's acquisition of Within on the basis that the merger would substantially lessen potential competition," but deciding to deny the FTC's motion for preliminary injunction).

[141] U.S. Dep't Just. & Fed. Trade Comm'n, Request for Information on Merger Enforcement § 5 (Jan. 18, 2022), https://www.justice.gov/opa/press-release/file/1463566/download ("Do the guidelines adequately identify mergers that are presumptively unlawful under controlling case law? … Does the structural presumption in the guidelines accurately reflect current understanding of the characteristics of mergers that prove to be anticompetitive? … What specific metrics or observable features of a transaction, firm, or market should, alone or in combination, trigger a presumption that a horizontal transaction is anticompetitive? … Should the guidelines identify thresholds for customer diversion and margins that, solely or together, create a presumption of competitive harm from certain mergers? … What specific metrics or observable features of a transaction, firm, or market should, alone or in combination, trigger a presumption that a non-horizontal transaction is anticompetitive? … Would the inclusion of multiple alternative presumptions better reflect the diversity of transactions and evidence presented by the modern economy? … How does the administrative cost and accuracy of the guidelines' structural presumption or any proposed alternative presumption(s), standing alone, compare to the administrative cost and accuracy of individually analyzing each transaction in depth?"); Fed. Trade Comm'n, Submit a Comment on the Joint FTC-DOJ Merger Enforcement Request for Information, https://www.ftc.gov/policy/studies/submit-comment-merger-enforcement-request-information ("The agencies seek information on whether concentration thresholds should be adjusted to improve the efficiency and effectiveness of enforcement, whether alternative metrics or qualitative factors should also trigger presumptions of competitive harm, and evidence regarding the accuracy of such presumptions.").

monopoly."[142] The key question agencies ask is whether the proposed merger is likely to create or enhance market power or facilitate its exercise. During a merger investigation, the agencies seek to determine whether the proposed merger would increase the likelihood of coordination among firms in the relevant market. There is also concern that goes beyond coordination to unilateral effects, particularly unilateral price increases, as the merged firm may be able to raise prices profitably post-merger.[143]

Potential competition in its various manifestations is highly relevant to those and other aspects of the merger assessment, including market definition, market power, rapid supply response, entry, and competitive effects.[144] A potential-competition merger may involve one competitor's buying a company that is planning to enter the market. As noted earlier, such an acquisition could be harmful because (1) it could prevent actual increased competition or (2) eliminate the disciplinary effect of the existence of a potential competitor poised to enter, assuming no others are poised to enter, or capable of entry even if not currently poised to do so.

The dynamic competition paradigm, when wedded to a capabilities framework, invites an overhaul of the conventional approach to market definition, market power, supply responses, potential competition, entry, and procompetitive justifications. The paradigm provides a new lens to look at the supply side and requires probing on the demand side beyond "the narrowest possible market" that the merger guidelines take.[145]

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142 Clayton Act § 7, 15 U.S.C. § 18.

143 U.S. DEP'T OF JUST. & FED. TRADE COMM'N, 2010 HORIZONTAL MERGER GUIDELINES (2010), § 6.1, www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf [hereinafter 2010 Merger Guidelines] ("A merger between firms . . . may diminish competition by enabling the merged firm to profit by unilaterally raising the price of one or both products above the pre-merger level.").

144 *Id.* § 5.3 ("A merger between an incumbent and a potential entrant can raise significant competitive concerns."); *see also* William H. Rooney, Colin Lee, & Amanda M. Payne, *Taking Innovation Seriously: A Dynamic Competition Model for Antitrust Law*, __ COLUM. BUS. L. REV. __ (forthcoming 2023) (noting that currently the Merger Guidelines only consider "suppliers that do not currently supply the relevant product but would 'very likely' provide 'rapid' supply responses" as potential market participants).

145 Rooney, Lee, & Payne, *supra* note 144, at 8 ("The DCM thus does not attempt to define the narrowest possible market but the group of products and suppliers that are interacting with one another in a dynamic competitive environment."); *see also* 2010 MERGER GUIDELINES, *supra* note 143, § 4 ("Defining a market broadly…can lead to misleading market shares…. Although excluding more distant substitutes from the market inevitably understates their competitive significance to some degree, doing so often provides a more accurate indicator of the competitive effects of the merger

With the dynamic competition paradigm framework, procompetitive justifications include assembling the various technologies needed to accomplish systematic or architectural innovation. Assembling and integrating all the complementary technologies required for a systematic innovation is often a Herculean task. This is separate from, and more important than, the cost-reducing "efficiencies" that the merger guidelines sometimes recognize per the static competition model.[146] Indeed, if one wanted to identify caricatures of the real-world competitive realities, one can look at various versions of the horizontal merger guidelines.[147]

The question arises as to how to assess dynamic competition issues, as administrability and predictability matter in developing legal standards.[148] Fortunately, the dynamic competition paradigm offers workable standards insofar as it calls for a careful factual assessment of competitive realities and a judgment about the likelihood of future competitive harm, which is the same analysis that enforcement agencies undertake today. The difference between the current static framework and the dynamic framework is not ease of application or predictability but the lens through which competitive facts are assessed. The dynamic approach is more attuned to emerging competitive threats and less inclined to reject them as "speculative," "untimely," or "insufficient."[149] The analytical horizon of the dynamic approach is broader and longer, and less myopic than that of the static approach. It places less

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than [including them would] . . . . Market shares of different products in narrowly defined markets are more likely to capture the relative competitive significance of these products, and often more accurately reflect competition between close substitutes. As a result, properly defined antitrust markets often exclude some substitutes to which some customers might turn in the face of a price increase even if such substitutes provide alternatives for those customers.").

[146] Rooney, Lee, & Payne, *supra* note 144, at 15 ("Efficiencies are considered only after the court has found a likely anticompetitive effect."); *see also* 2010 MERGER GUIDELINES, *supra* note 143, § 10 (noting that several considerations, such as research and development cost savings, "may be substantial and yet not be cognizable efficiencies" under the guidelines).

[147] *See, e.g.*, 2010 MERGER GUIDELINES, *supra* note 143, § 10 (restricting consideration of innovation to an efficiency that must be quantified and considered as a rebuttal to an anticompetitive effect already found); Rooney, Lee, & Payne, *supra* note 144, at 3 (noting that under the current guidelines "dynamic supply responses are not considered in defining markets or identifying market participants").

[148] It is of course important to recognize that administrability matters. As Tim Muris has noted, "the suitability of an economic hypothesis for shaping antitrust doctrine should be measured by whether the hypothesis lends itself to the development of standards that courts and enforcement agencies can administer effectively" Remarks before George Masen University Law Review. Jan 15 2003.

[149] 2010 MERGER GUIDELINES, *supra* note 143, § 9 (noting that entry is cognizable when it "would be timely, likely, and sufficient in its magnitude, character, and scope to deter or counteract the competitive effects of concern").

reliance on market concentration levels and changes in the HHI to assess market power and more reliance on the assessment of potential competition and the innovative capabilities of focal firms.

Thus, a firm with a significant market share, based on sales over the last fiscal year, may have weak capabilities, and, if so, its ability to wield market power is limited; on the other hand, a firm with strong capabilities and forward-looking technology and product development, but a moderate market share over the last year, is likely in a stronger competitive position. That a mathematically calculated index, like the four-firm concentration ratio or the HHI, is not yet available to place a numerical value on capabilities does not make those capabilities any less real or any less competitively relevant.

To be clear, strong dynamic and super-ordinary capabilities are not a complete predictor of market power. They provide a competing explanation for market success to be evaluated alongside scale, scope, network effects, and other textbook go-to explanations.

Most importantly, the antitrust implications for demand side disruptions (or potential reductions in disruptions through mergers) are different from those for supply side disruption. Demand side disruption may lead to acquisition… not necessarily to buy off the competitor but to add the competitors products to the incumbents existing line of products i.e. to fill a missing gap… Such acquisitions may not have much social benefit, as the customer will get the product any way… even if it's not one stop shopping.

Supply side or architectural disruption is more challenging. New technologies need to be integrated with the old, and often neither the incumbent nor the potential entrant can do that well by themselves. Strategic alliances and M&A activity may well be socially desirable under such circumstances. What's needed usually is deeper integration of the technology, and common ownership can facilitate that.

In short, systematic or architectural innovation requires integration. M&A transactions may not only speed new product introduction; they could lower the price and reduce the unnecessary duplication of activities… duplications that cost money, are a social waste and could slow market development and expansion, to the detriment of the consumer and the economy.

Static models of competition implicitly favor staid, cost-cutting, routinized competitive strategies, mindsets, and mergers.[150] The dynamic

[150] The incentives analysis that is so often used by enforcement agencies should be used to assess their own policies. Political and legal careers are advanced by

competition approach, on the other hand, gives credit to the successful navigation of uncertainty, and inventions that fuel growth, employment, and robust innovation ecosystems. It is less friendly to staid static efficiency mergers that do nothing to promote dynamic competition.

POTENTIAL COMPETITION REBOOTED: FURTHER IMPLICATIONS FOR MERGERS, ACQUISITIONS, AND MONOPOLY POWER

INTRODUCTION

The importance in the dynamic competition paradigm to the disciplining power of potential competition is readily apparent from the foregoing discussion. As discussed, the dynamic competition paradigm is solicitous of the prospect of bountiful potential competition, while the static competition model is skeptical of it. Current enforcement policies seem to view potential competition as speculative and often not sufficient to discipline the perceived immediate anticompetitive effects of a merger,[151] yet harms are found and cases are brought against mergers allegedly to protect potential competition even when the threat to that competition has not been substantiated.[152]

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bringing cases and starring in widely publicized "wins" that prohibit headline transactions. If government resources were used to promote a competitive process that yields the greatest innovation, creativity, and ingenuity, would the public weal not be well-served?

[151] However, a recent OECD publication suggested "treating potential competition with a ?party? of esteem with respect to actual competition" and considered "extending the timeframe need to evaluate potential competition", The concept of potential competition OECD, p.3.

[152] *See* Gönenç Gürkaynak "Innovation Paradox in Merger Control" Concurrences (Series) 2024; *see also* Fed. Trade Comm'n v. Meta Platforms Inc., 2023 WL 2346238, *32 (N.D. Cal. 2023) ("[T]he FTC has failed to demonstrate that it was 'reasonably probable' that Meta was perceived as a potential competitor into the relevant market."; Fed. Trade Comm'n v. Steris Corp., 133 F. Supp. 3d 962, 963, 984 (N.D. Ohio 2015) ("The FTC asked the Court to grant immediate injunctive relief . . . to prevent Steris from acquiring its alleged potential competitor, Synergy . . . [I]ts motion for preliminary injunction is hereby denied" for lack of evidence linking the proposed merger to the alleged reduction in potential competition. *See, e.g.*, United States v. UnitedHealth Grp. Inc, __F. Supp. 3d __, *15-*16 (D.D.C. Sept. 21, 2022) (noting that the government claims the merger will cause "UHC's rivals [to] innovate less" because UHC will "gain broad access and use rights to the claims data of UHC's rivals," which it would "have an incentive to share," but finding that "the Government [has failed to] put forward real-world evidence that United's rivals are likely to innovate less" because of the data misuse); *id.* at *24 ("Yet the Government provided zero real-world evidence that rival payers are likely to reduce innovation.").

Potential competition has an important role to play in antitrust with respect to both the assessment of mergers and monopoly power[153]. Yet it would be fair to say that, in the field of economics, there hasn't been any significant improvement in our understanding of potential competition for 100 years.

Richard Gilbert has identified four major schools of thought with respect to potential competition: (1) limit pricing; (2) dynamic limit pricing; (3) the theory of contestable markets, and (4) the market efficiency model.[154] None of these "schools of thought," to use Gilbert's descriptor, takes capabilities or innovation into account[155]. Dynamic limit pricing, despite its title, is not about innovation or enterprise development.

While Gilbert's survey rightfully concluded that "potential competition is important as a mechanism to control market power,"[156] there is next to nothing in the standard industrial organization literature he surveys to assist enforcement agencies in identifying and calibrating potential competition/potential entrants.[157] Gilbert lamented the lack of generality in the existing literature. He noted that "models that explain competitor behavior in one industry may be inappropriate to describe behavior in another."[158] He may well have been right in that assessment. But to have any chance of coming up with new insights, it is first necessary to build a framework of

[153] The Clayton Act with respect to the former and Section 2 of the Sherman Act with respect to the latter.

[154] *See* Richard J. Gilbert, *The Role of Potential Competition in Industrial Organization,* 3 J. ECON. PERSPECTIVES 107 (1989).

[155] The Baumol – Willig contestability literature reminded us that if the physical assets to support a business are redeployable at zero cost, then firms anywhere are potential competitors everywhere and can morph from potential to actual competition overnight. Unfortunately, the contestability literature wasn't anchored by any concept of organizational capabilities "Thus even if the tooling could be moved from Apple Foxconn facility in China to the USA, and even putting to one side issues of cost, the capabilities to manufacture iPhone at high volume would be highly unlikely.

[156] *See* Richard J. Gilbert, *The Role of Potential Competition in Industrial Organization,* 3 J. ECON. PERSPECTIVES 107, 123 (1989).

[157] Gilbert observes that with contestability theory "potential competitors were elevated to a status comparable to that of actual competitors." *See* Richard J. Gilbert, *The Role of Potential Competition in Industrial Organization,* 3 J. ECON. PERSPECTIVES 107, 123 (1989).

[158] *Id.* at 124.

enterprise-level capabilities, evolution, growth, and potential entry, which so far the field has been reluctant or unable to do.[159]

Being bereft of helpful theories from academic research, courts have quite sensibly tried to conduct factually oriented inquiries, based on the evidence that the parties have presented to them, concerning whether firms were poised to enter a market. They have tended to look at (1) competition in a relevant market and trends, (2) business attributes of the alleged potential entrants, and (3) decisions and actions that the identified potential entrant has taken in the recent past.[160] The focus is rarely an investigation of the capabilities of the potential competitor or an assessment of the likely evolutionary path of the business or of the development of their capabilities.[161] This is not because such an assessment is irrelevant, but because the parties have not presented the evidence and appropriate analytical

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[159] A very recent CPI *Antitrust Chronicle* issue (January, 2022) devoted to "The Economics of Potential Competition" provides little comfort that there are new developments since Gilbert's review 30 years ago. The lack of research relevant to the structure of today's issues is disturbing, although a few forward-looking glimpses might be gleaned from a sympathetic review of the *Antitrust Chronicle* volume cited above.

[160] *Fed. Trade Comm'n v. Steris Corp*., 133 F. Supp. 3d 962, 966 (N.D. Ohio 2015) ("In order to obtain injunctive relief, the FTC has to show a likelihood of proving at trial that, absent the merger, Synergy probably would have entered the U.S. contract sterilization market … within a reasonable period of time. The Court concludes, for the following reasons, that the FTC has not met its burden."); id. at 978 ("the most significant reason Synergy opted to discontinue the U.S. ex-ray project was lack of customer commitment,"); id. at 981 ("despite Synergy's best efforts, it was unable to harness the capital costs to build x-ray facilities in the United States"); id. at 982 ("Synergy was [not] poised to build x-ray sterilization facilities in the United States in the foreseeable future,"); id. at 984 ("the evidence unequivocally shows that the problems that plagued the development of x-ray sterilization … were the same problems that justified termination of the project in 2015: the failure to obtain customer commitments and the inability to lower capital costs."); Fed. Trade Comm'n v. Meta Platforms Inc., No. 5:22-CV-04325-EJD, 2023 WL 2346238, at *32 (N.D. Cal. Feb. 3, 2023) ("the FTC has failed to demonstrate that it was 'reasonably probable' that Meta was perceived as potential competitor into the relevant market,"); id. at *33 ("the FTC's evidence has not established that Meta's presence had a direct effect on Within's behavior…. [T]he objective evidence does not support a reasonable probability that firms in the relevant market perceived Meta as a potential entrant. Even if it did, the Court finds that there is no direct or circumstantial evidence to suggest that Meta's presence did in fact temper oligopolistic behavior or result in any other procompetitive effects.").

[161] The Merger Guidelines, for example, do not identify a potential competitor as a constraint on post-merger conduct. The Guidelines also do not identify a capabilities analysis nor an assessment of the evolutionary path of business as relevant in assessing the likelihood, sufficiency, or timeliness of entry. *See* 2010 MERGER GUIDELINES, *supra* note 143, § 9.

frameworks to the courts. The required capabilities analysis is also difficult, and there has been little help from mainstream economic research.

A new and better approach would require assessing the capabilities of potential competitors along with their financial wherewithal, together with the more traditional basic economics at work (e.g., scale, scope, and network effects). These newer concepts are important enough that the enforcement agencies and competition policy scholars must now begin to rise to this challenge. Those issues are not in lieu of the factors noted above that courts currently consider but are in addition to them. A capabilities analysis provides a much fuller profile of likely potential competition and a firmer basis on which to make judgments.

Richard Langlois has observed that competition economists need to think "less about firms and markets and more about economic capabilities and where they come from."[162] Elzinga et al. note that one needs to analyze "the evolution of the competitive landscape" and observes that "the likelihood that the product of the nascent competitor will evolve to become a competitive constraint on the incumbent firm can depend on … how the competitive landscape evolves."[163] However, he does not go down that path himself.

Langlois recalls the Microsoft case where Microsoft "portrayed its position as that of a dynamic competitor in an ever-changing market, perennially besieged by threats ranging from the dimly perceptible to the radically unknown."[164] Looking at the situation in 2020, noted technology analyst Benedict Evans observed that Microsoft's fall from dominance had less to do with antitrust intervention and more with the actual appearance of unforeseen competition.[165] At the time of the US v Microsoft trial, Microsoft executives were well aware of the high likelihood of new competition but their opinions were ridiculed by the economics profession, the press, and the enforcement agencies. Microsoft's status as the then-most relevant computing environment was doomed with the rise of the Internet. The Internet was already advanced by the time of trial, having gotten started with ARPANET in the 1980s. Even though it still provided the "client" for users to access the Internet through the Operating System Windows, Microsoft lost dominance

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[162] Richard N. Langlois, *Potential Competition as Process and Structure,* CPI ANTITRUST CHRON., 4, 52 (Feb. 2022).

[163] Andrew Elzinga, Nikhil Gupta, Margaret Kyle & Vivek Mani, *Economic Issues in Assessing Potential and Nascent Competition,* 1 CPI ANTITRUST CHRON. 15, 17–18 (Winter 2022).

[164] Richard N. Langlois, *Potential Competition as Process and Structure,* CPI ANTITRUST CHRON. 49, 50 (Feb. 2022).

[165] *See* Benedict Evans, *How to Lose a Monopoly*, BENEDICT EVANS (Jan. 1, 2020), https://www.ben-evans.com/benedictevans/2020/01/01/microsoft-monopoly-and-dominance [https://perma.cc/QF84-4NB8].

over the client to smartphones when Apple proposed a better client model for mobile internet access.[166]

There was a failure by some of the professionals involved, both in the U.S. and Europe, to understand the changing nature of competition. The intellectual blinders of the agencies likely stemmed less from deep uncertainty and more from strong adherence to the static model. It led to a significant waste of enforcement dollars and a distraction to the business and legal communities, including at Microsoft.

More recently, and as mentioned earlier, the rise of OpenAI with its flagship product ChatGPT, has brought new competition to Google and Microsoft in search and as well as in other services. As described elsewhere, OpenAI strengthens ordinary and dynamic capabilities by enabling quicker decision making through data analyses, rapid content generation and better customer service.[167] There is now an AI arms race involving not just OpenAI and Big Tech but also smaller players such as Lamini, Mindverse, Wonder, and many others. Severe competition is also emerging in China, as demonstrated by the recent launch of DeepSeek. AI has caught Apple a bit flatfooted, although AI is hurriedly being built into its products, upsetting competition landscapes everywhere.

ChatGPT's popularity surprised many, but not all. It has spurred innovation in natural language processing and AI, prompting all Big Tech companies to invest in these areas to stay competitive. It has also influenced the way companies, like Amazon, approach customer service, marketing, and product development by showcasing the potential of AI driven interaction, thereby sharpening superordinary capabilities and along with it both static and dynamic competition.

Clearly, the potential competition literature needs to be rebooted. A modest effect in that regard begins in the next section in the context of

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[166] Back in 2007 when the iPhone was launched, Microsoft's CEO at the time, Steve Ballmer, ridiculed the iPhone for its expense and lack of a keyboard which be believed was needed to make it a good email machine. *See* Jordan Weissmann, *iPhone Turns 5: A Short History of Its Famously and Loudly Wrong Critics*, THE ATLANTIC (Jun. 29, 2012), https://www.theatlantic.com/business/archive/2012/06/iphone-turns-5-a-short-history-of-its-famously-and-loudly-wrong-critics/259171/ [https://perma.cc/G3J8-4TRD]. In 2016, Ballmer admitted that it was also good business model innovation by Apple to get the operator to bundle the phone with a service agreement . . . thereby lowering the entry price for consumers. *See* Tim Hardwick, *Former Microsoft CEO Steve Ballmer Admits He Was Wrong About the iPhone*, MACRUMORS (Nov. 7, 2016), https://www.macrumors.com/2016/11/07/former-microsoft-ceo-steve-ballmer-wrong-iphone/ [https://perma.cc/ZJ2D-66ZN].

[167] See supra note 22.

discussing nascent competitors, which are a subclass of potential competitors, since they arguably stand ready to expand from the periphery to the center of an ecosystem.

CONSIDERING NASCENT COMPETITORS AS AN ELEMENT OF POTENTIAL COMPETITION

While potential competition involves assessing (or forecasting) future entry, such as when generic pharmaceuticals might compete with proprietary pharmaceuticals, the term "nascent competitor" describes an existing new entrant but one that is not yet a significant competitive constraint, but could be in the future.[168] Both potential and nascent competitors can in principle deliver future competition. The likelihood that a nascent competitor will evolve to become a competitive constraint depends, of course, on its strategy and its capabilities, as compared to the capabilities of the incumbent and other actual or potential competitors.

Hemphill and Wu claim that nascent competitors "are a distinct analytical category."[169] They do note that "nascent competitor means different things to different people" and go on to note that their approach emphasizes prospective innovation by a future direct competitor.[170] They also note that "a hesitant enforcer might insist on strong proof that the competitor, if left alone, probably would grow into a fully-fledged rival, yet in doing so, neglect an important category of anticompetitive behavior."[171] They counsel a "bias to [enforcement] action"; yet they do not think about the potential negative consequences for innovation, including in particular venture-capital investment in startups, for which a sale of the company is the most common monetization mechanism[172]. They do, however, offer a possible methodology for reducing the risk around interventions by laying out three (but only three) criteria which must be met to warrant illegality of the merger between an established and a nascent competitor. A nascent firm must (1) be an innovator, (2) have future potency, and (3) be a threat to the incumbent.[173] They exclude "firms producing complements that, absent exclusion or acquisition by the

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[168] C. Scott Hemphill & Tim Wu, *Nascent Competitors*, 168 U. PA. L. REV. 1879 (2020).

[169] *Id.* at 1881l. The authors define a nascent competitor as a firm whose prospective innovation represents a serious threat to the incumbent.

[170] *Id.*

[171] *Id.*

[172] Gary Dushnitsky & D. Daniel Sokol, *Mergers, Antitrust, and the Interplay of Entrepreneurial Activity and the Investments That Fund It*, 24 VAND. J. ENT. & TECH. L. 255, 277 (2022).

[173] *Id.* at 1886–89.

incumbent, might facilitate third party competition."[174] Future potency seems to refer to likely future capabilities;[175] but the authors do not offer a theory of capabilities to inform their analysis.[176]

There is always a concern that an acquisition would nip a likely successful competitor in the bud. One can worry about the false negatives that could have resulted in payoffs (presumably positive impacts for dynamic competition). Hemphill and Wu are worried only about nascent competitors that pose "serious threats to the incumbent."[177] If the incumbent has monopoly power, concerns about lost competition are heightened.[178] Their approach applies not only to M&A activity, but to exclusionary conduct.[179] They advocate a revision of the merger guidelines to take nascent competitors into account, not as a constraint on the merger of two other parties, but to direct regulators' attention to the potential anticompetitive effect of the acquisition of a nascent competitor.[180]

Hemphill and Wu do not acknowledge the importance that the acquisition of a nascent competitor can provide to building complementary competencies that enable systemic (architectural) innovation. Such an acquisition can enhance the innovation and the R&D productivity of the combined enterprises and accelerate commercialization by marrying the target's innovation assets with the incumbent's ability to scale. Just such a combination may be necessary to achieve systemic innovation and achieve next-generation product development.

A real concern that might animate policy is the acquisition of the nascent firm that could create or shape the next technological paradigm and would likely get shut down as a result of the acquisition. However, such an acquisition is likely to be prohibitively expensive for an incumbent, as far-

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174 *Id.* at 1889.

175 *Id.* at 1887–88.

176 C. Scott Hemphill & Tim Wu, *supra* note 168, at 1882. Our suggestion is that, at most, the firm or firms most threatened by the nascent competitor should not be allowed to buy out the threat. For most acquisition targets, that approach would block acquisition by (at most) one suitor. Thus, investors can expect a payout even if payment by the threatened incumbent is blocked. And so, for example, if Google instead of Facebook had bought WhatsApp, investors would still see a substantial return with less competitive concern. These limits greatly reduce concerns about overenforcement that might otherwise chill desirable behavior. Such concerns are further reduced if care is taken to avoid false positives, an issue we return to in Part III.

177 *Id.* at 1888.

178 *Id.* at 1891.

179 *Id.* at 1892.

180 *Id.* at 1909–10.

sighted owners and managers of (and investors in) such a nascent enterprise can achieve considerable rewards (and global recognition) from growing the nascent enterprise and keeping it independent. Moreover, ambitious startup founders are under no obligation to accept an incumbent's offer, as illustrated by Facebook's rejection of an offer of $1 billion from Yahoo! in 2006, Twitter's rejection of an offer of $500 million from Facebook in 2008,[181] and Groupon's rejection of an offer of $6 billion from Google in 2010.[182] That is not to say that short-termers might not sell out for a premium, but if they do, they reveal themselves as short-termers, which raises doubts that they have the capacity as managers of a stand-alone enterprise to overturn the status quo.

Given that nascent enterprises that would be status quo disrupters (whose function "is to reform or revolutionize the pattern of production" to quote Schumpeter)[183] are likely to be rare, interventions preventing acquisitions of nascent competitors should be infrequent and not assessed with a presumption of skepticism. When challenged, the enforcers must have compelling testimony by qualified experts and supporting evidence in the business records of the acquirer and the target.

There is always uncertainty in merger enforcement, which ought to lead to caution because markets will generally self-correct, particularly in the technology sphere. For example, in 2019, AT&T acquired Time Warner after prevailing against the DOJ in an antitrust challenge to the merger;[184] in 2022, AT&T sold Time Warner at a loss of about $47 billion,[185] putting to rest widely expressed concerns that the deal would enable AT&T to "dominate" the market for streaming content. In the unlikely event that markets do not self-correct, post-transaction enforcement actions under both Section 7 and

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[181] Henry Blodget, *Twitter Rejects $500 Million Takeover Offer From Facebook*, BUS. INSIDER (Nov. 24, 2008) https://www.businessinsider.com/2008/11/twitter-rejects-500-million-takeover-offer-from-facebook [https://perma.cc/D3NR-R27T].

[182] Nicholas Carlson, *Why Groupon Said No To Google's $6 Billion*, Bus. Insider (Dec. 8, 2010) https://www.businessinsider.com/why-groupon-said-no-to-google-2010-12 [https://perma.cc/K7N3-E8U8].

[183] JOSEPH A. SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY 132 (2003 ed.) (1942) (footnote omitted).

[184] Diane Bartz & David Shepardson, *U.S. Justice Department Will Not Appeal AT&T, Time Warner Merger After Court Loss*, REUTERS (Feb. 26, 2019) https://www.reuters.com/article/us-timewarner-m-a-at-t/u-s-justice-department-will-not-appeal-att-time-warner-merger-after-court-loss-idUSKCN1QF1XB [https://perma.cc/6WS8-ZSHU].

[185] James B. Stewart, *Was This $100 Billion Deal the Worst Merger Ever?* N.Y. TIMES (Nov. 19, 2022) https://www.nytimes.com/2022/11/19/business/media/att-time-warner-deal.html [https://perma.cc/UD3E-KBSM].

Section 2 are possible.[186] It is only in the rarest of circumstances that the effects of a false negative will be insurmountable.

The risk of intervention is not just on the occasional false negative; it's the chilling effect on entrepreneurship and investment that results from the prospect of unnecessary investigation and enforcement actions. This harms competition by reducing access to risk capital and compelling incumbents to conduct innovation internally in an environment that tends to lack the "high-powered" incentives (and associated compensation structure) that is necessary to motivate disruptive innovation.

To summarize, an acquisition of a nascent competitor ought to concern regulators if the nascent competitor only if it is able to develop into a mature and able competitor alone or by being purchased/supported by a non-incumbent enterprise. In addition, the nascent competitor would have to be able to bring competency-destroying innovation to a putative incumbent acquirer that possesses monopoly power. This indicates that at least the following six conditions would need to be met:[187] (1) Acquiring firm has monopoly power; (2) The nascent firm's technology has passed proof of concept (i.e., the technology works); (3) The nascent firm has a proven business model to monetize the technology; (4) The nascent firm has an existing entrepreneurial leadership team and strong capabilities to carry the enterprise forward for at least 5–10 years, or has a credible succession plan in place; (5) The nascent firm's technology will be disruptive to core revenue streams of the acquiring firm; (6) The technology of the nascent firm is not competency-enhancing (complementary) to the acquiring firm. Rather, it's primarily competency-destroying and, hence, threatening; (7) There are no other nascent competitors similarly situated. [188]

In order to scale on its own, the nascent competitor must have strong ordinary, super-ordinary, and dynamic capabilities. Otherwise it's not a competitive threat to incumbents. Determining this will require the enforcement agencies to look under the hood of the target and the acquirer in ways the agencies have not yet done. As noted earlier, most enforcement agencies have the investigation tools to do so. They need to know what to do. Absent the strengthening of agency capabilities, trying to identify actionable mergers involving nascent competitors is a fool's errand.

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[186] DuPont under Section 7; FTC v. Meta under Section 2.

[187] These criterion are based heavily "Innovating Big Tech firms and competition policy: favoring dynamic over static competition" (with Nicolas Petit) *Industrial and Corporate Change*, (Sept. 2021)

[188] *See* Nicolas Petit & David J. Teece *Capabilities Checklist for Mergers with Nascent Competitors,* 14 J. EUR. COMPETITION LAW AND PRACTICE 135 (2023).

In short, competition authorities need to be fully aware of the difficulties that a nascent enterprise faces when scaling. One cannot simply assume that scaling is easy and guaranteed. The customer discover process is complicated and dynamic. New enterprises must balance the relationship between what technology can provide, customer expectations, and competitive alternatives (if any). It cannot be assumed that nascent enterprises, even those with revenues, will scale. Significant financial resources and experienced managers are (scanner cut off…) Most new enterprises fail to scale alone… and blocking acquisition may deny the chance for a business to scale and compete with new technology.

As a general rule, the enforcement agencies should not block acquisitions of startups in the early years of their life, or if they are below a certain size. If the business model isn't yet generating significant revenues, then the company is fragile and its competitive prowess (and its standing as a potential competitor) must be heavily discounted. One should also remember that a management team that's not tried and tested is unlikely a robust team.

THE NATURE OF INNOVATION, ECOSYSTEMS, AND INNOVATION MARKETS/"SPACES"

Non-Linear Combinatorial Nature

Antitrust analysis, particularly of M&A activity, would benefit from a much richer understanding of the innovation process… understandings that one is hard pressed to find in the field of competition economics as it exists today. While R&D and innovation are commonly understood to be high risk, it's less well appreciated that it does not proceed in a convenient (for the analyst) linear fashion (from R&D to engineering to commercialization).[189] There are many twists and turns and activities often run in parallel, not seriatim. There is often no recognizable pipeline, except maybe in pharmaceuticals and pesticides where regulation is key and requires achievements of certain regulatory hurdles before research and testing can advance further.

Furthermore, the nature of innovation is not only non linear; it is by its very nature highly combinatorial and involves integration and convergence of multiple technologies to create transformative user friendly solutions. Remember that the Wright Brothers flying machine was built with many bicycle parts. Technologies often combine existing building blocks to create

[189] See Teece "Inter-organizational Requirements of the Innovation Process" Managerial and Decision Economics 10, Special Issue: Competitiveness, Technology and Productivity (Spring 1989), 35–42.

new building blocks.[190] Malcolm McLean, a trucker, developed the first metal intermodal shipping container. He then converted ocean tankers to transport them and eventually this led to a company called Sealand, which brought together ocean transportation, rail, and trucking. Today, AI is facilitating new combinations of various technologies. Likewise, autonomous vehicles, AI, Internet of Things (IoT), sensors support intelligent transport systems.

Not only is innovation highly combinatorial, requiring the amalgamation of different technologies and inventions[191], but it's also often systemic, requiring a complex of compatible bits and pieces to be drawn together using interfaces and standards[192]. This often requires M&A activity, as with the Sealand example provided earlier, because the systemic coordination of the various elements often require the planning capacity of a single organization.[193] I doubt the metaverse can be developed and assembled without many acquisitions. And of course, it's the exit option of acquisition which encourages the funding of startups and R&D investment in the first place.

Mergers and acquisitions are an inevitable and desirable way to accomplish the asset orchestration and the capability building needed for dynamic capabilities innovation and dynamic competition. Benefits are not primarily about "efficiencies" in the strict sense but about capability

[190] See Arthur, W. Brian (2009). The nature of technology: what it is and how it evolves. New York: Free Press.

[191] Even the sewing machine infringed as many as 70 patented technologies. See Mossoff, Adam, The Rise and Fall of the First American Patent Thicket: The Sewing Machine War of the 1850s (Mar. 6, 2009). Arizona Law Review, Vol. 53, pp. 165-211, 2011, *George Mason Law & Economics Research Paper* No. 09-19, Available at SSRN: https://ssrn.com/abstract=1354849 Smart phones many implicate as many as 250,000 patents according to RPX. There are also many more technologies used in sewing machines and smart phones which aren't patented.

[192] Where there are significant interdependencies, introduction of an innovation will often result in differing benefits and cost to various parties. This effect makes it difficult if not impossible to coordinate the introduction of systemic (i.e. architectural) innovation. While a system of frictionless markets could theoretically overcome this problem—the firms obtaining the benefits could compensate those incurring the costs so that the introduction of the innovation would not depend on the degree of integration in the industry—it is commonly recognized that it is extremely difficult to engineer a workable compensation agreement, in part because all relevant contingencies are not known when the contract would need to be drawn up. M&A transitions can help solve this issue. See D. J. Teece, Economic Analysis and Strategy, California Management Review. Vol 26 Issue 3 1984.

[193] See David Teece "Organizing for Innovation: When is Virtual Virtuous?" (with Henry W. Chesbrough), Harvard Business Review 74:1 (January-February 1996), 65-73; "Competition, Cooperation, and Innovation: Organizational Arrangements for Regimes of Rapid Technological Progress" *Journal of Economic Behavior and Organization* 18:1 (June 1992), 1-25.

enhancement and associated combinatorial innovation and improvement. While, on the one hand, one needs to consider (a) that mergers can be motivated by strategies to reduce the erosion of sales ("stealing" of customers) by the target firms, there is also (b) the benefit of scale, (c) the addition of complementary assets, and (d) the associated facilitation of systemic (architectural) innovation which can play on the other side. Too often competition economists focus on (a) and ignore (b), (c), and (d). These are admittedly more complicated, yet more powerful issues, that lead to widespread consumer benefits and enhanced dynamic competition. Because scholarly research those categories is largely outside of the competition economics literature, such factors have yet to receive sufficient attention.[194]

Ecosystem Orientation

With the rise of digital platforms, the type of innovation that holds significance for both the platform leader and society at large is ecosystem innovation. A thriving ecosystem, characterized by innovation at its core and complemented by various services, not only benefits consumers in the long term but also fosters competition among ecosystems, even if there are elements of cooperation or commonality among them.

Thus, in assessing a competitive behavior of an individual competitor, particularly the platform leader, it is important to analyze the health of the ecosystem and the strength of competition between ecosystems. It is less important, and usually a distraction, to look at competition within an ecosystem, as this flies in the face of the fundamental nature of competition in the digital economy.

In this regard, it is important to recognize that platform development and the creation of robust ecosystems requires rules that could be mistaken for restrictions on competition. Such rules may be necessary, or at least desirable,

[194] There is an extensive discussion of systematic (architectural) innovation in David J. Teece, "Economic Analysis and Strategic Management" California Management Review, Spring 1984. I explain why integration, which may require M&A, to speed an adoption of innovation, "Where there are significant independencies, introduction of an innovation will often result in differing benefits and cost to various parties. This effect makes it difficult if not impossible to coordinate the introduction of such an innovation. While a system of frictionless markets could overcome this problem—the firms obtaining the benefits could compensate those incurring the costs so that the introduction of the innovation would not depend on the degree of integration in the industry—it is commonly recognized that it may be extremely difficult to engineer a workable compensation agreement, in part because all relevant contingencies are not known when the contract would need to be drawn up.". Most activity would bring integration and "reduces contractual problems and facilitates the commercialization of innovation which affects several stages of production or several parts of an operating system.".

in terms of helping to produce experiences that most consumers want. It is natural for adherents to the static paradigm to want to see more “competitors” working to take rents away from a platform leader; but such approaches may have the perverse effect of reducing systemic innovation and ecosystem-to ecosystem-competition. Over time, the instincts of a static mindset are likely to hinder innovation and ecosystem competition.[195]

Novel Market Concepts and the Capabilities Framework

Economists have, in recent decades, begun toying with new types of market definition, partly in response to the challenges that innovation-driven competition poses to the mainstream framework. One such idea is "innovation markets," a term coined almost 30 years ago by Gilbert and Sunshine[196] to emphasize the importance of considering what I call capabilities, particularly what I refer to as "super-ordinary" capabilities, and innovation in merger analysis.

The concept of innovation markets was instrumental in the Department of Justice’s challenge of the proposed merger between General Motors (MS) and ZF Friedrichshafen (ZF), focusing on the ownership and control of what I call super-ordinary technological capabilities. In the context of the DOJs review of the proposed GM/ZF merger in a heavy-duty truck gearbox market, the DOJ claimed that only GM and ZF had the capabilities needed to compete with respect to transmissions in trucks and buses.[197]

What the DOJ considered as innovation was framed as a market, but this was a misleading definition, as of course, there were no transactions for these capabilities. The incorrect framing and labelling led to confusion among many at the time, including this author. While markets do exist for technical knowhow (since from time to time relevant proprietary information can get licensed), there was no indication that the DOJ had concerns about transactions in this market becoming monopolized. Therefore, portraying antitrust concerns in terms of a "market" for innovation was puzzling and remains so.

The DOJ's concern could have been framed in terms of the potential monopoly control over certain scarce technological assets and capabilities, tantamount to an essential facilities argument. However, the DOJ did not

[195] See N. Foss, J. Schmidt, & D. Teece “Ecosystem Leadership as a Dynamic Capability” Long Range Planning 2023.

[196] “Incorporating dynamic efficiency concerns in merger analysis: the user of innovation markets” Antitrust Law Journal, vol63 no2, Winter 1995

[197] Lawrence Landman points out that the concept of innovation markets is tantamount to a future market concept.

seem inclined to make such an argument, and had they done so, it would likely have been difficult to defend.

The real question at hand ought to have been whether the merger could impair the rate of improvement in the combined superordinary capabilities of the parties compared to what would occur if they were separate. GM & ZF walked away from the transaction, no doubt wishing not to get bogged in litigation around novel theories. Had the inquiry proceeded, analyzing the complementarity of the parties' technologies and the potential elimination of unnecessary duplication of R&D efforts through the merger could have been beneficial. This could have freed up resources for the parties to explore new areas and enhance their capabilities, potentially leading to the development of superior products and competition in the market.

It is unclear from the public record whether the technologies of GM & ZF were complementary and whether the parties intended to shut down or expand their combined activities. It is plausible that both parties possessed super-ordinary capabilities not available elsewhere, and competitive concerns could have been genuine, suggesting that a capabilities framework does not automatically grant merging parties a free pass, contrary to the fears of many in enforcement agencies.

FUTURE MARKETS AND INNOVATION SPACES

Introduction

There have been recent and not-so-recent efforts to address an issue that is central to the dynamic competition paradigm: namely unseen or future competition, be it in innovation "markets" or in innovation "spaces." Some of this is quite intriguing, and it is discussed at length by Landman's paper in this issue.[198] However, before delving into these concepts, it is necessary to remind oneself about the nature of innovation, as some of the existing cases have a rather limited perspective on this issue.

In reviewing the innovation markets concept in the GM/ZF aborted merger, Landman notes that rather than arguing that the firms competed in the same narrow products market for transmissions for trucks and buses, "the DOJ alleged that the firms competed in a broad market in which innovation was itself the product… this is how Gilbert and Sunshine launched the concept of innovation markets."[199] The DOJ was claiming that it could (and

[198] *See* Landman, Lawrence B., *Refining Future Potential Competition: The Doctrine Allowing Courts to Protect Innovation*, 86 Antitrust L.J. (forthcoming 2024), 53 pages (Feb. 1, 2024).

[199] *See* N. Foss, J. Schmidt, & D. Teece "Ecosystem Leadership as a Dynamic Capability" *Long Range Planning* 2023.

should) protect competition to innovate. Landman chooses to reinterpret this as an effort to protect future markets (see below).

Innovation Spaces and Dow-Dupont

The EU's Dow-Dupont decision perhaps has the seeds of a new (capabilities) framework and a more entrepreneurial process. I'll focus on just one methodological aspect of this discussion: the concepts of "innovation spaces." Although as Landman points out in this issue, innovation spaces may not be any different from the concept of "future markets."

The innovation spaces idea asks "who will be free (and able) to compete in that space in the future, and will a merger shrink the candidate population in a meaningful manner." But if one is going to adopt this approach, one must be open to all kinds of entities that can compete, including ones not currently in the space. Early on in its development, Amazon was not a cloud computing provider – and some would consider that to have been an unlikely entrant. However, Amazon had spare server capacity that it decided in 2002 to rent it out[200] Competition in cloud computing didn't come just from likely candidates like Salesforce and IBM and Oracle and Microsoft. It came also from an insurgent: Amazon.[201]

The concept of innovation space is perhaps tractable in pharmaceuticals and in pesticides where a "linear model" of innovation is effectively imposed by the regulatory process. (The regulatory process will not allow progression to human trials and associated learning until certain regulatory thresholds are met.) In the real world and for sure in the digital economy, as noted earlier, most innovation involves many overlapping steps, with many twists and turns[202].

In order to identify likely participants in innovation spaces, one thus needs to look, with a wide aperture lens, and identify all firms with relevant capabilities. In particular, one needs to look at firms with excellent specialty, or super-ordinary capabilities.

In Dow Dupont, the EC did something like this and looked at firms with relevant technological capabilities, based on patent filings. This is probably a satisfactory proxy in the pesticides business; but is unlikely to be helpful

[200] Geoff Colvin "How Amazon grew an awkward side project into AWS…" *Fortune* Nov. 30 2022.

[201] Likewise, Yevgeny Prigozhin started out as Putin's caterer, and then repurposed the security detail he needed in Russian for his high profile catering business into the Wagner Group that provided mercenary forces to Putin's Russia…for a time.

[202] See D.J. Teece's "Interorganizational requirements of the innovation process" *Managerial and Decision Economics*" 1989.

outside of the areas where patents matter[203]. I believe that the EC would do a better job if it embraced, and fleshed out, the capability theory of the firm that it has implicitly used in an ad hoc manner. Both super-ordinary capabilities and dynamic capabilities would have been relevant variables for them to explore. This might be challenging, but perhaps more fruitful than the current intellectual quagmire the commission has left us with.

Future Markets

Landman in this issue points out that his research for over twenty-five years has established that competition authorities in the US and the EU, in their quest to protect innovation, are in fact on a quest to protect future markets. To do so, they have implicitly employed what he calls his "Future Markets Model." He takes comfort from the publication in July 18, 2023 of the draft merger guidelines and from the Fifth Circuit Dec 15, 2023 decision in Illumina v FTC. With respect to the Fifth Circuit's decision, he points out that "the court held, for the first time, that section 7 of the Clayton Act allows the enforcers to protect competition in markets for products which do not exist yet."

Landman's "Model" is a four-step process, including a step which enquires "how many firms are trying to develop a future product." To answer this question, one might first ask (a) "which firms have the capability to develop a future product" and (b) "how many of those are trying"? The answer to (a) is likely, but need not be, larger than (b). The answer to (a) seems to be the more relevant for purposes of assessing future competition, because those that can but are not, trying will likely discipline those that are trying as well as the producers of existing products that are threatened themselves by new products.

Of course, the FTC and the DOJ have now appear to have endorsed (in the revised 2023 Merger Guidelines) the concept of future markets, even if they don't use that term. The Guidelines specifically state that "the agencies may define relevant markets… even if they don't yet exist."[204] They refer of course to the markets for products that would result from innovation.

In my view, the Guidelines focus excessively on how mergers might reduce incentives to self-cannibalize, but such assessments assume a degree of predictability to technology competition which usually does not exist. Such approach reflects static model assumptions, even if the matter at hand is

[203] R. Levin et al "Appropriating the returns from industrial R&D" *Brookings Papers on Economic Activity* 3, 1987. Chemicals were an industry sector where patents were important to value capture and therefore where patents might be an okay proxy for capabilities.

[204] *See* 2023 MERGER GUIDELINES, *supra* note 80, § 4.3.D.7.

innovation. It's a bold incumbent that believes that buying up a potential entrant (e.g., a so so-called nascent competitor) will stem the threat of competition in environments within the reach of American entrepreneurship and global venture capital.

That said, the new Guidelines do contain, as noted, the unclear statement that "the incentives to compete aggressively in innovation and product variety depend on the capabilities of firms…" It would have been better to say that "the ability to compete aggressively using innovative new products and services depends on the dynamic (and to some extent the ordinary and superordinary) capabilities of firms. The incentives jargon overloads the statement, making it not only awkward, but almost absurd. Landman provides a charitable interpretation, saying "the paragraph simply states the obvious fact for a firm to compete in a future market it must at least plausibly be able to make the relevant future product." He then goes on to say that "for a firm to be plausibly capable of making a future product, it must be trying to make that product." One can challenge the latter statement inasmuch as firms often have many options to make new products (given the capabilities they have) but they do not need to make them, or lack the necessary financial resources.

Landman goes on to make the passing comment that "competition authorities have great difficulty analyzing firms' capabilities." He is undoubtedly correct, the reason of course being that it is hard; but it would be much easier if the phylaxis of professionals in the agencies had made efforts to do so. There is little evidence that they have, although under more recent leadership[205], credible efforts may now be underway.

The assessment of future markets is in essence an assessment of current capabilities and requires an assessment of the degree to which those capabilities are deployed to go down a particular product development path. Capabilities can be viewed contemporaneously or inferred subsequently, after a product is produced. The production and sale of products can rest upon more generic capabilities reflecting the fact that resources and capabilities are often quite fungible. We should acknowledge economist Edith Penrose who noted that a firm's current products are merely an expression of its resource base.[206] Had Penrose's conceptualization of the firm been taken seriously when it was first published half a century ago, we would undoubtedly be further ahead in our understanding of potential competition.

[205] Susan Athey at the Dept of Justice Antitrust Division appears to be leading multidisciplinary efforts that have some promise in this regard.

[206] See Edith Penrose "Theory of the Growth of the Firm" 1959.

The enforcement agencies, which along with academic economists, marginalized dynamic competition and innovation capabilities for decades, now seem to be embracing not only dynamic competition but also the concept of capabilities. As the promoter of the former for 40 years, and the latter for almost as long, one might assume that this author would express satisfaction. That is not the case yet. For sure, these have been some steps in the right direction, but its noteworthy (but perhaps not surprising) that the agencies seem first to have manufactured a plethora of new theories of harm to innovation before they began to find some merit in the dynamic competition paradigm.

However, if future competition is an important factor that can be harmed by the wrong mergers, then it must also be true that future competition is a disciplinary factor with respect to market power. Accordingly, if we can develop an understanding of future competition by assessing capabilities and the likely trajectory of their evolution, we will also have a tool for assessing market power, allowing us to minimize the misleading use of market share as a proxy for market power. Future markets may be the right place to look, and when we do, we will generally find lots of occupants. M&A activity generally increases, not decreases, the populations that are able to inhabit this territory. The enforcement agencies, having now embraced future markets and dynamic competition, must do so in an even-handed manner.

MAINTAINING AND ENHANCING CAPABILITIES AND ECOSYSTEM INNOVATION: A LRCWS PROXY

The analysis so far underscores that competition can no longer be meaningfully assessed purely based on market shares in relevant markets. This is particularly true in the context of platforms, not only because multiple markets may be implicated (in the context of n-sided markets) but also because platform business models often result in certain sides being provided for "free" (e.g., Google search) while other sides pay (in the case of search, it's the advertisers). Moreover, sources of potential competition are often more powerful than what is often considered actual competition.

Furthermore, innovation and dynamic competition can be impacted by third parties such as app developers and other complementors. Hence, adopting the dynamic competition paradigm requires a focus on the health of the ecosystem when assessing competition with respect to multi-sided platforms. To assess the impact of an event (e.g., a merger), or a new business practice impacting innovation and dynamic competition, one might then ask whether the practice (or transaction) benefits or harms the innovation ecosystem and whether the experience of users (convenience, choice, etc.) is compromised. Harm would take the form of reduced innovation, and hence

competition. In assessing anticompetitive effects, traditional price and output impacts may be less reliable. Inasmuch as it may be difficult to assess incremental effects, a very good proxy for a long run consumer welfare standard (LRCWS) might be the impact (i.e., benefit or harm) to the innovation ecosystem.

The innovation ecosystem can be broken down into: (1) the platform itself and its associated protocols for access-to ensure functionality, privacy and security; along with (2) complementors. In examining the impact of a business decision on the innovation ecosystem, it is important to look at both the core, the complementors, and the periphery. It is often only the platform owner that can justify investment in systemic innovation, and this is a risky, but potentially valuable investment.

A fundamental question which can help guide competition policy as "competitive effects" are assessed is thus to ask whether the particular business conduct, including mergers and acquisitions, benefits the health/robustness of the ecosystem(s). Large platforms can use M&A to create benefits with respect to innovation and growth that help all constituencies; unless, of course, the ecosystem leader extracts "too much" of the rents. If they do, it will likely weaken the ecosystem vis-a-vis other ecosystems. Accordingly, there is a natural check on such behavior by the platform leader. This may be a difficult constraint to quantify; but that ought not dissuade us. Operational methodologies can be undoubtedly developed.

Platform envelopment occurs when platforms add new features. This can disintermediate other vendors. Envelopment usually adds great convenience to the user, but it may result in the elimination of new or potential entrants. What matters most is the end result: is innovation in the ecosystem harmed, and do users benefit?

The health of the innovation ecosystem depends in part on a steady stream of new ventures. Such new ventures or "startups" seek profitable exits. One pathway is IPOs, although the exit of capital for the founders/managers is much delayed because an IPO provides only limited liquidity for the founders. This is because investors expect the executive team to stay in place, and limited liquidity for founders/management is imposed by SEC trading rules. As a consequence, a "trade sale" (such as an acquisition) is often very much preferred by founders as a way to receive liquidity. A "trade sale" when the purchase is an incumbent will often require review by the relevant competition authorities. Should such activity become overly restrictive, the impact on entrepreneurship, and hence on the innovation ecosystem, is likely

to be quite deleterious. The supply of venture capital as well as entrepreneurs will shrink.[207]

Thus, when assessing an acquisition one should ask whether it will harm dynamic competition across ecosystems. More specifically one must ask: (a) Will innovation be advanced or harmed? Will the acquired entity be (i) shut down (ii) left alone (iii) integrated? After M&A activity, capabilities need not be lost (assuming no shut down) and the acquired entity remains in the ecosystem likely making it more robust and competitive. If the platform leader (orchestrator) is the buyer, one must also ask whether there is a track record with respect to nurturing innovation in the ecosystem? If it has a good track record, that should be taken into account. If it buys companies and snuffs them out, that's an unattractive attribute. Whether it respects other companies (e.g., especially startups) I.P. rights or not is another relevant consideration.

Acceptance of the dynamic competition framework requires that capabilities be assessed alongside, and sometimes instead of, more standard market competition issues when assessing M&A transactions. The consumer welfare standard, modified to stress the long run, can still anchor assessments. However, its recognized that in many cases… particularly in the case of platforms where there are many constituencies on many "sides" to consider, a good proxy for the welfare of all is the health of the innovation ecosystem. It is well recognized that innovation generates large benefits for consumers, as well as spillover benefits of considerable magnitude. Hence, innovation… not prices and output… is a good proxy for long run consumer welfare. It not only gives primacy to consumers; it also indirectly aides many other constituencies that benefit from innovation spillovers/externalities.

CONCLUSION

The dynamic competition paradigm as presented here and developed in my research (and that of my coauthors) is not the static model amended; it's the static model replaced.

Padilla's et al. in this issue recognition of an emerging dynamic competition "school" is thus both salutary and significant.[208] While the "school" has the scaffolding in place for a new model or "ideology" of antitrust, as Ed Mason might call it, many elements of the paradigm need further elaboration. At its core is recognition of the importance of deep

[207] *See also:* G. Dushitsky and D. Sokal "Mergers, Antitrust, and the Interplay of Entrepreneurial Activity and the Investment that Funds It," Vanderbilt Journal of Entertainment and Technology Law, Winter 2022

[208] *Supra note* 35.

uncertainty and the disciplining and creative power of competition (actual and potential) that is driven by innovation. The framework brings with it a rejuvenation of supply side analysis, and recognition of the role that capabilities play alongside incentives, not only in explaining corporate behavior, but in the determination of the strength and likely disciplinary role of latent or "future" or potential competition by both seen and unseen competitors.

The belated and still limited recognition and often just implicit endorsement of a dynamic competition paradigm has, however, been accompanied by the development of a number of new theories of harm, many supposedly resulting from M&A activity.

Unfortunately, many regulators today classify anticompetitive effects as tangible and predictable; at the same time they classify pro competitive arguments about innovation and the benefits of mergers as speculative, if not preposterous. Given the slender research literature that they seem familiar with, this attitude is not surprising, although it is alarming. The situation is tantamount to a bias against innovation… with innovation concerns used merely as new ammunition to intervene. In reality, what we have is a doubling down on the static approach. In particular, regulators seem concerned that incumbents might "nip in the bud" nascent competitors, causing harm to future innovation/future markets. There is some merit in these new concerns, but enforcement actions are unlikely to be able to avoid error without a better understanding of technological and organizational capabilities, their fungibility, and other enablers of enterprise innovation and growth. The assessment of individual potential/ nascent competitors as well as populations of such firms ought to be given priority.

Nevertheless, the dynamic competition paradigm appears to be getting momentum, although so far more in conjunction with the development of novel and speculative theories of harm than on the side of benefits. One needs to be aware that some self declared champions who use some of the vocabulary of dynamic competition have so far addressed dynamic issues in a lopsided manner. Any new theories of harm must not only be more carefully developed and articulated, but they also need to be balanced by a more fulsome view of how potential competition/unseen competition, along with actual competition, can energies competition and disciplines Big Tech. The data shows that Big Tech is spending big not just to protect but to advance their product offerings and to create future markets for "the next big thing". They are innovating heavily… not living what economist Sir John Hicks' called a monopolist's "easy life." They also have fungible technological assets that can support product development relevant to opportunities pursued by many corporations, big and small, seen and unseen. There is a need to recognize that any market power incumbents might have is severely limited

by devastating (potential) competition. The dramatic rise of OpenAI and its challenge to Big Tech is only the most recent example.

Traditional (static) analysis has focused predominantly on demand side factors, primarily because that is the easier side to analyze with existing analytic tools. The dynamic competition framework requires and enables a more fulsome analysis of capabilities and other key supply side success factors. This can help support a more balanced understanding of market competition and market outcomes.

It's now time to give full recognition to innovation arguments of defendants as well as plaintiffs. Rather than attacking or branding them as speculative, they should be embellished, utilizing the full panoply of academic research on innovation, entrepreneurship, and strategic management. There is a tendency for antitrust agencies to enthusiastically embrace untested theoretical constructs of potential harm to innovation and to competition; less enthusiasm from these same agencies about understanding potential benefits, even when they are less speculative than the potential harms that they are quick to identify.

I conclude by endorsing the view that "more research is needed to guide competition policy as new technologies create challenges."[209] That research must, in my view, incorporate a deep understanding not just of innovation but of how, in the context of the digital economy, business enterprises innovate, grow, develop, build capabilities and compete, often across ecosystems. Without such a focus, future research is likely to be banal (and remote from the reality of today's digital technology-based competition) and policy and enforcement error will likely be high.

[209] Clifford Winston, *Back to the Good—or Were They the Bad—Old Days of Antitrust? A Review Essay of Jonathan B. Baker's The Antitrust Paradigm: Restoring a Competitive Economy*, 59 J. ECON. LITERATURE 265, 282 (2021). Abdul-Rahman