

Paper Trail: Working Papers and Recent Scholarship

Editors' Note: Editor John Woodbury reviews two papers—one theoretical and the other applying the theory—by Jonathan Baker. The papers address the effects on the extent of innovation of antitrust efforts to reduce exclusionary practices by dominant firms. Send suggestions for papers to review to page@law.ufl.edu and jwoodbury@crai.com.

—WILLIAM H. PAGE AND JOHN R. WOODBURY

Recent Papers

Jonathan Baker, Exclusionary Conduct of Dominant Firms, R&D Competition, and Innovation (Mar. 15, 2015), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2523202

Jonathan Baker, Evaluating Appropriability Defenses for the Exclusionary Conduct of Dominant Firms in Innovative Industries (draft of Nov. 13, 2014), ANTITRUST L.J. (forthcoming), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2523203

These two papers by Jonathan Baker (Professor of Law, Washington College of Law, American University) address the effects on the extent of innovation of antitrust efforts to reduce exclusionary practices by dominant firms. The first paper considers these effects at a conceptual level (*Exclusionary Conduct of Dominant Firms, R&D competition, and Innovation*) (“Theory Paper”). The companion paper (*Evaluating Appropriability Defenses for the Exclusionary Conduct of Dominant Firms in Innovative Industries*) (“Applied Paper”) suggests how some of the results of the first paper might be applied in practice to evaluate claims by a dominant firm that the exclusionary practices preserve its innovation investment incentives by increasing its ability to appropriate the returns from innovation.

Exclusionary Conduct of Dominant Firms, R&D Competition, and Innovation

In this first paper, Baker develops a model of R&D competition in a two-firm setting, a dominant firm and a rival.¹ Baker's motivation for the paper is straightforward: “In antitrust cases, some dominant firms, including Microsoft and Intel, have sought to justify their alleged exclusionary conduct, or fend off proposed remedies that would prohibit it, by claiming that the conduct enhances their incentive to innovate by increasing their return to R&D investment.” (Theory Paper p. 6) The purpose of the model is to identify the effects on overall innovation success if the dominant firm were required to reduce the level of its exclusionary impediments to competition by the rival. In other words, Baker is addressing at least one Holy Grail of innovation analysis: Will elimination of the dominant firm's exclusionary impediments to competition increase the overall likelihood of successful innovation? Or, more colloquially, is more competition in R&D better than less?

¹ Given the technical nature of the paper, I have chosen to describe the model in broad-brush strokes, which may raise the ire of my economist colleagues at my lack of precision.

Although the model is highly stylized (and the paper itself is quite technical), the results turn on four key characterizations. The first is whether the firms regard R&D investment as a strategic substitute (i.e., if my rival's R&D investment increases, I find it profitable to accommodate that increase by reducing my R&D investment) or a strategic complement (i.e., if my rival's R&D investment increases, I find it profitable to increase my R&D investment).² In theory, the dominant firm, for example, could regard the rival's investment as a strategic complement while the rival could regard the dominant firm's investment as a strategic substitute (or vice-versa).

The second key issue is how these relationships change or shift when the enforcement agencies act to reduce the exclusionary impediments. The third is whether after those shifts, total R&D investment rises as a result of increased competition.

A fourth complexity is the need to distinguish between what Baker refers to as pre- and post-innovation competition scenarios. In the pre-innovation scenario, exclusion can take the form, for example, of foreclosing a rival's access to key inputs or distribution outlets, thus discouraging R&D investment by the rivals. Post-innovation competition can be impaired by loyalty discounts and the dominant firm designing its new product to be incompatible with the rival's innovation.

The focus of the rest of the paper is on the kinds of sufficient technical conditions that ensure the reduction in exclusionary impediments increased (or decreased) total R&D expenditures and so increased (or decreased) the probability that at least one of the firms will succeed in innovating. Drawing from Baker (Applied Paper pp. 6–7) and focusing on post-innovation competition, the “direct” effect of an impediment-reducing policy is to reduce the dominant firm's R&D investment incentives (because of reduced appropriability) and increase the rival's investment incentives. But if the rivals do invest more in R&D as a result and the dominant firm regards its rival's R&D investment as a strategic complement, there will be an offsetting dominant firm incentive to increase R&D spending in response to the rival's increased investment. As Baker notes (Theory Paper p. 16), “if the rival invests more and the dominant firm's R&D investment increases or does not decline much, the aggregate probability of R&D success may increase.”

When exclusionary impediments are reduced, the sufficient conditions for an increase in the overall probability of success in the pre-innovation market are a mirror image of those for post-innovation competition. With respect to the direct effects, Baker notes that the dominant firm has an incentive to increase (not reduce) R&D investment so as to “escape” competition while the reverse is true for the rival (which now finds the status quo more profitable). (Theory Paper p. 10.) If the dominant firm regards the rival's R&D investment as a strategic substitute, then the lowered investment of the rival will induce the dominant firm to increase investment. On the other hand, the rival's incentives to reduce R&D investment “will be dampened or countered if it views the dominant firm's R&D investment as a strategic complementIf the dominant firm invests more and its rival's R&D investment increases or does not decline by much, the aggregate probability of R&D success may increase.” (Theory Paper pp. 15–16.)

Baker concludes that “[e]nforcement actions challenging pre-innovation exclusion and enforcement actions challenging post-innovation exclusion will tend to be effective in different strategic settings.” (Theory Paper p. 18.)

Notwithstanding the technical nature of the paper, Baker has developed a simple but rich model that may capture the determinants of the effects of removing exclusionary impediments to

² More technically, one question is whether the best response/reaction function of the dominant firm's R&D investment decisions to the rival's investment decision is upward sloping (as the rival increases its R&D investment, the dominant firm responds by increasing its own investment) or downward sloping (as the rival increases its R&D investment, the dominant firm reduces its R&D investment). There is the analogous question for the rival. Throughout, the assumption is that greater R&D investment increases the likelihood of innovation success.

competition on innovation in a strategic setting. In that sense, the paper advances our knowledge of innovation competition and the possible effects of antitrust policy designed to encourage competition on innovation. But the paper also highlights the complexity in terms of identifying the likely effects in a real-world setting, effects that differ depending on the nature of strategic responses, how those responses shift when competition increases, and whether the policies are directed towards advancing pre-innovation or post-innovation competition. One could certainly argue given the complexity of the innovation effects even in this highly stylized model, that the antitrust agencies and the courts should be very cautious in attempting to reduce the extent of exclusionary practices to increase innovation without accounting for the strategic responses of the players to that effort (which also requires understanding whether the competition sought is pre- v. post-innovation). Baker's companion Applied Paper offers a start to exploring ways of identifying when eliminating exclusionary practices will increase aggregate innovation.

While I would recommend the Theory Paper to economist colleagues, it may be too technical for antitrust lawyers. All of the analysis is crammed into 18 pages, and, as a result, the paper is somewhat more dense than perhaps is necessary. Some elaboration would prove fruitful. For example, more of an analytic roadmap to the paper in the introduction would have been helpful. As another example, Baker spends little time on the definition or characteristics of pre-innovation/post-innovation competition, a distinction that is critical for understanding how competitive interactions affect innovation. And exclusion could be simultaneously happening in both "periods" or the effect on one competition type might spillover to the second (a complication Baker admits he ignores³). In addition, it would have been helpful if Baker had placed his paper against the backdrop of other papers examining competition in R&D and how this paper advances the literature. There is certainly some of that discussion buried in a footnote or two (see, for example, note 1 in the Theory Paper), but that discussion is quite sparse. More would have been helpful.⁴

Yet, in my discussion here, I have barely scratched the variety of possible outcomes within the four corners of the paper. Given the importance of understanding the effect of antitrust policy on innovation and Baker's focus on the role of strategic substitutes and complements in considering policy actions, the effort is worth the candle.

Evaluating Appropriability Defenses for the Exclusionary Conduct of Dominant Firms in Innovative Industries

Baker uses the Applied Paper to suggest how some of the insights gained from the Theory Paper can be employed in practice. In this effort, Baker's focus is narrower than that in the Theory Paper. He does not attempt to identify factors that would lead antitrust agencies or the courts to conclude that reducing exclusionary conduct will increase total R&D investment. Baker instead considers

³ But Baker does address this issue in passing in the Applied Paper at note 20: "When exclusionary conduct would affect both pre-innovation and post-innovation competition, the dominant firm's innovation incentives would likely depend primarily on the consequences for post-innovation competition . . . as the present value of dominant firm profits in product markets after new products are introduced would be commonly expected to exceed its profits while R&D is underway but before the products are introduced."

⁴ Interestingly, in the Applied Paper, Baker is more expansive in his literature references, but those are more focused on the applications rather than the theory. For example, in the Applied Paper, he notes (pp. 5–6) two observations suggesting that exclusionary conduct will not increase aggregate innovation incentives. "The first is the empirical economics literature that suggests that on average, the incentive to innovate to escape product market competition plays at least as large a role in fostering innovation as the incentive to obtain a greater reward for innovation success. The second is the observation that in many markets the dominant firm's payoff to innovation, and thus its incentives to invest in R&D, would likely remain high even if its exclusionary conduct is prohibited, because of structural features like rapid market growth, scale economies, network effects, sale of complementary products, and high customer switching costs." (Notes omitted, citing the relevant literature.)

claims by dominant firms that efforts to eliminate what the agencies or the courts might regard as exclusionary conduct will discourage the dominant firm's R&D investment by reducing the extent to which the dominant firm can reap (appropriate) most or all of the profits from a new innovative product. So, going forward, the dominant firm might argue, its offering of new innovative services will be reduced as competition increases.⁵

Baker provides some of the policy and legal context by focusing on seemingly contrasting court views of the incentive effects of a dominant firm's exclusionary practices. He notes (Applied Paper p. 4) that the appropriability defense was rejected by the Supreme Court in *Kodak*. In addressing Kodak's refusal to sell parts to independent service organizations (ISOs), Baker notes the Supreme Court's observation: "Kodak claims that its policies prevent ISO's from 'exploit[ing] the investment Kodak has made in product development, manufacturing, and equipment sales in order to take away Kodak's service revenues'. . . . This understanding of free-riding has no support in our case law."⁶

By contrast, the appropriability defense seems to have been accorded significant weight by the Supreme Court in its *Trinko* opinion. Baker quotes the Court as observing: "Firms may acquire monopoly power by establishing an infrastructure that renders them uniquely suited to serve their customers. Compelling such firms to share the source of their advantage is in some tension with the underlying purpose of antitrust law, since it may lessen the incentive for the monopolist, the rival, or both to invest in those economically beneficial facilities."⁷

To evaluate the credibility of the dominant firm's appropriability defense, Baker begins with a theme from the Theory Paper that there are two effects which can pull in opposite directions. First is the direct effect of eliminating the exclusionary conduct, which is to reduce the dominant firm's incentives to invest in R&D. This is the effect most often addressed by proponents of allowing dominant firms to preserve and enhance innovation incentives through exclusionary conduct.

But there is a second, indirect effect that these proponents do not consider: whether the dominant firm regards rivals' R&D investment as a strategic complement. If the rivals invest more as a result of eliminating exclusion, the dominant firm would have an incentive to increase its R&D investment.⁸ If this indirect effect is stronger than the direct effect, then, Baker argues, the appropriability defense should be rejected. Consequently, when assessing an appropriability defense, both effects must be considered.

Baker further notes that even if the direct effect dominates the indirect effect, the net effect on the dominant firm's R&D incentives from eliminating exclusion could be small while increasing the rivals' R&D investment (so that total industry R&D investment may increase). Moreover, Baker observes (Applied Paper n.25) that if the reduction in the dominant firm's R&D incentives is minor (and thus causing some consumer harm), consumers may nonetheless benefit on balance from

⁵ Thus, in this paper, Baker is focusing on post-innovation competition. Baker notes (Applied Paper p. 8) that "[i]t is reasonable to focus solely on the post-innovation exclusion when evaluating the appropriability defense because the dominant firm would not proffer that defense unless it is concerned with the incentive consequences of post-innovation product market competition." See also the discussion in note 3 *supra*.

⁶ Baker, Applied Paper p. 4 (quoting *Eastman Kodak Co. v. Image Technical Servs., Inc.*, 504 U.S. 451, 485 (1992), upholding circuit court reversal of the district court's award of summary judgment to Kodak on plaintiff's monopolization, attempted monopolization, and tying claims).

⁷ Baker, Applied Paper pp. 4–5 (quoting *Verizon Commc'ns Inc. v. Law Office of Curtis V. Trinko*, 540 U.S. 398, 407–08 (2004) (dicta)).

⁸ Baker (Applied Paper p. 12) is assuming that the magnitude of the direct effect of the elimination of exclusion on increasing the rivals' R&D investment incentives would dominate any secondary effects tending to reduce rivals' investment.

the increased product market competition that the elimination of exclusion would foster. Thus, the larger is the indirect effect (when the dominant firm views the rival's R&D investment as a strategic complement), the more likely it is that the reduction in exclusion will benefit consumers. "For this reason, a dominant firm's appropriability defense should be questioned, and often rejected, if exclusionary conduct lessens rival R&D investment and the dominant firm would be expected to increase its own R&D effort in response to increased R&D by its rivals." (Applied Paper p. 7.)

To evaluate the significance of the indirect effect for dominant firm R&D investment, Baker puts a bit more structure on the theoretical construct presented in the Theory Paper. Providing some intuition behind the notion of strategic complementarity in R&D investment, Baker notes (Applied Paper p. 10):

Intuitively, when a rival increases its R&D investment, the rival's likelihood of innovation success will increase. If the dominant firm's incremental gain from innovation success is greater when the rival succeeds than when the rival fails, the dominant firm will seek to improve its own prospects for innovation success by investing more in innovation too.

Based on an extended example in a more technical appendix, Baker identifies three factors that would affect the likelihood that the dominant firm regards the rival's R&D investment as a strategic complement. First, the dominant firm may anticipate a high market share even when both the dominant firm and the rivals experience innovation success. If so, the dominant firm will capture much of the profits from innovation even without exclusion of rivals. Second, the dominant firm expects to lose substantial sales to the rival if it fails to innovate and the rival succeeds. Baker notes that "each [of these two factors] increases the dominant firm's incremental benefit from new product introduction given that its rival also does so, relative to the firm's incremental benefits when its rivals do not upgrade." (Applied Paper p. 11.)

The third factor Baker identifies is the role of complements to the primary product. If the dominant firm produces complements for the upgraded product and such sales are very profitable to the dominant firm, "the dominant firm cares mainly about ensuring that *some* firm introduce a new product, so its incremental gain from upgrading its own product conditional on its rival introducing a new product will be small." (Applied Paper p. 11.) In that case, the dominant firm's incentives to invest are weakened: an increase in R&D investment by rivals could cause the dominant firm to reduce its R&D investment, i.e., the dominant firm regards the rival investment as a strategic substitute.

Baker assesses how these factors could have informed an evaluation of the appropriability defense in three sets of landmark antitrust matters: Microsoft's exclusion of operating system rivals by impeding the development and distribution of Netscape and Sun Microsystems Java, which could have facilitated OS competition; IBM's decisions to render its central processing units (CPUs) incompatible with the peripheral devices of other producers, which limited competition in peripherals; and Xerox's accumulation of patents which may have discouraged competition in the sale of plain paper copiers.

To briefly describe the IBM example, Baker focuses on a series of cases involving competition in computer peripherals during the 1960s and 1970s.⁹ At the time, "IBM was the leading manufacturer of central processing units (CPUs) [and] IBM may have had a monopoly share in markets

⁹ *Transamerica Computer Co. v. IBM Corp.*, 698 F.2d 1377, 1383–84 (9th Cir. 1983); *Cal. Computer Prods., Inc. v. IBM Corp.*, 613 F.2d 727, 744 (9th Cir. 1979); *Telex Corp. v. IBM Corp.*, 510 F.2d 894 (10th Cir. 1975).

for plug-compatible peripherals [e.g., tapes, disks, printers, and terminals].” (Applied Paper p. 15.) When IBM introduced a new generation of CPUs, those were incompatible with non-IBM peripherals and some rivals challenged the incompatibility as an attempt to monopolize the next-generation peripherals sales. Baker notes that when resolving these cases, the courts “declined to condemn IBM’s product design decisions found to enhance product quality or reduce[d] manufacturing costs, in part in order to avoid chilling that firm’s incentives to innovate.” (Applied Paper p. 16)

Suppose instead that the courts had agreed that IBM’s designs were exclusionary and so required compatibility as a remedy and suppose that that remedy provided increased incentives for rivals to engage in R&D for a new generation of peripherals. If IBM were to respond by increasing its own R&D investment, then the appropriability defense would be undercut. “IBM would likely respond in this way if it would expect to benefit more by developing next generation peripherals in the event its rivals also introduced upgraded peripheral products than it would gain by upgrading if its rivals did not innovate.” (Applied Paper p. 16.)

First, Baker notes that IBM likely expected to maintain a high share of peripherals even in the face of innovations by rivals: “Factors like customer loyalty, brand reputation, and service would likely have protected IBM’s share.” (Applied Paper p. 17.) Second, Baker points to evidence that if IBM reduced its R&D investment in response to increased peripheral compatibility, it risked losing substantial peripheral sales to those innovating rivals. Consequently, if these conditions held, “IBM would likely have responded to greater innovative effort by its peripherals rivals—as might have been the product of antitrust enforcement against IBM’s conduct—by increasing its own innovative effort.” (Applied Paper p. 17.) If so, this outcome would undercut an appropriability defense.

However, that’s not the end of the story. IBM might reduce its investment in peripherals R&D if the profitability of CPU sales were substantial and would be greater as long as some firm invested in the peripherals.

[If so,] IBM would have benefitted from the introduction of new peripherals regardless of whether the new products came from IBM or its rivals If the profitability of [CPUs] was the dominant influence on IBM’s response to rival innovative effort, then IBM might have responded to antitrust enforcement by cutting back on its own effort, consistent with what an appropriability defense would maintain. (Applied Paper pp. 17–18.)

A Conclusion

On the one hand, Baker’s marrying of the Theory Paper to the Applied Paper makes both papers that much more interesting. The Applied Paper provides a solid practical environment to consider some of the implications of the theory for the practice. On the other hand, like Charles Dickens’s *Oliver*, I find myself wanting more in the Applied Paper. To be sure, Baker is clear that he is only illustrating how the Theory Paper might be used to assess the appropriability claims of dominant firms that use exclusion to constrain competition from rivals: “The case studies are intended to illustrate the approach, not to opine definitively on whether an appropriability defense should have been accepted in those cases.” (Applied Paper p. 21.) Still, he seems to offer what appears to be a stronger conclusion that “[a]s a group, [the case studies] suggest that it would neither be unusual nor surprising for dominant firms to respond to new product development efforts of rivals with greater innovative effort of their own.” (Applied Paper p. 21.) But Baker speeds through the three case studies, leaving the reader wondering how strong his case is for

evaluating appropriability in those matters. Some of the support for his application is contained in notes that probably should be in the text. But generally, more supporting facts would have been helpful.

And the IBM example suggests lingering questions on how to apply Baker's three factors to assessing an appropriability defense. For example, if IBM's peripheral share is expected to remain high after rivals innovate, how high does it have to be? Similarly, how large do the losses to rivals have to be if IBM failed to innovate? Obviously, if IBM's peripheral share is expected to fall "significantly" or if the losses to rivals in the event IBM doesn't innovate are "small," then eliminating exclusionary barriers to increase rivals' R&D investment incentives could diminish the investment incentives of the dominant firm. It would be helpful to design an "appropriability arithmetic" that can place critical thresholds on the combination of these two factors that would allow a more concrete prediction. Finding evidence that IBM's share would not fall "much" in the event both IBM and its rivals innovate and/or that the loss to IBM in the event it does not innovate would be substantial certainly suggests that less weight should be attached to an appropriability defense. While this is exactly the point Baker makes, more elaboration would be better as it is otherwise not clear how much less weight should be attached to the defense.

Of course, even if one concludes that the exclusionary practices did provide the dominant firm with greater R&D investment incentives, one might still want to know whether rivals' R&D investment will offset this dominant firm's reduced R&D investment incentives—the focus of the Theory Paper.

All in all, the two papers provide useful and potentially important theoretical and practical insights into how competitive interaction in the presence of exclusionary conduct affects overall innovation (the Theory Paper) and the evaluation of the appropriability defense (the Applied Paper).

—JRW