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THE LAW AND ECONOMICS OF MONOPOLIZATION STANDARDS

forthcoming chapter in Antitrust Law and Economics

(Edward Elgar Publishing, 2009)

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The Law and Economics of Monopolization Standards

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Abstract: This chapter provides a survey of the law and literature on monopolization. The focus is American law, but the issues considered are equally applicable to European law. After briefly reviewing the history of monopolization law in the U.S., I review various approaches to the legal standard for monopolization suggested in the literature. I then attempt to model monopolization standards, and assess their desirability in light of error costs.

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I. Introduction

Monopolization, the restriction of competition by a dominant firm, is regulated in roughly half of the world's nations.¹ The two most famous laws regulating monopolization are Section 2 of the Sherman Act,² in the United States, and Article 82 of the European Community Treaty.³ Both laws have been understood as prohibiting "abuses" of monopoly power.

In this chapter I will review the law on monopolization in the U.S., with a view toward identifying the legal tests for monopolization. I will also review the literature on monopolization standards. Since both the law and literature on monopolization are older and more developed in the U.S., it is no serious drawback to focus only on the Sherman Act and related literature. The issues addressed here apply equally well to monopolization law outside of the U.S.

In general, two approaches to distinguishing lawful from unlawful monopolization have appeared in the law and in the literature: a specific intent approach and welfare balancing approach. These are general categories that contain several specific versions.⁴ The key difference is that the specific intent approach condemns monopolizing acts when it appears that the dominant firm's sole purpose was to destroy competition. The welfare balancing approach condemns monopolizing acts after balancing anticompetitive effects against some notion of procompetitive benefits.

I set out models of the various monopolization tests in an effort to clarify the distinctions and to raise questions about the underlying goals of the tests. I argue that the traditional specific intent approach is equivalent to the "no economic sense" and "profit sacrifice" tests recently proposed. Within the model, the profit sacrifice test (appropriately generalized), the no-economic-sense test, and the equally-efficient-competitor test are alternative statements of the same standard. The welfare balancing tests have been described in two versions: a consumer harm test and general welfare balancing test.

Although the general welfare balancing test comes closest to mimicking a cost-benefit standard, it is not necessarily the most desirable test when error costs are taken into account. If false convictions are more costly than false acquittals, the specific intent test is best as a default rule. Conversely, if false acquittals are more costly than false

¹ Of the roughly 200 nations in the world, slightly over 100 have competition laws. Keith N. Hylton & Fei Deng, *Antitrust Around the World: An Empirical Analysis of the Scope of Competition Laws and Their Effects*, 74 ANTITRUST L. J. 271, 272 (2007). The vast majority of the competition statutes have provisions governing monopolization. For a survey of competition laws around the world, see Keith N. Hylton et al., *Antitrust World Reports*, available at <http://antitrustworldwiki.com>.

² For an overview and discussion of statute and case law on monopolization, see PHILLIP AREEDA ET AL., *ANTITRUST ANALYSIS* 368-342 (6th ed. 2004).

³ For an overview, see FAULL & NIKPAY: *THE EC LAW OF COMPETITION* (Jonathan Faull & Ali Nikpay eds., 1999).

⁴ The versions have presented by several authors, and will be examined in the text below. For an economic analysis of several specific versions, see Steven C. Salop, *Exclusionary Conduct, Effect on Consumers, and the Flawed Profit-Sacrifice Standard*, 73 ANTITRUST L. J. 311 (2006).

convictions, the consumer harm test may be preferable. Several propositions in the literature on monopolization suggest that false convictions are generally more costly than false acquittals. In light of these propositions, I argue that the specific intent test is optimal as a general default standard in monopolization cases.

However, one important message of this chapter is that instead of there being a single monopolization test that is appropriate for all cases, the optimal test depends on the distribution of error costs. Of course, there is a need for default rules, to provide clarity under the competition laws. But if with respect to a certain category of activities, false acquittals are more costly than false convictions, a test that is biased toward false convictions, such as the consumer harm test, may be appropriate. For example, where dominance is secured through state support, a monopolization test biased toward false convictions may be preferable to one biased toward false acquittals.

Part II provides a brief history of monopolization law in the U.S. Part III surveys the literature on monopolization standards. Part IV models monopolization standards, in an effort to clarify the relationships among proposed tests. Part V examines monopolization standards in light of error costs. The appendix elaborates on the model of monopolization standards and examines the welfare tradeoff analysis of Williamson when value as well as cost efficiencies are present. Unsurprisingly, Williamson's argument for taking efficiencies into account in antitrust analysis becomes stronger when both value and cost efficiencies are present. In each part of this chapter I have tried to identify the key insights from the literature, and to expand upon those insights where possible.

II. A Brief History of Monopolization Law

This part provides a brief overview of the development of Section 2 law.⁵ Section 2, like Section 1, is a relatively short provision stating its prohibition in general terms. However, while the two key provisions of the Sherman Act are alike in terms of brevity and generality, they are quite different in terms of the interpretations that could have been given to those provisions at the time of enactment. Section 1 could be interpreted in terms of a long history of case law on contracts in restraint of trade. Section 2, on the other hand, had little to draw on as a source of interpretive norms from prior case law.

Even if we start with an acceptance of the commonplace observation that statutes are invitations to develop common law, Section 2 of the Sherman Act is a surprisingly broad invitation. Congress invited courts to develop a common law of monopolization. What existed before then as common law on monopolization was scant and unlikely to be of much use to courts in interpreting the Sherman Act.

⁵ This history of the law borrows heavily from remarks I delivered at a conference on antitrust, see Keith N. Hylton, *Section 2 and Article 82: A Comparison of American and European Approaches to Monopolization Law*, (Boston University School of Law Working Paper No. 06-11), available at SSRN: <http://ssrn.com/abstract=902655>.

A. Common Law Background

Some scholars have questioned the existence of a pre-Sherman Act common law of monopolization.⁶ Perhaps the best evidence of such a body of common law is a single English case, *Darcy v. Allen*.⁷ The queen had granted Darcy a patent to manufacture and import playing cards. The court rejected the patent on the ground that it was against the common law. The court held that the queen had been deceived because patents were designed to enhance social welfare, but this one served no purpose other than to allow Darcy to extract wealth from consumers.

If *Darcy v. Allen* is the best evidence of the existence of pre-Sherman Act common law on monopoly, it immediately suggests that judges would have a difficult time developing common law based on Section 2 of the Sherman Act. The obvious difference is that *Darcy v. Allen* invalidates efforts by the government to cordon off certain markets and hand them over to monopolists, while Section 2 of the Sherman Act aims at private efforts to monopolize markets. There were legislative and common law efforts here and there (e.g., the market-interference statutes governing “forestalling” and other acts⁸) to control specific instances of advantage taking based on temporary monopoly status, but no general prohibition of private monopolization on the scale of Section 2.⁹

B. Early Development of Section 2 Law: Specific Intent Approach

Probably because of the absence of useful common law on the monopoly problem, courts took a conservative approach initially to Section 2. With virtually no case law other than that based on Section 1 to draw on for guidance, they extended the reach of Section 2 only to conduct that seemed most clearly to violate it.¹⁰ The most comprehensive early effort to interpret Section 2 appears in the *Standard Oil* decision of 1911.¹¹ Areeda described *Standard Oil* as “remarkable for its cloudy prolixity,”¹² and that is a fair and perhaps charitable summary. It is a singular example of poor writing from the bench; repetitive, vague, and in some parts an almost impenetrable jungle of big words.

In spite of these weaknesses, *Standard Oil* does manage to deliver a few basic lessons about the early understanding of Section 2. It adopts the “abuse standard” of monopolization.¹³ Under that standard, a firm can be found guilty of violating Section 2

⁶ WILLIAM LETWIN, LAW AND ECONOMIC POLICY IN AMERICA: THE EVOLUTION OF THE SHERMAN ANTITRUST ACT 19 (1965).

⁷ *Darcy v. Allen*, (1603) 77 Eng. Rep. 1260 (K.B.).

⁸ KEITH N. HYLTON, ANTITRUST LAW: ECONOMIC THEORY AND COMMON LAW EVOLUTION 31-33 (2003).

⁹ For example, admiralty law prevented hard bargains in the course of rescuing distressed ships at sea. *See, e.g.*, RICHARD A. EPSTEIN, CASES AND MATERIALS ON TORTS 55 (8th ed. 2004). This was an effort by the law to prohibit an especially brutal form of monopoly exploitation.

¹⁰ *See, e.g.*, HYLTON, *supra* note 8, 186-188 (discussing early Section 2 case law).

¹¹ *Standard Oil Co. v. United States*, 221 U.S. 1 (1911).

¹² PHILLIP AREEDA, ANTITRUST ANALYSIS: PROBLEMS, TEXT, AND CASES 148 (3d ed. 1981).

¹³ *E.g.*, HYLTON, *supra* note 8, 187.

if it engages in conduct that would violate Section 1 if engaged in by a combination of firms. Moreover, the abuse standard requires a finding of specific intent to monopolize.¹⁴

Specific intent to monopolize, in turn, is inferred by conduct that cannot be justified on the basis of legitimate competitive goals, conduct that can be understood only as an effort to destroy competition from rivals. The early opinions, including *Standard Oil*, suggest that it is an objective inquiry based on facts.¹⁵ In other words, the intent inquiry is not described in the early opinions as an effort to discover intent by searching the words of the defendant. It is described as an inference based on the defendant's conduct.

The early cases also made clear that monopoly status by itself is not unlawful.¹⁶ The statute was interpreted to prohibit efforts to monopolize, say by destroying competitors. However, the statute was not interpreted to prohibit the setting of the monopoly price or the monopoly quantity.

This conservative approach to Section 2 was not without controversy. Proponents of strong antitrust enforcement wanted a more aggressive interpretation and found their position vindicated, in their eyes, by the government's loss in the *United States Steel* case of 1920.¹⁷ On the other hand, the conservative approach discouraged judges from attempting to conduct their own consumer-welfare tests of dominant firm conduct. The specific intent approach originally taken with respect to Section 2 asked courts to determine whether there were plausible pro-efficiency or competitive bases for the defendant's conduct. If so, the specific intent test implied that the defendant should not be found guilty of unlawful monopolization.

C. Modern Section 2 Law: Balancing Test Approach

The conservative approach came to an end in 1945 with Judge Learned Hand's decision in *Alcoa*.¹⁸ The *Alcoa* opinion is a marvel in clarity in comparison to *Standard Oil*. However, its statement of the new monopolization standard leaves room for alternative interpretations.¹⁹ One point appears to be absolutely clear: the specific intent test is no longer required under Section 2.²⁰ Beyond that unambiguous point, Judge Hand's

¹⁴ *Id.* This is also clear from perusing the early opinions. See, e.g., AREEDA ET AL., *supra* note 2, 369-372 (providing excerpts from *Standard Oil*, 221 U.S. at 58, 61, 67, 75, and *United States v. American Tobacco Co.*, 221 U.S. 106, 181-183 (1911), stating that the defendant was found guilty of violating Section 2 because its conduct indicated an intent to monopolize by excluding or destroying rivals).

¹⁵ See, e.g., AREEDA ET AL., *supra* note 2, 369-372 (excerpts from *Standard Oil*, 221 U.S. at 61, 62, 75 and *American Tobacco*, 221 U.S. at 181-183).

¹⁶ See e.g., *Standard Oil*, 221 U.S. at 62 (“[T]he statute...by the omission of any direct prohibition against monopoly in the concrete...indicates a consciousness that the freedom of the individual right to contract...was the most efficient means for the prevention of monopoly”) (emphasis added).

¹⁷ *United States v. U.S. Steel Corp.*, 251 U.S. 417 (1920).

¹⁸ *United States v. Alum. Co. of America*, 148 F.2d 416 (2d Cir. 1945) [hereinafter *Alcoa*].

¹⁹ See, e.g., Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards and Microsoft*, 7 GEO. MASON L. REV. 617 (1999) (interpreting *Alcoa* as a “no fault” or strict liability standard), versus Ronald A. Cass & Keith N. Hylton, *Preserving Competition: Economic Analysis, Legal Standards, and Microsoft*, 8 GEO. MASON L. REV. 1 (1999) (interpreting *Alcoa* as a balancing test).

²⁰ *Alcoa*, 148 F.2d at 432 (“no monopolist monopolizes unconscious of what he is doing”).

decision suggests that, as a general rule, violations of Section 2 will be determined by a balancing of the procompetitive and anticompetitive effects of the defendant's conduct. In other words, under Hand's test, the defendant may have substantial efficiency justifications for its conduct, yet it may still be found in violation of Section 2 because the anticompetitive effects were deemed too severe by the court.

Judge Hand's approach to Section 2 law remains valid as a general description of the law today. Courts continue to refer to it as a starting point in discussions of the monopolization test.²¹ But a more detailed look reveals that the standard for monopolization has been altered in practice since *Alcoa*, and largely in a direction that favors dominant firm defendants. The date at which the change in Section 2 law began appears to be 1975, with the publication of the Areeda and Turner article on predatory pricing.²² Areeda and Turner noted the uncertainty surrounding predation charges and the costs of error, and proposed a cost-based test to screen out predation claims with high error costs. Following their article, courts began to adopt their cost-based screen and to take seriously the costs of false convictions.

The changes in Section 2 case law have not occurred across the board, but in specific pockets. One pocket in which the law has changed is predatory pricing. The *Matsushita*²³ and *Brooke Group*²⁴ line of cases require, in order to hold a firm guilty of predatory pricing under Section 2, a price below some measure of cost (average variable cost usually) and objective evidence that the defendant would be able to recoup the losses incurred in the predatory (low-price) period.²⁵ The *Brooke Group* test is equivalent to a specific intent test.²⁶ The reason is that if the requirements of the *Brooke Group* test are satisfied, then one can say that the objective evidence implies that the defendant's intent could only have been predatory.

As this example suggests, the choice between the pre-*Alcoa* and post-*Alcoa* monopolization standards may not be terribly important in the end. Whether the monopolization test is framed, as in the pre-1945 period, in terms of specific intent, or, as in the post-1945 period, as a consumer welfare balancing test, the underlying question is the evidentiary burden placed on plaintiffs in a monopolization case. In general, the specific intent test, as historically applied, puts the greatest evidentiary burden on the plaintiff. The consumer welfare test, by its terms, places a much lighter burden on the plaintiff. But if the consumer welfare test were coupled with additional evidentiary

²¹ See, e.g., *F. Hoffman-La Roche Ltd. v. Empagran S.A.*, 542 U.S. 155, 165 (2004); *Eastman Kodak Co. v. Image Tech. Svces.*, 504 U.S. 451, 483 (1992); *Aspen Skiing Co. v. Aspen Highland Skiing Corp.*, 472 U.S. 585 (1985); *United States v. Microsoft Corp.*, 253 F.3d 34, 44 (D.C. Cir. 2001), *cert. denied*, 534 U.S. 952 (2001).

²² Phillip Areeda & Donald Turner, *Predatory Pricing and Related Practices under Section 2 of the Sherman Act*, 88 HARV. L. REV. 697 (1975).

²³ *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574 (1986).

²⁴ *Brooke Group, Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 226 (1993) (evidence of below-cost pricing is not alone sufficient to permit an inference of probable recoupment and injury to competition).

²⁵ *Id.* at 240-242; *Matsushita*, 475 U.S. at 595-598.

²⁶ *Salop & Romaine*, *supra* note 19, at 17, 24, 35; *Cass & Hylton*, *supra* note 19, at 639, 671.

burdens – e.g., standards requiring proof by clear and convincing evidence – it could present roughly the same obstacles to plaintiffs as the specific intent test. Conversely, if the specific intent test were applied in a way that put too little weight on defendant’s evidence and too much weight on plaintiff’s anticompetitive theories, the results might be indistinguishable from a consumer welfare balancing test applied with a pro-plaintiff bias. The issue at bottom is one of evidentiary burden.

Another pocket of Section 2 case law in which courts seem to have drifted back to the specific intent formulation is that involving “essential facilities”.²⁷ The holding in *Aspen*,²⁸ which suggested that the defendant lost solely because it failed to provide a credible competitive justification for its conduct, carried the implication that the mere provision of such a justification would immunize a defendant from liability in an essential facilities case.

That implication appeared to receive confirmation with the Court’s opinion in *Trinko*.²⁹ Justice Scalia’s opinion for the Court, expressing skepticism toward the essential facilities doctrine, described *Aspen* as a case “at or near the outer boundary of Section 2 liability.”³⁰ Scalia described the defendant’s conduct in *Aspen* as refusing, without a competitive justification, to supply a product at retail price to one’s competitor,³¹ which suggested an intent to harm. The defendant in *Trinko*, like that in *Aspen*, failed to provide a pro-competitive justification for its actions. However, the Court refused to find an antitrust violation based solely on the defendant’s failure to embrace a statutory burden to support rivals. Thus, *Trinko* implies that a sufficient justification for denying access to an essential facility is the desire to avoid providing a benefit to a rival. If that is a sufficient justification for denying liability, then it follows that a plaintiff, in order to prevail in an essential facilities case, has to present evidence indicating that the defendant had an *intent to harm* its rival.³²

Recent decisions and commentary have recommended that a profit-sacrifice test be used to determine violations of Section 2.³³ The sacrifice test asks whether the dominant firm

²⁷ See generally Philip E. Areeda, *Essential Facilities: An Epithet in Need of Limiting Principles*, 58 ANTITRUST L.J. 841 (1990); Thomas F. Cotter, *Intellectual Property and the Essential Facilities Doctrine*, 44 ANTITRUST BULL. 211 (199); Keith N. Hylton, *Economic Rents and Essential Facilities*, 1991 BYU. L. REV. 1243; Abbott B. Lipsky, Jr. & J. Gregory Sidak, *Essential Facilities*, 51 STAN. L. REV. 1187 (1999); Glen O. Robinson, *On Refusing to Deal with Rivals*, 87 CORNELL L. REV. 1177 (2002).

²⁸ *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585 (1985).

²⁹ *Verizon Communications Inc. v. Law Offices of V. Trinko, LLP.*, 540 U.S. 398 (2004).

³⁰ *Trinko*, 540 U.S. at 409.

³¹ *Id.*, at 408-409.

³² The link between the specific intent standard and essential facility cases is also suggested by Judge Ginsburg’s opinion in *Covad Communications Co. v. Bell Atlantic Corp.*, 398 F.3d 666 (D.C. Cir. 2005). Judge Ginsburg applies the predation doctrine of *Brooke Group* to *Bell Atlantic*’s refusal to deal, suggesting that the two types of claim (predation and essential facilities) should be treated under the same legal test, see *Covad Communications*, 398 F.3d at 675-676.

³³ The profit-sacrifice test is suggested by the language of *Aspen*, 472 U.S. at 608-610, and *Trinko*, 540 U.S. at 409. For arguments in favor of the profit sacrifice test see A. Douglas Melamed, *Exclusionary Conduct Under the Antitrust Laws: Balancing, Sacrifice, and Refusals to Deal*, 20 BERKELEY TECH. L.J. 1247 (2005).

conduct in question would be profitable but for its tendency to eliminate or lessen competition.³⁴ The profit-sacrifice test has the appeal, to some observers, of being able to operate in a manner similar to the specific intent test. Indeed, the aim of the profit-sacrifice is the same as the more general specific intent test: to limit findings of guilt under Section 2 to those instances in which the evidence suggests that the dominant firm's conduct could only have been motivated by an intent to monopolize and not to benefit consumers.

The most celebrated non-Supreme Court Section 2 case of recent history, *Microsoft*,³⁵ suggests a broader shift toward the specific intent approach. The D.C. Circuit's opinion initially states the monopolization test as a consumer welfare balancing test.³⁶ Then, when it gets around to actually applying the test to Microsoft's conduct, it moves into a specific intent analysis. The court repeatedly condemns Microsoft's conduct because it appeared to the court to have no credible pro-efficiency or competitive rationale.³⁷

Of the 117 years that the Sherman Act has been in effect, courts applied a specific intent test under Section 2 for 55 of those years – from 1890 to 1945, the date of *Alcoa*. *Alcoa* introduced a balancing test in 1945 and scrapped the specific intent test. However, since roughly 1975 and beginning with the predatory pricing cases, the specific intent approach has reemerged within specific pockets of monopolization law.

III. Literature: Proposed Monopolization Standards

Given the ambiguity of Learned Hand's description of the monopolization standard in *Alcoa*³⁸ and the recent splintering of the standard in specific subject matters such as predation, antitrust scholars have proposed several approaches for determining violations of Section 2. Some of the new proposals mirror those offered by an earlier generation of scholars. Still, in view of its importance for the law, surprisingly few scholars have

³⁴ John Vickers, *Abuse of Market Power*, 115 *The Economic Journal* F244-F262, F253 (June 2005).

³⁵ *Microsoft*, 253 F.3d at 34.

³⁶ *Id.* at 58.

³⁷ *Id.* at 72, 74, 76, 77. The opinion is confusing because the D.C. Circuit's application of the specific intent test was arguably equivalent to a balancing test conducted with a pro-plaintiff bias. In examining the complaints concerning Microsoft's integration of Internet Explorer with its Windows operating system, the court found that two of the three complaints (excluding Internet Explorer from the Add/Remove Programs function and commingling browser and operating system code) were violations of the Sherman Act, because Microsoft offered no credible procompetitive justification, while one (overriding the choice of an alternative default browser in certain circumstances) was not a violation because Microsoft's justification was sufficient. *Id.* at 66-67. Yet it seems that the technical justifications offered by Microsoft, and accepted by the court, in response to the complaint that was rejected should apply just as well to the other two complaints.

³⁸ The ambiguity of Hand's standard, from the perspective of a judge that had to apply it, was at least suggested by Judge Wyzanski's discussion in *United Shoe* of different approaches to the monopolization standard. Wyzanski described three approaches to the monopolization test and argued that United Shoe's conduct could be held unlawful under any one of the tests. *U.S. v. United Shoe Machinery Corp.*, 110 F.Supp. 295, 341-343 (D. Mass. 1953)

attempted to provide either a positive or normative theory of monopolization law. In this part I will review the proposed approaches.

The proposed approaches hew closely to the two dominant standards in the Section 2 case law – the specific intent test and the consumer welfare test. I will review the literature chronologically in each of these categories. The chronological approach may seem artificial, but it is based on the premise that ideas run free, and as a consequence later authors may have been influenced by earlier authors even if there is no direct acknowledgment in their work.

A. Specific Intent Approaches

1. Kahn (1953)

Perhaps the earliest article to attempt to explain and to provide a normative approach to the legal test for monopolization is Alfred Kahn's *Standards for Antitrust Policy*.³⁹ Kahn distinguished three potential approaches to monopolization under the Sherman Act: a per se approach based on structural evidence, an objective consumer welfare test, and an intent-based approach. Without delving seriously into the case law history, Kahn argued that the specific intent approach was both the traditional and the prevailing approach; and that it was the best approach. Kahn viewed *Alcoa* as an exceptional case in which the court appeared to adopt a more restrictive effects-based test because of the unusually high level of market power.⁴⁰ However, Kahn argued that evidence of intent still appeared to be an important factor in the *Alcoa* decision.⁴¹

Kahn's argument consists largely of four propositions. First, that a per se approach based on structure would be undesirable because it would eliminate a good deal of conduct that benefits consumers. Second, that a true consumer welfare test would fail to generate predictable rules, require an intrusive level of government intervention, and largely be unworkable. Third, that a legal test for monopolization devoid of any inquiry into intent would have to involve per se elements, which would generate undesirable outcomes. Kahn's fourth claim was that in light of the first three propositions, some inquiry into intent would have to be a feature of any useful legal test for monopolization.

Kahn argued that the objective welfare approach, to be workable, would have to develop per se rules. But this would be undesirable because it would discourage some procompetitive conduct.

While Kahn's approach is quite consistent with that of modern proponents of the specific intent test, it reflects a somewhat dated skepticism toward the capacity of courts to rigorously apply the consumer welfare test. Kahn noted that "there are no scientific standards for drawing the line between desirable and undesirable consequences, even

³⁹ Alfred E. Kahn, *Standards for Antitrust Policy*, 67 HARV. L. REV. 28 (1953).

⁴⁰ *Id.* at 30-31.

⁴¹ *Id.* at 31.

when they are traceable.”⁴² Antitrust scholars and practitioners probably would reject such an assessment today, given the advances in econometrics and economic theory, and their inroads into the litigation process.

2. Cass and Hylton (2001)

Cass and Hylton offered a positive and normative theory of the monopolization test and case law, based on the specific intent approach.⁴³ The normative theory builds on Easterbrook’s error-cost argument.⁴⁴ Cass and Hylton provided a typology of the factors that influence the likelihood of error and its costs in monopolization cases. They argued that error probabilities in antitrust are determined by the competence of courts to determine whether conduct is welfare enhancing and the distribution of private information among litigants. Error costs are determined largely by the presence of market constraints (Easterbrook’s point) and rent seeking. Relying on Tullock’s analysis of the costs of monopolization,⁴⁵ Cass and Hylton argued that rent seeking would put upward pressure on false conviction costs. This upward pressure, in combination with the downward pressure on false acquittal costs due to market constraints, implies that the specific intent test is preferable to the consumer welfare approach. The defense of the specific intent approach in Cass and Hylton does not rely on any notion of the welfare test being scientifically standardless as suggested by Kahn.

Cass and Hylton did not specify a precise approach to applying the specific intent test. They describe the specific intent test as requiring objective evidence that the sole or overwhelming purpose of the defendant’s conduct is to reduce competition. In particular, conduct should not be condemned when it involves a mixture of potentially procompetitive (pro-consumer or efficiency-enhancing) and potentially anticompetitive actions.

3. Posner (2001)

Posner proposed as a general test for monopolization the equally efficient competitor standard. Under this standard, the defendant’s conduct would not be deemed unlawful monopolization unless the evidence proved that the conduct was likely under the circumstances to exclude from the market an equally efficient competitor.⁴⁶

Although the equally efficient competitor test generates interpretive issues,⁴⁷ it does not appear to be a balancing test. If the exclusionary effect of the defendant’s conduct is

⁴² Kahn, *supra* note 39, at 51-52.

⁴³ Ronald A. Cass & Keith N. Hylton, *Antitrust Intent*, 74 S. CAL. L. REV. 657 (2001).

⁴⁴ Frank H. Easterbrook, *The Limits of Antitrust*, 63 TEX. L. REV. 1 (1984).

⁴⁵ Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 W. ECON. J. 224 (1967).

⁴⁶ RICHARD A. POSNER, *ANTITRUST LAW: AN ECONOMIC PERSPECTIVE* 194-95 (2d. ed. 2001).

⁴⁷ For example, some commentators have argued that the equally-efficient-competitor standard is flawed because it immunizes the defendant when he excludes a less efficient rival, see, e.g., Salop, *supra* note 4, at 328-29. But this is not clear. If the defendant’s conduct would exclude an equally efficient rival, then the equally-efficient-competitor standard probably would not immunize his conduct, even if the complainant is a less efficient competitor.

entirely attributable to its efficiency, then the equally-efficient-competitor test shields the defendant from antitrust liability.

4. Elhauge (2003)

Elhauge argued that the monopolization standard should focus on whether the exclusionary conduct succeeds in furthering monopoly power only if the monopolist has improved its own efficiency or by impairing rival efficiency whether or not it enhances monopolist efficiency.⁴⁸ While it is not immediately clear whether this is designed to be an intent-based test, it is clearly not a welfare-balancing test.⁴⁹

Unless Elhauge's proposed standard is designed to be a per se test (which would be undesirable as explained by Kahn), any attempt to determine whether an exclusionary act is designed to improve the monopoly firm's efficiency or to impair the efficiency of rivals will inevitably involve some assessment of facts in order to determine the objectives of the monopolist. The reason for this is that there are likely to be cases in which it will not be clear whether the monopolist's conduct was designed to take advantage of its own efficiency or impair the efficiency of rival firms. For example, a firm may enter into an exclusive dealing contract, which has the potential to improve its own efficiency and to impair the efficiency of rivals. A per se test based on the eventual outcome would effectively discourage such contracts. An approach that attempted ex post to assess the objectives of the firm would avoid the per se approach. However, it would also be equivalent to the specific intent test.

One major focus of the Elhauge article is a critique of the profit-sacrifice standard. Elhauge argued that the standard was ineffective because the sacrifice of profit is neither necessary nor sufficient for conduct to have an anticompetitive effect.

5. Melamed (2005)

A. Douglas Melamed argued that the profit-sacrifice standard is the best approach to distinguishing lawful from unlawful monopolization.⁵⁰ Melamed defines the profit-sacrifice test as asking whether anticompetitive conduct would be profitable for the defendant and would make good business sense even if it did not exclude rivals and thereby create or preserve market power for the defendant. As Melamed notes, this is not a welfare balancing test, and it raises the likelihood of a false acquittal in comparison to the welfare balancing test.

⁴⁸ Einer Elhauge, *Defining Better Monopolization Standards*, 56 STAN. L. REV. 253 (2003). By impairing rival efficiency, Elhauge means taking actions that raise the short run costs of rivals. On impairing efficiency in this sense, see Steven Salop & David Scheffman, *Raising Rivals' Costs*, 73 AM. ECON. REV. 267 (May 1983); Thomas Krattenmaker & Steven C. Salop, *Anticompetitive Exclusion: Raising Rivals' Costs to Achieve Power over Price*, 96 YALE L. J. 209 (1986).

⁴⁹ Elhauge argues against using an open-ended balancing approach because it would create "massive business uncertainty." *Id.* at 315. He also argues that an open-ended balancing inquiry "would often be inaccurate, hard to predict years in advance when the business decisions must be made, and too costly to litigate." *Id.* at 317.

⁵⁰ Melamed, *supra* note 33.

Melamed's definition of the profit-sacrifice test, which has now become standard (see Vickers⁵¹), is useful because it distinguishes the general profit sacrifice test from its more specific version in the predatory pricing context – specifically, the recoupment test of *Brooke Group*. The profit sacrifice test has been criticized because the more specific version used in the context of predatory pricing is not easily generalized to other settings.⁵² In addition, Elhauge's critique of the profit-sacrifice standard is easily applied in the case of the specific sacrifice-plus-recoupment version. A firm could take a decision that involves the sacrifice of profits in anticipation of recoupment without having an anticompetitive effect; and conversely an anticompetitive act might not require the sacrifice of profits. Melamed's generalization of the profit-sacrifice test avoids these criticisms.

6. Werden (2006)

Gregory Werden suggested a “no economic sense” test as the best formulation of a specific intent standard.⁵³ Werden offered the test as a definition for exclusionary conduct, which makes the test a necessary rather than sufficient condition for liability under his formulation. Although the notion that one could define both necessary and sufficient conditions for characterizing the conduct of a dominant firm as unlawful monopolization opens up new questions, the Werden paper, beyond mentioning safe harbors, does not specify the precise differences between these conditions. To simplify matters, I will treat the no-economic-sense formulation as a description of the test for unlawful monopolization.

The no economic sense test condemns exclusionary conduct when the conduct would make no economic sense but for its tendency to eliminate or lessen competition. Werden argued that this formulation is superior to the profit sacrifice standard – because the sacrifice of profits with anticipation of recoupment is neither necessary nor sufficient for an anticompetitive effect. However, the more general statement of the profit-sacrifice test offered by Melamed appears to be immune from this critique and, as I will argue below, is equivalent to the no-economic-sense test.

Although the general profit-sacrifice test articulated by Melamed and the no-economic-sense test of Werden appear to be immune to the criticisms that apply to the sacrifice-plus-recoupment test, it remains true that both tests are neither necessary nor sufficient to define conduct that has an anticompetitive effect.⁵⁴ I will explore this distinction below in the course of modeling monopolization standards.

B. Consumer Welfare Approaches

⁵¹ Vickers, *supra* note 34.

⁵² Salop, *supra* note 4, at 314-319.

⁵³ Gregory J. Werden, *Identifying Exclusionary Conduct Under Section 2: The “No Economic Sense” Test*, 73 ANTITRUST L. J. 413 (2006).

⁵⁴ Salop, *supra* note 4, at 318-26.

The consumer welfare approach has recently been promoted by Steven Salop.⁵⁵ However, the welfare approach had been urged by an earlier generation of scholars advocating a market performance test.

1. Market Performance Test

The earlier generation of scholars to consider the ideal standard for monopolization – among them Edward Mason,⁵⁶ Clare E. Griffin,⁵⁷ and S. Chesterfield Oppenheim⁵⁸ – provided arguments in favor of the consumer welfare approach as the appropriate legal test for monopolization. Rather than referring to this approach as welfare balancing, the labels that they used were “market performance” test and “workable competition”. However, since the test that they envisioned required an objective assessment of the benefits to consumers as well as the efficiency gains from firm conduct,⁵⁹ it is equivalent to the approach modern scholars refer to as welfare balancing. The market performance test advocates drew heavily on the work of economists such as J. M. Clark⁶⁰ and George Stigler,⁶¹ who had written extensively on how to determine whether an industry was sufficiently competitive that the prospects for successful government intervention to enhance consumer welfare were slim.

The market performance scholars argued that the law should move away from its traditional focus on anticompetitive intent and focus on the actual performance of firms and industries. Edward Mason suggested the following questions as part of an assessment of market performance:

1. Progressiveness: are the firms in the industry actively and effectively engaged in product and process innovation?
2. Cost-price relationships: are reductions in cost, whether due to falling wages or material prices, technical improvements, discovery of new sources of supply, passed on promptly to buyers in the form of price reductions?
3. Capacity-output relationships: is investment excessive in relation to output?
4. The level of profits: are profits continually and substantially higher than in other industries exhibiting similar trends in sales, costs, innovations, etc.?
5. Selling expenditures: is competitive effort chiefly indicated by selling expenditures rather than by service and product improvements and price reductions?⁶²

⁵⁵ *Id.*

⁵⁶ Edward S. Mason, *The Current Status of the Monopoly Problem in the United States*, 62 HARV. L. REV. 1265 (1949).

⁵⁷ CLARE E. GRIFFIN, *AN ECONOMIC APPROACH TO ANTITRUST PROBLEMS* (1951).

⁵⁸ S. Chesterfield Oppenheim, *Federal Antitrust Legislation: Guideposts to a Revised National Antitrust Policy*, 50 MICH. L. REV. 1139 (1952).

⁵⁹ Mason, *supra* note 56, at 1280.

⁶⁰ J. M. Clark, *Toward a Concept of Workable Competition*, 30 AM. ECON. REV. 241 (1940).

⁶¹ George J. Stigler, *The Extent and Bases of Monopoly*, 32 AM. ECON. REV. 1 (Supplement, June 1942).

⁶² Mason *supra* note 56, at 1281-1282.

2. Salop (2006)

The market performance approach has been resuscitated recently in the work of Steven Salop. Salop and Romaine suggested that the proper approach to monopolization cases is one that balances consumer benefits from improved product performance or efficiency against potential harms from anticompetitive conduct.⁶³ Later, Salop elaborated that the proper test should focus largely on consumer welfare.⁶⁴ The consumer welfare test urged by Salop would not involve Williamsonian balancing of efficiency gains against consumer harms, but would focus largely on consumers.⁶⁵ The test would condemn conduct as exclusionary whenever the net effect on consumers is harmful. In other words, Salop argues in favor of a consumer harm standard.

Thus, there are two approaches in the literature on balancing tests for monopolization. One is the overall welfare balancing test, which involves a comparison of anticompetitive harms and efficiency gains. The other, due to Salop, focuses on a comparison of the direct consumer benefits from product performance and the consumer harms from the erection of anticompetitive barriers.

IV. Modeling Monopolization Standards

I will offer a simple model of the monopolization standards proposed in an attempt to provide clarity. Suppose a dominant firm takes an action that improves the quality of its product in a manner that benefits consumers by the amount Δv . Suppose the same action permits the firm to erect barriers to competition that permit the firm to increase its price by Δp . Lastly, suppose that the same action causes the firm's cost to change by Δc .

As an illustration, suppose a dominant firm enters into an exclusivity contract with a supplier. The exclusivity contract has the consequence of foreclosing access to the supplier to the firm's competitor. As a result, the competitor's costs rise, because it has to seek inferior sources of supply, forcing the competitor to increase its price. The exclusivity contract permits the dominant firm to enhance the reliability of its own product and also reduce production costs. However, since it also raises the costs of the dominant firm's competitor, it permits the dominant firm to increase its price. Suppose the price increase is \$25 and the value of reliability enhancement is \$5.

A. Welfare Balancing Approaches

Consumers are harmed by the dominant firm's conduct if the conduct involves an increase in price that exceeds the value increment to consumers; that is, if $\Delta p > \Delta v$. The consumer harm standard of Salop condemns exclusionary conduct when

⁶³ Steven C. Salop & Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L REV. 617 (1999).

⁶⁴ Salop, *supra* note 4.

⁶⁵ Oliver E. Williamson, *Economies as an Antitrust Defense: The Welfare Tradeoffs*, 58 AM. ECON. REV. 18 (1968).

$$\Delta p - \Delta v > 0. \tag{1}$$

In the preceding example in which the exclusivity contract enables the dominant firm to increase its price by \$25 ($\Delta p = \25) and also enhances value by \$5 ($\Delta v = \5), the consumer harm test leads to the conclusion that the exclusivity contract violates the Sherman Act.

The consumer harm test proposed by Salop is a general description of factors that should be considered in examining consumer harm. As a test, it has to be understood as approximate and conservative. It understates the level of consumer harm because it does not take into account the forgone consumer surplus from restriction of supply.⁶⁶

The general welfare balancing test suggested by the market performance advocates involves a comparison of efficiency gains to consumer harms. The simplest description of such a test would declare the dominant firm's conduct lawful if the net harm to consumers is less than the efficiency gain to the firm:

$$\Delta p - \Delta v < -\Delta c . \tag{2}$$

This approach is closest to Williamsonian balancing of efficiency gains against consumer harms.⁶⁷ In the exclusivity contract example considered earlier, assessing whether the contract constitutes unlawful monopolization requires information on the productive efficiency gain. If the price increase is \$25 and the value increment is only \$5, consumers suffer a net harm – because they are paying more for the value increment than it is worth to them. The reason this occurs is because competition barriers have restricted the consumers' options to purchase substitutes at a cheaper price. If the productive efficiency gain is only \$1 ($\Delta c = -\1), then the general welfare balancing test implies that the conduct constitutes unlawful monopolization – because the efficiency gain of \$1 is insufficient to offset the consumer harm of \$20. However, if the productive efficiency gain is \$50, the welfare balancing test excuses the dominant firm's conduct.

The general welfare balancing test overstates the weight that should be put on the harm to consumers due to the price increase. In a precise balancing test for overall welfare, much of the price increase would be treated as a transfer between the consumer and the firm, not affecting overall welfare. Only the portion of the price increase reflected in the deadweight loss (i.e., the social value of forgone output) from monopolization would be counted in such an evaluation. To elaborate, suppose the output level before the monopolizing act was Q_0 and the output level after the monopolizing act is Q_1 . A welfare evaluation would condemn the monopolizing act when⁶⁸

⁶⁶ See Appendix.

⁶⁷ Williamson, *supra* note 65. See the appendix for a detailed presentation of the tradeoff analysis. The appendix shows that in the presence of value and cost efficiency gains, Williamson's argument for taking efficiencies into account in antitrust analysis becomes stronger.

⁶⁸ This is not a precise formulation. The left hand term overstates the forgone consumer welfare. See the diagram in the appendix.

$$\Delta p(Q_0 - Q_1) < (\Delta v - \Delta c)Q_1 . \quad (3)$$

Since the ratio of the output change to the initial output level – i.e., of $(Q_0 - Q_1)$ to Q_1 – will be less than one in most cases, the general welfare test, by giving the price increase the same weight as the efficiency gain, will overweight the consumer harm by treating a substantial part of the transfer as a reduction in social welfare.⁶⁹ Indeed, this is a key point of Williamson’s welfare tradeoff analysis. Williamson’s analysis provides a relatively precise formula for analyzing the welfare effects in the context of this model:

$$\frac{\Delta v}{v} - \frac{\Delta c}{c} > \frac{\eta}{2} \left(\frac{\Delta p}{p} \right)^2 , \quad (4)$$

where η is the elasticity of demand and Δp is the price increase, both measured along the original (pre-value enhancement) demand schedule. Because Williamson’s analysis avoids overweighting the consumer harm, it implies that relatively modest efficiency gains will be sufficient to justify the firm’s conduct in an overall welfare analysis.

There is, however, a counterargument to the claim that the general welfare test overweights consumer harm. If, as Tullock argued,⁷⁰ firms invest into the creation of barriers to competition, perhaps all of the consumer harm can be treated as a reduction in social welfare. In this case, the transfer from consumers will serve as an upper-bound approximation of the directly unproductive investments into monopolization. This argument should have a rather limited application, though. If a firm’s investment has the dual payoff of enhancing efficiency and creating a barrier to competition, then those investments cannot be viewed as directly unproductive. The argument has a better fit to investments into state-granted competition barriers, such as licenses or taxi medallions. Investments into state-granted competition barriers do not enhance efficiency and are likely to be more durable as competition barriers than is the typical efficiency-motivated investment. This suggests that in the case of state-granted competition barriers, the general welfare test does not necessarily overweight the consumer harm component.

The decision maker could assign different weights to the components of the welfare balancing test,⁷¹ based on his preferences for consumer welfare versus productive efficiency. A general welfare balancing test would take the form

⁶⁹ The overweighting point might be made clearer by rewriting the welfare evaluation as $\Delta p\beta < (\Delta v - \Delta c)$, where $\beta = (Q_0 - Q_1)/Q_1$. In the case of linear demand and cost schedules, and the firm’s barriers permit it to move from perfect competition to absolute monopoly, $\beta = 1$. But this extreme will not be observed in general.

⁷⁰ Tullock, *supra* note 45; see also Richard A. Posner, *The Social Cost of Monopoly and Regulation*, 83 J. POL. ECON. 807 (1975).

⁷¹ See Mason, *supra* note 56, at 1283. Williamson notes that weights could reflect concerns over income distribution, or the asymmetric effects of price increases and productive efficiency gains. For example, while productive efficiency gains are product specific, price increases might weaken competition across markets that include substitute goods. Williamson, *supra* note 65, at 27-28.

$$(1 - \alpha)(\Delta p - \Delta v) < -\alpha \Delta c \quad , \quad (5)$$

where the weight on efficiency is given by the parameter α ($0 \leq \alpha \leq 1$). Setting the efficiency weight α equal to $\frac{1}{2}$ leads to the Williamsonian welfare balancing approach, which reflects an assumption that a dollar given to shareholders is just as productive of social welfare as a dollar given to consumers. Hence there is no reason to prefer the welfare of consumers over the welfare of firm owners. In a setting in which ownership stakes are widely dispersed, and the class of owners is indistinguishable from the class of consumers, the general welfare balancing approach would have the appeal of treating equal increments in social welfare equally.

Setting the efficiency weight at close to one, in the general welfare balancing test, would be defensible when the increment to social welfare is greater when firm owners are given a dollar than when consumers are given an extra dollar. Suppose, for example, the dominant firm is owned by its workers and produces a luxury product (e.g., yachts) consumed by a small number of wealthy clients. In this setting it may be appropriate to treat a dollar going to workers as more productive of social welfare than one hundred dollars going to the consumers. A consumer injury of \$100 might be excused under the monopolization test if the underlying conduct generates \$1 in productive efficiency gains.

Setting the efficiency weight at zero, or close to it, yields the consumer harm test, which reflects the assumption that \$1 additional consumer surplus is more productive of social welfare than \$100 of efficiency gains. This reflects the traditional view of the firm owner as a lone robber baron, while the consumers are a large class reflecting the average wealth status of the population. If marginal utility is diminishing in income, a dollar in additional consumer surplus will enhance social welfare more than would an additional dollar of efficiency gain – unless the efficiency gain generates higher wages. This view is increasingly anachronistic as stock ownership becomes more widely dispersed. Moreover, it is not clear why society should prefer the consumer harm test over the general welfare balancing test in light of dynamic considerations. There are many settings in which a small efficiency gain today will be followed by more substantial efficiency gains later, as the dominant firm works its way down the learning curve.⁷²

B. Specific Intent Inquiries

The specific intent test asks whether the sole purpose of the dominant firm's conduct is to harm competition. This is equivalent to asking whether the conduct would have made economic sense even if it did not have an exclusionary effect. Clearly, if the firm's conduct leads to an increase in value or a reduction in cost, it would make sense even in a competitive setting. Thus, one way of defining the specific intent approach is to say that in order to find a dominant firm guilty of monopolization in violation of the law,

$$\Delta v - \Delta c < 0 \quad . \quad (6)$$

⁷² On learning curve effects and monopolization, see A. Michael Spence, *The Learning Curve and Competition*, 12 Bell J. Econ., 49-70 (Spring, 1981).

If this condition holds, the overall welfare effect of the firm's conduct is negative, even if the conduct did not create a barrier to competition. A competitive market would not support such conduct.

An alternative and equivalent approach to modeling the specific intent test would ask whether $\Delta v > 0$ and c is unaffected ($\Delta c = 0$), or whether $\Delta c < 0$ and v is unaffected ($\Delta v = 0$). If either of these is true, the difference $\Delta v - \Delta c > 0$, so the firm's conduct would be supported by a competitive environment.

Return to the exclusive contract example mentioned earlier. Suppose, as a consequence of entering into an exclusivity relationship with a supplier, the dominant-firm price increase is \$25, the value increase is \$5, and the productive efficiency gain is \$1. The dominant firm's decision to enter the contract would be condemned under the consumer harm test and under the general welfare balancing test. However, it would not be condemned under the specific intent test since

$$\Delta v - \Delta c = \$5 - (-\$1) = \$6.$$

The formulations of the specific intent test in the Cass and Hylton article and in Werden's article are consistent with this approach. Both the Cass and Hylton and Werden articles suggest that the test should excuse dominant firm conduct that is based in efficiency.⁷³ However, this approach could be too lenient. Suppose the firm degrades its product and at the same time reduces production costs. Although part of its conduct is efficient, that should not immunize the firm from a finding of unlawful monopolization. For example, suppose the productive efficiency gain is \$5 and the loss in the consumer's valuation from product degradation is \$6. Even though there is an efficiency justification that the dominant firm could point to as a defense (e.g., cost reduction), that should not be sufficient to avoid liability. Even though there is an efficiency gain in the form of lower production costs, the firm's conduct would be inefficient overall. A competitive market would not support the conduct.

It follows that the specific intent test should not be understood as excusing the dominant firm's conduct as long as there is *any* plausible efficiency basis for it whatsoever.⁷⁴ The specific intent test should require an examination of the overall efficiency of the firm's conduct. If the productive efficiency gain is \$5 and the consumer valuation loss from product degradation is only \$1, the conduct is efficient overall and should be excused under the specific intent test. However, if the efficiency gain is \$5 and the consumer

⁷³ Werden suggests that efficient (e.g., cost-reducing) conduct should serve as a "safe harbor" for monopolization defendants, see Werden, *supra* note 53, at 418.

⁷⁴ In this narrow sense, the framework provided here agrees with Andrew Gavil's criticism of the no economic sense test on the ground that it might immunize conduct that produces any efficiency gain, see Andrew I. Gavil, *Exclusionary Distribution Strategies by Dominant Firms: Striking a Better Balance*, 72 ANTITRUST L. J. 3, 53 (2005). The test should require an examination of overall efficiency. In addition, there is the question of proof. For the test to have some ability to reject weak defenses, it should require credible evidence of efficiency gains rather than mere speculation, see Cass & Hylton, *supra* note 19, at 677.

valuation loss from product degradation is \$10, the conduct should not be excused under the specific intent test.

The profit-sacrifice test (appropriately generalized, as described by Melamed) can be shown to be equivalent to the preceding formulations of the specific intent test. Let π represent the unit profit of the dominant firm. The *profit decomposition* of the firm's action can be expressed as follows

$$\Delta\pi = \Delta p - \Delta c = (\Delta p - \Delta v) + (\Delta v - \Delta c) . \quad (7)$$

This expression decomposes the firm's incremental unit profit into two components, the gain from creating barriers to competition and the overall efficiency gain. If the overall efficiency gain is zero or negative, then the only way that the firm could profit from its conduct is by harming consumers. Thus, if the firm's conduct is profitable *only* because of the harmful effect on competition, the net consumer harm ($\Delta p - \Delta v$) will be positive while the overall efficiency gain ($\Delta v - \Delta c$) is either zero or negative.

What if the firm's conduct is profitable because it is both efficient and creates barriers to competition? This is excused under the profit-sacrifice test, because the test condemns conduct only when limiting competition is necessary for the conduct to be profitable. Suppose the dominant firm enters into an exclusivity contract that effectively impairs the efficiency of rivals, forcing them to cut back and raise their prices. If the exclusive contract is efficient overall in the sense that it reduces costs without hurting product quality, then it is excused under the profit-sacrifice test.

As an alternative illustration, consider the following example offered by Salop.⁷⁵ Suppose a firm changes its product design, leading to an increase in value of \$5, and increase in unit cost of \$3. If the design change also makes the dominant firm's product incompatible with similar products, it may effectively raise competition barriers to the point that the dominant firm can increase its price by \$50. The firm's change in profit can be decomposed as

$$\$50 - \$3 = (\$50 - \$5) + (\$5 - \$3).$$

The firm's per-unit profit of \$47 consists of a \$45 gain from the raising of entry barriers and a \$2 gain from overall efficiency. Since the design change would have been carried out even if it had no impact on competition barriers, the profit-sacrifice test does not condemn it.

It should be clear, in this profit-decomposition analysis, that a firm's conduct may have an anticompetitive effect, in the sense of imposing a net harm on consumers, even though it does not require a sacrifice in overall efficiency. In other words, the specific intent (or profit-sacrifice or no-economic-sense) test is neither necessary nor sufficient to define an anticompetitive act. However, this analysis leads into the deeper question of how to

⁷⁵ Salop, *supra* note 4, at 345-346.

define an anticompetitive act. The theoretical monopolization standards discussed to this point propose tests for determining a violation of the law, but these tests do not necessarily provide a definition of anticompetitive conduct.

Elhauge's proposed efficiency test, which focuses on improvement of own efficiency versus impairment of rival efficiency, is best examined within this profit decomposition analysis. If the firm's own efficiency is the basis for its conduct, $\Delta v - \Delta c$ will be positive. On the other hand, if the basis of the conduct is to impair the efficiency of a rival, $\Delta p - \Delta v$ will be positive. If Elhauge's test is interpreted as an inquiry into the intent of the dominant firm – whether it sought to improve its own efficiency or impair its rivals' efficiency – then evidence that it sought to improve its own efficiency should immunize the firm from liability. However, if Elhauge's test is based on outcomes, then it is distinguishable from the specific intent test, and is indeed an alternative statement of the consumer harm test. The reason is that if the test is based on outcomes, then a finding that there is net consumer harm due to the impairment of rival efficiency is sufficient to find unlawful monopolization under the test.

The profit decomposition approach is also useful in examining Posner's equally-efficient-competitor test as a version of the specific intent standard. If the overall efficiency of the defendant's conduct is negative or neutral, $\Delta v - \Delta c$ will be less than or equal to zero. The defendant's conduct will be profitable then, only because of its exclusionary effects. Since rivals are clearly equally efficient in this scenario, the defendant will be in violation of the standard because the conduct excluded equally efficient rivals.

Suppose the defendant's conduct is efficient and simultaneously creates barriers to competition. Consider, for example, the design standard change analyzed above. If the competition barriers derive solely from the effect of the efficient design modification, then the equally efficient competitor standard should immunize the firm's conduct. In other words, the equally efficient competitor standard should preclude a finding of liability under Section 2 when the exclusion results from the dominant firm's efficiency and its collateral effects. This analysis suggests that the equally-efficient-competitor standard is equivalent to the other versions of specific-intent tests, such as the profit-sacrifice and no-economic-sense tests.

The equally-efficient competitor test has some advantages over the other specific intent tests. Consider, for example, the news-sharing network in *Associated Press v. United States*.⁷⁶ Under the profit decomposition analysis the gain to the defendants from setting up a news-sharing network can be divided into a portion due to the overall efficiency gain ($\Delta v - \Delta c$), and a portion due to the creation of competition barriers ($\Delta p - \Delta v$). There are two cases to consider. Suppose, first, that the competition barriers are all incidental to the development of the news-sharing network. For example, if the network employs the lion's share of available talent in the industry, the creation of the network will unavoidably impair the efficiency of potential rivals, at least in the short run. However, the impairment that results from natural monopoly features of the market

⁷⁶ 326 U.S. 1 (1945).

should not be considered a violation of the equally-efficient competitor test. Second, suppose the competition barriers are in part the result of a second category of acts, unrelated to the efficiency of the network, that directly obstruct competition from rivals. Under the equally-efficient competitor test, this second category of acts could violate the law. The acts in the second category, that directly create competition barriers and have no relation to the efficiency-enhancing conduct, could exclude an equally efficient competitor. If the acts in the second category are sufficiently powerful in effect that they could exclude an equally efficient rival, then the equally-efficient competitor test does not suggest that the defendant should be immunized from a finding of liability.⁷⁷ This example suggests that the equally-efficient competitor test, though equivalent to other specific intent tests, makes it easier for a court to analyze cases in which the defendant's conduct involves a combination of efficient and entry-blocking actions.

V. Assessment of Monopolization Standards in Light of Error

There has been little effort in the literature to define a standard by which errors should be determined in antitrust. In the criminal law, a false conviction can be determined largely by reference to the law. If someone is convicted for murder even though his conduct does not satisfy the statutory elements of the crime, then the judgment is most likely erroneous. In antitrust, at least in the U.S., the prohibition against unlawful monopolization cannot easily be captured in simple statutory provisions. The underlying prohibition is determined, more or less, by the objective of the statute.

Although most commentators would say “consumer welfare” is the objective of the statute, that approach is probably too narrow.⁷⁸ If the statute aims to enhance consumer welfare alone, then an act that in the short run enhances efficiency by \$100 and harms consumers by \$1 has to be condemned. However, in the long run, such a large efficiency gain will probably benefit consumers, as entry and competition force firms to share the efficiency gains with consumers. By taking efficiency defenses into account in mergers, antitrust law has already conceded that efficiency deserves to be counted as one of the objectives of the statute.

In an ideal world in which courts made no mistakes, the optimal test would be the welfare balancing test. The reason is that the welfare balancing test comes closest to a test for maximizing social welfare (equivalently, total wealth). Any desired allocation of welfare among economic agents could be arranged through transfers among them (e.g., between firm owners and consumers). Moreover, if the social welfare function requires putting

⁷⁷ This raises a causation issue that has not been adequately analyzed in court opinions. When the equally efficient competitor standard is applied to a mixture of conduct, it would appear to be necessary to find that the anticompetitive conduct, rather than the efficient conduct, caused the exclusionary injuries to rival firms. The causation issue was considered in *United States v. Microsoft*, 253 U.S. F.3d 34 (D.C. Cir. 2001), but the causation requirement was set so low that virtually any allegedly anticompetitive act could meet the causation requirement. If courts continue to apply such a light causation requirement, it would be preferable to let efficiency serve as a safe harbor, as suggested by Werden, *supra* note 53, at 418.

⁷⁸ Williamson, *supra* note 65; ROBERT H. BORK, *THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF*, 107-115 (Basic Books, Inc., 1978)

more weight on the avoidance of harm to consumers, the general welfare balancing test could be designed to replicate the concerns reflected in the social welfare function by choosing the appropriate weights to put on efficiency gains and net consumer harm.

Given that society should prefer the test that maximizes welfare, we can define mistakes in terms of the general welfare norm. If a test condemns conduct that enhances social welfare, we can call such judgments “false convictions”. Similarly, if a test approves, or declares as lawful, conduct that reduces social welfare, we can call such judgments “false acquittals”.

A. Types of Errors and Biases

The types of errors generated by the monopolization tests are easy to assess in this framework. Consider first the consumer harm test. The consumer harm test puts no weight at all on productive efficiency gains. The consumer harm test is biased in the direction of committing false convictions, because it condemns monopolizing acts even when those acts enhance social welfare because of their contribution to productive efficiency. This type of error is costly because it discourages incentives to invest in efficiency. Another reason that there is a tendency toward false convictions in the consumer harm test is that it treats much of the price increase as a reduction in welfare rather than a transfer.

As an illustration, suppose the dominant firm enters into an exclusivity contract that has the effect of raising competition barriers. As a result, price increases by \$30. Because of the promotional advantages of the exclusivity deal, product value (through enhanced consumer education) increases by \$5. The exclusivity deal also results in more efficient distribution, reducing cost by \$40. Under the consumer harm test, the exclusivity arrangement should be condemned, because the \$5 value increase is insufficient to offset the \$30 price increase. However, social welfare is enhanced. The supply-side efficiency gain, \$40, is larger than the net harm to consumers, \$25. Discouraging such conduct reduces society’s welfare. The consumer harm test generates a false conviction in this case.⁷⁹

Next, consider the specific intent test. This test puts no weight on the consumer harm portion. It is biased toward false acquittals because it will excuse some acts of monopolization even when society loses more in the short run from the monopolizing act than from the overall efficiency gains (cost reductions and product performance improvements).

⁷⁹ As suggested earlier, the result could be made to depend on the welfare weights assigned to consumer welfare and supply-side efficiency. The analysis in the text assumes equal weights. If the weight on supply-side efficiency is zero, then the consumer harm test generates no errors. Suppose, instead, the weight on efficiency is 40%. Then under the welfare test one would have to compare 60% of the net consumer harm, which is \$15, to 40% of the supply-side efficiency gain, which is \$16. Thus, even if we give supply-side efficiency a weight of only 40%, the consumer harm test still generates a false conviction. For the consumer harm test to avoid generating a false conviction in this example, the welfare weight on supply-side efficiency must be less than 38.5%.

To illustrate, return to the incompatible design change example (due to Salop). The firm's conduct leads to an increase in value of \$5, and an increase in unit cost of \$3. It also leads to an increase in price of \$50, due to new competition barriers. Since the overall efficiency gain is positive ($\$5 - \$3 > 0$), the specific intent test approves the conduct. However, consumers are harmed (consumer welfare changes by $-\$45$). And under the general welfare test, the design change is harmful to social welfare because there is no efficiency gain to offset the reduction in consumer welfare ($\$50 - \$5 > -\$3$). Thus, application of the specific intent test results in a false acquittal in this case.

I have already noted that the general welfare balancing test appears to be the least biased of the three tests, in the sense that it does not totally ignore some substantial component of the welfare analysis. In spite of this, it shares the same tendency of the consumer harm test to overstate the social harm of monopoly pricing. However, totally ignoring a component of welfare analysis is probably a more serious error than over- or under-weighting that component.

For this reason, it is plausible to assume that the general welfare test would be the best if the costs of false convictions and false acquittals were symmetrical. However, the costs of false convictions and false acquittals are unlikely to be symmetrical.

B. False Acquittal versus False Conviction Costs

That the general welfare balancing test is not clearly biased toward false convictions or false acquittals is not a sufficient reason for preferring it, because one needs to also consider the aggregate (or expected) costs of both types of error. Suppose false acquittals and false convictions both occur at a rate of five percent under the general welfare balancing test. If false convictions are substantially more costly than false convictions, it may be socially preferable to have a test that is biased toward false acquittals.

There are four reasons offered in the literature to believe that false convictions tend to be more costly than false acquittals. The first is the existence of market constraints that limit the social costs of efforts to create barriers to competition. Another is the Williamson tradeoff model. The third is the problem of rent seeking. The fourth, more of an empirical observation than a theoretical account of the ratio of error costs, focuses on baseline probabilities and the ex post distribution of errors.

1. Market Constraints and Error Costs

Easterbrook argued that market constraints limit the extent to which a firm will be able to exploit anticompetitive barriers.⁸⁰ A firm that takes an action that raises barriers to competition will obviously attempt to exploit those barriers by increasing its price. But the profits that would result from the firm's action would also attract new entrants and encourage existing competitors to steal business from the dominant firm. In addition,

⁸⁰ Easterbrook, *supra* note 44.

consumers would seek substitutes. In the long run, firms would enter to compete until economic profits are driven to zero.

The costs of false acquittals will be kept in check by entry of new rivals, competition from existing rivals, and the substitution efforts of downstream purchasers. False conviction costs, however, are not policed by the same market forces. Easterbrook's argument implies that false convictions are greater than false acquittals in the long run.

As an illustration, consider again the example of a dominant firm that changes the design of its product in a manner that enhances competition barriers because of incompatibility. Recall that the consumer valuation increases by \$5, cost increases by \$3, and price increases by \$50. Of the overall unit profit enhancement of \$47, \$45 can be attributed to the new competition barriers (i.e., $\Delta p - \Delta v = \$45$) and \$2 can be attributed to efficiency (i.e., $\Delta v - \Delta c = \$2$). With such a large share of revenue due to temporary competition barriers created by product design, the market will provide a strong inducement to existing competitors and new entrants to compete for a share of the profits. Suppose, for example, competitors will suffer a cost increase of \$6 in order to redesign to become competitive with the dominant firm. As long as the unit profit, to the dominant firm, attributable to competition barriers is greater than \$1, competitors will find redesign for entry purposes profitable. Entry will continue until the dominant firm's price (market price) falls by \$44, at which point its unit profits are attributable entirely to its efficiency advantage over rivals.

2. Welfare Tradeoff Considerations

Return to the welfare tradeoff model of Williamson,⁸¹ though applying it in reverse order. Under the welfare tradeoff model, relatively modest price increases due to the erection of competition barriers are likely to be offset by efficiency gains. This is plausible in a scenario in which the dominant firm faces a risk of especially vigorous competition if it raises its price above a certain level, perhaps determined by the cost of transportation for foreign competitors. In such a scenario, the dominant firm will be able to exploit competition barriers, but only up to a point. If the same conduct that generates competition barriers also generates efficiency gains, the outcome is likely to be one in which the efficiency gains swamp the net consumer harm.

Now reverse the argument: Williamson's model suggests that the costs of discouraging investments in efficiency are likely to be larger than the social costs of monopoly pricing. This suggests that false acquittal costs (exploitation of constrained market power) are generally smaller than false conviction costs (discouraged investment).

Return to the case of the exclusivity contract that enables the dominant firm to erect a barrier to competition. Suppose the contract enables the firm to increase its price by 5 percent. If the elasticity of demand is 2, the firm's output falls by (at most) 10 percent. That leaves 90 percent of the sales base still intact. It is over this 90 percent sales base

⁸¹ Williamson, *supra* note 65.

that the efficiency cost of discouraged investment should be assessed. On the other hand, it is only over the 10 percent output reduction that the cost of monopolization should be assessed. A modest (less than 5 percent) per-unit efficiency cost, spread over 90 percent of the original sales base, will be greater than the 5 percent price increase spread over 10 percent of the sale base.

3. Rent Seeking

Recall that Tullock stressed the importance of directly unproductive, rent seeking investments in the evaluation of the social costs of monopoly.⁸² Such investments could provide a defense for the overweighting of the consumer harm component in the general welfare test.

Directly unproductive investments should also be taken into account in comparing false acquittal and false conviction costs in monopolization law. False convictions send the signal that monopolization law can be used a tool in competition. Firms may interpret the law as providing a strategic weapon against competitors that cut prices or make investments in efficiency. And once it becomes clear that the law can be used as a weapon in competition, the same competitive pressures that drive firms to cut prices will also drive them to file monopolization lawsuits against aggressive competitors.

How much will firms invest into directly unproductive litigation? If the dominant firm's efficiency gain resulting from its action can be taken as a measure of the long run threat to the profits of rival firms, those rivals will have a stronger incentive to invest in litigation as the efficiency gain increases. In other words, investment into monopolization lawsuits will vary with the efficiency of the defendant's conduct rather than the consumer harm. This implies both larger investments into litigation than warranted and poorly targeted litigation. Such unproductive investments put upward pressure on the false conviction costs of monopolization law.

4. Baseline Probabilities and Ex Post Error Rates

The foregoing arguments focus on costs and ignore the issue of error rates. Examining error rates is a bit more complicated because it introduces empirical questions that have not been resolved. Still, if one takes error rates into account, there is a powerful case that error rates will tend toward false convictions, even under the welfare balancing test.⁸³

First, one must distinguish between ex ante and ex post error rates. Ex ante, a monopolization standard, such as the welfare balancing test, may have a predictable rate of error. If courts are equally likely to make mistakes in acquitting or convicting, false

⁸² Tullock, *supra* note 45.

⁸³ Keith N. Hylton & Michael A. Salinger, *Tying Law and Policy: A Decision-Theoretic Approach*, 69 ANTITRUST L. J. 469 (2001); David S. Evans & A. Jorge Padilla, *Designing Antitrust Rules for Assessing Unilateral Practices: A Neo-Chicago Approach*, 72 U CHI L. REV. 73 (2005); James C. Cooper, Luke M. Froeb, Dan O'Brien, and Michael Vita, *Vertical Antitrust Policy as a Problem of Inference*, 23 INTN'L J. INDUS. ORG. 639 (2005).

acquittals and false convictions will be equally probable ex ante. However, the ex post rate of error depends on the underlying base rates of anticompetitive and procompetitive conduct challenged by the test.

Much of the conduct that is the subject of monopolization lawsuits consists of standard competitive practices – price cutting, exclusive dealing, product tying. In other words, much of the conduct targeted in litigation is observed in competitive markets. If the conduct is generally procompetitive, which is plausible in the case of conduct that is frequently observed in competitive markets, then even a modest error rate would imply a large share of false convictions within the pool of guilty verdicts. This suggests that even a slight differential putting the false conviction cost greater than the false acquittal cost translates into large aggregate difference between the two types of cost.

Suppose ex ante error rates (false convictions and false acquittals) under the general welfare balancing test are the both equal to 5 percent. Operating on a random assortment of 200 cases involving procompetitive and anticompetitive conduct, this would lead to 5 false convictions and 5 false acquittals. But if the balance of the sample is shifted so that there are 160 cases involving procompetitive conduct, then there will be 8 false convictions and 2 false acquittals. With a total of 46 convictions, the ex post rate of false convictions will be 17 percent. The ex post rate of false acquittals will be 1 percent. Now let the cost of a false conviction be \$105 and the cost of false acquittal be \$100. The total cost of false convictions would be \$840 and the total cost of false acquittals \$200.

C. Summing Up and Moving Forward

These arguments suggest that specific intent test is the best on error-cost grounds, the general welfare balancing test comes in second, and the consumer harm test third. This provides a justification for the pre-1945 legal standard on monopolization, and some of the recent decisions, such as *Brooke Group* and *Trinko*, effectively returning to that standard. However, it does not provide a justification for using the standard of *Alcoa* as a default standard for monopolization.

A broader message from this analysis is that monopolization standards should be shaped in view of the expected costs of errors. If courts adopted a general welfare balancing test as the default standard, as the *Alcoa* opinion appears to do, that test should be applied in a manner that is sensitive to error costs. Thus, as a general rule the default standard should be applied in a manner that minimizes the risk of false convictions. The lesson here, then, is not that *Alcoa* is impossible to justify in an error cost framework. It is that the issue at bottom is evidentiary burden. The *Alcoa* standard could be applied in a manner that is consistent with the implications of this analysis, as long as the burdens of proof are allocated in a way that puts greater weight on avoiding false convictions than false acquittals.

An even broader message is suggested. The optimal monopolization standard depends on the balance of error costs. Although the specific intent rule appears best as a default rule

in this analysis, the most desirable rule in any setting will depend on the likelihood and cost of error. In some settings, the balance of error costs may indicate that either the welfare balancing test or the consumer harm test would be preferable to the specific intent standard.

For example, in the case of state-sponsored barriers to competition, much of the error cost analysis considered previously in this chapter would have to be modified. First, the incentive to invest in such barriers for anticompetitive purposes will be stronger than usual, given the more durable nature of state-supported competition barriers. Second, the market constraints that ordinarily put downward pressure on false acquittal costs would no longer be present. The reason is that state-erected barriers, backed by the state's coercive power, are more effective at barring competition than most privately-created barriers. This suggests that in a setting of state-sponsored protection from competition, the consumer harm test is probably preferable to the specific intent test.

Another example in which the standard error cost analysis might be reversed is in the case of some types of essential facilities. One of the key reasons that the Court in *Trinko* suggested support for the specific intent test was the concern that an alternative test would discourage capital investment. Firms that invest in essential facilities, such as telecommunications networks or electricity transmission grids, would have a diminished incentive to do so under a legal rule that required them to share the efficiency gains from those investments with rivals. However, suppose that instead of investing on the usual terms in a risky infrastructure, the dominant firm acquires the essential facility from the state in a rigged auction. In this case, a legal rule requiring the sharing of the facility's benefits would not necessarily discourage productive investment. If appropriately limited, the rule could discourage wealth transfers from the state, such as corrupt privatizations.

The characteristics of the type of essential facility case in which an access sharing rule has a greater than ordinary procompetitive potential are easy to describe. They would involve the state transferring, without a competitive auction, control over some market portal (or essential entry path) to a private firm or a group of firms. Another characteristic is the absence of a significant scope for efficiency enhancing investments on the part of the possessor of the facility. For example, in *American Federation of Tobacco Growers v. Neal*,⁸⁴ the state of Virginia handed the power to regulate warehouse sales of tobacco to the defendant trade association, and the association used that power to exclude a new entrant. *Tobacco Growers* is an example of the state handing control over entry to a private group.

In a setting like *Tobacco Growers*, the likelihood of false acquittal costs being checked by competition is a lot lower than in the case of a free-entry market. Moreover, the prospect of gaining the power to block entry will encourage efforts by private parties to seek control over market portals. The error cost balance in this setting is not clearly in favor of a specific intent test, and may be closer to favoring the consumer harm test.

⁸⁴ *American Fed'n of Tobacco Growers, Inc. v. Neal*, 183 F.2d 869 (1950).

Although I have argued that the specific intent test appears best as a default rule on error cost grounds, the error cost approach to monopolization standards suggests a great deal of flexibility. One could argue that there is no need for default rules under the error cost approach; that the optimal monopolization test can be decided on a case-by-case basis by an assessment of error cost consideration specific to each case. Similarly, one could argue, as I have suggested, that a general balancing test could be adopted and evidentiary burdens could be used to strike the right balance in terms of error costs. Indeed, one could argue that each case should be decided on an empirical assessment of the relative costs of false acquittals and false convictions.

The flaw in this line of reasoning is that it ignores the need for clear rules in antitrust. Firms have to make investment decisions on the basis of the monopolization test in force. If there is a risk that they will be required under antitrust law to share the efficiency gains from those investments, they will be discouraged from investing. Using the error cost framework as a general set of norms that each court would apply in fashioning a particular result fails to provide firms with clear signals from the law.

Because the law affects investment decisions, there is a need for clear default rules in antitrust. The error cost framework should be used to identify broad categories in which various monopolization tests would be applied. The specific intent test has reemerged in specific pockets of American antitrust law, and the argument of this chapter is that it is an especially appealing default rule for monopolization cases. However, the error cost framework does not rule out alternative tests for specific pockets of monopolization law.

VI. Conclusion

Lack of clarity has been a long running problem in monopolization law.⁸⁵ Part of the problem is a failure to develop a theory of monopolization tests that is capable of application to the case law. I have tried to improve matters a little on that score in this chapter.

The default rule tests for monopolization can be stated with clarity: consumer harm, general welfare balancing, and specific intent. Over time, the law will probably contain all three of these tests, though allocated to the types of monopolization cases for which they are optimal in light of error costs.

⁸⁵ Kahn, *supra* note 39, at 40-41; Elhauge, *supra* note 48, at 253.

Appendix: Monopolization Tests and Welfare Tradeoffs

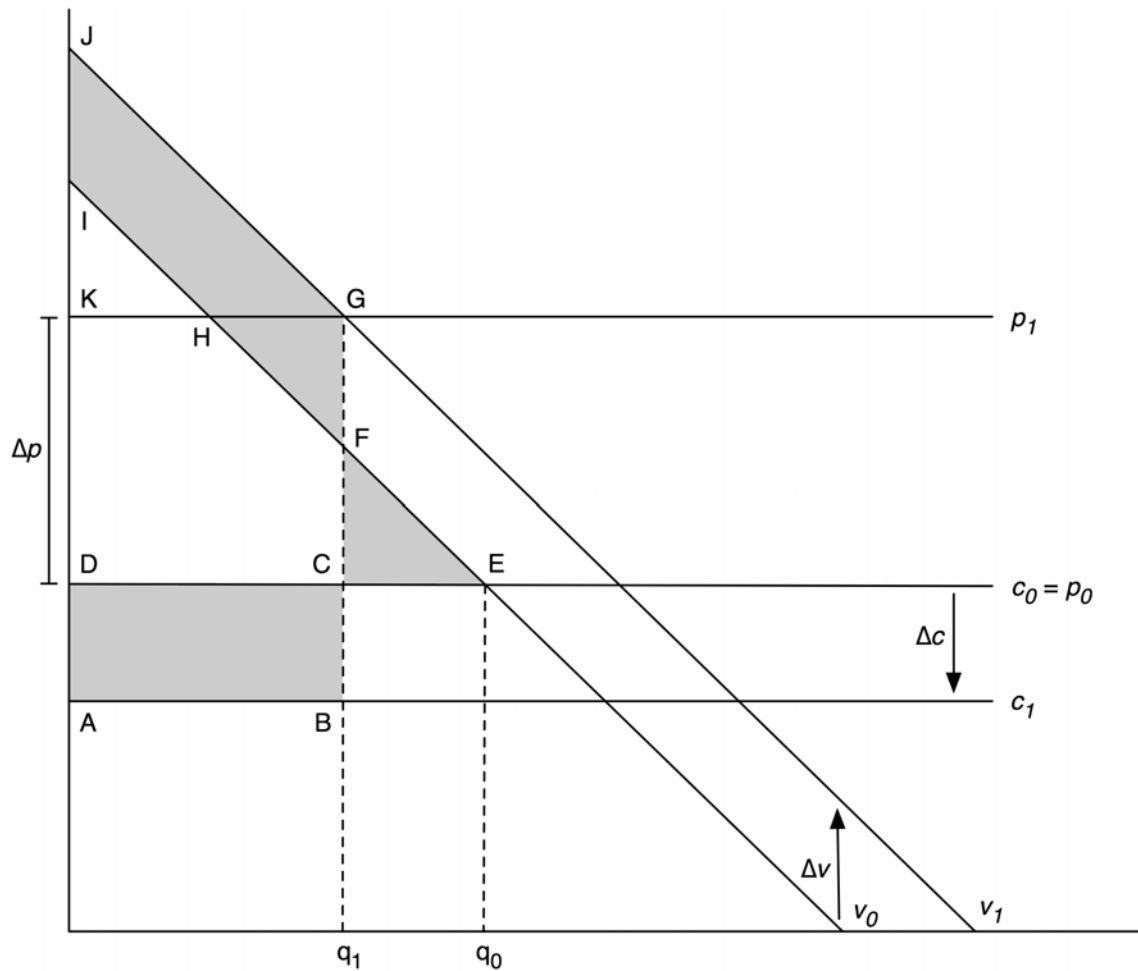


Figure A1

- ABCD = Productive efficiency gain
- CEF = Deadweight loss (forgone consumer surplus)
- IFGJ = Welfare gain from product enhancement
- HGJ = Recaptured welfare gain from enhancement

Figure A1 presents the welfare effects of conduct that enhances barriers to competition and simultaneously generates productive efficiency gains ($\Delta c < 0$) and product quality gains ($\Delta v > 0$). If the price increase is less than or equal to the valuation gain, there is no deadweight loss resulting from the dominant firm's conduct. In other words, no deadweight loss results unless $\Delta p > \Delta v$.

The consumer harm is equal to area DEHK, which is the sum of the original consumer surplus transferred to the monopolist and the forgone original consumer surplus.

The monopolist's conduct is socially desirable if the sum of the welfare gains from enhancement and productive efficiency exceed the deadweight loss. In terms of the diagram, the conduct is desirable if the sum of area ABCD and area IFGJ exceed area CEF. If $ABCD + IFGJ > CEF$, the firm's conduct is permissible under the consumer welfare test for monopolization. It should be clear that Williamson's argument that modest efficiency gains will often outweigh the harmful effects of price increases is stronger in this model.

The consumer harm due to competition barriers is represented by the area KDEH, which is the sum of the portion of the original consumer surplus transferred to the monopolist (KDCFH) and the deadweight loss portion (CEF). The gain to consumers from product enhancement is represented by IHGJ. Thus, consumers are harmed if $KDEH - IHGJ > 0$. Since the deadweight loss component is difficult to determine, we can refer to the "measurable consumer harm" as the difference $KDCFH - IHGJ$. The consumer harm test proposed by Salop is equivalent to determining whether $KDCG - IFGJ > 0$. This is equivalent to the measurable consumer harm. However, it understates the real consumer harm by excluding the deadweight loss portion CEF.

The specific intent test declares the monopolist's act unlawful only if $IFGJ + ABCD < 0$. Obviously, this requires either a productive efficiency loss or degradation of product quality.

Williamson's welfare tradeoff analysis focused on the case in which average cost is reduced. Williamson's formula is easily extended to this case:

$$\frac{\Delta v}{v} - \frac{\Delta c}{c} > \frac{\eta}{2} \left(\frac{\Delta p}{p} \right)^2.$$

In this inequality, η is the elasticity of demand for the original demand curve (at v_0) and Δp is the price change on the original demand curve (corresponding to the segment CF in the diagram). If this condition holds, the firm's conduct, which is efficient and at the same time raises barriers to competition, is socially desirable. Williamson showed that when η is 2 and the price increase is 20 percent, a cost reduction of 4 percent would be sufficient to offset the negative welfare effect of the price change. In this analysis, the same argument applies, though here the overall efficiency change ($\Delta v/v - \Delta c/c$) would only have to be 4 percent to offset the effect of the price increase. The welfare tradeoff analysis in this model lends greater support to taking efficiencies into account in the tradeoff setting.