

MERGING INNOVATION INTO ANTITRUST AGENCY ENFORCEMENT OF THE CLAYTON ACT

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INTRODUCTION

The Sherman Act and the Clayton Act are the Ten Commandments of U.S. antitrust law. Like the Ten Commandments, they describe in very general terms what parties “shall not do” and they have their origins in a time when the world was very different from today. Many of the industries that power today’s economy did not exist when Congress passed the Clayton Act in 1914 and could not even have been anticipated. There was no Internet. A social network was a neighborhood. The microchip had not been invented and nor had its predecessor, the transistor, and it was two decades before Alan Turing would develop the concept of the modern computing machine. Other industries that provide products and services that are critical to the modern economy were in their infancy in 1914. The first Model T automobile rolled off one of the first automated assembly lines only six years earlier. It was only a decade since the Wright Brother’s first flight. The vacuum tube amplifier had been invented only eight years earlier and Thomas Edison had only recently demonstrated the first talking motion picture.

“Innovation” is defined as “something new or different introduced.”² Antitrust has long acknowledged the importance of innovation but has struggled to incorporate innovation within the contours of its analyses. Perhaps nowhere is this effort more apparent than with regard to mergers. This article explores the U.S. Antitrust Agencies’ evolution of the treatment of “innovation” under §7 of the Clayton Act as expressed in their enforcement policy guidelines and as implemented in their actual enforcement records.

Part I briefly introduces the seminal positions, as exemplified by Joseph A. Schumpeter

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² RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE (1968). Some define “invention” as the creation of a new product or process and “innovation” as the improvement or significant contribution to an existing product or process. *See, e.g.*, Tom Grasty, “The Difference Between ‘Invention’ and ‘Innovation,’” Idea Lab, March 29, 2012, available at <http://www.pbs.org/idealab/2012/03/the-difference-between-invention-and-innovation086/>, accessed February 5, 2015. We refer to an inventor as an entity that creates an innovation, but otherwise use the terms interchangeably.

and Kenneth J. Arrow, regarding the key relationships between innovation, market structure, and competition. Although the effects of market structure and competitive conditions on incentives to innovate are complex, we note that economic theory supports a conclusion that mergers may reduce incentives for innovation in some circumstances while increasing incentives for innovation in other circumstances. Part II discusses the treatment of innovation in the Agencies' variously promulgated enforcement guidelines. We identify key industry attributes that should affect the relationship between competition and innovation. Part III reviews the enforcement history of the Department of Justice's Antitrust Division (DOJ) and the Federal Trade Commission (FTC) in the eleven-year period 2004 – 2014 regarding mergers that may affect innovation. Since 2004, the Agencies have identified innovation concerns in approximately one-third of their merger challenges. A fraction of these mergers occurred in industries characterized by relatively high R&D intensity, as measured by the ratios of R&D expenditures to sales or R&D expenditures per worker.³ Within the context of challenged mergers in high R&D intensity industries, the Agencies identified innovation concerns in nearly all of their merger challenges. If mergers are equally likely to promote or retard innovation, the observation that the Agencies have raised innovation concerns in most challenged mergers in high technology industries suggests that they are giving too little weight to potential innovation efficiencies. Part IV offers some tentative observations, using the 2010 Merger Guidelines as a primary point of reference, regarding how the Agencies can better address innovation-based concerns under §7 of the Clayton Act.

I. PERSPECTIVES ON INNOVATION, MARKET POWER, AND COMPETITION

Section 7 of the Clayton Act proscribes mergers “in any line of commerce or in any activity affecting commerce in any section of the country, [for which] the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly.”⁴ Its enforcement largely has focused on what constitutes a substantial lessening of competition. The generally accepted view is that it is an increase in the (quality adjusted) price of a good or service. However, price is but one dimension of competition, and it is not necessarily the dimension that most affects consumer welfare.

Innovation is a critical dimension of market performance. The impact on consumers from new products and services has far exceeded the impact from price changes in numerous markets. What has been more important for consumer welfare: the development of the modern smartphone or the fact that the smartphone has a retail price of \$400 rather than \$450? New production methods have delivered enormous benefits in many industries. Modern microprocessors deliver over one million times the performance of Intel's 4004 microprocessor, advances made possible by innovations in manufacturing and design.⁵ Between 1974 and 1996, prices of memory chips decreased by a factor of 27,270 times, a rate of decline of 40.9 percent per year.⁶ Innovations in methods to improve distribution services have led to lower prices and enhanced consumer choice.

³ See *infra* notes 48-49 and accompanying text.

⁴ Clayton Act of 1914, 15 U.S.C. § 18.

⁵ Andrew Danowitz, *et al.*, *CPU DB: Recording Microprocessor History*, 10(4) COMM. ACM 1 (2012). Available at <http://queue.acm.org/detail.cfm?id=2181798>.

⁶ Dale W. Jorgenson, *Information Technology and the U.S. Economy*, 91 AM. ECON. REV. 1, 3 (2001).

Innovation has many determinants and ultimately relies on imagination and entrepreneurial spirit to translate ideas into market realities. Although the garage tinkerer and the absent-minded professor are still vital components in the production of innovation, market incentives guide their efforts and the efforts of the large-scale establishments that invest in research and development. Competition is certainly not the sole driver of innovation, but it is an important determinant of the incentive to innovate. The reward from successful innovation and, therefore, the financial incentive to innovate is the difference in the profits that can be earned with and without the invention. Competition affects both parts of this equation. Furthermore, innovation also drives observed market structures, as highly concentrated industries may reflect research and development outcomes that have advantaged one or a few firms.

Innovation-based effects can inform merger analysis in various ways. Given that these effects are most often only alleged and not fully litigated, the questions surrounding both their actual as well as proper treatment only increase. A merger can have positive or negative effects on the incentive and the ability to innovate. Depending upon the significance in absolute terms of those innovation-based effects (dynamic efficiency) as well as their significance relative to other non-innovation-based competitive effects (static efficiency), innovation considerations play either a more central or more secondary role in the antitrust analysis.

Joseph A. Schumpeter and Kenneth J. Arrow each provided seminal, albeit very different, perspectives on the relationship between innovation, market power, and competition. Schumpeter is credited as among the earliest and the most influential advocate of the view that market power can promote innovation. For Schumpeter, who observed the role of technical progress in promoting economic growth in the early twentieth century, what matters most is not price “but the competition from the new commodity, the new technology, the new source of supply....”⁷ He argued that sacrificing the short-term benefits of pricing close to incremental costs that competitive markets achieve for greater dynamic performance of less competitive markets can be an attractive trade for consumers and society. Moreover, Schumpeter’s market characterization supports innovation as an efficiency defense for mergers that might otherwise increase or enhance market power, or facilitate its exercise.

Roughly three decades after Schumpeter’s treatises, Kenneth Arrow showed that market power can lower incentives to innovate in certain circumstances.⁸ Consider two potential inventors striving to develop a new product and assume that each will benefit the same amount if she is successful. Further assume that one of the potential inventors owns a firm with an existing product that generates profits that the innovation would eliminate, while the other potential inventor has no corresponding profits at risk. Arrow showed that the profit flow lowers the incremental benefit from an innovation relative to an inventor that has no such profits at risk from the new product.⁹ Moreover, to the extent that a reduction in competition would increase

⁷ CAPITALISM, SOCIALISM AND DEMOCRACY (Harper Torchbooks 3d ed. 1950).

⁸ Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources to Invention*, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND SOCIAL FACTORS 609 (Universities-National Bureau Committee for Economic Research & Committee on Economic Growth of the Social Science Research Councils eds., 1962).

⁹ *Id.* Jean Tirole has dubbed this the “replacement effect.” THE THEORY OF INDUSTRIAL ORGANIZATION (MIT Press 1988).

this profit flow, it would further decrease the incentive to invent.

Arrow's conclusion that profits can dampen innovation depends on many factors. One factor is the implicit assumption that a new competitor can appropriate the benefits from innovation to no less an extent than an existing firm. This circumstance would obtain if the inventor has strong protection from imitation, for example, from an effective patent, and can either fully exploit the innovation in-house or license the technology to others. Without such protection, an established firm that accounts for a large fraction of sales in an industry may gain more from innovation because it can more easily appropriate the benefits.¹⁰ Existing profit flows also can have differential effects for investments in processes and products. The incentive to invest in processes that lower a firm's production cost is proportional to the firm's anticipated sales with the new process. Projected sales can be larger for an established firm than for a new competitor that has to build a market presence. New products can have different benefits for established and new firms depending, *inter alia*, on the established firm's other products and the scope for product differentiation.¹¹ Furthermore, a firm with market power can have incentives to invest in innovation to preempt investment by competitors in order to maintain its market power.¹²

A firm's ability to appropriate the benefits of the research and development efforts is central to Schumpeter and Arrow's contrasting conclusions.¹³ Appropriation is limited if firms can observe and easily imitate rivals' innovations without compensating them. A merger can increase the ability of the combined firm to appropriate the benefits from innovation in two ways. First, if the benefit from an innovation is proportional to the scale of operations that employ the innovation, a merger can increase appropriation by increasing the size of the operations that profit from the innovation. Second, by increasing the merged firm's market share, a merger can increase appropriation by reducing the share of the market that may imitate the innovation without compensation. The first effect concerns a firm's ability to internalize the innovation's benefits within its own operations. The second effect concerns a firm's ability to reduce technological spillovers that would benefit its rivals and lower the profitability of innovation by making the post-innovation market more competitive.

Weak appropriation supports the Schumpeterian view that size, and indirectly market share, promotes incentives to innovate. In contrast, if firms can appropriate the benefits from

¹⁰ See, e.g., Jonathan B. Baker, *Fringe Firms and Incentives to Innovate*, 63 ANTITRUST L.J. 621 (1995).

¹¹ See, e.g., Richard J. Gilbert, *Looking for Mr. Schumpeter: Where Are We in the Competition-Innovation Debate?*, in 6 INNOVATION POLICY AND THE ECONOMY 159 (Adam B. Jaffe et al. eds., 2006); Yongmin Chen & Marius Schwartz, *Product Innovation Incentives: Monopoly vs. Competition*, 22 J. ECON. & MGMT. STRATEGY 513 (2013).

¹² Richard J. Gilbert and David M.G. Newbery, *Preemptive Patenting and the Persistence of Monopoly*, 72 AM. ECON. REV. 514 (1982).

¹³ See generally Michael L. Katz & Howard A. Shelanski, *Merger Policy and Innovation: Must Enforcement Change to Account for Technological Change?*, in 5 INNOVATION POLICY AND THE ECONOMY 109 (Adam B. Jaffe et al. eds., 2005); Gilbert, *supra* note 11; Jonathan B. Baker, *Beyond Schumpeter vs. Arrow: How Antitrust Fosters Innovation*, 74 ANTITRUST L.J., 575 (2007); Michael L. Katz & Howard A. Shelanski, *Mergers and Innovation*, 74 ANTITRUST L.J. 1 (2007); J. Gregory Sidak & David F. Teece, *Dynamic Competition in Antitrust Law*, 5 J. COMPETITION L. & ECON. 581 (2009); Douglas H. Ginsburg & Joshua D. Wright, *Dynamic Analysis and the Limits of Antitrust Institutions*, 78 ANTITRUST L.J. 1 (2012); Carl Shapiro, *Competition and Innovation: Did Arrow Hit the Bull's Eye?*, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY REVISITED 361 (Josh Lerner & Scott Stern eds., 2012).

their innovations, Arrow's conclusion applies as profits from existing operations reduce the net returns to innovation and the incentive to invest in research and development. Appropriation is strong when innovations are protected by enforceable intellectual property rights. Alternatively, a firm may be able to appropriate most of the benefits from innovation if it is a major discovery that allows the firm to capture most of the sales in the industry and if the firm can maintain secrecy to avoid imitation. The conditions that affect a firm's ability to appropriate the benefits from its investments in research and development differ among industries and technologies, and support different predictions regarding a merger's likely effects on incentives to innovate.

II. ANTITRUST AGENCIES' POLICY STATEMENTS REGARDING INNOVATION

Although the Antitrust Agencies first promulgated merger guidelines during the mid-1960's, innovation would not be explicitly referenced within the guidelines until their revision in 1992 and, even then, only in a footnote. Innovation would not receive meaningful treatment within the merger guidelines until 2010. To fully appreciate the evolution of the Antitrust Agencies treatment of innovation, it is necessary to also understand their earlier merger guidelines that did not address innovation. Towards that end, Part II selectively traces the changes that occurred in the Agencies' merger guidelines from 1968 through 2010.

A. Guidelines in the 1960s

The DOJ issued its first general statement of merger enforcement policy in 1968¹⁴ in connection with its role in enforcing Clayton Act § 7 enforcement "to preserve and promote market structures conducive to competition."¹⁵ The 1968 Guidelines adopted the principle that DOJ "seeks primarily to prevent mergers which change market structure in a direction likely to create a power to behave non-competitively in the production and sale of any particular product". The Guidelines further explained that "a concentrated market structure...tends to discourage vigorous price competition" and, conversely, that it tends to "encourage" other "undesirable conduct" including inefficient production methods.¹⁶ They do not identify the conduct associated with innovation despite its economic significance. The only reference to technological change occurs within the context of market definition.¹⁷ As such, the 1968 Guidelines do not focus on whether a change in market structure affects innovation but rather they address whether innovation might change the relevant market structure for analysis of the transaction.¹⁸

B. Guidelines in the 1980s

The DOJ's 1982 revision of the horizontal merger guidelines continued the 1968 Guideline's emphasis on market structure and established as their lodestar "that mergers should

¹⁴ Reprinted in 4 Trade Reg. Rep. ¶13,101 (May 20, 1968), available at www.justice.gov/atr/hmerger/11247.htm

¹⁵ *Id.* at § 2.

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *Id.* (The Guidelines state that in "exceptional circumstances" structural factors will not necessarily be conclusive. An example of such a case might be "where basic technological changes are creating new industries, or are significantly transforming older industries, in such fashion as to make current market boundaries and market structure of uncertain significance.").

not be permitted to create or enhance market power or to facilitate its exercise.”¹⁹ Market power was defined as “the ability of one or more firms profitably to maintain prices above competitive levels for a significant period of time.”²⁰ While the 1982 Guidelines nominally recognized that “[s]ellers with market power also may eliminate rivalry on variables other than price,” such non-price competition received little further elaboration.²¹ Discussion of the potential significance of technological change is very narrowly circumscribed. The Guidelines note that rapid technological change may complicate the use of a single price to analyze markets and effects on competition.²²

The 1982 Guidelines were revised just two years later. Most significantly, for understanding innovation as an element of merger policy, the 1984 Guideline’s expanded the possible role for efficiencies as a defense (*i.e.*, a mitigating factor) when assessing a merger’s anticompetitive effect.²³ As such, it offered a narrow avenue through which increased innovation could be argued as a procompetitive effect for a proposed transaction.

C. Guidelines in the 1990s

The first reference to innovation in Agency merger guidelines occurred in their 1992 revision.²⁴ This development, albeit modest, came nearly eighty years after the Clayton Act was enacted. It took the form of a footnote that stated, “Sellers with market power also may lessen competition on dimensions other than price, such as product quality, service, or innovation.”²⁵ In other respects the 1992 Guidelines continued to emphasize a transaction’s ability to create or enhance market power (defined by the ability to raise price) or to facilitate its exercise as the key determinants in merger evaluations. In 1997 the Agencies issued revised guidelines that expanded their treatment of efficiencies.²⁶ For the first time, the Guidelines explicitly acknowledged that a merger could benefit consumers by facilitating the incentive of the merged firm to develop new or improved products; *i.e.*, to be a better innovator. However, the Guidelines added the qualifications that “certain types of efficiencies are more likely to be cognizable and substantial than others” and that efficiencies related to research and development “are potentially substantial but are generally less susceptible to verification and may be the result of anticompetitive output reductions.”²⁷

The next guideline revision, in 2010, would constitute the first time that innovation was both explicitly and prominently addressed.²⁸ The meaningful treatment of innovation in the 2010 Guidelines is also noteworthy given the many years that elapsed since sophisticated thinking about innovation and merger effects emerged within the Agencies during the early-to-mid 1990s.

¹⁹ Reprinted in 4 Trade Reg. Rep. ¶13,102 at § I (June 14, 1982), available at www.justice.gov/atr/hmerger/11248.htm.

²⁰ *Id.*

²¹ *Id.*

²² *Id.* at § III(C)(1)(a) n. 36.

²³ Reprinted in 4 Trade Reg. Rep. ¶13,103 (June 14, 1984), available at www.justice.gov/atr/hmerger/11249.htm. See generally, § 3.5.

²⁴ Reprinted in 4 Trade Reg. Rep. ¶13,104 (Apr. 2, 1992).

²⁵ *Id.* at § 0.1, n. 6.

²⁶ Reprinted in 4 Trade Reg. Rep. . ¶13,104 (rev. Apr. 8, 1997).

²⁷ *Id.*

²⁸ See *infra* sec. D.

By way of example, in a 1993 article, *Innovation Issues Under the 1992 Merger Guidelines*, Commissioner Dennis A. Yao and Attorney Advisor Susan S. DeSanti clearly delineated “the need” and “the difficulties” associated with assessing innovation within the merger context.²⁹ They then elaborated upon innovation’s specific “implications for competitive effects analysis.”³⁰ The Agencies themselves adopted more comprehensive policies regarding innovation just a few years later, albeit in a non-merger context, in their jointly issued 1995 *Antitrust Guidelines for the Licensing of Intellectual Property* (IP Guidelines).³¹

The fact that these innovation-related statements, whether formal or informal, were not incorporated into the merger guidelines seems broadly consistent with Agency decisions at the time. Richard J. Gilbert and Willard K. Tom analyzed the DOJ and FTC merger challenges throughout the 1990s.³² From 1990 through 1994, the Agencies cited innovation-based concerns “only four times” when challenging a merger; a figure that amounts to only 3% of the cases.³³ Over the course of the next five years, innovation concerns characterized 17.5% of the Agencies’ merger challenges.³⁴ Gilbert and Tom found that from 1995 through 1999, “innovation concerns were decisive in only a few cases.”³⁵ They hastened to add, however, that even in those numerous cases for which innovation was raised but it was not dispositive, one cannot conclude that “innovation impacts were unimportant.”³⁶

D. Guidelines in 2010

Another dozen years passed until the guideline’s next revision. The 2010 Guidelines, for the first time, both explicitly and prominently address innovation. They mention innovation no fewer than nineteen times, both as a potential anticompetitive harm (potential decrease in innovation) as well as a potential procompetitive effect in the form of an efficiency defense (potential increase in innovation).³⁷ These latest guidelines acknowledged that adverse effects on innovation may occur with or without simultaneous adverse price effects.³⁸

Of particular interest is the section “Innovation and Product Variety” that contains two significant admissions.³⁹ The first is that “[c]ompetition often spurs firms to innovate.”⁴⁰ The second is that a merger may harm innovation “by encouraging the merged firm to curtail its innovative efforts below the level that would prevail in the absence of the merger.”⁴¹ The former

²⁹ 61 ANTITRUST L.J. 505, 506-507 (1993).

³⁰ *Id.* at 513.

³¹ Reprinted in 4 Trade Reg. Rep. (CCH) ¶ 13,132 (April 6, 1995), available at www.usdoj.gov/atr/public/guidelines/0558.pdf.

³² Richard J. Gilbert & Willard K. Tom, *Is Innovation King at the Antitrust Agencies? The Intellectual Property Guidelines Five Years Later*, 69 ANTITRUST L.J. 43 (2001).

³³ *Id.* at 49.

³⁴ *Id.* at 48-49.

³⁵ *Id.* at 44.

³⁶ *Id.*

³⁷ Reprinted in 10 Trade Reg. Rep. (CCH) ¶ 13,100 (August 19, 2010), available at <http://www.justice.gov/atr/public/guidelines/hmg-2010.pdf>.

³⁸ *Id.* at 24.

³⁹ *Id.* at § 6.4.

⁴⁰ *Id.*

⁴¹ *Id.*

quotation reflects the presumption that competition and innovation are often intertwined. The latter quotation recognizes the relationship between a change in market structure accompanying a merger and the merged firm’s incentive to innovate. The Guidelines explain that diminished innovation could entail, “reduced incentive to continue with an existing product-development effort or reduced incentive to initiate development of new products.”⁴² More specifically, they attribute the diminished incentive to initiate new product development as a “longer-run effect” that is “most likely to occur if at least one of the merging firms has capabilities that are likely to lead it to develop new products in the future that would capture substantial revenues from the other merging firm.”⁴³

The 2010 Guidelines observe the importance of appropriation as a determinant of a merger’s effect on innovation.

When evaluating the effects of a merger on innovation, the Agencies consider the ability of the merged firm to conduct research or development more effectively. ... The Agencies also consider the ability of the merged firm to appropriate a greater fraction of the benefits resulting from its innovations. Licensing and intellectual property conditions may be important to this enquiry, as they affect the ability of a firm to appropriate the benefits of its innovation.⁴⁴

Nonetheless, the 2010 Guidelines also note that, “Research and development cost savings may be substantial and yet not be cognizable efficiencies because they are difficult to verify or result from anticompetitive reductions in innovative activities.”⁴⁵

In order to better understand how the Agencies have dealt with innovation concerns, the next section presents empirical evidence regarding the frequency of innovation challenges by the Agencies and the characteristics of the industries in which these challenges have occurred.

III. ANTITRUST AGENCIES’ ENFORCEMENT RECORDS REGARDING INNOVATION

As Part II explained, the guidelines that the U.S. antitrust agencies have issued to describe their merger enforcement methodologies changed dramatically in their treatment of innovation. The first guidelines failed to acknowledge any role for innovation either as a potential adverse competitive effect or as a possible efficiency defense. Over the past two and a half decades, the guidelines evolved from a brief statement limiting innovation to a subset of non-price competitive effects to providing a prominent place for innovation in the 2010 Merger Guidelines. In this Part III we review the recent record of merger enforcement actions by the DOJ and FTC with a focus on the frequency and manner with which they allege innovation harm.

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.* at §10.

⁴⁵ *Id.*

A. The Frequency of Innovation-Related Challenges

Although the concept of innovation embraces a wide range of activities that influence the development of new products, services, or cost-reducing methods, we adopt a literal definition to identify enforcement actions that involve innovation. A matter is identified as raising innovation-based concerns if it explicitly uses the term “innovation” or “research and development” to describe, within select public documents, the marketplace or the competitive effects. One of the practical consequences associated with this definition is that it excludes mergers covering a swath of industries for which the Agencies describe the competitive effects solely in terms of “product development” or “product design,” an issue to which we return below.

We identified the universe of mergers for which the FTC or DOJ filed a complaint during the eleven-year period 2004 through 2014.⁴⁶ Proposed mergers that the parties abandoned prior to the filing of a complaint were excluded. The small number of proposed mergers that were abandoned after a complaint was filed are included in this analysis. Although the universe includes numerous litigated mergers, most were resolved with consent agreements that were filed concurrently with the complaints.

Based on the foregoing, we identified 247 challenged mergers. For each of these matters, we analyzed the FTC and the DOJ’s complaints as well as, whenever available, the FTC’s Analysis to Aid Public Comment and the DOJ’s Competitive Impact Statement. The Agencies file these documents (collectively referred to as “merger documents”) for public comment prior to entering into a consent decree.⁴⁷ For each matter we examined whether these documents alleged, whether in strong or weak terms, that the merger implicated innovation or research and development.

Table 1 provides some summary statistics for the challenged transactions. During this eleven-year period the DOJ challenged approximately half as many mergers as did the FTC. The DOJ and FTC raised innovation-based considerations within 29 and 53 transactions respectively. Both the DOJ and the FTC alleged harm to innovation in about one-third of their merger challenges.

⁴⁶ Data on mergers from 2008 to 2014 was derived, in part, from Market Federal Merger Enforcement Actions Summaries published by Thomson Reuters. The authors collected data from 2004 to 2007 from published complaints and other Agency documents. The DOJ and the FTC websites provide the relevant merger documents. *See generally*, DOJ Antitrust Case Filings *available at* www.justice.gov/atr/cases/index.html#page=page-1 and FTC Cases and Proceedings *available at* www.ftc.gov/enforcement/cases-proceedings.

⁴⁷ For those matters in which the FTC issued a complaint and also filed an injunction or temporary restraining order in federal court, we examine the FTC complaint.

Table 1. Merger challenges: 2004 – 2014

	Number	Percent of category
Total number of challenged transactions	247	100%
FTC challenges	162	65.6%
DOJ challenges	85	34.4%
Total number challenges alleging harm to innovation	82	33.2%
FTC challenges alleging harm to innovation	53	32.7%*
DOJ challenges to innovation	29	34.1%**

* Percentage of FTC challenges that allege harm to innovation

** Percentage of DOJ challenges that allege harm to innovation

Using statistics from the National Science Foundation (NSF)⁴⁸ and the Brookings Institution (Brookings),⁴⁹ we classified industry sectors into three levels of R&D intensity, which we labeled low, moderate and high. Appendix A lists the industry sectors in each category.⁵⁰ NSF and Brookings employ different metrics for different time periods. The NSF data are R&D expenditures as a fraction of sales for 2003-7 and the Brookings data are R&D expenditures per worker for 2009. They sometimes yield different R&D intensity rankings for the same industry and in other cases the industry classifications encompass broad economic sectors that include subsectors with different R&D intensities. Subjective assignments were necessary for a few sectors for which the data sources were not consistent or industry sectors were not reported at a sufficient level of detail.⁵¹ Moreover, the NSF and Brookings data do not always clearly identify the R&D intensity for the markets associated with the mergers at issue herein.

Our search algorithm does not always clearly identify innovation concerns in merger challenges because the Agencies do not always use the terms “innovation” or “research and development” to describe their concerns about mergers that might affect the supply of new or improved products or services. In some cases the Agencies refer to harm to product “development” or “design” without specifically mentioning innovation or R&D. We did not expand our search algorithm to include these other terms out of caution for casting too broad a

⁴⁸ National Science Foundation, Science and Engineering Indicators, Division of Science Resources Statistics, Survey of Industrial Research and Development (annual series), Appendix Table 4-14. *Available at*, <http://www.nsf.gov/statistics/seind10/appendix.htm>, accessed March 9, 2015.

⁴⁹ Mark Muro et al., *America’s Advanced Industries*, Brookings Advanced Industries Project 21 (Feb. 2015). *Available at*, http://www.brookings.edu/~media/Research/Files/Reports/2015/02/03-advanced-industries/final/AdvancedIndustry_FinalFeb2lores.pdf?la=en.

⁵⁰ A description of the data and the algorithms for classifying industries are on file with authors.

⁵¹ Industry sectors requiring such subjective assignments include “generic pharmaceuticals,” “oil and gas retailing, transport and storage,” and “media, broadcasting and entertainment,” all assigned to low R&D intensity, and “genetically modified organisms,” assigned to high R&D intensity.

net that might ensnare merger challenges that do not involve innovation or R&D.⁵² It is instructive, nonetheless, to examine certain isolated examples to see how they might affect our conclusions, as we do below.

In addition to industry R&D intensity, we collected other data from the relevant merger documents regarding the parties and the industries the proposed transaction affected. These data include the transaction size, whether unilateral and/or coordinated competitive effects were alleged, whether the transaction excluded a potential entrant, whether the transaction had a vertical component, and the market concentration or number of significant competitors for each market identified in the complaint or other public document. We conducted a probit regression that related the probability that the Agencies allege harm to innovation in their merger challenges to these industry and market characteristics. With the exception of industry R&D intensity, none of these variables were related to the probability of an innovation allegation with a high degree of statistical confidence. In particular, allegations of innovation harm were not more likely in mergers that were larger, mergers in more concentrated industries, or mergers involving the exclusion of potential entrants.⁵³

Table 2 shows the percentage of merger challenges that allege harm to innovation for the DOJ and FTC collectively and for each Agency separately, categorized according to the R&D intensity of the affected industry. For the DOJ and FTC combined, merger challenges that invoked innovation considerations in moderately R&D intensive industries occurred more than five times as often compared to challenges in industries with low R&D intensity (42.9%/7.7%). In industries with high R&D intensity, merger challenges that allege innovation occurred more than ten times as often compared to challenges in industries with low R&D intensity (85.5%/7.7%). As the Table 2 highlights, both the DOJ and FTC allege harm to innovation in a very high percentage of merger challenges in industries that we classify as having high R&D intensity.

Table 2. Fraction of Agency merger challenges that allege harm to innovation

	Low R&D intensity	Moderate R&D intensity	High R&D intensity
FTC + DOJ	7.7%	42.9%	85.5%
FTC	4.8%	32.4%	86.4%
DOJ	11.9%	87.5%	83.3%

Both the harm to innovation from a merger and the potential for a change in industry structure to promote innovation – and therefore create a merger-specific efficiency – are most likely to occur in industries with high R&D intensity. In all but three mergers that the DOJ challenged in industries that we identified as high R&D intensity, our search algorithm also

⁵² Note that the determination of whether an innovation *harm* is alleged is complicated by what constitutes an innovation. For example, minor changes to assembly processes or minor product improvements may or may not be identified as potential innovations.

⁵³ The regression results are on file with authors.

identified that the DOJ alleged that these mergers, if consummated without conditions, would harm innovation. It is instructive to examine more closely these three outliers.⁵⁴

The DOJ challenged Cengage Learning, Inc.'s proposed acquisition of Houghton Mifflin College Division's assets.⁵⁵ The product market was the "development, publication, and sale of textbooks and ancillary materials" for use in courses taught at higher education institutions throughout the United States. We determined this product market corresponds to "publishing," which the NSF classified as having relatively high R&D intensity. If, instead, textbook publishing were classified as having moderate or low R&D intensity, the fraction of merger challenges in highly R&D intensive industries for which the DOJ raised innovation concerns would increase to 88% (15/17).⁵⁶

There were two other mergers DOJ challenged in high R&D intensive industries for which our search algorithm did not identify innovation concerns. These were *U.S. v. General Electric Company & CVT Holding SAS*⁵⁷ and *U.S. v. Microsemi Corp.*⁵⁸ In the former the DOJ raised concerns about "development, manufacture and sale of low-speed synchronous electric motors ..." and in the latter about the "development, manufacture and sale" of transistors and diodes. Although not highlighted by search algorithm, these statements suggest concerns about harms related to product innovation.⁵⁹

If one re-classified these three cases for the foregoing reasons and the balance of the cases are correctly designated analyzed with regard to both the presence of an alleged harm to innovation and the designation of R&D intensity, then the conclusion would be that the DOJ raised innovation concerns in 100% of the mergers that it challenged in highly R&D intensive industries.

According to our classification of industry R&D intensity and our search algorithm to identify innovation concerns, the FTC did not raise innovation concerns when challenging six mergers in high R&D intensity industries. If one re-examined these six merger challenges to assess whether they raised possible innovation concerns that escaped our algorithm, it would not be unreasonable to conclude that a substantial fraction of these cases involved innovation harms such as harm to "product development," leading to the conclusion that the FTC raised innovation

⁵⁴ In addition to possible false negatives, our algorithm may also generate possible false positives. A small subset of the high R&D intensity matters in which the relevant product market is defined as including "research, development" as well as "manufacture, sale" but they do not include any explicit reference to "innovation" or harm to "research and development." See *In re. Allergan & Inamed* (Cmplt. filed Mar. 8, 2006); *In re. Novartis AG (Alcon)* (Cmplt. filed Aug. 16, 2010); *In re. Eli Lilly & Novartis AG* (Cmplt. filed Dec. 19, 2014). Furthermore, it is also possible that some industries classified as having low or moderate R&D intensity might more properly be considered as having high R&D intensity.

⁵⁵ *US v. Cengage Learning Holdings, et al.* (Cmplt. filed May 28, 2008 D. D.C.).

⁵⁶ Brookings' "software publishers" category has relatively high R&D intensity. Brookings has no separate category for "publishers." It is possible that the NSF category "publishers" includes software and other digital technologies that have relatively high R&D intensity.

⁵⁷ *US v. General Electric Co. & CVT Holdings SAS* (Cmplt. filed Aug. 29, 2011 D. D.C.).

⁵⁸ *US v. Microsemi Corp.* (Cmplt. filed Dec. 18, 2008 E.D. Va.).

⁵⁹ Implicitly, we are thinking of the development of the products considered in these matters to involve significant technological improvements. Otherwise, innovation harm could be linked to almost any product involving some development, even when the innovation involved is relatively small. See *supra* note 53.

concerns in over 90% of the mergers that the Agency challenged in highly R&D intensive industries.

The differences in the respective fractions of challenged mergers for which the DOJ and FTC alleged harm to innovation, as indicated in Table 2, need not necessarily indicate different enforcement postures by the two agencies, as their industry portfolios differ. The observation that the FTC alleges harm to innovation in a smaller percentage of mergers than the DOJ in industries that we classify as moderately R&D intensity could well reflect that more FTC mergers are in industries that the NSF and Brookings classify as moderately R&D intensive, but are not viewed as such by the Agency. For example, for historical reasons and based on accumulated experience, a significant fraction of the FTC's merger enforcement portfolio is in the health care industry. Both the NSF and Brookings classify "health care services" as having moderate R&D intensity. Yet this classification, like a number of others, encompasses a very broad swath of activities, many of which are not R&D intensive. Examples include outpatient surgery services and inpatient services provided by hospitals that do little R&D.

By concentrating markets, mergers can either harm or promote incentives for innovation.⁶⁰ An increase in market power from a merger can dull the incentive to invent in at least two ways. By increasing the flow of profits from existing products and services, the merger can reduce the merged firm's incentive to create new products and services. Alternatively, the merger can combine two firms, each of which would have taken significant sales from the other if they had been successful innovators. The merger internalizes this externality, thereby reducing incentives for invention.

Yet a merger also can increase incentives for innovation. Many innovations create value that is largely specific to the firm that develops the innovation. A new process to lower production costs will create value that is proportional to the innovator's sales, unless the innovator can license others at terms that reflect the lower costs enabled by the innovation. If licensing at compensatory terms is not viable, a larger firm has a greater incentive to innovate because it has more sales that can benefit from the innovation. A merger can enhance this type of innovation by enabling the merged firm to appropriate a larger share of the innovation's potential value. In a sense, the merger partially solves the appropriation problem associated with imperfect licensing.

Of course the Agencies challenge only a fraction of the mergers that they investigate. We do not observe the mergers that the Agencies do not challenge because they recognize the pro-competitive benefits of the mergers for innovation. These mergers do not appear in any searchable database. Instead, what we observe is mergers that the agencies have challenged because they are likely to raise prices or harm innovation, or both. Because not all mergers harm innovation, it should be the case that some fraction of the observed challenges is in industries for which adverse innovation effects are unlikely.

Nonetheless, both the DOJ and the FTC allege adverse innovation effects in a very large fraction of their respective merger challenges in high R&D intensity industries. Furthermore, their innovation challenges across all types industries are statistically unrelated to a set of

⁶⁰ See generally *supra* Part I.

reported characteristics (market concentration, transaction size, etc.) of those industries other than R&D intensity. Yet we would expect net merger benefits for innovation to be more likely in some industries than in others, holding R&D intensity constant. Furthermore, there ought to be at least some mergers in which there is no significant innovation harm.

The very high fraction of mergers in high R&D intensity industries in which the Agencies allege harm to innovation, then, invites further consideration. One explanation is that the Agencies undervalue or inadequately consider innovation benefits that may arise from a merger in such sectors. This explanation is consistent with the lack of evidence from the probit regression analysis that market concentration, transaction size, and other relevant factors such as whether the merger presents concerns about coordinated effects, correlate with allegations of harm to innovation. Another possibility is that when the Agencies predict a net benefit to innovation from a merger, the predicted innovation benefit is highly weighted vis-à-vis any predicted static efficiency harm (at least in high R&D intensity industries). If in the exercise of prosecutorial discretion innovation benefits generally trump price effects, then the Agencies will not challenge the merger and, therefore, proposed mergers involving a net positive benefit to innovation would not appear in the data regarding merger challenges.⁶¹ However, economic theory suggests that some industries should not present significant concerns about innovation.⁶² Mergers in these industries may raise static efficiency concerns from higher prices, but should not also raise concerns about dynamic effects. Hence, this is an incomplete explanation. In either case, as discussed in the next section, the Agencies should provide greater clarity regarding their analysis of innovation harms.⁶³

B. The Treatment of Innovation-Related Challenges

The central determination in our analysis is whether or not and under what conditions the Agencies invoke harm to innovation within their respective merger challenges. This section provides some further insight regarding the heterogeneity characterizing the Agencies' invocation of innovation-based concerns. Our binary treatment of an innovation challenge does not address, for example, the level of Agency concern. Assessing the level of concern, particularly from the public documents at issue, is a task that is both difficult and subjective. As such, we adopt a relatively simple approach that examines the manner in which innovation is invoked as a noisy measure of the level of concern.

We divided the 82 matters for which the Agencies have alleged innovation concerns into two groups depending upon whether the Agency's treatment of innovation, as defined by our search algorithm, takes the form of being *mentioned* or *discussed*. "Mentioned" describes when the Agency directly states that a decrease in competition will harm innovation but the Agency

⁶¹ In other antitrust contexts courts have treated innovation benefits quite favorably. *See, e.g.*, Hillary Greene, *Muzzling Antitrust: Information Products, Innovation and Free Speech*, 95 B.U. L. REV. 35, 79 (2015) (In Sherman Act §2 monopolization cases involving allegedly anticompetitive product redesign, "the existence of a nonpretextual innovation justification is sufficient to overcome claimed anticompetitive effects.").

⁶² As previously discussed, mergers in industries with weak appropriation should not raise significant innovation concerns. Furthermore, innovation concerns should be less likely when competition takes the form of coordinated interactions because it is more difficult for firms to coordinate on research and development expenditures.

⁶³ When Agencies challenge mergers, it appears that, as a matter of litigation strategy, their complaints do not address procompetitive benefits other than to cursorily reject them.

does not provide further elaboration. This would include various circumstances and includes examples such as when an Agency notes that an acquisition will eliminate competition and “and likely will result in higher prices and reduced innovation”⁶⁴ or when the Agency states that “eliminating competition for research, development, manufacture, and sale ... [would] reduc[e] incentives to improve product quality or to pursue further innovation.”⁶⁵

“Discussed” describes when the Agency explicitly posits not only the harm to innovation but also elaborates upon the contours or nature of that harm.⁶⁶ Such discussion frequently entails a more specific statement that the market at issue has benefited innovation spurred by competition.⁶⁷ And a portion of those discussions often take the form of specifically identifying the innovations that resulted from such competition and the likely harms that would occur from the proposed transaction.⁶⁸

Though less common, the nature of innovation is reflected in discussions regarding the mechanisms of innovation or distinctions among firm’s innovation capabilities. For example, one complaint contained a subsection entitled, “how competition occurs,” explained that producers “must engage in research and development to deliver better products in order to compete effectively.”⁶⁹ Another complaint discussed how the harm to innovation would arise, in part, because “[i]t would be prohibitively expensive for many customers to develop a [product] with functionality comparable to the features offered by [merging parties], and it would be difficult to maintain the same pace of innovation.”⁷⁰

Chart 1 presents the summary statistics. When examining the percentage of innovation matters that are discussed by the Agencies, innovation is mentioned in roughly half and discussed in the other matters (i.e., 42%, 59%, and 46% for low, medium and high R&D intensity industries, respectively). Moreover, these discussion rates do not vary markedly across the three R&D intensity categories. As such, the use of the binary indicator for an innovation challenge in our earlier analysis does not appear to mask a skewed pattern of discussion about innovation effects that differs across R&D level categories.

⁶⁴ In re. Solera Holdings, Inc. (AAPC filed June 22, 2013).

⁶⁵ In re. General Electric Co. & InVision Tech. (Cmplt. filed Sept. 9, 2004).

⁶⁶ The “discussed” category also includes “innovation market” arguments. *See, e.g.*, In re. Nielsen Holdings NV & Arbitron Inc. (Cmplt. filed April 20, 2013).

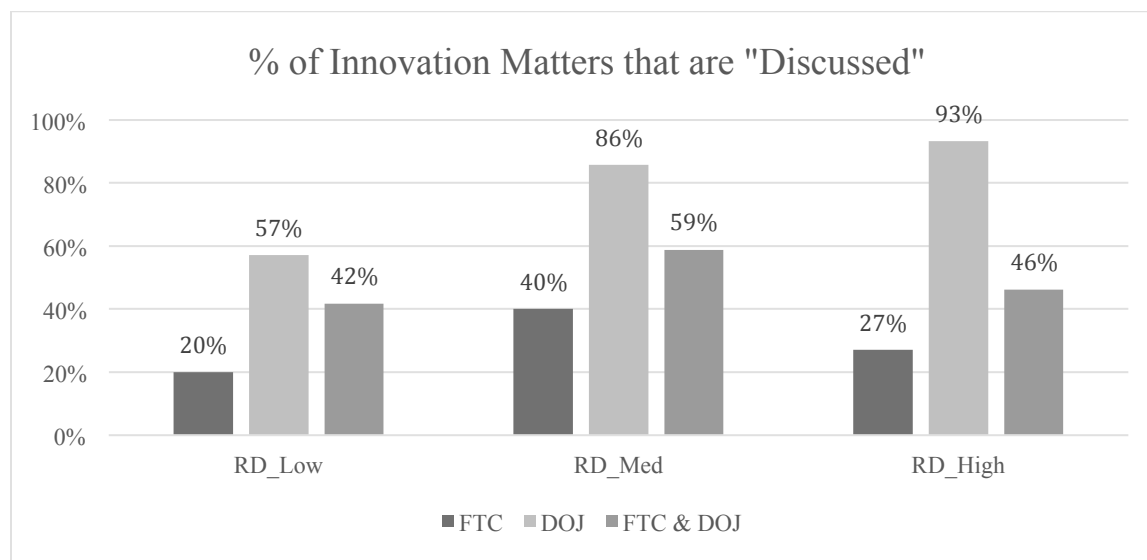
⁶⁷ *See, e.g.*, In re. Hologic, Inc. (Cmplt. filed July 7, 2006).

⁶⁸ *See, e.g.*, US v. AT&T Inc., T-Mobile USA, Inc. & Deutsche Telekom ABG (Cmplt. filed Aug. 31, 2011).

⁶⁹ US v. Amcor Ltd., Rio Tinto PLC & Alcan Corp. (Cmplt. filed June 10, 2010 D. D.C.).

⁷⁰ US v. Bazaarvoice, Inc. (Cmplt. filed Jan. 10, 2013 N.D. Cal.).

Chart 1.



We also analyzed the data underlying Chart 1 to examine whether the use of “research, development” within our search algorithm skewed the results regarding high R&D intensity industries because “research, development” could be present in the merger documents at issue regardless of the existence of an innovation concern.

One interesting pattern that emerged is an apparent difference in relative treatment by the Agencies. Conditional on an innovation concern being raised within the documents at issue, on average DOJ engages in a greater level of discussion than does the FTC. This difference is found for across every level of R&D intensity. The Agencies review different portfolios of industries and, therefore, this apparent difference could be explained in part by a composition effect as was discussed regarding the percentage of merger challenges involving innovation in Table 1. However, because DOJ has higher levels of discussion across all R&D intensity categories, a shift of industries cannot fully explain this pattern. This pattern might suggest that DOJ substantively handles innovation somewhat differently than FTC. Alternatively, the difference could be explained by the arguably higher standard of review DOJ faces compared to FTC regarding consent orders/complaints. Or, it could merely reflect a difference in more formalistic conventions rather than a substantive difference in how these matters are thought through. Any more definitive assessment of this data is beyond this article’s scope.

CONCLUDING THOUGHTS REGARDING FURTHER GUIDANCE

Innovation is a critical issue for merger policy. Mergers can promote as well as harm innovation. Complaints and other public statements issued by the Antitrust Agencies generally focus on the likely anticompetitive effects from a combination and rarely explain the reasons why they choose not to challenge a transaction, including possible efficiency defenses from innovation. However, it is our view that the Agencies can provide greater transparency to antitrust practitioners and the business community, and possibly sharpen their analytical

approach, if the Agencies describe their innovation concerns with greater specificity when merger challenges allege harm to innovation.

The 2010 Guidelines constitute a valuable contribution to the merger discourse regarding innovation and a long-anticipated updating of the Agencies' enforcement policy. Yet the Guidelines offer few details to describe the Antitrust Agencies' analytical processes to evaluate innovation concerns and our attempt to "reverse engineer" their approach by examining actual enforcement actions in merger cases reveals few consistent patterns. It is unavoidable that at any given point the merger guidelines' content will invariably lag somewhat behind both the academic and practical insights drawn from law, economics, and business field as well as actual Agency practices. Scholarly research that posits a connection between competition and incentives to innovate is complex and evolving. The empirical evidence is impressive but not entirely definitive. Nonetheless, there are important themes that have withstood the test of time without contradiction from theory or empirics. Central among these concerns is the ability of the merging parties to appropriate the benefits from investments they make in research and development.

The Guidelines note the importance of appropriation to the analysis of the effects of a merger on the incentive to innovate, but say little more than "The Agencies also consider the ability of the merged firm to appropriate a greater fraction of the benefits resulting from its innovations." More detail about how each Agency undertakes such an evaluation is needed. Providing such detail would better inform businesses and antitrust practitioners about the Agencies' enforcement practices and clarify the Agencies' concerns about potential harms to innovation from mergers and the scope for innovation-related merger efficiencies.

Appendix A. Industry sector R&D intensity

High R&D intensity:

(Patented) Pharmaceuticals and Medicines
 Aerospace Products and Parts
 Architectural, engineering, and related services
 Audio and Video Equipment
 Chemicals
 Communications Equipment
 Computer and electronic products
 Computer systems design and related services
 Computers and Peripheral Equipment
 Data processing, hosting, and related services
 Engines, Turbines, and Power Trans. Equipment
 Genetically modified organisms**
 Internet service providers and Web search portals
 Medical Equipment and Supplies
 Motor Vehicles
 Navigation, Measurement, and Control Instruments
 Other computer and electronic products
 Other Information
 Other Transportation Equipment
 Pesticides, Fertilizers, and Other Agricultural Chemicals
 Professional, scientific, and technical services
 Publishing
 Scientific R&D services
 Scientific Research and Development
 Semiconductors and Other Electronic Components
 Software Publishers

Moderate R&D intensity:

Aluminum Production and Processing
 Basic chemicals
 Clay Products
 Construction
 Electrical equipment, appliances, and components
 Health care services
 Machinery
 Magnetic and Optical Media
 Management of companies and enterprises
 Mining, extraction, and support activities
 Miscellaneous manufacturing
 Motor Vehicle Parts
 Motor vehicles, trailers, and parts
 Newspaper, periodical, book, and database
 OTC drugs (low patent protection)**

Other chemicals
 Other nonmanufacturing (family services)
 Plastics and rubber products
 Resin, synthetic rubber, fibers, and filament
 Satellite Telecommunications
 Ship and Boat Building
 Transportation equipment

Low R&D intensity: Architecture and Engineering
 Beverage and tobacco products
 Cable and Other Subscription Programming
 Concrete, sand and gravel**
 Consumer nondurables**
 Electric Lighting Equipment*
 Electric Power Generation, Trans., and Distribution
 Electrical Equipment*
 Fabricated metal products
 Finance, insurance, and real estate***
 Food
 Foundries (and fabricated metal products)
 Furniture and related products
 Generic pharmaceuticals**
 Household Appliances*
 Iron, Steel, and Ferroalloys
 Media, broadcasting and entertainment**
 Medical and Diagnostic Laboratories
 Metal Ore Mining (and primary metals)
 Mgmt., Scientific, and Technical Consulting
 Miscellaneous services**
 Motor Vehicle Bodies and Trailers
 Oil and Gas Extraction*
 Oil and gas retailing, transport and storage**
 Other Electrical Equipment and Components*
 Other Nonmetallic Mineral Products
 Outpatient medical services**
 Paper, printing, and support activities
 Petroleum and Coal Products*
 Railroad Rolling Stock
 Retail trade
 Textiles, apparel, and leather
 Transportation and warehousing
 Utilities
 Wired and wireless (except satellite) telecommunications carriers
 Wood products

* = Imputed from 3-digit NAICS by Brookings

** = category added to list without data

*** = added despite data at 2-digit NAICS level