

Memorandum re: Comments on Horizontal Merger Guidelines Review Project

To: Department of Justice, Antitrust Division, and Federal Trade Commission

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I am submitting the attached draft paper, *Critique of Williamson's Economic Case for an Efficiencies Defense in Antitrust Merger Analysis: The Rectangles are Rarely Larger Than the Triangles and Policy Prescription*, as a comment on the efficiencies section of the Horizontal Merger Guidelines. Section VIII of the paper sets forth the following policy prescriptions for addressing efficiencies:

Contrary to the Williamson principle, the above analysis demonstrates that in any merger giving rise to a significant increase in market power, the size of the Efficiency Rectangle is not likely to be substantially larger than the consumer and producer Welfare Triangles and in many cases may be smaller. Thus, the U.S. and the EU antitrust authorities should not consider liberalizing the approaches to efficiencies taken in the DOJ/FTC Guidelines and in the EU Guidelines. Both these Guidelines have an implicit requirement that the efficiencies must overpower the anticompetitive effect and keep the post merger price from rising. This is the correct standard, and if there is any doubt that these Guidelines adopt this standard, the doubt should be eliminated by clarifying amendments. As both sets of Guidelines acknowledge, this standard is most likely to be satisfied when the anticompetitive effects of the merger are small and the efficiencies substantial.

As a way of conserving resources for both agency officials and parties, I suggest that both the DOJ/FTC and EU Guidelines be amended to state prominently that the antitrust officials will consider efficiencies only in those cases where on the basis of factors other than efficiencies, the officials determine that a decision to oppose the transaction or require a divestiture or other remedy is a close one. If the decision is not close, the officials would not consider efficiencies and the parties would not have to go to the expense of preparing White papers supporting efficiency claims. Only if the officials decided that the decision was otherwise close would the parties be permitted to submit arguments regarding the efficiencies to be realized in the transactions. In such a case, in evaluating the overall transaction the officials would take account of any efficiency claims that satisfied the "merger specific," "verification," "cognizable" and other requirements of the current guidelines. Thus, the submission of efficiency analyzes would be permitted when the officials decided on the basis of an analysis of other factors that there was a significant concern that a challenge to the transaction or a requirement to divest may lead to a Type I error (*i.e.*, finding that the merger is anticompetitive when it is not).

Also, given the findings above with regard to the possibility that even significant marginal cost efficiencies may not swamp the Welfare Triangle, it would be appropriate for officials to consider only variable cost savings. In this connection, as indicated above, *Merger Efficiencies at the FTC* points out that both the Bureau of Competition and the Bureau of

Economics at the FTC are as likely to accept both fixed costs savings and variable cost savings at about the same rates.

Finally, the above analysis shows that even for jurisdictions that may consider adopting a total welfare approach or the “balancing weights” approach of the Canadian Competition Tribunal, only in limited circumstances will total welfare be increased as a result of efficiencies realized in a merger resulting in significant market power. This is a reason for countries to reject the total welfare approach and any variant thereof.

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**CRITIQUE OF WILLIAMSON’S ECONOMIC CASE FOR AN EFFICIENCIES
DEFENSE IN ANTITRUST MERGER ANALYSIS:
THE RECTANGLES ARE RARELY LARGER THAN THE TRIANGLES AND POLICY
PRESCRIPTION¹**

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I. Scope²

This article examines the pricing, output, and welfare effects resulting from a merger in which a pre-merger competitively organized market becomes a post-merger monopolistically organized market, and the acquiring firm realizes substantial productive efficiencies. The analysis focuses on static efficiency gains and does not consider potential dynamic efficiencies or dynamic inefficiencies that may arise in a merger.

Section II briefly discusses the various types of efficiencies that may occur as a result of a merger and the treatment of efficiencies under both the DOJ/FTC Horizontal Merger Guidelines³

² This article is partially based on and is an extension of parts of Chapter 8, *Computation Of Results Of Productive Efficiency Gains From A Merger To Monopoly* of Samuel C. Thompson, Jr., A PRACTITIONER'S GUIDE TO THE ECONOMICS OF THE ANTITRUST MERGER GUIDELINES (1997) [hereinafter ECONOMICS OF MERGER GUIDELINES]. Previous drafts of this article were developed while I was serving as a consultant for the Federal Trade Commission during the summer 2002 and working in the European Commission's Merger Taskforce in its Directorate General - Competition in Brussels during the summer of 2003.

³ Department of Justice and Federal Trade Commission, Horizontal Merger Guidelines (1992 revised 1997) [DOJ/FTC Guidelines].

and the EU Guidelines on Assessment of Horizontal Mergers.⁴ Although the DOJ/FTC Guidelines were adopted in 1992, the efficiencies section of these Guidelines was revised in 1997. A March 2009 study by two members of the FTC's staff, entitled *Merger Efficiencies at the FTC*, provides some helpful insights into the approach the FTC has been taking to efficiencies since the adoption of the 1997 revision.⁵ The EU Guidelines were adopted in 2004 and contain an efficiencies section that is similar to the approach taken in DOJ/FTC Guidelines. As will be seen, both of these Guidelines take a cautious approach to the consideration of efficiencies in merger analysis.

Section III examines the effect of productive efficiencies on the output and pricing decisions of the firm resulting from the merger of the ten firms in a hypothetical widget industry.⁶ The specific output, price, and welfare effects are computed first under the assumption of competition, then under the assumption of a merger to monopoly without efficiencies, and finally under the assumption of a merger to monopoly that results in substantial productive efficiencies. The findings call into question the basic assertion by Professor Williamson (the 2009 Nobel Laureate in Economics), first made in 1968, that productive efficiencies are likely to offset the loss in welfare represented by the Welfare Triangle. Section III.D presents a critique of the Williamson approach that is different from any critique of which I am aware. Basically, the critique challenges the Williamson assertion that “non-trivial” efficiencies will swamp the dead-weight welfare loss from a merger to monopoly.

The impact Williamson's theory has had in convincing the antitrust authorities to adopt an efficiencies defense in the DOJ/FTC Guidelines and in the EU Guidelines is explained as follows by Professor Greaney in a 2009 chapter in a book on antitrust analysis:

The economic underpinnings for explicitly incorporating efficiencies into merger analysis can be traced to Oliver Williamson's influential article '*Economies as an Antitrust Defense: The Welfare Tradeoffs*', which threw down the gauntlet for enforcers: “If neither the courts nor the enforcement agencies are sensitive to [efficiency] considerations, the system fails to meet a basic test of economic rationality. And without this the whole enforcement system lacks defensible standards and becomes suspect.” Assumptions about demand elasticities and other factors led many to adopt working assumptions that rectangles (surpluses resulting from efficiencies) [Efficiency Rectangles] were likely to be larger than triangles (deadweight welfare losses) [Welfare Triangles] in conducting the welfare trade-off. At a minimum, the possibility that in a not insignificant proportion of cases empirical examination by courts would reveal that efficiencies outweighed potential harms led a chorus of academics and politically appointed agency heads to support adding an efficiencies defense to Clayton Act jurisprudence.⁷

⁴ Commission Notice: Guidelines on the Assessment of Horizontal Mergers Under the Council Regulation on the Control of Concentrations Between Undertakings (January 30, 2004) [*EU Guidelines*].

⁵ Malcolm B. Coate and Andrew J. Heimert, *Merger Efficiencies at the Federal Trade Commission 1997-2007* (Bureau of Economics, Federal Trade Commission, February 2009) [hereinafter *Merger Efficiencies at the FTC*].

⁶ The hypothetical widget industry is explored in greater detail in Chapter 6 of *ECONOMICS OF MERGER GUIDELINES*, *supra* note 2.

⁷ Thomas L. Greaney, *Efficiencies in Merger Analysis: Alchemy in the Age of Empiricism?*, Chapter 12 of JOSEF DREXL, LAURENCE IDOT, AND JOEL MONEGER, *ECONOMIC THEORY AND COMPETITION LAW* (2009).

Along the same lines, the leading treatise on antitrust states: “[I]n welfare terms, the loss from higher prices may be outweighed by the gain in resource savings from greater efficiency [*i.e.*, the Efficiency Rectangle]. Indeed, a relatively small cost savings would result in a net gain in [total] welfare in many if not most situations.”⁸

Contrary to these assertions, the thesis set forth in Section III.D is that Efficiency Rectangles are rarely larger than Welfare Triangles, and consequently, efficiencies should rarely, if ever, be considered in examining the antitrust aspects of a merger or acquisition. Along this line, Section III.D.5 criticizes the Canadian “balancing weights” approach, which (1) is based on the Williamson approach, (2) was adopted by the Canadian Competition Tribunal in the *Superior Propane* case (in a defeat for Canadian law enforcers, who adopted a contrary view), and (3) is now accommodated by Canadian enforcers in Canadian Competition Bureau’s Bulletin on Efficiencies in Merger Review,⁹ promulgated in 2009.

Section IV analyzes the Williamson principle with a demand curve that is both more and less flat (elastic) than the demand curve used in the above analysis. This section shows that the results can vary significantly depending on the steepness of the demand curve. Section V conducts the analysis of the Williamson principle with a merger of less than monopoly with less than a monopoly price increase. The analysis here shows that even if there is only a small price effect, the Williamson principle may still not apply.

Section VI discusses the critiques of the Williamson approach by Judges Bork and Posner, and Section VII discusses Williamson’s own reservations with his trade –off model. Section VIII provides a policy prescription, which I urge the DOJ and FTC to consider carefully as they begin their 2009 review of the DOJ/FTC Guidelines.¹⁰ This section suggests that the antitrust agencies and courts should be particularly cautious in evaluating efficiency claims, because efficiencies will offset the anticompetitive effects of mergers only in rare circumstances. Thus, the limited approach to efficiencies in both the DOJ/FTC Guidelines and the EU Guidelines is about right and should not be liberalized, as is advocated by some, including FTC Chairman Muris¹¹ and Bill Kolasky.¹² Finally, Sections IX through XV contain Appendices A through I, which provide some of the background calculations.

⁸ PHILIP E. AREEDA AND HERBERT HOVENKAMP, *IVA ANTITRUST LAW* 27 (3rd Ed. 2009) [hereinafter *Areeda and Hovenkamp*]

⁹ Canadian Competition Bureau, Bulletin on Efficiencies in Merger Review (March 2, 2009) [hereinafter *Canadian Efficiencies Bulletin*].

¹⁰ See Department of Justice, News Release, Department of Justice and Federal Trade Commission to Hold Workshops Concerning Horizontal Merger Guidelines (Sept. 22, 2009).

¹¹ See Section II.B.9.

¹² William J. Kolasky, *Effectively Advocating Efficiencies in Merger Review*, Antitrust Report (Spring 2003) and William J. Kolasky and Andrew R. Dick, *The Merger Guidelines and the Integration of Efficiencies Into Antitrust Review of Horizontal Mergers*, (2002, Antitrust Division Website, www.usdoj.gov/atr/hmerger/11254.htm) [hereinafter Kolasky and Dick, *Efficiencies*].

II. Efficiencies and Their Treatment under the DOJ/FTC Guidelines and the EU Guidelines

A. Introduction

In setting the foundation for an analysis of the Williamson theory, this section first provides a general discussion of the principal types of efficiencies that may occur as a result of a merger and then sets out a brief introduction to the present treatment of efficiencies in the DOJ/FTC Guidelines and in the EU Guidelines. Those readers familiar with these principles may proceed directly to Section III.

B. Types of Efficiencies

1. Productive Efficiencies

Economies of scale may result from mergers,¹³ and this may be one of the principal business advantages of mergers. There appear to be four major types of economies of scale:

- (1) capital-raising economies;
- (2) plant-specific economies;
- (3) product-specific economies; and
- (4) marketing economies.¹⁴

Capital-raising economies may result from the acquisition of a small firm by a larger firm. After such an acquisition, the smaller firm may benefit from the larger firm's lower cost of capital.¹⁵ This benefit may be offset, however, if the merger results in an increase in business risk, which generally occurred with conglomerate mergers in the 1960s.¹⁶ If a merger results in greater business risk for the firm, the cost of capital may increase after the merger.

Plant-specific and product-specific economies are more likely after horizontal mergers. In the short run, however, plant-specific economies of scale are unlikely after a horizontal merger, because the operation of the plants of the merging firms is likely to continue.¹⁷ This may not be so in a declining or depressed industry; after the merger in such industries the least efficient plants may be eliminated.¹⁸ Even though scale economies may not be realized in the short run, in the long run such economies may be realized through plant closures and expansion of other plants.¹⁹

¹³ F.M. Scherer and David Ross, *INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE* 162-67 (3rd Ed 1990) [hereinafter SCHERER & ROSS]. See also Joseph F. Brodley, *Proof of Efficiencies in Mergers and Joint Ventures*, 64 *ANTITRUST L. J.* 575 (1996) [hereinafter Brodley, *Proof of Efficiencies*] and Miguel de la Mano, *For the Customer's Sake: The Competitive Effects of Efficiencies in European Merger Control*, Enterprise Papers No. 11, pages 5-6 (2002), European Commission Enterprise Directorate General [hereinafter Mano, *Efficiencies in European Merger Control*].

¹⁴ SCHERER & ROSS, *supra* note 10, at 162.

¹⁵ *Id.* at 163.

¹⁶ *Id.*

¹⁷ *Id.* at 164.

¹⁸ *Id.*

¹⁹ *Id.*

Product-specific economies of scale may result if the merging firms produce similar products, and after the merger, production assignments can be rearranged to combine and lengthen production runs.²⁰ This type of economy of scale does not appear to be a substantial motive for mergers in the U.S. because the large U.S. market makes it possible to attain most product-specific economies without merging.²¹

Scherer and Ross reach the following conclusion about plant-specific and product-specific economies of scale:

Plant-specific and product-specific scale economies can and do result from mergers. But for a significant fraction of the cases in which they do, it is because competition has failed to stimulate efficient plant investment, specialization, or closure choices. Mergers are a second-best solution, given the failure of competition. It follows obversely that the more effectively competition is working, the less essential mergers are as a source of production scale economies.²²

Marketing economies may result from better utilization of field sales forces, broader product lines, common advertising themes, and the sharing of any quantity discounts offered by advertising agencies or the media.²³ In one study, which involved mostly conglomerate acquisitions, marketing economies were found to be much more important than production economies, but not as important as capital raising economies.²⁴ Other studies, however, have found marketing economies to be relatively unimportant.²⁵

Professor Brodley points out that “[s]ome efficiency gains may come from employment reductions, perhaps involving large layoffs,” and further notes that “[I]n a time of massive ‘downsizing,’ some would challenge whether reduced employment is a true efficiency gain since it may produce harmful social externalities.”²⁶ Although he recognizes that adverse social effects may arise from layoffs resulting from mergers, he would “resist attempting to inject this factor into the efficiencies defense analysis.”²⁷

2. Dynamic and Innovation Efficiencies

In addition to productive efficiencies, a merger could result in “dynamic efficiencies,” which include [1] reductions in transactions costs associated with vertical integration, “[2] savings associated with the introduction of new products or processes, [3] savings in related markets that are inextricably linked to the market of concern, and [4] an enhanced ability to compete.”²⁸

²⁰ *Id.*

²¹ *Id.* at 165.

²² *Id.*

²³ *Id.*

²⁴ *Id.* at 165-66.

²⁵ *Id.* at 166.

²⁶ Brodley, *Proof of Efficiencies*, *supra* note ___, at 582.

²⁷ *Id.*

²⁸ *Merger Efficiencies at the FTC*, *supra* note ___, at 7. A footnote to the above quote discusses “demand side” efficiencies:

Along these same lines, Professor Brodley argues that “innovation efficiency or technological progress provides the single most important factor in the growth of real output..., representing over half the total gain in U.S. output over extensive time periods.”²⁹ It should be noted, however, that the Canadian Efficiencies Bulletin makes the point that “mergers may result in either a loss or gain in dynamic efficiencies.”³⁰

3. Fixed Cost and Variable Cost Efficiencies

For reasons discussed below, microeconomic theory generally concludes that in the short run, price is determined by marginal cost, which is derived from average variable cost, and not by fixed cost. As a consequence, it would appear that it would be more likely that antitrust regulators would be more amenable to considering efficiencies that result in a lowering of variable costs.

4. Category of Efficiencies Considered at the FTC since Adoption of the Efficiencies Section of the Guidelines

The merger efficiencies considered by the FTC since the amendment in 1997 of the efficiencies provisions of the DOJ/FTC Guidelines are separated into the following 12 categories in the recent staff report, *Merger Efficiencies at the FTC*:

Five categories generally focus on fixed-costs: (1) overhead reductions, (2) plant or facilities “rationalization,” (3) savings on research and development, (4) promotional and marketing efficiencies, and (5) a miscellaneous category for other fixed-cost claims. . . . [F]ive categories of efficiencies . . . typically represent variable-cost savings: (6) production-cost efficiencies, (7) distribution-cost reductions, (8) raw-material economies, (9) “best practices” (implementation of one company’s superior, and cheaper, production methods), and (10) an “other” category for variable-cost efficiencies that do not fit into one of the variable-cost categories. Finally, . . . two additional categories of efficiencies [were]: (11) dynamic efficiencies to cover savings that accrue other than from reductions in the cost of day-to-day operations . . . [and] (12) generic claims, address[ing] cost savings advanced by the parties without sufficient detail to allocate the savings into fixed or variable categories.³¹

Merger Efficiencies at the FTC finds that both the FTC’s Bureau of Competition, which consist mainly of lawyers, and the FTC’s Bureau of Economics, which consists mainly of economists, both have the same acceptance rate for variable and fixed costs efficiencies.³²

In some instances, parties claimed demand-side efficiencies, which were allocated into the dynamic-efficiency category. Demand-side efficiencies are those stemming from a company’s ability to offer better products or a broader range of products that increase consumer demand. The efficiencies result from the ability of a merged company to capture marketing synergies that the two merging parties, when separate, were not able to obtain. Synergies of this type are often called “cross-selling” opportunities, although they are not necessarily limited to such approaches.

²⁹ Brodley, *Proof of Efficiencies*, *supra* note ___, at 581.

³⁰ *Canadian Efficiencies Bulletin*, *supra* note ___, at 6.

³¹ *Merger Efficiencies at the FTC*, *supra* note ___, at 7-8.

³² *Id.* at 19 and 25.

C. Treatment of Efficiencies under the DOJ/FTC Horizontal Merger Guidelines

1. Five Step Process in the DOJ/FTC Guidelines³³

The DOJ/FTC Guidelines set forth the enforcement policy of the agencies under Section 7 of the Clayton Act for horizontal mergers. Although it is clear that the “[a]pplication of the Guidelines as an integrated whole to case-specific facts . . . determines whether the Agency will challenge a particular merger,”³⁴ the Guidelines set out the following five-step process for answering the ultimate inquiry: Will the merger likely create or enhance market power or facilitate its exercise?

First step. The first step is to determine whether the merger would significantly increase concentration and result in a concentrated market, properly defined. Thus, the starting point is the definition of the market and the determination of concentration levels in the market. This step is consistent with the approach of the case law interpreting Section 7.

The relevant market is determined by applying a formula that is premised on the microeconomic concept of cross elasticity of demand. Thus, market definition under the DOJ/FTC Guidelines focuses on the demand side of the market. After determining the relevant market, the final part of the first step is to determine the level of concentration in the market. This involves an analysis of the productive capacities of both actual competitors and certain potential competitors (*i.e.*, “uncommitted entrants”). Uncommitted entrants are firms that could begin producing in the relevant market quickly without incurring significant “sunk” costs of entry or exit. Thus, these are the “hit and run” potential entrants of the contestable markets theory.

Second step. The second step in the DOJ/FTC Guidelines is to determine whether, in view of market concentration and numerous other factors, the merger raises concerns about potential anticompetitive effects. Thus, in ascertaining whether there is any anticompetitive effect, consideration is given both to the concentration level in the market and to an examination of market structure to determine whether the market is likely to be characterized by anticompetitive effects from either coordinated interactions (*i.e.*, collusion between competitors) or unilateral (*i.e.*, single firm market power).

The Guidelines divide markets into three concentration levels depending on the post-merger Herfindahl-Hirschman index (“HHI”), a measure of concentration in a market. The HHI is determined by squaring the market shares of the firms in the market. Thus, if one firm has 100% of a market, the HHI is 10,000, indicating a monopoly, and if each of 100 firms in a market has 1% of the market, the HHI is 100, indicating a competitive market.

³³ This section is adapted from Chapter 8 of Samuel C. Thompson, Jr. *BUSINESS PLANNING FOR MERGERS AND ACQUISITIONS* (3rd Ed. 2008).

³⁴ Department of Justice and Federal Trade Commission, *Comments on the Horizontal Merger Guidelines* 15-16 (March 2006) [hereinafter 2006 DOJ/FTC Comments].

The tentative enforcement decision depends on both (1) the total post-merger HHI for the market, and (2) the increase (or delta) in the HHI resulting from the merger. If two firms merge, the delta, or increase, in HHI equals the market share of the acquiring firm (assume, 20%) times the market share of the target (assume, 10%) times 2, or 400 ($20 \times 10 \times 2 = 400$). Markets with a post-merger HHI of 1000, which corresponds roughly to a 4-firm concentration level of 40%, are considered unconcentrated, and mergers in this range are almost never challenged. Markets with a post-merger HHI between 1000 and 1800, which corresponds roughly to a four firm concentration level of 70%, are considered moderately concentrated, and mergers in this range are rarely challenged. On the other hand, the Guidelines provide that if the post-merger HHI is above 1800 and the delta is more than 100 points (*e.g.*, a merger of two 8% firms, $8 \times 8 \times 2 = 128$), the merger “likely [will] create or enhance market power or facilitate its exercise.” Such mergers may be challenged depending on an analysis of (1) coordinated and unilateral effects, (2) entry conditions (*see* Third Step), (3) efficiencies (*see* Fourth Step) and (4) the failing firm doctrine. (*See* Fifth Step).

As a practical matter, the agencies are unlikely to challenge a merger or require divestitures unless the post-merger HHI is significantly higher than 1800 and the delta is significantly higher than 100. For example, in examining bank acquisitions, the DOJ routinely requires divestitures in markets where the post-merger HHI exceeds 2000 and the delta exceeds 200.

In summary, the second step involves a determination of whether the post-merger concentration levels in the market and the increase in concentration resulting from the merger provide a basis for competitive concern. If so, then the second step proceeds to an analysis of whether the merger is likely to lead to coordinated interactions or unilateral anticompetitive effects. If after an analysis of these three oligopoly factors (concentration, coordinated interactions, and unilateral effects) it is tentatively decided to challenge the merger, the analysis proceeds to the third step.

Third step. The third step is to determine whether entry into the market by “committed entrants” would be timely, likely and sufficient to deconcentrate the market. Committed entrants are those potential entrants that could enter only by incurring significant sunk costs. Even if the merger appears to be anticompetitive after an analysis of concentration levels and the other oligopoly factors, it may not be challenged if the possibility of new entry by committed entrants would prevent the exercise of market power.

Fourth step. If after considering entry the decision to challenge still holds, then the analysis proceeds to the fourth step: determining whether there are any efficiency gains that cannot be attained otherwise. Thus, the presence of efficiencies may lead to the decision not to challenge a merger.

Fifth step. If after going through the first four steps, a decision to challenge the merger is made, then the analysis turns to the fifth step: determining whether the failing firm exception applies.

2. Guidelines' Rationale for Considering Efficiencies

On April 10, 1997, the Department of Justice and the FTC issued a revision of Section 4 of the DOJ/FTC Guidelines addressing efficiencies. Section 4 says that although "[c]ompetition usually spurs firms to achieve efficiencies internally . . . , mergers have the potential to generate significant efficiencies by permitting a better utilization of existing assets, enabling the combined firm to achieve lower costs in producing a given quantity and quality than either firm could have achieved without the proposed transaction." The Guidelines go on to say: "Indeed, the primary benefit of mergers to the economy is their potential to generate such efficiencies."

The Guidelines say that merger-related efficiencies can "enhance the merged firm's ability and incentive to compete, which may result in lower prices, improved quality, enhanced service, or new products." The section gives the following example of such a merger: "For example, merger-generated efficiencies may enhance competition by permitting two ineffective (*e.g.*, high cost) competitors to become one effective (*e.g.*, lower cost) competitor."

3. Impact of Efficiencies in Coordinated Interaction and Unilateral Effects Cases

The Guidelines then address the role of efficiencies in evaluating mergers that give rise to concerns with (1) coordinated interaction (*i.e.*, mergers enhancing the potential for collusion in a market), and (2) unilateral effects (*i.e.*, mergers resulting in single firm market power). For a market where there is a concern with coordinated interactions as specified in Section 2.1 of the 1992 DOJ/FTC Guidelines, the section says that "marginal cost reductions may make coordination less likely or effective by enhancing the incentives of a maverick to lower price or by creating a new maverick firm." For mergers raising concerns with unilateral effects as detailed in Section 2.2 of the 1992 DOJ/FTC Guidelines, the section says that "marginal cost reductions may reduce the merged firm's incentive to elevate price." Thus, the Guidelines give more credibility to efficiencies resulting in reductions of marginal costs than to those resulting in reductions of fixed costs.

4. Dynamic Efficiencies

In addressing dynamic economies the Guidelines say: "Efficiencies also may result in benefits in the form of new or improved products, and efficiencies may result in benefits even when price is not immediately and directly affected." The Guidelines acknowledge, however, that even if efficiencies enhance a firm's ability to compete, a merger may also lead to anticompetitive effects. Further, it should be noted that the high rate of failure of mergers indicates that many mergers may produce dynamic inefficiencies, and this may be a reason to view claims of dynamic efficiency with skepticism. As indicated above, the Canadian Efficiencies Bulletin makes a similar point.

5. Merger Specific Efficiencies

The Guidelines say that the agencies (*i.e.*, the DOJ and FTC) will consider only efficiencies that are likely to be accomplished with the proposed merger and are unlikely to be accomplished in the absence of the merger or by other means having comparable anticompetitive effects. The Guidelines refer to these efficiencies as "merger-specific" efficiencies, and a footnote explains:

The Agency will not deem efficiencies to be merger-specific if they could be preserved by practical alternatives that mitigate competitive concerns, such as divestiture or licensing. If a merger affects not whether but only when an efficiency would be achieved, only the timing advantage is a merger-specific efficiency.

The Guidelines explain, however, that only “practical” alternatives will be considered, and the “Agency will not insist upon a less restrictive alternative that is merely theoretical.”

6. Verification

The Guidelines explain that efficiencies are difficult to verify and quantify, and the relevant information is “uniquely in the possession of the merging firms.” Further, there may be non-intentional errors in estimating efficiencies and as a result “efficiencies projected reasonably and in good faith by the merging firms may not be realized.”

Consequently, the merging firms must “substantiate” efficiency claims so that they can be verified by the agencies. The Guidelines elaborate on this verification process:

[T]he merging firms must substantiate efficiency claims so that the Agency can verify by reasonable means the likelihood and magnitude of each asserted efficiency, how and when each would be achieved (and any costs of doing so), how each would enhance the merged firm’s ability and incentive to compete, and why each would be merger-specific. Efficiency claims will not be considered if they are vague or speculative or otherwise cannot be verified by reasonable means.

7. Cognizable Efficiencies.

The Guidelines define “cognizable efficiencies” as merger-specific efficiencies that have been verified and that do not arise from anticompetitive reduction in output or service, and the section further explains that “[c]ognizable efficiencies are assessed net of costs produced by the merger or incurred in achieving those efficiencies.”

8. Enforcement Standard

The Guidelines set out the following enforcement standard: “The Agency will not challenge a merger if cognizable efficiencies are of a character and magnitude such that the merger is not likely to be anticompetitive in any relevant market.” Under this standard, it would seem that the price-depressing effect of the efficiencies would have to outweigh any price-increasing effect from anticompetitive effects of the merger.

A footnote explains that while the Agency will normally assess competition in the relevant market:

In some cases . . . the Agency in its prosecutorial discretion will consider efficiencies not strictly in the relevant market, but so inextricably linked with it that a partial divestiture or other remedy could not feasibly eliminate the anticompetitive effect in the relevant market without sacrificing the efficiencies in the other market(s). Inextricably linked efficiencies rarely are a significant factor in the Agency’s determination not to challenge

a merger. They are most likely to make a difference when they are great and the likely anticompetitive effect in the relevant market(s) is small.

The Guidelines give the following guidance on how the Agency will make the determination of whether the cognizable efficiencies are likely to prevent any anticompetitive effect:

To make the requisite determination, the Agency considers whether cognizable efficiencies likely would be sufficient to reverse the merger's potential to harm consumers in the relevant market, *e.g.*, by preventing price increases in that market. In conducting this analysis,³⁵ the Agency will not simply compare the magnitude of the cognizable efficiencies with the magnitude of the likely harm to competition absent the efficiencies. The greater the potential adverse competitive effect of a merger—as indicated by the increase in the HHI and post-merger HHI from Section 1, the analysis of potential adverse competitive effects from Section 2, and the timeliness, likelihood, and sufficiency of entry from Section 3—the greater must be cognizable efficiencies in order for the Agency to conclude that the merger will not have an anticompetitive effect in the relevant market. When the potential adverse competitive effect of a merger is likely to be particularly large, extraordinarily great cognizable efficiencies would be necessary to prevent the merger from being anticompetitive.

The Guidelines make it clear that efficiencies are unlikely to be considered in a merger to monopoly or near monopoly:

In the Agency's experience, efficiencies are most likely to make a difference in merger analysis when the likely adverse competitive effects, absent the efficiencies, are not great. Efficiencies almost never justify a merger to monopoly or near-monopoly.

9. Types of Efficiencies Likely to be Considered

The Guidelines give the following guidance on the types of efficiencies that are likely to be recognized:

The Agency has found that certain types of efficiencies are more likely to be cognizable and substantial than others. For example, efficiencies resulting from shifting production among facilities formerly owned separately, which enable the merging firms to reduce the marginal cost of production, are more likely to be susceptible to verification, merger-specific, and substantial, and are less likely to result from anticompetitive reductions in output. Other efficiencies, such as those relating to research and development, are potentially substantial but are generally less susceptible to verification and may be the result of anticompetitive output reductions. Yet others, such as those relating to

³⁵ [Footnote in the original] The result of this analysis over the short term will determine the Agency's enforcement decision in most cases. The Agency also will consider the effects of cognizable efficiencies with no short-term, direct effect on prices in the relevant market. Delayed benefits from efficiencies (due to delay in the achievement of, or the realization of consumer benefits from, the efficiencies) will be given less weight because they are less proximate and more difficult to predict.

procurement, management, or capital cost are less likely to be merger-specific or substantial, or may not be cognizable for other reasons.

D. Treatment of Productive Efficiencies under the EU Guidelines³⁶

1. Six Step Process in the EU Guidelines

The EU Guidelines set out a six step process for analyzing horizontal mergers that is similar to the five step process in the DOJ/FTC Guidelines. The preamble to the EU Guidelines states that the Guidelines are “structured around the following [six] elements:”

- (a) The approach of the Commission to market shares and concentration thresholds (Section III).
- (b) The likelihood that a merger would have anticompetitive effects in the relevant markets, in the absence of countervailing factors (Section IV).
- (c) The likelihood that buyer power would act as a countervailing factor to an increase in market power resulting from the merger (Section V).
- (d) The likelihood that entry would maintain effective competition in the relevant markets (Section VI).
- (e) The likelihood that efficiencies would act as a factor counteracting the harmful effects on competition which might otherwise result from the merger (Section VII).
- (f) The conditions for a failing firm defense (Section VIII).

Thus, as in the U.S., the efficiencies are considered in determining if a merger will pass antitrust scrutiny in the E.U.

2. The Basic Standard in the EU Guidelines: The Price Increase Standard

The efficiencies section of the EU Guidelines starts out by saying that “mergers may be in line with the requirements of dynamic competition and are capable of increasing the competitiveness of industry, thereby improving the conditions of growth and raising the standard of living in the Community.”³⁷ This statement should go some way in rebutting the claims that some have made that there is an efficiency “offense” in the EU, that is, that efficiencies are sometimes a grounds for challenging a transaction.

The EU Guidelines go on to say that the Commission takes into account in its assessment of horizontal mergers the “factors mentioned in Article 2(1) [of the Merger Regulation],

³⁶ For a discussion of the EU’s traditional approach to efficiencies, see Mano, *Efficiencies in European Merger Control*, *supra* note ____, at 26-55.

³⁷ EU Guidelines, *supra* note ____, at Para 76.

including the development of technical and economic progress provided that it is to the consumers' advantage and does not form an obstacle to competition.”³⁸

The phrase “the development of technical and economic progress provided that it is to the consumers' advantage and does not form an obstacle to competition” comes verbatim from Section 1(b) of Article 2 of the EU’s original and amended Merger Control Regulation.³⁹ Thus, the efficiencies provisions of the EU Guidelines build on the existing EU law governing mergers.

In setting out those situations in which the Commission will consider efficiencies, the EU Guidelines say that the “Commission considers any substantiated efficiency claim in the overall assessment of the merger.”⁴⁰ The Guidelines go on to say:

[The Commission] may decide that, as a consequence of the efficiencies that the merger brings about, there are no grounds for declaring the merger incompatible with the common market pursuant to Article 2(3) of the Merger Regulation. This will be the case when the Commission is in a position to conclude on the basis of sufficient evidence that the efficiencies generated by the merger are likely to enhance the ability and incentive of the merged entity to act pro-competitively for the benefit of consumers, thereby counteracting the adverse effects on competition which the merger might otherwise have.⁴¹

The EU Guidelines say that for the Commission to take efficiency claims into account, “the efficiencies have to benefit consumers, be merger specific, and be verifiable.”⁴² The Guidelines further say that “[t]hese conditions are cumulative.”⁴³

3. Benefit to Consumers

a) In General

The EU Guidelines say that consumers must not be “worse off as a result of the merger” and that “efficiencies should be substantial and timely and should, in principle, directly benefit consumers in those relevant markets where it is otherwise likely that competition concerns would occur.”⁴⁴ Thus, under this standard, it would appear that if a merger were likely to lead to price increases or other anticompetitive effects in the absence of efficiencies and the parties could establish that there would be no price increase or other anticompetitive effects because of the efficiencies, then the Commission would consider the efficiencies, assuming they met the other requirements discussed below. As explained below, this is, in essence, a requirement that the benefit of the efficiencies be passed on to consumers.

³⁸ *Id.*

³⁹ The original Merger Control Regulation is Council Regulation (EEC) No 4064/89 of 21 December 1989 on the Control of Concentrations between Undertakings, and the amended Merger Control Regulation is Council Regulation (EC) No 139/2004 of 20 January 2004 on the Control of Concentrations between Undertakings.

⁴⁰ EU Guidelines, *supra* note, _____, at Para 77.

⁴¹ *Id.*

⁴² *Id.* at 78

⁴³ *Id.*

⁴⁴ *Id.* at Para 79.

b) Reductions in Variable or Marginal Cost

The Guidelines say that cost savings in production and distribution can lead to lower prices for consumers and cost efficiencies that lead to reductions in variable or marginal cost are “more likely to be relevant to the assessment of efficiencies than reductions in fixed costs, [since] the former are more likely to result in lower prices for consumers.”⁴⁵ The Guidelines also say: “Cost reductions, which merely result from anti-competitive reductions in output, cannot be considered as efficiencies benefiting consumers.”⁴⁶

c) New and Improved Products or Services

The EU Guidelines also recognize that consumers may “benefit from new or improved products or services, for instance resulting from efficiency gains in the sphere of R&D and innovation.”⁴⁷ In this regard the Guidelines say that a “joint venture company set up in order to develop a new product may bring about the type of efficiencies that the Commission can take into account.”⁴⁸

d) Efficiencies in a Coordinated Effects Case

The EU Guidelines provide that in the “context of co-ordinated effects, efficiencies may increase the merged entity's incentive to increase production and reduce prices, and thereby reduce its incentive to coordinate its market behaviour with other firms in the market. Efficiencies may therefore lead to a lower risk of co-ordinated effects in the relevant market.”⁴⁹

e) Timeliness Requirement

The Guidelines provide that “[i]n general, the later the efficiencies are expected to materialise in the future, the less weight the Commission can assign to them. This implies that, in order to be considered as a counteracting factor, the efficiencies must be timely.”⁵⁰

f) Passing on Requirement

With regard to the issue of whether the benefit of efficiencies is required to be passed on to consumers, the EU Guidelines provide:

The incentive on the part of the merged entity to pass efficiency gains on to consumers is often related to the existence of competitive pressure from the remaining firms in the market and from potential entry. The greater the possible negative effects on competition, the more the Commission has to be sure that the claimed efficiencies are substantial, likely to be realised, and to be passed on, to a sufficient degree, to the consumer.⁵¹

⁴⁵ *Id.* at Para 80.

⁴⁶ *Id.*

⁴⁷ *Id.* at Para 81.

⁴⁸ *Id.*

⁴⁹ *Id.* at Para 82.

⁵⁰ *Id.* at Para 83.

⁵¹ *Id.* at Para 84.

g) Unlikely to be Considered in Mergers to Near Monopoly

The EU Guidelines, like the DOJ/FTC Guidelines, make it clear that efficiencies are unlikely to be considered in a merger to monopoly:

It is highly unlikely that a merger leading to a market position approaching that of a monopoly, or leading to a similar level of market power, can be declared compatible with the common market on the ground that efficiency gains would be sufficient to counteract its potential anti-competitive effects.⁵²

4. Merger Specificity

The EU Guidelines, like the DOJ/FTC Guidelines, require that the efficiencies be merger specific:

Efficiencies are relevant to the competitive assessment when they are a direct consequence of the notified merger and cannot be achieved to a similar extent by less anticompetitive alternatives. In these circumstances, the efficiencies are deemed to be caused by the merger and thus, merger-specific. It is for the merging parties to provide in due time all the relevant information necessary to demonstrate that there are no less anti-competitive, realistic and attainable alternatives of a non-concentrative nature (*e.g.* a licensing agreement, or a cooperative joint venture) or of a concentrative nature (*e.g.* a concentrative joint venture, or a differently structured merger) than the notified merger which preserve the claimed efficiencies. The Commission only considers alternatives that are reasonably practical in the business situation faced by the merging parties having regard to established business practices in the industry concerned.⁵³

5. Verifiability

Finally, the EU Guidelines, like the DOJ/FTC Guidelines, require that the efficiencies be verified:

Efficiencies have to be verifiable such that the Commission can be reasonably certain that the efficiencies are likely to materialise, and be substantial enough to counteract a merger's potential harm to consumers. The more precise and convincing the efficiency claims are, the better the Commission can evaluate the claims. Where reasonably possible, efficiencies and the resulting benefit to consumers should therefore be quantified. When the necessary data are not available to allow for a precise quantitative analysis, it must be possible to foresee a clearly identifiable positive impact on consumers, not a marginal one. In general, the longer the start of the efficiencies is projected into the future, the less probability the Commission may be able to assign to the efficiencies actually being brought about.⁵⁴

The EU Guidelines point out that since information on efficiencies is “solely in the possession of the merging parties,”

⁵² *Id.*

⁵³ *Id.* at Para 85.

⁵⁴ *Id.* at Para 86.

It is, therefore, incumbent upon the notifying parties to provide in due time all the relevant information necessary to demonstrate that the claimed efficiencies are merger-specific and likely to be realised. Similarly, it is for the notifying parties to show to what extent the efficiencies are likely to counteract any adverse effects on competition that might otherwise result from the merger, and therefore benefit consumers.⁵⁵

The Guidelines also provide that the following types of evidence are relevant to an efficiencies claim:

[I]nternal documents that were used by the management to decide on the merger, statements from the management to the owners and financial markets about the expected efficiencies, historical examples of efficiencies and consumer benefit, and pre-merger external experts' studies on the type and size of efficiency gains, and on the extent to which consumers are likely to benefit.⁵⁶

E. Williamson Principle and the DOJ/FTC and EU Guidelines

Neither the DOJ/FTC nor the EU Guidelines accept the Williamson principle. However, as indicated below, the principle has been accepted in the Canadian merger guidelines.

III. Impact of Productive Efficiencies in Antitrust Analysis of Mergers

A. The General Case: The Graphical Presentation

1. Introduction

Professor Williamson has developed the theory that in certain mergers that create monopoly power, productive efficiency gains can outweigh the loss in welfare.⁵⁷ His theory is that cost saving from an efficiency-enhancing merger may offset the deadweight loss from the output restriction. He argues that in this situation the overall effect of the merger on allocative efficiency is positive, and the merger should be permitted even though it results in reduced output and higher prices to consumers. In a paper given on the occasion of the 20th anniversary of the Horizontal Merger Guidelines, William Kolasky and Andrew Dick, both then with the Antitrust Division of the Department of Justice, gave the following elaboration on the Williamson approach and its acceptance in the first Merger Guidelines, which were issued by the DOJ in 1968:

⁵⁵ *Id.* at Para 87.

⁵⁶ *Id.* at Para 88.

⁵⁷ Oliver Williamson, *Economies as an Antitrust Defense Revisited*, 125 U. PA. L. REV. 699 (1977) [hereinafter Williamson, *Economies Defense*]; see also, Oliver Williamson, *Economies as an Antitrust Defense: The Welfare Tradeoffs*, 58 AM. ECON. REV. 18, 21-23 (1968); Timothy Muris, *The Efficiency Defense Under Section 7 of the Clayton Act*, 30 CASE W. L. REV. 381, Section I The Efficiency Market Power Tradeoff 384-393 (1980) [hereinafter Muris, *The Efficiency Defense*]; and A. Jorge Padilla, *Efficiencies in Horizontal Mergers Revisited* (2005) available at www.ssrn.com.

Williamson used what he termed his "naive trade off model" to show that a merger that yields nontrivial real economies will only have a net negative allocative effect if it produces substantial market power resulting in relatively large price increases. He also showed that cost savings almost always benefit consumers because even a monopolist would pass some portion of any cost savings on to its customers, unless its demand function was perfectly inelastic. Williamson argued, therefore, that "a rational treatment of the merger question requires that an effort be made to establish the allocative implications of the scale economies and market power effects of the merger" in determining whether it should be found unlawful.

Williamson's work prompted Turner [the then head of the DOJ's Antitrust Division] to incorporate into the 1968 Guidelines a limited efficiencies defense notwithstanding the Supreme Court's seeming hostility to it. Departing sharply from the Court's dicta, the Guidelines recognized that in some "exceptional circumstances" efficiencies might justify a merger that would otherwise be subject to challenge.⁵⁸

The Reagan Administration has been described as usually having the maximization of economic efficiency as its "sole criterion" for merger policy.⁵⁹ Under this standard, "market power" is undesirable only because it reduces allocative efficiency; wealth transfers are irrelevant. A merger that improved economic efficiency would, therefore, be beneficial even if it led to higher consumer prices and transferred wealth from consumers to firms with market power.⁶⁰ This approach is consistent with Professor Harberger's third postulate of welfare economics, which ignores distributional effects.⁶¹ This approach is referred to as the total welfare approach, because it simply focuses on the question of whether there has been an increase in total welfare.

In contrast to the Williamson approach Fisher *et al.* have argued that the proper antitrust approach is to permit an efficiency-enhancing merger only if the price reducing effect of efficiencies offsets the price increasing effect of enhanced market power.⁶² Although not specifically articulated in this manner, the efficiency provisions of both the DOJ/FTC Guidelines and the EU's Guidelines seem to adopt a similar standard, because under both Guidelines the efficiencies must redound to the benefit of consumers.

It is instructive to put Professor Williamson's theory to test in the monopolized market for widgets, which is developed in several chapters of ECONOMICS OF MERGER GUIDELINES by assuming substantial marginal cost efficiency gains (*i.e.*, productive efficiencies) after a merger to monopoly.

⁵⁸Kolasky and Dick, *Efficiencies*, *supra* note ____ at ____.

⁵⁹[Check cite] *Id.* at 779.

⁶⁰[Check cite] *Id.* at 779-80.

⁶¹Arnold C. Harberger, *Three Basic Postulates for Applied Welfare Economics*, IX J. ECON. LIT. 785 (1971).

⁶²Alan A. Fisher, Frederick I. Johnson and Robert H. Lande, *Price Effects of Horizontal Mergers*, 77 CAL. L. REV. 777 (1989) [hereinafter Fischer, *Price Effects*].

2. Background on the Widget Industry and the Merger of the Ten Firms

a) The Demand Curve

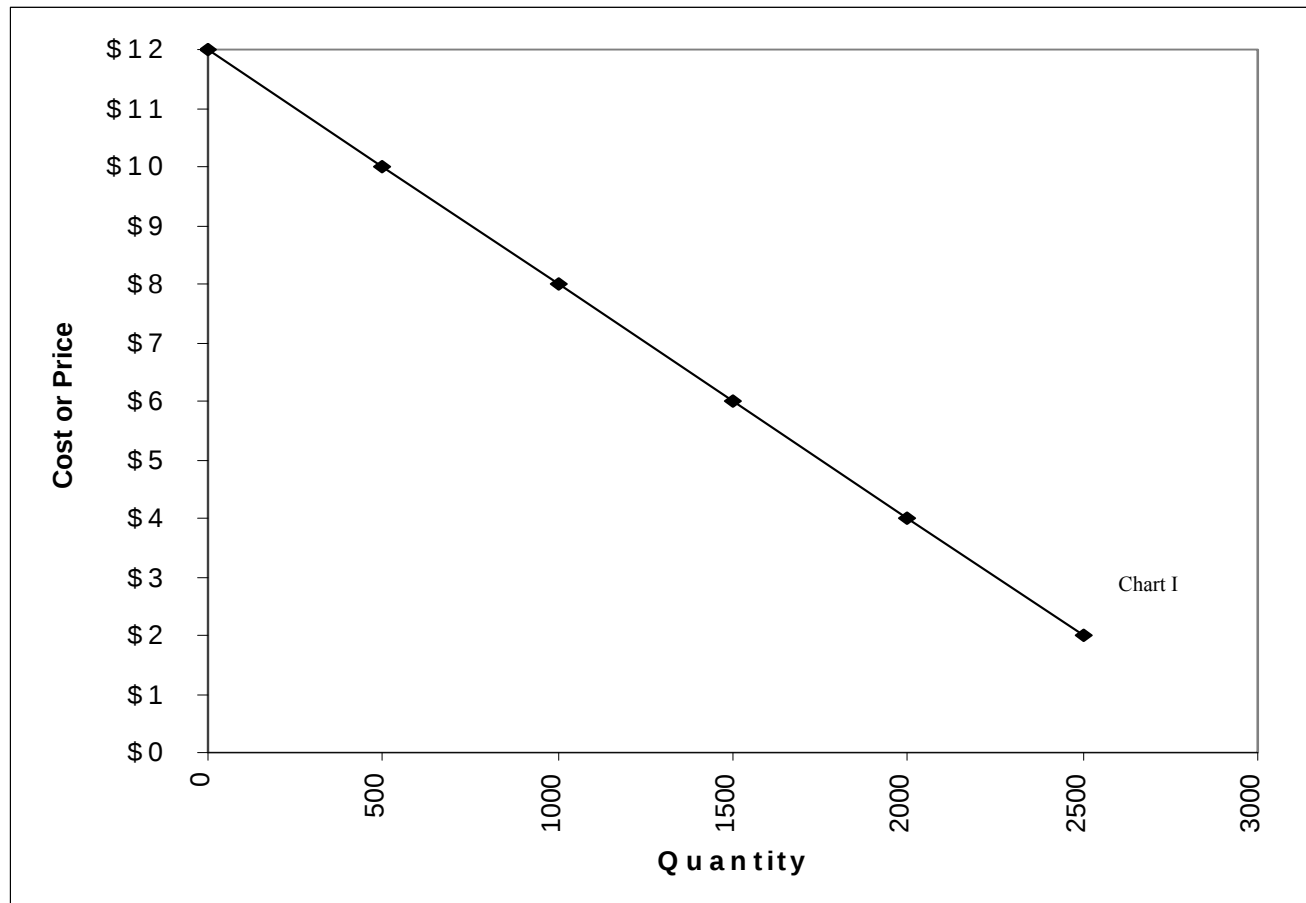
The analysis must start with a view of the state of demand in the market, and Chart I is a reproduction of the hypothetical Widget Market Demand Schedule from Chart 4-II of ECONOMICS OF MERGER GUIDELINES:

Chart I
Widget Market Demand Schedule

<u>Price Per Unit</u>	<u>Quantity Demanded</u>
12	0
10	500
8	1000
6	1500
4	2000
2	2500

Graph A sets out the Demand Curve for widgets, which demonstrates that the lower the price, the more quantity demanded by the consumers of widgets:

Graph A
Widget Demand Curve



b) The Marginal Costs

Moving to the supply side of the market, Chart II is a reproduction of the Widget Industry's Average Fixed Cost, Average Variable Cost and Average Total Cost, which is set out in Chart 4-IV of ECONOMICS OF MERGER GUIDELINES. This reflects the horizontal summation of the relevant costs of each of the ten firms in the market. The costs are assumed to be the same for each firm.

Chart II
Aggregate Cost Data For All
Firms in the Widget Market

[1]	[2]	[3]	[4]	[5]	[6]	[7]
Amount of Total Costs <u>Output</u>	Fixed Cost	Total Variable Costs	Total Cost (2) +(3)	Average Fixed Cost [2] ÷ [1]	Average Variable Cost [3] ÷ [1]	Average Total Cost (4) ÷ (1)
500	\$ 500	\$ 2500	\$ 3000	\$ 1.00	\$ 5.00	\$ 6.00
1000	\$ 500	\$ 4000	\$ 4500	\$.50	\$ 4.00	\$ 4.50
1500	\$ 500	\$ 5000	\$ 5500	\$.33	\$ 3.33	\$ 3.66
2000	\$ 500	\$ 7000	\$ 7500	\$.25	\$ 3.50	\$ 3.75
2500	\$ 500	\$10000	\$10500	\$.20	\$ 4.00	\$ 4.20

Chart III is a reproduction of the Approximation of the Industry Marginal Cost Curve, which is set out in Chart 4-VI of ECONOMICS OF MERGER GUIDELINES. As demonstrated, the Marginal Cost is a function of the change in Variable Cost at different levels of production. To more accurately reflect the actual Marginal Cost, the Marginal Costs are computed at the midpoint of the output range, which is column [7].

Chart III
Approximation of Industry Marginal Cost Per Marginal Unit

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
	Amount	Total	Variable	New	Average		Marginal
Amount	of	Variable	Cost of	Increase	Marginal		Cost at
of Total	Variable	Costs*	Next	In	Cost per	Midpoint	Cost at
<u>Output</u>	<u>Output</u>	<u>Costs*</u>	<u>Lower</u>	<u>Variable</u>	<u>Marginal</u>	<u>of Output</u>	<u>Midpoint</u>
			<u>Level of</u>	<u>Cost</u>	<u>Unit***</u>	<u>Range</u>	<u>of Output</u>
			<u>Output**</u>	<u>[3] – [4]</u>	<u>[5] ÷ [2]</u>		<u>Range</u>
500	500	\$ 2500	\$0	= \$ 2500	\$ 5	250	\$ 5
1000	500	\$ 4000	\$2500	= \$ 1500	\$ 3	750	\$ 3
1500	500	\$ 5000	\$4000	= \$ 1000	\$ 2	1250	\$ 2
2000	500	\$ 7000	\$5000	= \$ 2000	\$ 4	1750	\$ 4
2500	500	\$10000	\$7000	= \$ 3000	\$ 6	2250	\$ 6

c) The Price and Output in a Competitive Market

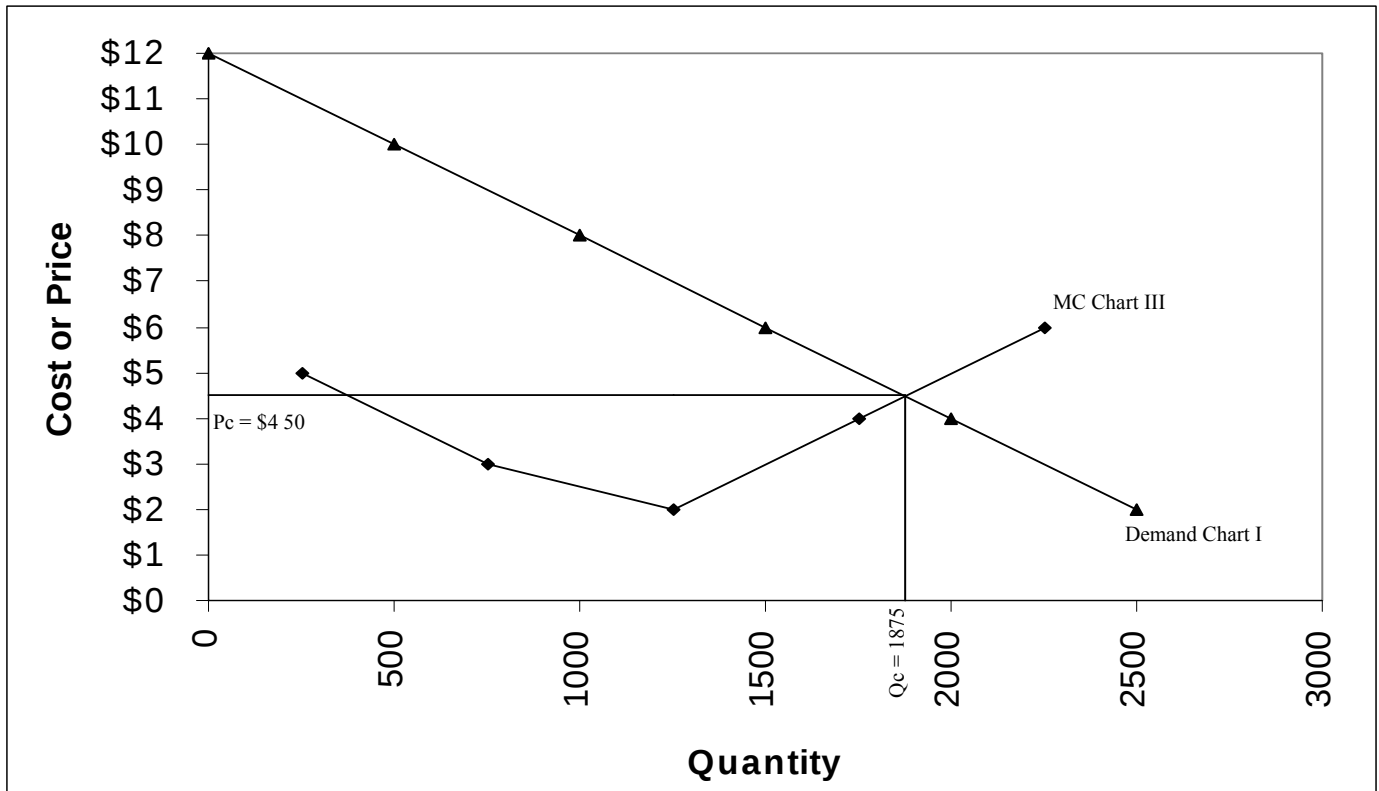
It is first assumed that the ten firms in the Widget Industry act competitively. Therefore, under the competitive model with the Demand Curve from Chart I and Marginal Cost Curve from Chart III, the competitive price and quantity are computed in Graph B:

* From Column [3] of Chart II.

** The next lower level of output here is -0- for 500 units of output, 500 for 1000 units of output, 1000 for 1500 units of output, and so on.

*** This column computes the average marginal cost over a range of output as opposed to the additional cost of the last unit produced, which is the true marginal cost. The indicated marginal cost is a more accurate reflection of the midpoint of the output ranges, as computed in column [8]. For example, it would be more accurate to place a marginal cost of \$6 at an output of 2250 as opposed to 2500, which is done in column [8].

Graph B
Price and Output under Competition



Thus, under competition, the price will be \$4.50 and the quantity will be 1875, which is determined by the intersection of the Marginal Cost Curve (the Supply Curve) and the Demand Curve. At this point profits are maximized because Marginal Cost equals Marginal Revenue, which is equal to Price (*i.e.*, $MC=MR=P$). This, of course, assumes that there is no price discrimination.

d) The Price and Output in a Monopoly Market

If the ten firms merge it would be necessary to compute the Marginal Revenue Curve faced by the new firm, a monopolist. Here the Marginal Revenue Curve will be downward sloping and below the Demand Curve, because the monopolist can choose to sell anywhere along the Demand Curve, that is, the monopolist can sell fewer items at a higher price or more items at a lower price. The Marginal Revenue is the increment to total revenue realized by selling one additional unit (say the 500th unit) at the lower price that applies to all 500 units than the sale of one less unit (say the 499th unit) at the higher price that would apply to all 499 units. This also assumes no price discrimination. In other words, the marginal revenue from the sale of the 500th unit is the difference between (1) the total revenue realized from the sale of all 500 units at the lower price applicable to such units, and (2) the total revenue realized from the sale of all 499 units at the higher price applicable to such units.

Chart IV sets out the data for the actual Marginal Revenue Curve for the above Demand Curve, which is derived through the use of calculus in Chapter 6 of ECONOMICS OF MERGER GUIDELINES and set out there in Chart 6-II.

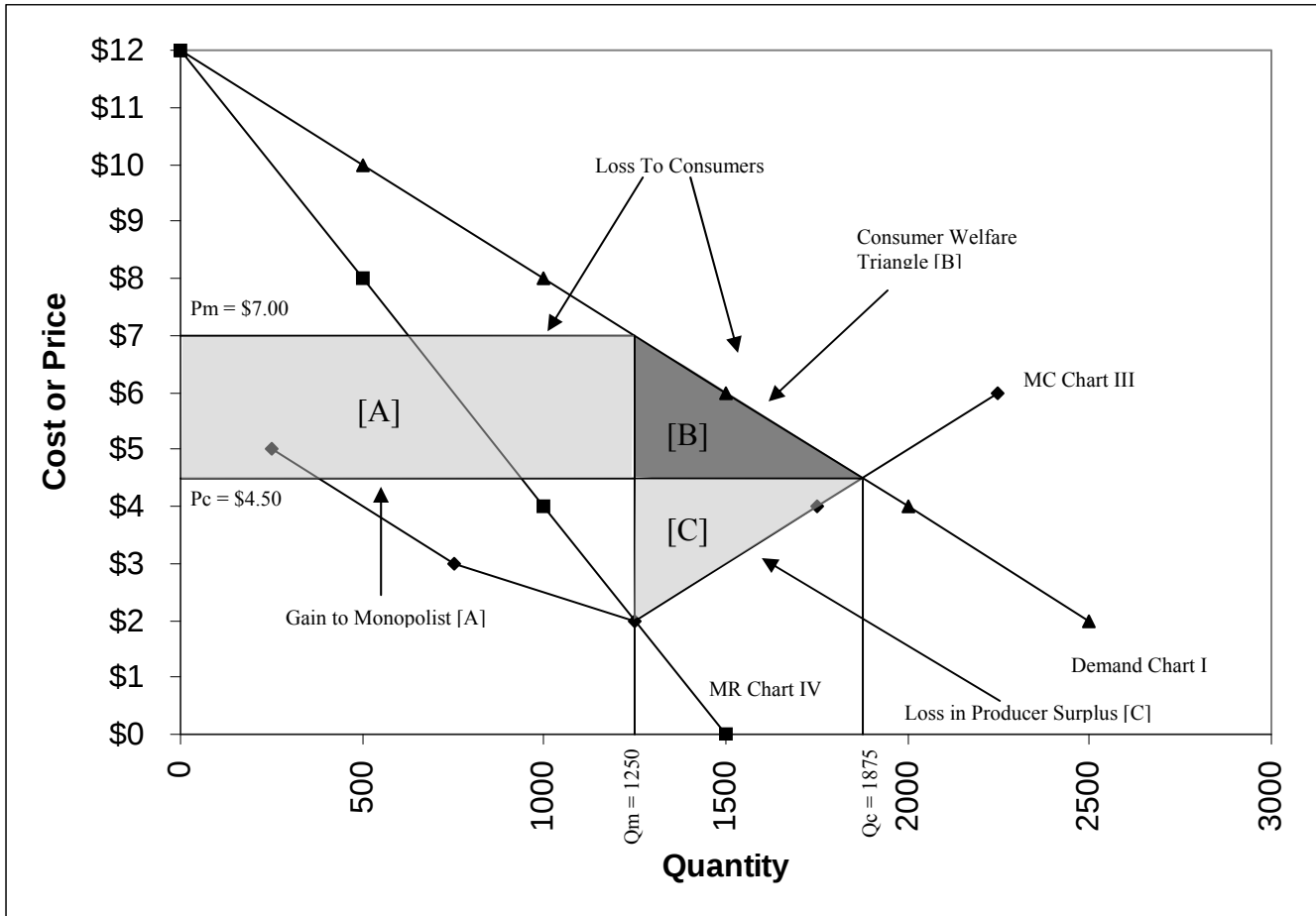
Chart IV
Computation of Actual
Marginal Revenue Curve Using Calculus

<u>Amount of Total Output</u>	<u>Marginal Revenue</u>
0	\$12
500	\$8
1000	\$4
1500	\$0

The output under monopoly is determined by the intersection of the Marginal Revenue Curve, as computed above, and the Marginal Cost curve shown on Graph B above, that is, output is determined at the point where Marginal Cost equals Marginal Revenue. As demonstrated in Graph C below, this intersection results in production of 1250 widgets. The monopoly price however, is determined by reference to the price associated with the Demand Curve at the 1250 level of production, which as Graph C shows is \$7.00. Thus, with the Demand Curve, the Marginal Revenue Curve, and the Marginal Cost Curve, Graph C sets out (1) the price (\$4.50) and the output (1875) under competition (see Graph B); (2) the price (\$7.00) and output (1250) under monopoly; and (3) the welfare effects of the monopoly. These welfare effects consist of (1) a loss in consumer welfare under monopoly, which includes the Welfare Triangle [B] and the gain to the monopolist from the increase in price [A], and (2) the loss in producer welfare (or surplus) [C]. In other words, as a result of moving from competition to monopoly, consumers

suffer a loss in welfare in the amount of A plus B , and producers realize a gain in welfare of A and a loss in welfare of C .

Graph C
Consumer Welfare Triangle and Loss in Producer Surplus



Virtually everyone agrees that this type of merger should be prohibited because total welfare is reduced, that is, the welfare loss to consumers is more than the welfare gain to the monopolist.

3. Output and Price Assuming Marginal Costs Efficiencies

Assume that after the merger of the ten firms, there are substantial cost savings (*i.e.*, productive efficiency gains) in the widget industry so that the total variable cost⁶³ schedule of the new firm is as follows:

*Chart V
Cost Savings*

<u>Amount of Total Output</u>	<u>Old Total Variable Cost</u>	<u>New Total Variable Cost</u>
500	2500	\$2000
1000	4000	\$3000
1500	5000	\$3500
2000	7000	\$4500
2500	10000	\$6500

Thus, the cost savings for each level of output are equal to, or in excess of 20%, which are substantial cost savings.⁶⁴ With the new total variable cost, the average total cost schedule would be as follows:

*Chart VI
Computation of New Average Total Cost*

[1] <u>Amount of Total Output</u>	[2] <u>Fixed Cost</u>	[3] <u>New Total Variable Cost</u>	[4] <u>New Total Cost [2] + [3]</u>	[5] <u>New Average Total Cost [4] ÷ [1]</u>
500	\$500	\$2000	\$2500	\$5
1000	\$500	\$3000	\$3500	\$3.5
1500	\$500	\$3500	\$4000	\$2.6
2000	\$500	\$4500	\$5000	\$2.5
2500	\$500	\$6500	\$7000	\$2.8

⁶³ Reductions in variable cost will change the firm's marginal cost and, therefore, the point at which the marginal cost curve intersects the marginal revenue curve. Consequently, reductions in variable cost lead to reductions in price, as demonstrated below. Reductions in fixed cost have no effect on marginal cost in the short run.

Consequently, reductions in fixed cost do not have an impact on price and redound to the benefit of the owners of the firm. See, *e.g.*, Fisher et al., *Price Effects*, *supra* note ____, at 578.

⁶⁴ For example, Professor Brodley points out that various authorities have "suggested that efficiency gain ought to equal at least 5 percent of total cost." Brodley, *Proof of Efficiencies*, *supra* note ____, at 578.

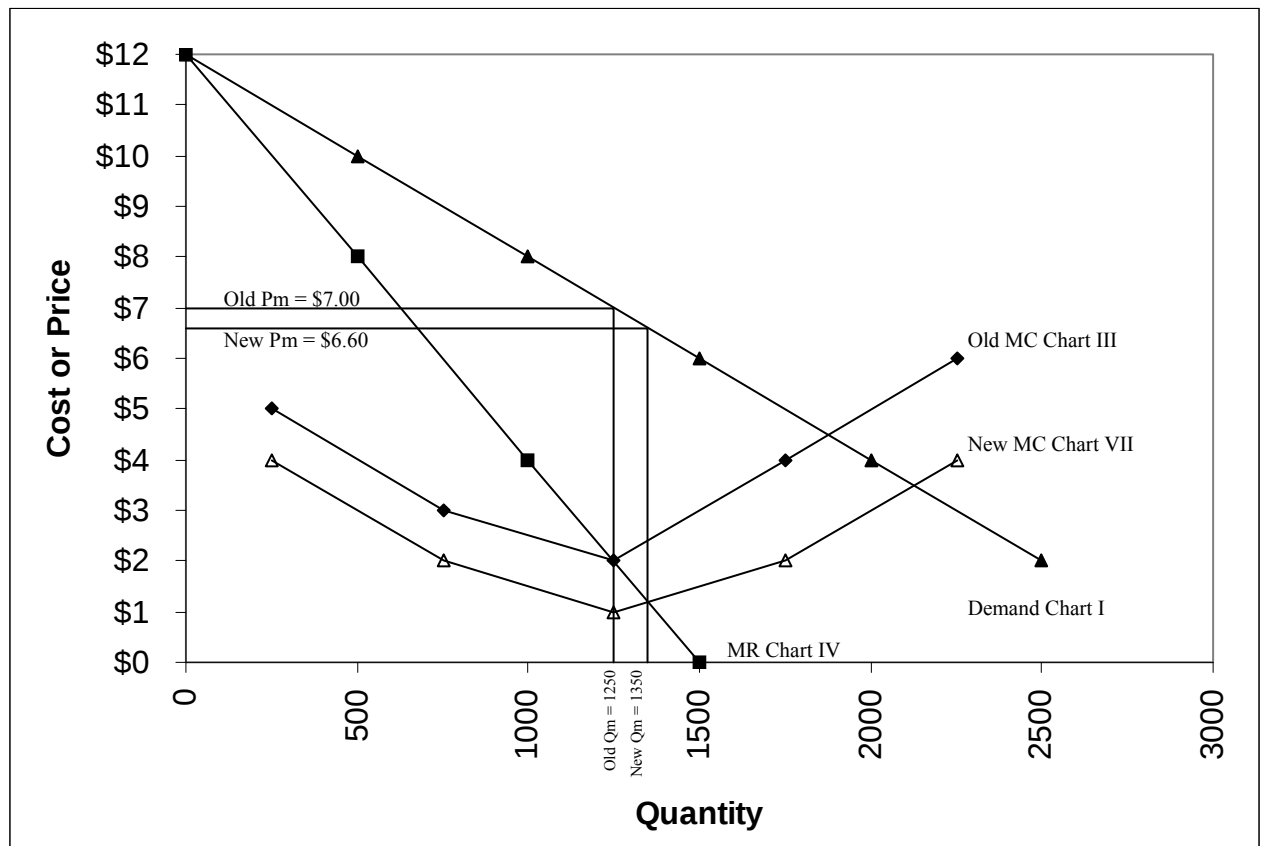
The new marginal cost schedule would be as follows:

Chart VII
Computation of New Marginal Cost Per Marginal Unit

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Amount of Total Output	Amount of Variable Output	New Total Variable Costs	Variable Cost of Next Lower Level of Output	New Increase In Variable Cost [3] – [4]	Average Marginal Cost per Marginal Unit [5] ÷ [2]	Midpoint of Output Range	Marginal Cost at Midpoint of Output Range
500	500	\$2000	\$0	\$2000	\$4	250	\$4
1000	500	\$3000	\$2000	\$1000	\$2	750	\$2
1500	500	\$3500	\$3000	\$500	\$1	1250	\$1
2000	500	\$4500	\$3500	\$1000	\$2	1750	\$2
2500	500	\$6500	\$4500	\$2000	\$4	2250	\$4

To determine the new equilibrium under the monopoly assumption after taking account of efficiencies, Graph D sets out the Old Marginal Cost Curve, the New Marginal Cost Curve reflecting the productive efficiencies, the Demand Curve, and the Marginal Revenue Curve.

Graph D
 New Output Levels and New Prices Resulting
 from Productive Efficiencies



As a result of the substantial productive efficiencies, production would be increased to approximately 1350 units as compared to 1250 units without any productive efficiencies, and price would be approximately \$6.60, as compared with the \$7 price without productive efficiencies. The computation of the precise level of output and price with the productive efficiencies is set forth in Appendix A.

4. Comparing Output and Price With and Without Marginal Costs Efficiencies

The output and price levels under monopoly with and without productive efficiencies is set forth in Chart VIII.

Chart VIII
Output Under Monopoly
With and Without Productive Efficiencies

<u>Monopoly</u>	<u>Output</u>	<u>Price</u>
Without Efficiencies	1250	\$7.00
With Efficiencies	1350	\$6.60

The above chart demonstrates that a merger to monopoly that also has efficiencies results in greater output and lower prices than a merger to monopoly without efficiency gains. However, rarely, if ever, would the cost savings from efficiencies be great enough to cause the output to rise and the price to fall to the competitive level. For example, in Graph D, even 100% cost savings would not have such effects. This observation is consistent with both (1) the statement in the DOJ/FTC Guidelines to the effect that “[e]fficiencies almost never justify a merger to monopoly or near-monopoly,”⁶⁵ and (2) the statement in the EU Guidelines that “[i]t is highly unlikely that a merger leading to a market position approaching that of a monopoly, or leading to a similar level of market power, can be declared compatible with the common market on the ground that efficiency gains would be sufficient to counteract its potential anti-competitive effects.”⁶⁶

⁶⁵ DOJ/FTC Guidelines, supra note ____, at Section 4.

⁶⁶ EU Guidelines, supra note ____, at Para 84.

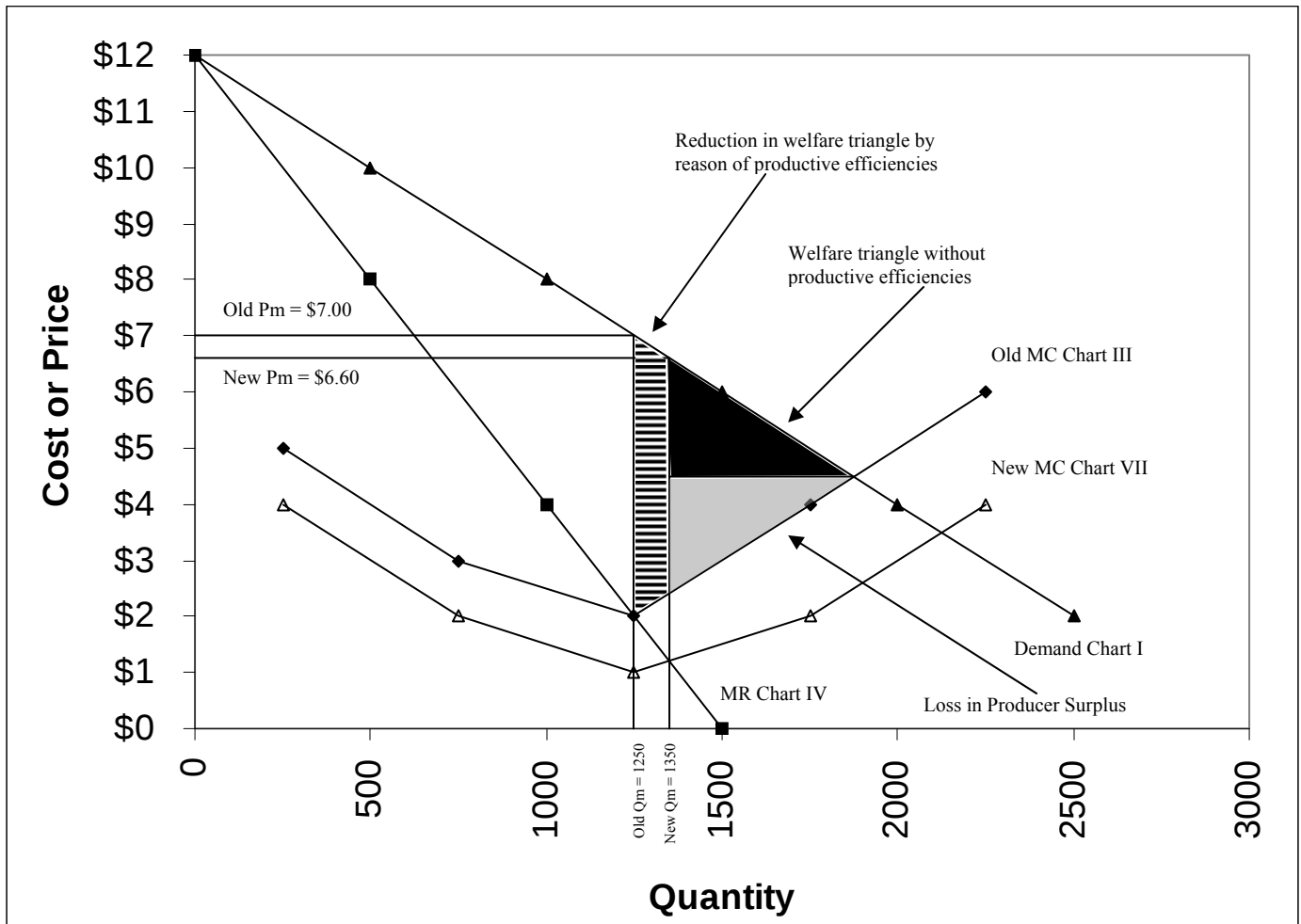
B. Impact of Productive Efficiencies on Welfare Triangle and the Loss of Producer Surplus

Notwithstanding the substantial marginal costs productive efficiencies, the output and price are not substantially different from those that occur under monopoly without productive efficiencies. Also, the productive efficiencies reduce the size of both the Welfare Triangle and the triangle indicating loss in producer surplus. These are triangles [B] and [C] on Graph C, which shows the deadweight loss from monopoly. The reductions, however, are relatively small. This can be seen on Graph E below, which displays both triangles under monopoly without productive efficiency gains and demonstrates the effect the productive efficiencies have on the triangles.

Graph E has the Demand Curve, the Marginal Revenue Curve, the Marginal Cost Curve without efficiencies (Old MC) and the Marginal Cost Curve with efficiencies (New MC). The base of the Welfare Triangle is the horizontal line running from the price axis to the intersection of the demand curve and the Old MC curve. This line represents a price of \$4.50, which is the price under competition. The vertical side of the Welfare Triangle is determined by the vertical line running from the quantity axis through the point at which the Old MC curve intersects the Marginal Revenue Curve up to the Demand Curve. This line indicates a quantity of 1250, which is the quantity produced under monopoly without productive efficiencies.

The reduction in the Welfare Triangle is determined by the vertical line running from the quantity axis up through the point at which the New MC curve intersects the MR curve, up to the Demand Curve and then horizontally to the price axis from the Demand Curve. There is a similar reduction in the loss in producer surplus triangle, which is below the Welfare Triangle.

Graph E
 Illustration of Impact on Welfare Triangle Resulting
 from Productive Efficiencies



Graph E demonstrates that the productive efficiencies only partially offset the welfare loss from monopoly. Therefore, even these substantial productive efficiencies, which as a practical matter are unlikely to be attained,⁶⁷ do not substantially reduce the allocative inefficiency represented by both the Welfare Triangle and the loss in producer surplus triangle. This example illustrates that only in rare circumstances could productive efficiency gains from monopoly outweigh the deadweight loss in allocative efficiency.

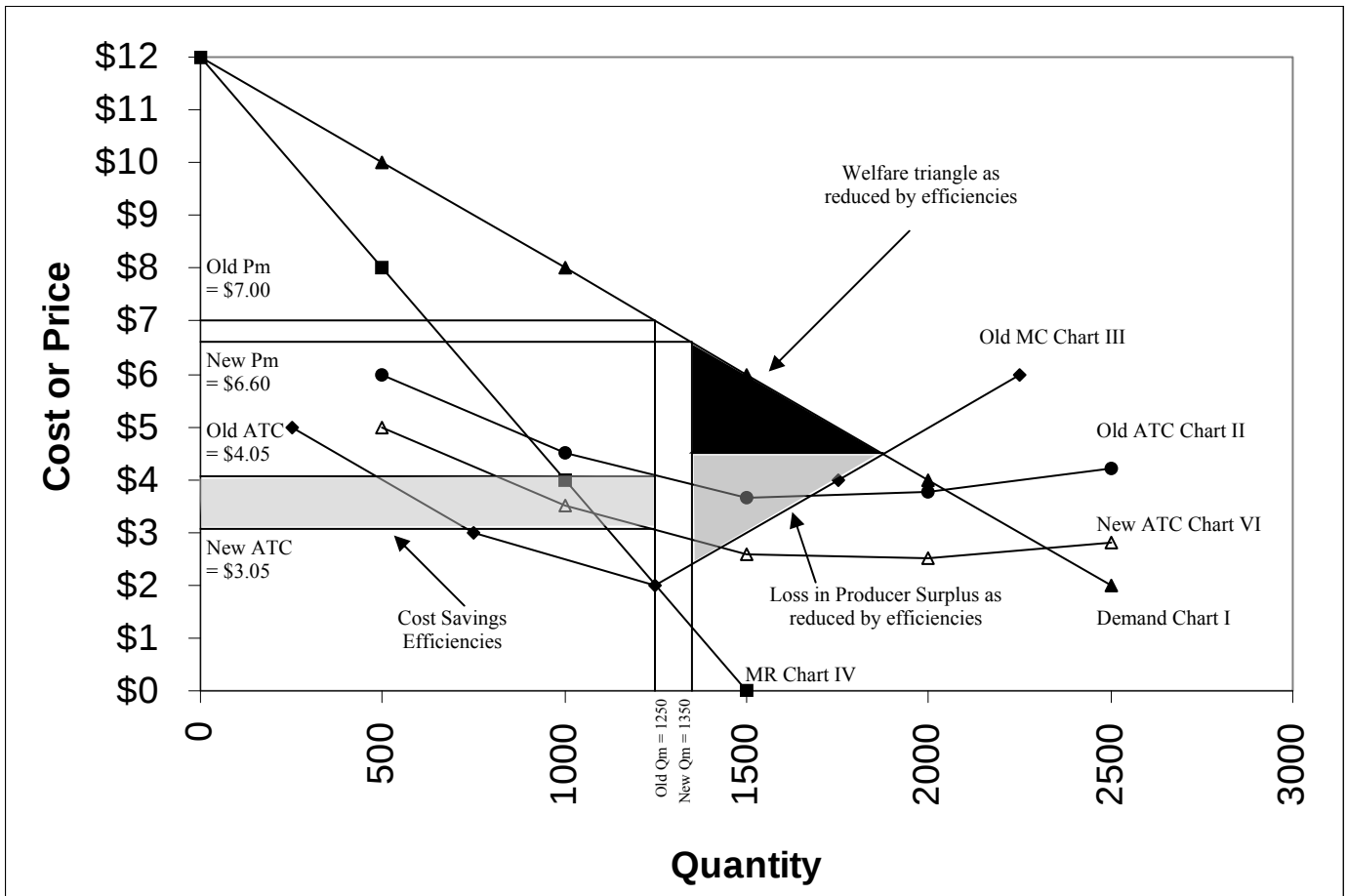
C. The Williamson Total Welfare Analysis

Professor Williamson argues that where there are efficiencies resulting from a merger, it is appropriate to compare the deadweight loss with the cost savings realized by the monopolist.⁶⁸ He argues that the net allocative efficiency effect of the merger is positive if the cost savings the monopolist realized exceeds the deadweight loss. The cost savings is demonstrated on Graph F below, which also shows both the Welfare Triangle and the loss in producer surplus triangle, as reduced by efficiencies. For the purposes here, the cost savings is measured over the level of output under monopoly without productive efficiencies. In other word, the cost savings do not extend to the extra units produced as a result of the efficiencies. Thus, the cost savings is determined by comparing the average total cost curves before and after the merger (see Charts II and VI) at the point where the Old Marginal Cost curve intersects the Marginal Revenue Curve.

⁶⁷ See, discussion in §II.

⁶⁸ Williamson, *Economics Defense*, *supra* note ____.

Graph F
 Illustration of Impact of Cost Savings on Allocative Efficiency



The Old ATC at the point at which the Old Marginal Cost Curve intersects the Marginal Revenue Curve (*i.e.*, at 1250 units) is approximately \$4.05 and the New ATC at this point is approximately \$3.05. These figures can be obtained by extrapolation from Charts II and VI. Thus, there is a cost savings of approximately \$1.00 per unit resulting from the productive efficiencies realized after the merger. The total cost savings is approximately \$1,250, which is the number of units of output under monopoly without the productive efficiencies (1250) multiplied by the average cost savings of \$1.00.

On the other hand, both the Welfare Triangle and the loss in producer surplus triangle each represent a loss to society of approximately \$551.25. For this purpose both triangles have been reduced to reflect the productive efficiencies as demonstrated on Graph E.⁶⁹ The loss to society from the Welfare Triangle is equal to $\frac{1}{2}$ of an amount equal to (1) the horizontal side of the Welfare Triangle as reduced by efficiencies, times (2) the vertical side of the Welfare Triangle. The horizontal side is equal to the 525 units of widgets, which are the additional units that would have been produced under competition. If competition continued to exist 1875 units would have been produced. With monopoly, only 1350 units are produced taking account of the efficiencies.

Therefore, there would be 525 additional units under competition. The vertical side of the Welfare Triangle is the difference between the monopoly price with efficiencies, \$6.60, and the competitive price of \$4.50, or \$2.10. Thus, the amount of the Welfare Triangle is \$551.25, which is one half of 525 units times \$2.10. The loss in producer surplus triangle is the same size as the Welfare Triangle. Thus, the total deadweight loss after accounting for the efficiencies is \$1,102.50.

Under Professor Williamson's analysis, this type of merger results in a positive net allocative efficiency effect even with monopoly pricing. This is because the cost savings of \$1,250 exceeds the welfare loss of \$1,102.50. It should be noted, however, that if the cost savings were only, say, 10%, the welfare loss would far exceed the cost savings.

D. Critique of the Williamson Analysis⁷⁰

1. In General

Professor Williamson asserts that "a relatively modest cost reduction is sufficient to offset relatively large price increases even if the elasticity of demand is high."⁷¹ He goes on to say that "a merger that promises nontrivial economies – say greater than two percent – will generally yield a net allocative efficiency gain."⁷² It should be noted, however, that even with the approximately 20% cost savings in this case, the net gain in allocative efficiency is not that large.

⁶⁹ Note that the point of both triangles is determined by the intersection of the Old Marginal Cost Curve and the Demand Curve. It would be possible, however, to show both triangles by reference to the intersection of the New Marginal Cost Curve and the Demand Curve.

⁷⁰ The critique here is different from other critiques of the Williamson approach that I am aware of. For a discussion of several "qualifications on the model" see W. Kip Viscusi, John Vernon, and Joseph Harrington, Jr., *ECONOMICS OF REGULATION AND ANTITRUST* 203 (2000) [hereinafter *Viscusi, et al.*].

⁷¹ Williamson, *Economies Defense*, *supra* note ____, at 709.

⁷² *Id.*

Further, as shown in the next section, if the cost savings were 10% rather than 20% (which would still be a large cost savings), the deadweight loss would swamp the efficiency gain; that is, the triangle would be larger than the rectangle.

2. Assumption of 10% Efficiencies: The Triangle Swamps the Rectangle

It is possible to quickly test Professor Williamson's assertion that a mere 2% reduction in cost will cause the efficiency gains represented by the rectangle to exceed the Welfare Triangle. Assume that the cost savings were only 10% rather than the approximate 20% cost savings assumed. Without going through the full analysis, a quick examination of the change can be made by observing Graph E. As a result of a reduction of efficiencies to 10%, there would be two basic changes in the graph. First, the increase in production from the position of monopoly without efficiencies would be less, and this would make the Welfare Triangle and the loss in producer surplus triangle slightly larger. Thus, the amount represented by the Welfare Triangle and the loss of producer surplus triangle would be slightly greater than the \$1,102.50 with the 20% efficiencies. Second, the rectangle representing efficiencies would in essence be cut in half because the cost savings would be approximately \$.50 rather than \$1. Thus, the amount represented by the rectangle would be \$625, which is the \$.50 cost savings times the 1250 output under monopoly without efficiencies. This amount is obviously less than the total loss in welfare of \$1,102.50.

3. Differences between Professor Williamson's Analysis and the Analysis Here

Professor Williamson's analysis differs from the above analysis in several respects. First, he assumes a flat or constant Marginal Cost Curve (he refers to this curve as the Average Cost Curve) throughout the range of production,⁷³ whereas the above analysis employs an upward sloping Marginal Cost Curve.⁷⁴ With a flat Marginal Cost Curve, the loss in welfare is equal to the consumer Welfare Triangle only, but with an upward sloping Marginal Cost Curve, the loss in welfare is equal to the aggregate of (1) the Welfare Triangle, and (2) the loss in producer surplus triangle. Thus, with an upward sloping Marginal Cost Curve, the loss in welfare is significantly more than (in this case double) the loss in welfare with a flat marginal cost curve. Thus, for this reason, Professor Williamson's model potentially understates the amount of welfare loss.

Second, Professor Williamson also potentially understates the amount of the welfare loss by using a concaved Demand Curve in his model.⁷⁵ On the other hand, the above analysis employs a linear Demand Curve. As will be demonstrated below, the concaved Demand Curve

⁷³ See Williamson, *Economies Defense*, *supra* note ____, at 707. See also Muris, *The Efficiency Defense*, *supra* note ____, at 385.

⁷⁴ Compare the flat marginal cost curve used in *Areeda and Hovenkamp*, *supra* note ____, at 38; Richard A Posner, *ECONOMIC ANALYSIS OF LAW* 277 (4th Ed. 1992); and in Herbert Hovenkamp, *ECONOMICS AND FEDERAL ANTITRUST LAW* 297 (1984), with the upward sloping Marginal Cost Curve used in Edwin Mansfield, *MICRONOMICS, THEORY/APPLICATIONS* 317 (9th Ed. 1997) and in Jack Hirshleifer and David Hirshleifer, *PRICE THEORY AND APPLICATIONS* 208 (3rd Ed. 1998) [hereinafter *HIRSHLEIFER & HIRSHLEIFER*].

⁷⁵ See Williamson, *Economies Defense*, *supra* note ____, at 707. See also Muris, *The Efficiency Defense*, *supra* note ____, at 385

significantly reduces the size of the Welfare Triangle, and indeed, with the linear Demand Curve used in this analysis of the widget industry, with Professor's Williamson's analysis, the size of the welfare loss illustrated by the consumer Welfare Triangle alone swamps the welfare savings from the 20% productive efficiencies.

This can be seen by examination of the type of graph Professor Williamson employs in his analysis. Assume the same Demand Curve and Marginal Revenue Curve are as shown above, but with a flat Marginal Cost Curve before the merger at a price of \$4.50, which is the point at which the Marginal Cost Curve intersects the Demand Curve. This is set out in Chart IX:

*Chart IX
Old Flat MC Curve*

<u>Output</u>	<u>Cost</u>
250	\$4.50
750	\$4.50
1250	\$4.50
1750	\$4.50
2250	\$4.50

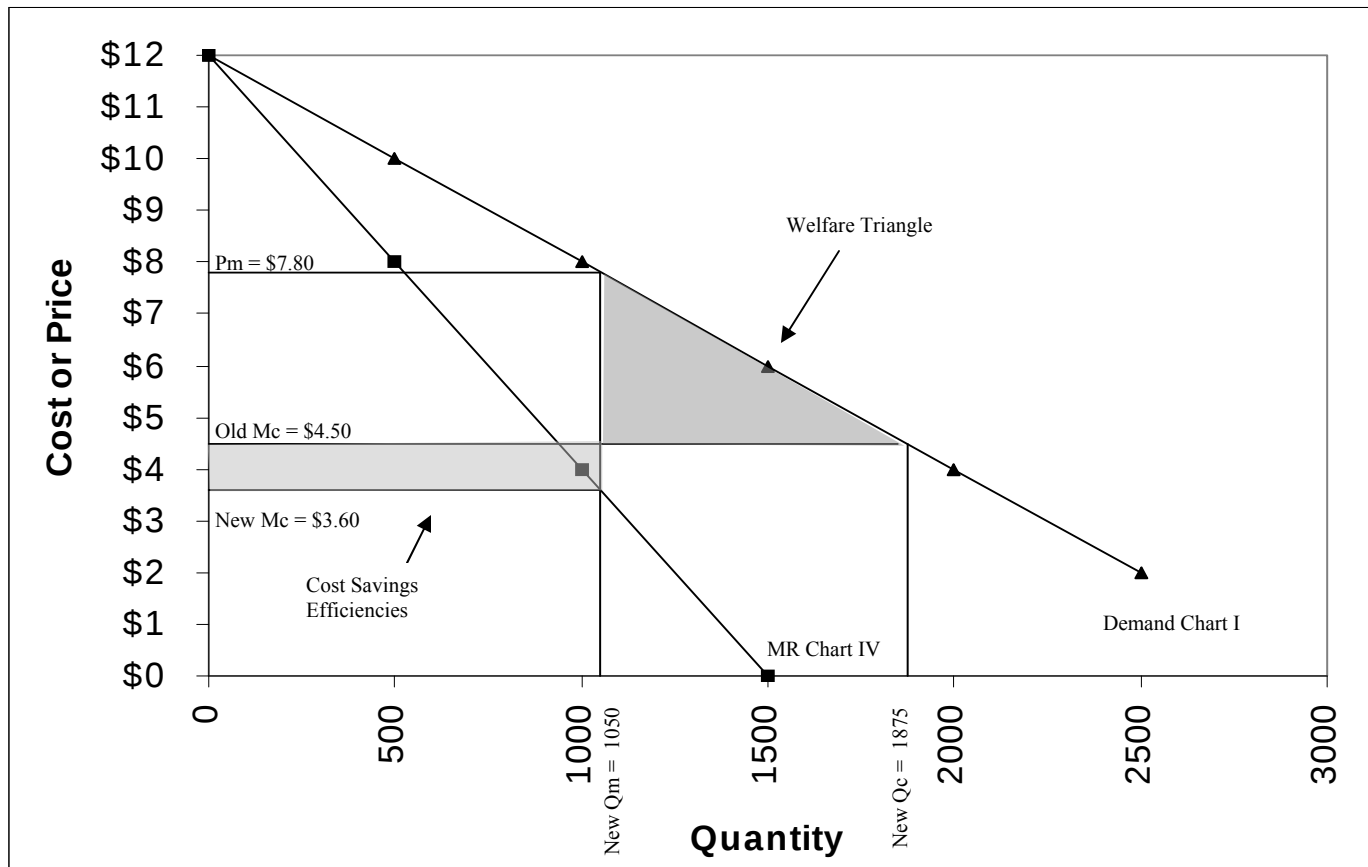
We then set out the New Marginal Cost Curve with the assumption that there will be 20% savings in marginal cost at all production levels. This is set out in Chart X:

*Chart X
New Flat MC Curve (20% Cost Savings)*

<u>Output</u>	<u>Cost</u>
250	\$3.60
750	\$3.60
1250	\$3.60
1750	\$3.60
2250	\$3.60

These two flat Marginal Cost Curves together with the linear Demand Curve and Marginal Revenue Curve are set out on Graph G, which, except for the linear demand curve, is the traditional type of presentation employed by Professor Williamson and others:

Graph G
Traditional Williamson Presentation of Welfare Tradeoff



The level of output with efficiencies is determined by the intersection of the New Marginal Cost Curve and the Marginal Revenue Curve. Graph G shows that these two curves intersect between 1000 and 1500 units of output and both have associated prices of \$3.60. As calculated in Appendix B, with these productive efficiencies the precise quantity produced by the monopolist is 1050 and the precise price charged is \$7.80.

It is now possible to determine the trade off between the size of the Welfare Triangle and the size of the cost savings rectangle. The base of the Welfare Triangle runs from 1050, the level of output with monopoly and efficiencies, and 1875, the level of output under competition without the efficiencies. This is 825. The vertical side of the Welfare Triangle is the difference between the monopoly price with efficiencies, \$7.80, and the competitive price of \$4.50, or \$3.30. Thus, the amount of the Welfare Triangle is \$ 1361.25, which is one half of 825 units times \$3.30 (*i.e.*, \$2,722.5). Thus, the total deadweight loss is \$1361.25. The total cost savings is the rectangle, which has a base of 1050 and a height of \$.90. Thus, the rectangle represents \$945 (*i.e.*, 1050 x \$.90) in efficiency gains realized by the merging firms. But these gains are \$416.25 (*i.e.*, \$1361.25-\$945) less than the amount of the Welfare Triangle. This indicates that Professor Williamson may have significantly overstated his case.

These results are summarized in Chart XI below:

Chart XI
Merger to Monopoly:
Comparison of Welfare Triangle with Efficiency Gains Rectangle

Welfare Triangle	\$1361.25
Efficiency Gains Rectangle	\$945.00
Excess of Welfare Triangle	\$416.25
Over Efficiency Gains Rectangle	

4. Analysis of the Case of a Merger to Less than Monopoly with Efficiencies

The Williamson argument has also been criticized because it assumes that the efficiencies are realized by all firms in the market, whereas in a merger that does not result in monopoly, any efficiencies will be realized only by the merging firms. On this point, Viscusi, Vernon, and Harrington, in their book *ECONOMICS OF REGULATION AND ANTITRUST*, say: "While the economies of the merger are limited to the two combining firms, the market power effects may lead to price increases by other firms as well. Hence the costs (deadweight losses) * * * may be understated."⁷⁶ Former FTC Chairman Timothy J. Muris has challenged this critique.⁷⁷

It is instructive to consider this critique in the context of the hypothetical widget industry. Assume that rather than ten firms in the widget industry there are five firms each with 20% of the market. The cost structure for the industry is as set out in Chart II, with each firm having 20% of

⁷⁶ Viscusi, *et al.*, *supra* note _____, at 203.

⁷⁷ See Muris, *The Efficiency Defense*, *supra* note _____, at 388-89 (acknowledging but challenging this critique).

the costs. The HHI for the industry is 2000 (*i.e.* $20 \times 20 \times 5 = 2000$).⁷⁸ Two of the firms propose to merge, and the resulting increase in the HHI will be 800 (*i.e.*, $20 \times 20 \times 2 = 800$), and the post merger HHI will be 2800. Consequently, this transaction would be presumed to create or enhance market power and may be challenged under the DOJ/FTC Guidelines.⁷⁹

The merging parties claim as a defense that they will realize efficiencies of 20% in variable costs as a result of the merger. Since the merging firms will have 40% of the market, the aggregate amount of the savings generated by these efficiencies are assumed to be 40% of the amount of the savings represented by the rectangle in Graph F, assuming that the merger resulted in price coordination that led to monopoly level output and pricing. Thus, the efficiency savings as a result of the merger would be \$500 (*i.e.*, 40% of the full industry savings in Graph F of \$1,250). On the other hand, the total loss in consumer surplus and producer surplus as a result of the merger would be \$1,102.50. Thus, the aggregate welfare loss would be more than double the efficiency gain. If the efficiencies are only at a 10% level, which is more realistic, the dollar amount of the efficiencies is only \$250, and the deadweight loss is still \$1,250.

It might be argued that it is unlikely that in this type of market, there would be monopoly output and pricing after the merger. This may be so; however, even if it is assumed that the output and pricing is not at the monopoly level, there would have to be a significant increase in output and lowering of price over the monopoly level before the gains from the efficiencies would exceed the amount of the deadweight loss.

a) Conclusion on the Critique

The above analysis calls into question the validity of the basic assumption in the Williamson model that “non-trivial” efficiency gains are likely to exceed welfare losses in mergers to monopoly. There are other criticisms of the model, but if this fundamental proposition is not accurate, the case for considering efficiencies in merger analysis evaporates.

5. The Canadian Balancing Weights Approach of *Superior Propane*

a) Tribunal Decision in *Superior Propane*

This total welfare approach proposed by Professor Williamson was adopted by the Canadian Competition Tribunal but initially rejected by the Canadian Federal Court of Appeals in the *Superior Propane* case.⁸⁰ On remand the Canadian Competition Tribunal used what is referred to as a “balancing weights” analysis, which involved “weigh[ing] the effects of the merger on consumers against the effects of the merger on the shareholders of the merged entity.”⁸¹ The Tribunal rejected the arguments of the Commissioner of Competition to the effect

⁷⁸ As the 1992 DOJ/FTC Guidelines, *supra* note ____, explain, the HHI is calculated by summing the squares of the market shares of each firm in the market.

⁷⁹ 1992 DOJ/FTC Guidelines, *supra* note ____, at Section 1.51. The presumption of market power may be overcome by showing, *inter alia*, ease of entry, countervailing efficiencies, or imminent failure of one of the merging parties. *Id.* at Sections 2-5

⁸⁰ *Commissioner of Competition v. Superior Propane, Inc.*, LEXIS 13913, Canadian Federal Court of Appeals (2001). *Kolasky and Dick* explain that on remand the Tribunal “took account of both wealth transfer effects and total surplus effects and allowed the merger.” *Kolasky and Dick*, *supra* note ____, at 22.

⁸¹ *Commissioner of Competition v. Superior Propane, Inc.*, 2003 FCA 53, para 20 (Jan. 31, 2003).

that the “entire wealth transfer of \$40.5 million [i.e., the price increase gained by the producer and lost by the consumer] should be added to the deadweight loss of \$6 million” and that consequently “the total of \$46.5 million would outweigh the efficiency gains of \$29.2 million and the merger would be disallowed.”⁸² The court said that this approach is “what economists refer to as the consumer surplus standard.”⁸³

The court described the “balancing weights” approach of the Tribunal, which it found acceptable, as follows:

Implicit [in the Commissioner’s] approach is that the \$40.5 million wealth transfer is entirely socially adverse. For purpose of the subsection 96(1) inquiry, the Tribunal was not prepared to assume that the entirety of the wealth transfer should necessarily be considered a socially adverse effect of the merger. The wealth transfer might have positive or neutral social effects. It concluded that it was only the socially adverse portion of the wealth transfer that should count against the efficiency gains (the “socially adverse effects approach”). It, therefore, rejected the Commissioner’s submission that the entire wealth transfer be included in the calculation of anti-competitive effects under subsection 96(1).

The only socially adverse effects of the merger that the Tribunal was able to find were the effects on low income households that used propane for essential purposes and had no good alternatives. The Tribunal calculated this socially adverse portion of the wealth transfer to be approximately \$2.6 million per year.

Having regards for the balancing weights approach . . . the Tribunal acknowledged that the interest of these low income consumers should be weighted more heavily than the interests of the shareholders of the merged entity. . . . [T]he Tribunal found that even if the adverse portion of the wealth transfer was doubled, the total anti-competitive effects would not exceed \$11.2 million (adverse portion of wealth transfer of \$5.2 million (2X \$2.6 million) + deadweight loss of \$6 million). As a result the Tribunal concluded that under any reasonable weighting, the merger should be allowed as the gains in efficiency of \$29.2 per year would be greater than, and would offset, the effects of the prevention and lessening of competition attributable to the merger.⁸⁴

b) Critique of the Tribunal’s Decision in *Superior Propane*

Although it is relatively easy to understand the balancing weights approach of the Canadian Competition Tribunal, I question whether the amounts of the efficiency gains, deadweight loss, and wealth transfer have been computed properly. For example, the efficiency gain was found to be \$29 million, while the wealth transfer was found to be only \$40.5 million. Thus, the wealth transfer was only 125% of the efficiency gain. As can be seen from Graph F, the wealth transfer is twice the size of the efficiency gain and this is the case with both the more

⁸² *Id.* at par 22.

⁸³ *Id.*

⁸⁴ *Id.* at pars 23-25.

and less elastic demand curves shown in Graphs H and I, respectively. Also, the deadweight loss does not take account of any deadweight loss incurred by the producer with an upward sloping cost curve as demonstrated in Graph F. Finally, the \$29 million efficiency gain is over 4 times as large as the consumer deadweight loss of \$6 million. As illustrated in Graph F and also in the more and less elastic demand curves in Graphs H and I, the deadweight loss attributable to consumers in each case is at least close to half of the efficiency gains. Thus, I suspect that the Tribunal has not computed these amounts correctly.

Also, even though the Tribunal's approach counts the "socially adverse" portion of the wealth transfer against the efficiency gain, nothing is done to correct the socially adverse effect. That is, nothing is done to assist those "low income consumers" who will be harmed by the price increase.

c) Treatment in 2009 Canadian Efficiencies Bulletin

The 2009 Canadian Efficiencies Bulletin gives the following guidance on the manner in which the balancing of weights approach will be applied:

On the issue of where cost savings likely to result from efficiency gains should be taken into account in Canadian merger investigations, the Bureau's current enforcement policy follows the direction given by the Competition Tribunal in the redetermination decision in *Superior Propane*. . . . Consistent with this decision, the Bureau considers whether cost savings likely to result from substantiated efficiency gains offset the likely anti-competitive effects of a transaction under the efficiencies exception found in section 96 of the Act. By incorporating an explicit exception for efficiency gains, Parliament has indicated that the assessment of the competitive effects of the merger be segregated from the evaluation of efficiency gains.

This approach is consistent with the Canadian legislation which incorporates an explicit efficiencies exception, in contrast to the so-called integrated analysis applied in other jurisdictions (such as the United States and the European Union), where efficiency gains are considered as one of many factors in determining whether the transaction is likely to substantially lessen competition.

That said, cost savings from substantiated efficiency gains may be relevant to the analysis under section 92 of whether the merger is likely to substantially lessen or prevent competition in the following limited sense: the Bureau will consider whether, as a result of true cost savings, the parties to the merger are better positioned to compete in a competitive market or are less likely to engage in coordinated behaviour.

While a different approach to weighing efficiency gains against the anti-competitive effects may be appropriate in a specific case, the Bureau will generally follow the direction given by the Competition Tribunal in *Superior Propane* by applying the balancing weights standard when considering the trade-off analysis contained in section 96. Under the balancing weights standard, any increase in surplus arising from the efficiency gain from the merger is balanced against the deadweight loss resulting from the likely anti-competitive effects of the merger and, where appropriate, some portion

(including possibly all or none) of the associated transfer of surplus from consumers to producers.

Whether some portion of the transfer is included in the trade-off analysis depends on the value consumers place on the surplus relative to producers (i.e., the owners, including shareholders, of the merged entity). If consumers of the relevant product(s) are worse off than producers, a portion or all of the transfer is counted as part of the loss in surplus that would have to be offset by any efficiency gains that result from the merger. If consumers are as equally well-off as producers, the redistribution of income as a result of the merger would not be considered a loss in surplus under the standard, but as a neutral redistribution of income.

The Bureau anticipates that, in the vast majority of mergers, the difference between the anti-competitive effects and the gains in efficiency will be sufficiently large that it will not be necessary to determine whether a portion of the transfer is adverse under the balancing weights standard. For those mergers where it is necessary to determine whether a portion of the transfer is adverse, the redetermination decision in *Superior Propane* identifies a number of factors to be considered:

- the balancing weight relative to that implied by the general proportionality of effective tax rates;
- the income level of the consumers of the product at issue relative to relevant average incomes and relative to incomes of producers of the product;
- how the product at issue is used, and whether that use tends to be one engaged in by relatively higher income groups. For example, the Tribunal noted in the redetermination decision in *Superior Propane* that less weight would be placed on the redistribution effects among households that use propane for swimming pools, heating second homes and so forth; and
- where affected consumers are businesses, the relative profitability of those businesses and their ability to pass on price increases.⁸⁵

As indicated below, Judges Posner and Bork, both strong proponents of the Chicago School of antitrust analysis, say that there is no way for courts to properly determine the amounts of the wealth transfer, the deadweight loss, and the efficiency gains. Yet, the Canadian approach not only requires the computation of these amounts but also requires the computation of the socially adverse portion of the wealth transfer.

IV. Williamson Analysis with Both a More and a Less Elastic Demand Curve

A. Introduction

The demand curve used in the above analysis is about midway between an inelastic vertical demand curve and a completely elastic horizontal demand curve, and this section

⁸⁵ *Canadian Efficiencies Bulletin*, *supra* note ____.

examines whether the analysis would change if the demand curve were either more or less elastic. Thus, this section considers the Williamson analysis with both a more elastic (*i.e.*, a flatter) and a less elastic (*i.e.*, a steeper) demand curve. The analysis below starts with a demand curve that is more elastic than the demand curve above and then proceeds with an analysis with a demand curve that is less elastic. It should be noted that this use of relative elasticities of demand curves must be approached with caution. As Professors Jack and David Hirshleifer explain in their *Price Theory* text:

Since elasticity is usually changing along a demand curve, it is generally inadvisable to describe an entire demand curve as elastic / inelastic. Rather one should say that demand is elastic / inelastic *in the neighborhood of some given price quantity point*.⁸⁶

B. Williamson Analysis with a More Elastic (i.e., a Flatter or Less Steep) Demand Curve

Graph H below presents the Williamson Analysis with a more elastic (*i.e.*, a flatter) demand curve, which is plotted from the data in Chart XII below:

*Chart XII
New Flatter, More Elastic Demand Curve*

<u>Price</u>	<u>Output</u>
9.5	0
8.5	500
7.5	1000
6.5	1500
5.5	2000
4.5	2500

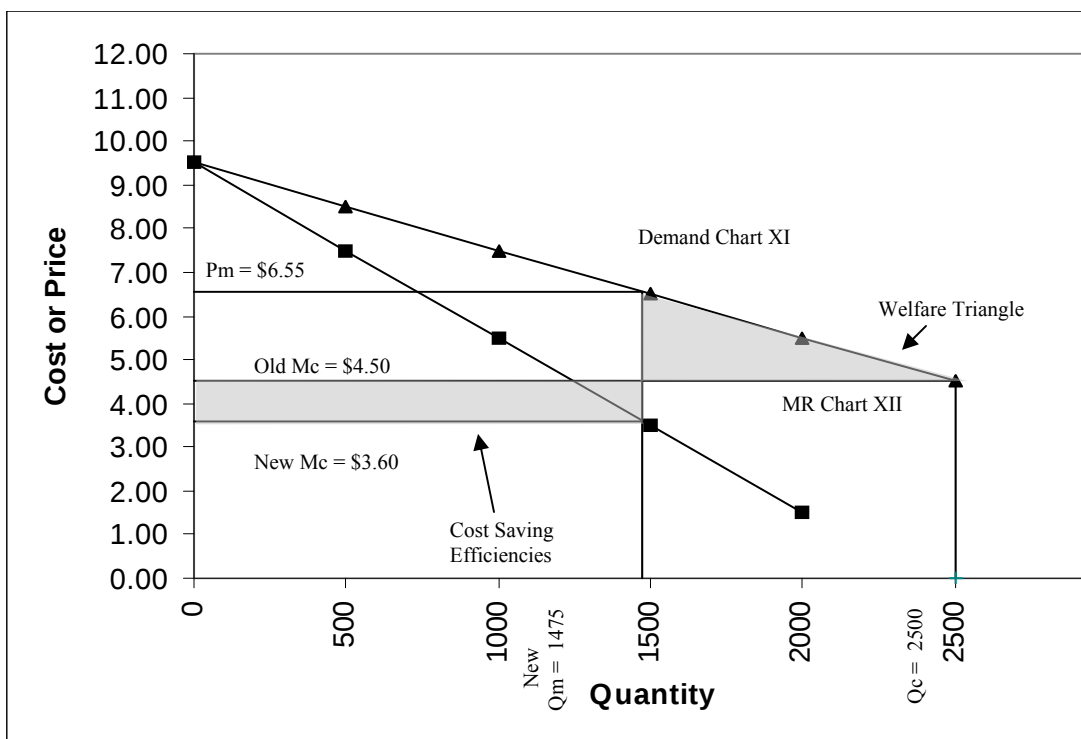
The new marginal revenue curve, which is computed with the use of calculus as demonstrated in Appendix C (Chart Appendix C-1) is plotted on Graph H as set out in Chart XIII below:

*Chart XIII
Marginal Revenue Curve for More Elastic Demand Curve*

<u>Marginal Revenue</u>	<u>Q</u>
0	9.5
500	7.5
1000	5.5
1500	3.5
2000	1.5

⁸⁶ HIRSHLEIFER & HIRSHLEIFER, *supra* note _____, at 135.

Graph H
Williamson Analysis with More Elastic, *i.e.*, a Flatter, Demand Curve



Graph H also has the Old Marginal Cost Curve of \$4.50 and the New Marginal Cost Curve at \$3.60 after the merger with efficiencies. Therefore, the efficiencies are 20% of the \$4.50 original Marginal Cost or \$.90. As a result of the efficiencies, production is increased from approximately 1250 units with the old Marginal Cost Curve to 1475 units with the New Marginal Cost Curve.⁸⁷ The price at 1475 units is \$6.55.⁸⁸ This means that the size of the Welfare Triangle, after reduction for the increased production attributable to efficiencies is equal to one half of the base of the triangle, which is 1075 units running from 1475 units to 2500 units (*i.e.*, the number of units at the intersection of the Old Marginal Cost Curve and the Demand Curve), times the height of the triangle which is \$2.05 (*i.e.*, the difference between the price under monopoly with efficiencies of \$6.55 and the marginal cost of \$4.50). Thus, the amount of the Welfare Triangle is \$1815, which is computed in Chart XIV as follows:

Chart XIV
Computation of Amount in the Welfare Triangle

$$\frac{1}{2} (1075 \times 2.05)$$

$$\frac{1}{2} (2203.75)$$

$$= \$1101.875$$

The amount in the rectangle is the \$.90 difference between the Old Marginal Cost and the new Marginal Cost multiplied by the 1475 units of output. Thus the amount is \$1327.5, which is computed in Chart XV:

Chart XV
Computation of Amount of Efficiency Gains

$$\$.90 \times 1475$$

$$\$1327.5$$

Thus, the cost savings indicated by the efficiencies rectangle exceeds the Welfare Triangle by \$225.625 (1327.5-1101.875). Recall that with the initial demand curve, the Welfare Triangle exceeded the cost savings by \$416.25. This shows that the more elastic, *i.e.*, the flatter, the demand curve, the more likely it is that the Efficiency Rectangle will be greater than the

⁸⁷ The level of output at the intersection of the Old Marginal Cost curve and the Marginal Revenue Curve is approximately 1250. The level of output at the intersection of the New Marginal Cost Curve and the Marginal Revenue Curve is 1475, which is calculated in Appendix D.

⁸⁸ The price charged by the monopolist is determined by the price indicated on the demand curve at the 1475 level of output. This is determined by solving for price in the equation for the demand curve under the assumption of a 1475 unit level of production, which is \$6.55, as calculated in Appendix E.

Welfare Triangle. However, this result obtains with efficiencies of 20%. If the efficiencies are only 10% (i.e., \$.45 of the \$4.50 original Marginal Cost) so that the New Marginal Cost Curve is at \$4.05 (i.e., \$4.50 - \$.45), then the Efficiency Rectangle is less than \$663.75 (i.e., .45X1475⁸⁹), and the amount in the Welfare Triangle would be more than the \$1101.875, which applies with the 20% cost savings.⁹⁰ Thus, it is clear that even with the flatter Demand Curve, the Welfare Triangle significantly swamps the efficiencies rectangle if the efficiencies are only 10%.

C. Williamson Analysis with a Less Elastic (i.e., a Steeper) Demand Curve

Graph I below presents the Williamson Analysis with a less elastic (i.e., a steeper) demand curve, which is plotted from the data in Chart XVI below:

*Chart XVI
New Steeper Less Elastic Demand Curve*

<u>Price</u>	<u>Output</u>
12	1250
10.5	1500
7.5	2000
4.5	2500

The new marginal revenue curve, which is computed with the use of calculus as demonstrated in Appendix F, (Chart Appendix F-1), is plotted on Graph I as set out in Chart XVII below:

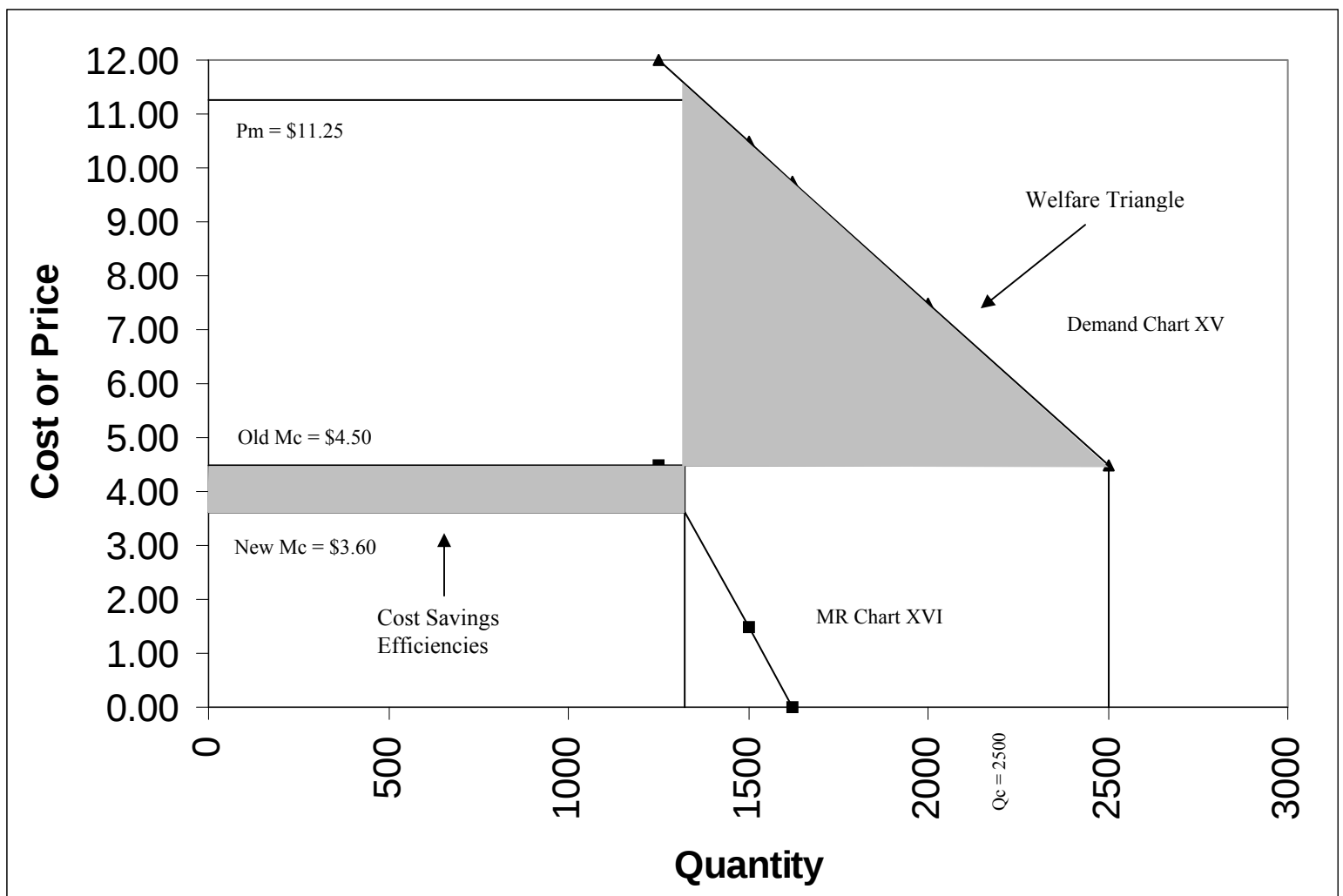
*Chart XVII
Marginal Revenue Curve for Less Elastic Demand Curve*

<u>Marginal Revenue</u>	<u>Q</u>
1250	4.5
1500	1.5
1625	0

⁸⁹ The production would be less than 1475 with the higher New Marginal Cost Curve resulting from the lower level of efficiencies. Consequently, the actual amount in the efficiencies rectangle would be less than \$663.75.

⁹⁰ With lower efficiencies there would be less production and a larger deadweight loss.

Graph I
Williamson Analysis with Less Elastic, i.e., a Steeper, Demand Curve



Graph I also has the Old Marginal Cost Curve at \$4.50 and the New Marginal Cost after merger with 20% efficiencies at \$3.60. As a result of the efficiencies, production is increased from approximately 1300 units to 1325 units.⁹¹ The price at 1325 units is \$11.25.⁹² This means that the size of the Welfare Triangle, after reduction for the increased production attributable to efficiencies is equal to one half of the base of the triangle times the height of the triangle. The base of the triangle is 1175, which is the amount running from the 1325 units under monopoly with efficiencies to the 2500 units, which would have been produced under competition without efficiencies. This 1175 amount is calculated in Appendix I. The height of the triangle is \$6.75, the difference between the price under monopoly with efficiencies of \$11.25 and the marginal cost of \$4.50. Thus, the amount of the Welfare Triangle is:

$$\frac{1}{2} (1175 \times 6.75)$$

$$\frac{1}{2} (7931.25)$$

$$\$3965.625$$

The amount in the rectangle is the \$.90 difference between the old Marginal Cost and the new Marginal Cost multiplied by the 1325 units of output. Thus, the amount is:

$$\begin{aligned} & \$.90 \times 1325 \\ & \$1192.5 \end{aligned}$$

Thus, the Welfare Triangle exceeds the cost savings by \$2773.125 (\$3965.625-\$1192.5) which is six times more than the \$416.25 excess with the initial demand curve. This shows that the less elastic, *i.e.*, the steeper, the demand curve, the more likely the Welfare Triangle will significantly swamp the Efficiency Rectangle.

D. Summary of Results with the Original Demand Curve, a More Elastic, i.e., a Flatter, Demand Curve, and a Less Elastic, i.e., a Steeper Demand Curve

The less elastic (steeper) demand curve produces the greatest excess of the Welfare Triangle over the Efficiency Rectangle. With 20% efficiencies, the more elastic (flatter) demand curve produces an excess of the Efficiency Rectangle over the Welfare Triangle; however with 10% efficiencies, the Welfare Triangle exceed the Efficiency Rectangle. It is to be expected that

⁹¹ The level of output at the intersection of the Old Marginal Cost Curve and the Marginal Revenue Curve is approximately ----. The level of output at the intersection of the New Marginal Cost Curve and the Marginal Revenue Curve is 1325, which is calculated in Appendix G.

⁹² The price charged by the monopolist is determined by the price indicated on the demand curve at the 1325 level of output. This is determined by solving for price in the equation for the demand curve under the assumption of a 1375 unit level of production, which is \$11.25, as calculated in Appendix H.

competition is associated with elastic demand curves, and this may simply be an illustration of why efficiencies in a competitive or near competitive market will likely benefit consumers. As indicated in the following chart the amount of the excess increases with increases in elasticity:

Chart XVIII
Comparison of Welfare Triangle with Efficiencies Rectangle with 20% Efficiencies

Elasticity of Demand Curve	Excess of Welfare Triangle Over Efficiencies Rectangle
More Elastic, <i>i.e.</i> , Flatter, Demand Curve	-\$225.625
Original Demand Curve	\$416.25
Less Elastic, <i>i.e.</i> , Steeper Demand Curve	\$2773.125

V. Williamson Analysis with Mergers to Less than Monopoly with Less than Monopoly Price Increase

A. Introduction

One critique of the above analysis is that Williamson does not assume an increase in price to a monopoly level, and that his trade off argument is valid for mergers that result in less than monopoly level pricing. This section examines this critique.

B. Merger of Firms With 40% of Market, Resulting in Price Increase of 40% of the Excess of Monopoly Price over Competitive Price

As indicated above, before the merger there are ten firms in the widget market, each having 10% of the market. Assume that rather than all ten firms merging to monopoly as discussed above, only four of the firms merge to form one firm with 40% of the market and the other six firms remain independent. This merger would exceed the Guidelines' Threshold, because the post-merger HHI for the market would be 2200.⁹³ The pre-merger HHI is 1000,⁹⁴ and therefore, there is a 1200 increase in the HHI as a result of the merger.

Assume further that as a result of the merger, the price charged by all of the firms in the market increases from the competitive price of \$4.50 to a price of \$6, which is exactly 41% of the \$3.30 difference between the competitive price of \$4.50 and the monopoly price of \$7.80. This is also a 33% increase over the premerger competitive price. As a consequence, the quantity produced would decrease to 1500 units as demonstrated by Graph 8-J below. The

⁹³ One firm would have 40% of the market, which produces an HHI of 1600, and there would be six additional firms in the market with 10% of the market, which produces an HHI of 100 for each firm or a total of 600. Thus, the post-merger HHI would be 2200.

⁹⁴ With each firm having 10% of the market, the HHI for each firm is 100 and the pre-merger HHI is, thus 1000.

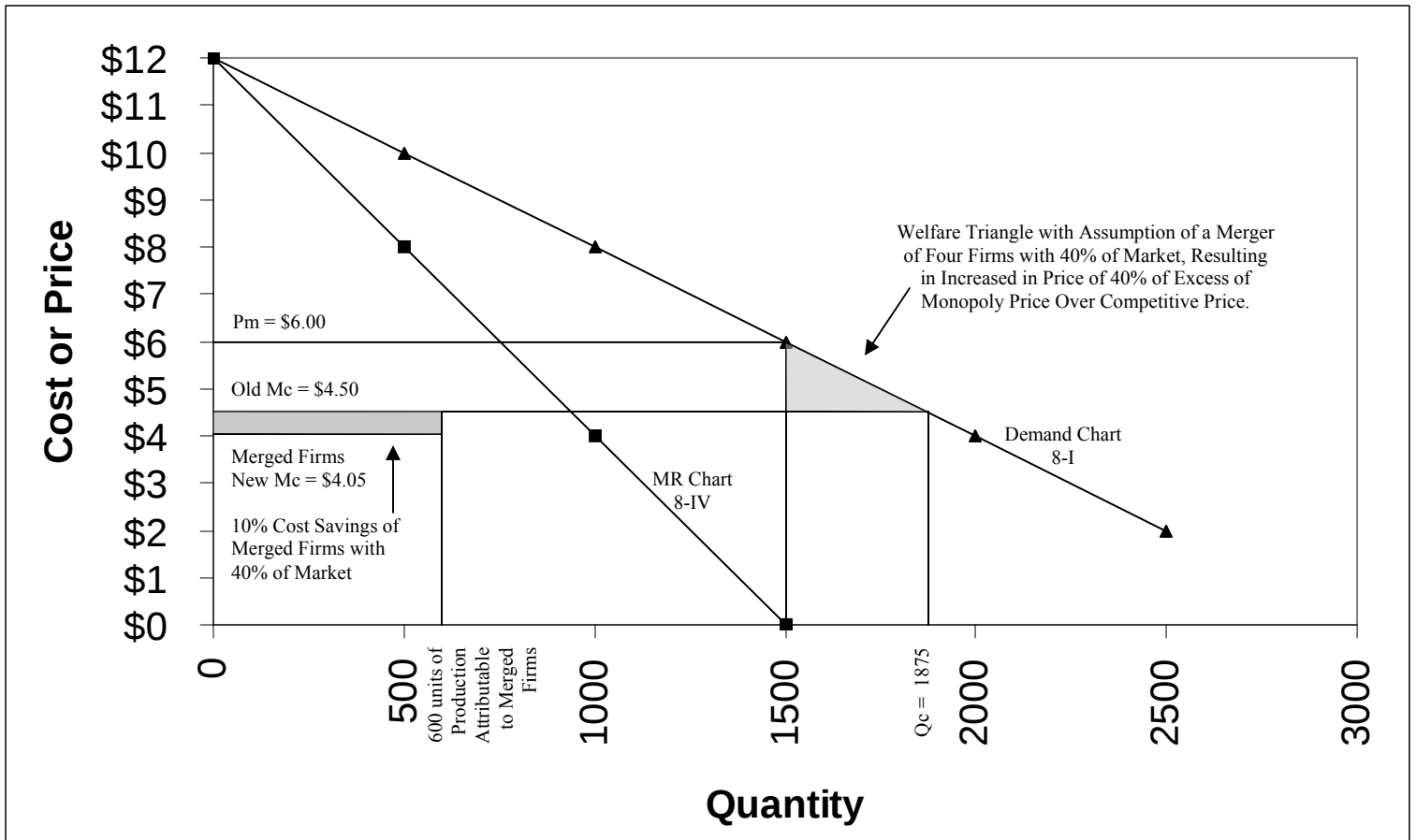
Welfare Triangle resulting from this price increase has a base of 375 and a height of \$1.50 as shown on Graph 8-J. Therefore the amount in the Welfare Triangle is \$281 (*i.e.*, $375 \times \$1.5/2$).

Also assume that as a result of the merger, the merged firm, but not the non-merging firms, experiences efficiencies at the 10% level. This is illustrated on Graph 8-J by the rectangle showing the difference between the Old Marginal Cost Curve and the New Marginal Cost Curve of the merged firm. The rectangle covers the 40% or 600 units of the 1500 units of production that is attributable to the merged firm. The 60% or 900 units balance of the 1500 units of production is attributable to the six other firms in the market that do not realize efficiency gains as a result of the merger. The cost savings rectangle for the merged firm represents \$270 (*i.e.*, 600 units $\times$ \$.45, or 10% cost savings). Thus, even this merger does not satisfy the Williamson principle, because the amount in the Welfare Triangle (\$281) exceeds the amount in the efficiencies rectangle (\$270). These results are set out in Chart XIX below:

Chart XIX
Merger to Less than Monopoly:
Comparison of Welfare Triangle with Efficiency Gains Rectangle

Welfare Triangle	\$281
Efficiency Gains Rectangle	\$270
Excess of Welfare Triangle Over Efficiency	\$11
Gains Rectangle	

Graph J
Williamson Presentation of Welfare Tradeoff with Merger to Less Than Monopoly



C. *Applicability of Williamson Principle Where the Expected Price Increase is Small*

The Williamson principle would seem to apply principally in situations in which the price increase resulting from a merger is quite small or the cost saving extraordinarily large. For example, if the expected price increase after the merger of the four firms is just 10% of the premerger price, the deadweight loss from the merger would be quite small, approximately, \$31.25.⁹⁵ In such case minor efficiencies realized by the merged firm would offset the welfare loss. To be precise, assuming that the resulting firm had 40% of the 1750 sales in the market, or 700, the merged firm would have to realize cost savings of only \$.04, which is a cost savings of approximately 1% of the premerger price, in order to offset the welfare loss. This is a situation in which the Williamson principle clearly applies. Although the agencies may use a 10% price increase as a threshold for determining whether to challenge a merger, there can be no certainty that an expected 10% price increase will not result in a significantly higher price increase. Clearly, the merging parties in a problematic merger have a large incentive to drive the price as close to the monopoly level as possible, and any significant price increase is likely to make the Williamson principle inapplicable.

VI. Opposition to Efficiencies Defense by Judges Posner and Bork

In addition to the above challenge to the theoretical case for an efficiencies defense, both Judges Bork and Posner over the years have on practical grounds opposed the use of this defense. It is instructive to consider the following extensive quotes from these two antitrust scholars.

In his 1978 book ANTITRUST PARADOX, Judge Bork writes:

There remains the difficult problem of the mixed case, the business practice that seems likely to produce both output restriction and efficiency. This is the case represented by Oliver Williamson's trade-off model If we disallow all horizontal mergers, no matter how small, we shall make a great sacrifice of productive efficiencies. If we allow all horizontal mergers, no matter how large, we shall make large sacrifices in allocative efficiencies. Somewhere on the spectrum between large and small mergers lies a range of mixed cases, and in these we do not know with certainty whether the efficiency or the trade restraint element predominates. How is the law to make a sensible decision in such cases?

The temptation is to reply: by making a showing of efficiencies as an affirmative defense. But that is a temptation to be resisted, although its superficial plausibility lends the idea a certain attractiveness. After all, it might be said, facts are better than conjectures. They are, but only if you are sure that what you are dealing with are facts,

⁹⁵ This is derived by assuming that the price was raised from the \$4.50 competitive price to \$5, which is a price increase slightly above the 10% level. In such case the output would be 1750, the base of the Welfare Triangle would run from 1750 to 1875, or 125, and the height of the triangle would be \$.50. Therefore, the amount in the triangle would be \$31.25 (125 X .5/2).

and, unfortunately, the relevant ultimate facts for antitrust purposes cannot be perceived directly or quantified. . . .

Passably accurate measurement of the actual situation is not even a theoretical possibility; much less is there any hope of arriving at a correct estimate of the hypothetical situation. Consider two of the factors that would have to be known: the demand curve over all possibly relevant ranges of output and the marginal cost curve over those same ranges. Only by knowing where marginal cost and demand intersect could one know whether there was a restriction of output and what its size was. Nobody knows these curves. Even the companies involved do not. . . .

There is a good reason why firms do not know these things, and it is the same reason why they cannot be known through an antitrust trial. The demand curve is not known because it changes continually and because the company is not constantly plotting it by running its prices up and down. . . .

But it is the quantification of the productive efficiency factor that renders the problem utterly insoluble.⁹⁶

In his 2001 book, *ANTITRUST LAW*, Judge Posner writes:

I said [before] that there should be no general defense of efficiency. I still think this is right. It is rarely feasible to determine by the methods of litigation the effect of a merger on the costs of the firm created by the merger. If the merger has not yet been consummated, the realization of cost savings lies in the future and is thus a matter of speculation flavored by hope. If the merger has been consummated, disentangling its effect from other influences on the firm's costs is likely to be intractable. And in both situations it will be necessary, but usually impossible, to determine how soon the efficiencies might have been realized without a merger, that is, by internal growth or managerial changes. In addition, any estimate of the cost savings enabled by the merger would have to be weighed against the merger's effect in facilitating collusion—and we still don't know enough about the effect of marginal increases in concentration under different market conditions to be able to predict the price effects, let alone the social costs likely to be imposed as a result of those effects, of a challenged merger, to weigh against any likely cost savings. Those savings, moreover, may be dissipated by expenditures on measures for engrossing the expected monopoly profits made larger by those savings—expenditures, for example, on persuading the courts, legislatures, or regulatory bodies to permit the merger to take place. A final consideration weighing against recognizing a defense of efficiency is that the less encompassing the prohibition of horizontal mergers, the less need there is to worry about the adverse consequences of ignoring the efficiency justifications of challenged mergers; most such mergers will no longer be subject to being challenged.⁹⁷

On the approach of courts to the consideration of efficiencies, Judge Posner says:

Although courts, tending as I have said to follow the Department's lead in antitrust matters . . . remain willing in principle to consider a defense of efficiency to a

⁹⁶ Robert H. Bork, *THE ANTITRUST PARADOX* 123-124, 125-126 (1978).

⁹⁷ Richard A. Posner, *ANTITRUST LAW* 133 (2ND 2001).

challenged merger, they have been understandably, and I think correctly, reluctant to accept the defense in actual cases.⁹⁸

VII. Professor Williamson's Qualification on the Use of an Efficiencies Defense

Professor Williamson even expressed reservations on the utility of an efficiency defense:

I do not think it feasible or rewarding for the courts to entertain explicitly an efficiencies defense involving a full-blown tradeoff assessment. The courts may nevertheless find it instructive to permit arguments pertaining to technological and transactional efficiencies to be brought before them. For one thing, permitting such arguments assures that efficiencies will not be regarded perversely as anticompetitive. Additionally, an efficiencies defense may help put the relevant issues in perspective. If the government argues that a merger has an anticompetitive purpose or effect, when, in fact, the evidence of either is extremely thin, and speculative, permitting the defense to demonstrate that nontrivial efficiencies exist presumably will make the court more reluctant to accept the government's contentions. On the other hand, when efficiencies cannot be shown to exist or appear to be negligible, courts will perceive little social cost in holding for the government.⁹⁹

Thus, the person that developed the tradeoff model, apparently thinks that it is appropriate to consider "nontrivial" efficiencies only when the evidence of anticompetitive effect is "thin and speculative." As discussed below, this is close to the current standard in the DOJ/FTC Guidelines and the EU Guidelines.

VIII. Policy Prescription

As the above analysis demonstrates, in any merger giving rise to a significant increase in market power, the size of the Efficiency Rectangle is not likely to be substantially larger than the consumer and producer welfare triangles and in many cases may be smaller. Thus, the U.S. and the EU antitrust authorities should not consider liberalizing the approaches to efficiencies taken in the DOJ/FTC Guidelines and in the EU Guidelines. Both these Guidelines have an implicit requirement that the efficiencies must overpower the anticompetitive effect and keep the post merger price from rising. This is the correct standard, and if there is any doubt that these Guidelines adopt this standard, the doubt should be eliminated by clarifying amendments. As both sets of Guidelines acknowledge, this standard is most likely to be satisfied when the anticompetitive effects of the merger are small and the efficiencies substantial.

As a way of conserving resources for both agency officials and parties, I suggest that both the DOJ/FTC and EU Guidelines be amended to state prominently that the antitrust officials will consider efficiencies only in those cases where on the basis of factors other than efficiencies, the officials determine that a decision to oppose the transaction or require a divestiture or other remedy is a close one. If the decision is not close, the officials would not consider efficiencies and the parties would not have to go to the expense of preparing White papers supporting

⁹⁸ *Id.* at 136.

⁹⁹ Williamson, *Efficiencies Defense*, supra note ____, at 728.

efficiency claims. Only if the officials decided that the decision was otherwise close would the parties be permitted to submit arguments regarding the efficiencies to be realized in the transactions. In such a case, in evaluating the overall transaction the officials would take account of any efficiency claims that satisfied the “merger specific,” “verification,” “cognizable” and other requirements of the current guidelines. Thus, the submission of efficiency analyzes would be permitted when the officials decided on the basis of an analysis of other factors that there was a significant concern that a challenge to the transaction or a requirement to divest may lead to a Type I error (*i.e.*, finding that the merger is anticompetitive when it is not).

Also, given the findings above with regard to the possibility that even significant marginal cost efficiencies may not swamp the Welfare Triangle, it would be appropriate for officials to consider only variable cost savings. In this connection, as indicated above, *Merger Efficiencies at the FTC* points out that both the Bureau of Competition and the Bureau of Economics at the FTC are as likely to accept both fixed costs savings and variable cost savings at about the same rates.

Finally, the above analysis shows that even for jurisdictions that may consider adopting a total welfare approach or the “balancing weights” approach of the Canadian Competition Tribunal, only in limited circumstances will total welfare be increased as a result of efficiencies realized in a merger resulting in significant market power. This is a reason for countries to reject the total welfare approach and any variant thereof.

IX. Appendix A: Mathematical Derivation of Profit Maximizing Position with Productive Efficiencies in Graph D

The profit maximization point in Graph D, *New Output Levels and New Prices Resulting from Productive Efficiencies*, can be determined by identifying the equation for the New Marginal Cost Curve and equating that equation with the equation for the Marginal Revenue Curve.

Graph D shows that the Marginal Revenue Curve intersects the New Marginal Cost curve between 1250 and 1750 of output, which have associated prices of \$1 and \$2. The equation of the New Marginal Cost Curve between these two levels of output can be determined as follows. Since the curve is a straight line between these two points, the equation can be expressed as follows:

$$P = mQ + b$$

The slope of the equation is determined as follows:

$$m = \frac{\Delta P}{\Delta Q}$$

$$m = \frac{2-1}{1750-1250}$$

$$m = \frac{1}{500}$$

The constant (b) can be determined by specifying an amount for P and associated Q (*e.g.*, \$2 and 1750), as follows:

$$P = \frac{1}{500} Q + b$$

$$2 = \frac{1}{500} (1750) + b$$

$$2 = 3.5 + b$$

$$2 - 3.5 = b$$

$$b = -1.5$$

Thus, the equation for the New Marginal Cost curve is as follows:

$$P = \frac{1}{500} Q - 1.5$$

This equation can be checked by setting Q at another point on the curve (*e.g.*, 1250) and then determining whether the equation produces the correct price (*e.g.*, \$1), which it does, as follows:

$$P = \frac{1}{500} Q - 1.5$$

$$P = \frac{1}{500} (1250) - 1.5$$

$$P = \frac{1250}{500} - 1.5$$

$$P = 2.5 - 1.5$$

$$P = 1$$

The optimum level of output can be determined by solving for Q in the following two equations:

New Marginal Cost Equation	Marginal Revenue Equation
$\frac{1}{500} Q - 1.5$	$= - \frac{4}{500} Q + 12$

$$\begin{aligned}
\frac{1}{500} Q + \frac{4}{500} Q &= 12 + 1.5 \\
\frac{5}{500} Q &= 13.5 \\
Q &= \frac{13.5}{5/500} \\
Q &= \frac{500(13.5)}{5} \\
Q &= \frac{6750}{5} \\
Q &= 1350
\end{aligned}$$

Thus, assuming productive efficiencies, the quantity produced by the monopolist is 1350. Although the marginal cost at 1350 of output is less than \$1.50, the price charged by the monopolist is determined by the price indicated on the Demand Curve at the 1350 level of production. This is determined by solving for price in the equation for the Demand Curve under the assumption of a 1350 level of production as follows:

DEMAND CURVE EQUATION

$$\begin{aligned}
P &= - \frac{2}{500} Q + 12 \\
P &= - \frac{2}{500} (1350) + 12 \\
P &= - \frac{2700}{500} + 12 \\
P &= - 5.4 + 12 \\
P &= 6.6
\end{aligned}$$

Thus, the precise price charged with the productive efficiencies is \$6.60

X. Appendix B: Computing the Output and Price in Graph G

The equation for the New Marginal Revenue Curve can be determined as follows. Since the curve is a straight line between 1000 and 1500, the equation can be expressed as follows:

$$P = mQ + B$$

The slope of the equation is determined as follows:

$$m = \frac{\Delta P}{\Delta Q}$$

$$m = \frac{\$3.60 - \$3.60}{1500 - 1000}$$

$$m = 0$$

Since the first term of the equation is zero, the equation for the New Marginal Cost Curve is:

$$P = \$3.60$$

The equation for the Marginal Revenue Curve is

$$\frac{-4Q}{500} + 12$$

Therefore, the optimum level of output can be determined by solving for Q in the following two equations:

New Marginal Cost Equation	=	Marginal Revenue Equation
3.60	=	- $\frac{4}{500} Q$ + 12
$\frac{4}{500} Q$	=	12 - 3.60
	=	$\frac{8.4}{\frac{4}{500}}$
	=	$\frac{500 (8.4)}{4}$

$$Q = \frac{4200}{4}$$

$$Q = 1050$$

Thus, with these productive efficiencies the quantity produced by the monopolist is 1050. The price charged by the monopolist is determined by the price indicated on the Demand Curve at 1050 level of output. This is determined by solving for price in the equation for the Demand Curve under the assumption of a 1050 level of production as follows:

DEMAND CURVE EQUATION

$$P = - \frac{2}{500} Q + 12$$

$$P = - \frac{2}{500} (1050) + 12$$

$$P = - \frac{2100}{500} + 12$$

$$P = - 4.2 + 12$$

$$P = 7.80$$

Thus, the precise price charged with the productive efficiencies is \$7.80.

XI. Appendix C: Computation of Marginal Revenue Curve of More Elastic, *i.e.*, a Flatter, Demand Curve¹⁰⁰

To compute the Marginal Revenue Curve for this new demand curve we first determine the equation for the new demand curve by starting with the following:

$$P = m Q + b$$

The slope (m) is determined by relating the change in price, or Delta P, to the change in output, or Delta Q, pursuant to the following formula

$$= \frac{\frac{\Delta P}{\Delta Q}}{P_2 - P_1}$$

¹⁰⁰ This section follows the analysis in § 6.04 (b), *Derivation of the Marginal Revenue Curve by Use of Calculus in Economics of Merger Guidelines*, *supra* note ____.

$$Q_2 - Q_1$$

The ΔP can be determined by subtracting an old high price (P_1) from a new low price (P_2), and ΔQ can be determined by subtracting an old small quantity (Q_1) produced at the old high price (P_1) from the new large quantity (Q_2) produced at the new low price (P_2). Since the demand curve is a straight line (that is, is linear), it does not matter which P_1 and P_2 and Q_1 and Q_2 are selected.

Thus, for example, assume that on Graph H above a price of \$7.50 is selected as P_1 and a price of \$6.50 is selected as P_2 . Since 1000 will be produced at a price of \$7.50, Q_1 is 1000, and since 1500 will be produced at a price of \$6.50, Q_2 is 1500. Thus, the slope of the demand curve can be determined as follows (where 7.5 is P_1 and 6.5 is P_2):

$$\begin{aligned} & \frac{\Delta P}{\Delta Q} \\ = & \frac{P_2 - P_1}{Q_2 - Q_1} \\ = & \frac{7.5 - 6.5}{1500 - 1000} \\ = & - \frac{1}{500} \end{aligned}$$

Once the slope is determined, the constant (b) can be determined by taking the price and quantity for a particular point on the line, say a price of \$7.5 and quantity 1000, and putting these into the equation together with the slope and then solving for b as follows:

$$\begin{aligned} y &= mx + b \\ P &= mQ + b \\ 7.5 &= - \frac{1}{500} (1000) + b \\ 7.5 &= - 2 + b \\ 9.5 &= b \end{aligned}$$

Thus, the equation for the demand curve is:

$$P = - \frac{1}{500} Q + 9.5$$

For example, if the quantity produced is 2500 the price will be \$4.50 computed as follows:

$$P = - \frac{1}{500} Q + 9.5$$

$$P = - \frac{1}{500} (2500) + 9.5$$

$$P = - \frac{2500}{500} + 9.5$$

$$P = - 5 + 9.5$$

$$P = 4.5$$

The marginal revenue curve can be derived from the demand curve by the use of algebra and elementary calculus, as demonstrated in this section. The starting point is the equation for the demand curve for the widget industry, which, as derived above is as follows:

$$P = - \frac{1}{500} Q + 9.5$$

The next step is the formula for computing total revenue (TR) for any particular price and output level. This is given in the following equation:

$$TR = QP = Q \cdot f(Q)$$

This formula says that total revenue (TR) is equal to the quantity produced (Q) multiplied by the associated price for that Q, which in turn is equal to Q times the function of Q or f(Q). Since price (P) is the function of Q, f(Q) can be written as the equation for the demand curve:

$$f(Q) = - \frac{1}{500} Q + 9.5$$

Thus, total revenue can be written as follows:

$$TR = QP = Q \cdot f(Q)$$

$$TR = Q \cdot f(Q)$$

$$TR = Q - \left(\frac{1}{500} \right) Q^2 + 9.5Q$$

$$TR = - \frac{1}{500} Q^2 + 9.5Q$$

The above equation gives the function for TR.

The next step is to apply the concept of the derivative from calculus to compute the marginal revenue. The derivative of a function gives the rate of change of the function. Thus, the marginal revenue (MR), which is the rate of change of total revenue, can be found by taking the derivative of total revenue (TR). The marginal revenue at some level of production (Q) is approximately equal to the revenue earned in producing the (Q+1) item. In other words, the marginal revenue is the change in revenue resulting from the production of one additional unit of output. Algebraically it is the difference between (1) the new lower price that prevails in the market as a result of production of an additional item multiplied by the number of items sold at that price, and (2) the old, higher price that prevailed in the market at the old level of production multiplied by the numbers of items sold at the old price.

Thus, marginal revenue can be determined by taking the derivative of the TR function. The short hand for the derivative of total revenue is:

$$\frac{dTR}{dQ}.$$

This means the derivative of total revenue with respect to quantity, and it can also be written as TR'.

Taking the derivative of TR with respect to Q involves the applications of the following rules to the TR equation:

$$TR = - \frac{1}{500} Q^2 + 9.5Q$$

This equation has two constant terms:

$$- \frac{1}{500} \text{ and } + 9.5.$$

The derivative of the above function is determined by applying the constant times a function rule and the power rule. Under the constant times a function rule, the derivative of a constant times a function is equal to the constant times the derivative of a function. Thus, the equation can be rewritten as follows:

$$TR = - \frac{1}{500} F'Q^2 + 9.5f'Q$$

Under the power rule, the derivative of a function in the form Q^n equals NQ^{n-1} . Thus, under the power rule, the derivative is found by multiplying the function (Q) by the exponent (N) and decreasing the exponent by 1. This power rule is applied to the above function as follows:

$$TR' = - \frac{1}{500} F'Q^2 + 9.5f'Q$$

$$\begin{aligned} \overline{500} \\ TR' &= - \frac{1}{500} (2Q^1) + 9.5(1Q^{1-1}) \\ TR' &= - \frac{1}{500} (2Q) + 9.5(1) \\ TR' &= - \frac{2}{500} Q + 9.5 \end{aligned}$$

Thus, the derivative of the TR function, or the equation for marginal revenue is:

$$TR' = MR = - \frac{2}{500} Q + 9.5$$

The next step is to compute the Marginal Revenue Curve by using various quantities in the equation.

For example, if Q is set at -0-, MR is \$9.5, computed as follows:

$$\begin{aligned} MR &= - \frac{2}{500} (-0-) + 9.5 \\ MR &= 9.5 \end{aligned}$$

This is the point at which the Marginal Revenue Curve intersects the price axis, indicating that the price to be earned from the sale of one item is approximately \$9.5. It is also the point at which the demand curve intersects the price axis.

If Q is set at 500, MR is \$7.5, computed as follows:

$$\begin{aligned} MR &= - \frac{2}{500} (500) + 9.5 \\ MR &= - \frac{1000}{500} + 9.5 \\ MR &= - 2 + 9.5 \\ MR &= 7.5 \end{aligned}$$

If Q is set at 1000, MR is \$5.5, computed as follows:

$$MR = - \frac{2}{500} (1000) + 9.5$$

$$MR = - \frac{2000}{500} + 9.5$$

$$MR = - 4 + 9.5$$

$$MR = 5.5$$

If Q is set at 1500, MR is 3.5, computed as follows:

$$MR = - \frac{2}{500} (1500) + 9.5$$

$$MR = - \frac{3000}{500} + 9.5$$

$$MR = - 6 + 9.5$$

$$MR = 3.5$$

If Q is set at 2000, MR is 1.5, computed as follows:

$$MR = - \frac{2}{500} (2000) + 9.5$$

$$MR = - \frac{4000}{500} + 9.5$$

$$MR = - 8 + 9.5$$

$$MR = 1.5$$

This is just before the point at which the Marginal Revenue Curve intersects the quantity axis.

Thus, the computation of the Marginal Revenue Curve by reference to output of 0, 500, 1000, and 1500 can be summarized as follows:

Chart Appendix C-1
Computation of Actual
Marginal Revenue Curve Using Calculus

<u>Amount of Total</u> <u>Output</u>	<u>Marginal Revenue</u>
-0-	\$9.5
500	\$7.5
1000	\$5.5

1500	\$3.5
2000	\$1.5

The above data is plotted on Graph H above, as the actual marginal revenue curve.

XII. Appendix D: Output with More Elastic, *i.e.*, a Flatter Demand Curve

Since the equation for the Marginal Revenue Curve is:

$$MR = - \frac{2}{500} Q + 9.5,$$

the optimum level of output with the New Marginal Cost Curve can be determined by solving for Q in the following two equations:

New Marginal Cost Equation		=		Marginal Revenue Equation
3.60		=		- $\frac{2}{500} Q + 9.5$
$\frac{2}{500} Q$		=		9.5 - 3.60
		=		$\frac{5.9}{\frac{2}{500}}$
		=		$\frac{500 (5.9)}{2}$
		=		$\frac{2950}{2}$
		=		1475

Thus, with these productive efficiencies the quantity produced by the monopolist with the flatter demand curve would be 1475.

XIII. Appendix E: Monopoly Price with More Elastic, *i.e.*, a Flatter Demand Curve

The price charged by the monopolist is determined by the price indicated on the demand curve at the 1475 level of output with the flatter demand curve. This is determined by solving for price in the equation for the demand curve under the assumption of a 1475 level of production, as follows:

Demand Curve Equation

$$P = - \frac{1}{500} Q + 9.5$$

$$P = - \frac{1}{500} (1475) + 9.5$$

$$P = - \frac{1475}{500} + 9.5$$

$$P = - 2.95 + 9.5$$

$$P = 6.55$$

Thus, the precise price charged with the productive efficiencies and the flatter demand curve is \$6.55.

XIV. Appendix F: Computation of Marginal Revenue Curve of Less Elastic, i.e., a Steeper, Demand Curve¹⁰¹

To compute the Marginal Revenue Curve for this new demand curve we first determine the equation for the new demand curve by starting with the following:

$$P = m Q + b$$

The slope (m) is determined by relating the change in price, or Delta P, to the change in output, or Delta Q, pursuant to the following formula

$$\begin{aligned} & \frac{\Delta P}{\Delta Q} \\ &= \frac{P_2 - P_1}{Q_2 - Q_1} \end{aligned}$$

The ΔP can be determined by subtracting an old high price (P_1) from a new low price (P_2), and ΔQ can be determined by subtracting an old small quantity (Q_1) produced at the old high price (P_1) from the new large quantity (Q_2) produced at the new low price (P_2). Since the demand curve is a straight line (the is, is linear), it does not matter which P_1 and P_2 and Q_1 and Q_2 are selected.

¹⁰¹ This section follows the analysis in § 6.04 (b), *Derivation of the Marginal Revenue Curve by Use of Calculus of Economics* in *Merger Guidelines*, *supra* note ____.

Thus, for example, assume that on Graph I above a price of \$10.5 is selected as P_1 and a price of \$7.5 is selected as P_2 . Since 1500 will be produced at a price of \$10.5, Q_1 is 1500, and since 2000 will be produced at a price of \$7.5, Q_2 is 2000. Thus, the slope of the demand curve can be determined as follows:

$$\begin{aligned} & \frac{\Delta P}{\Delta Q} \\ = & \frac{P_2 - P_1}{Q_2 - Q_1} \\ = & \frac{7.5 - 10.5}{2000 - 1500} \\ = & - \frac{3}{500} \end{aligned}$$

Once the slope is determined, the constant (b) can be determined by taking the price and quantity for a particular point on the line, say a price of \$10.5 and quantity 1500, and putting these in the equation together with the slope and then solving for b as follows:

$$\begin{aligned} y &= mx + b \\ P &= mQ + b \\ 10.5 &= - \frac{3}{500} (1500) + b \\ 10.5 &= - 9 + b \\ 19.5 &= b \end{aligned}$$

Thus, the equation for the demand curve is:

$$P = - \frac{3}{500} Q + 19.5$$

For example, if the quantity produced is 2000 the price will be \$7.5, computed as follows:

$$P = - \frac{3}{500} Q + 19.5$$

$$P = - \frac{3}{500} (2000) + 19.5$$

$$P = - \frac{6000}{500} + 19.5$$

$$P = - 12 + 19.5$$

$$P = 7.5$$

The Marginal Revenue Curve can be derived from the demand curve by the use of algebra and elementary calculus, as demonstrated in this section. The starting point is the equation for the demand curve for the widget industry, which, as derived above is as follows:

$$P = - \frac{3}{500} Q + 19.5$$

The next step is the formula for computing total revenue (TR) for any particular price and output level. This is given in the following equation:

$$TR = QP = Q \cdot f(Q)$$

This formula says that total revenue (TR) is equal to the quantity produced (Q) multiplied by the associated price for that Q, which in turn is equal to Q times the function of Q or f(Q). Since price (P) is the function of Q, f(Q) can be written as the equation for the demand curve:

$$f(Q) = - \frac{3}{500} Q + 19.5$$

Thus, total revenue can be written as follows:

$$TR = QP = Q \cdot f(Q)$$

$$TR = Q \cdot f(Q)$$

$$TR = Q - \left(\frac{3}{500} Q + 19.5 \right)$$

$$TR = - \frac{3}{500} Q^2 + 19.5Q$$

The above equation gives the function for TR.

The next step is to apply the concept of the derivative from calculus to compute the marginal revenue. The derivative of a function gives the rate of change of the function. Thus, the marginal revenue (MR), which is the rate of change of total revenue, can be found by taking the derivative of total revenue (TR). The marginal revenue at some level of production (Q) is approximately equal to the revenue earned in producing the (Q+1) item. In other words, the marginal revenue is the change in revenue resulting from the production of one additional unit of output. Algebraically it is the difference between (1) the new lower price that prevails in the market as a result of production of an additional item multiplied by the number of items sold at that price, and (2) the old, higher price that prevailed in the market at the old level of production multiplied by the numbers of items sold at the old price.

Thus, marginal revenue can be determined by taking the derivative of the TR function. The short hand for the derivative of total revenue is

$$\frac{dTR}{dQ}.$$

This means the derivative of total revenue with respect to quantity, and it can also be written as TR'.

Taking the derivative of TR with respect to Q involves the applications of the following rules to the TR equation:

$$TR = - \frac{3}{500} Q^2 + 19.5Q$$

This equation has two constant terms:

$$- \frac{3}{500} \text{ and } + 19.5.$$

The derivative of the above function is determined by applying the constant times a function rule and the power rule. Under the constant times a function rule, the derivative of a constant times a function is equal to the constant times the derivative of a function. Thus, the equation can be rewritten as follows:

$$TR = - \frac{3}{500} F'Q^2 + 19.5f'Q$$

Under the power rule, the derivative of a function in the form Q^n equals NQ^{n-1} . Thus, under the power rule, the derivative is found by multiplying the function (Q) by the exponent (N) and decreasing the exponent by 1. This power rule is applied to the above function as follows:

$$TR' = - \frac{3}{500} F'Q^2 + 19.5f'Q$$

$$TR' = - \frac{3}{500} (2Q^1) + 19.5(1Q^{1-1})$$

$$TR' = - \frac{3}{500} (2Q) + 19.5(1)$$

$$TR' = - \frac{6}{500} Q + 19.5$$

Thus, the derivative of the TR function, or the equation for marginal revenue is:

$$TR' = MR = - \frac{6}{500} Q + 19.5$$

The next step is to compute the marginal revenue curve by using various quantities in the equation.

For example, if Q is set at 1250, MR is \$4.5, computed as follows:

$$MR = - \frac{6}{500} 1250 + 19.5$$

$$MR = - \frac{7500}{500} + 19.5$$

$$MR = - 15 + 19.5$$

$$MR = 4.5$$

If Q is set at 1500, MR is \$1.5, computed as follows:

$$MR = - \frac{6}{500} (1500) + 19.5$$

$$MR = - \frac{9000}{500} + 19.5$$

$$MR = - 18 + 19.5$$

$$MR = - 1.5$$

If Q is set at 1625, MR is \$0, computed as follows:

$$MR = - \frac{6}{500} (1625) + 19.5$$

$$MR = - \frac{9750}{500} + 19.5$$

$$MR = - 19.5 + 19.5$$

$$MR = 0$$

This is the point at which the Marginal Revenue Curve intersects the quantity axis.

Thus, the computation of the Marginal Revenue Curve by reference to output of 1250, 1500, and 1675 can be summarized as follows:

Chart Appendix F-1
Computation of Actual
Marginal Revenue Curve Using Calculus

<u>Amount of Total</u> <u>Output</u>	<u>Marginal Revenue</u>
1250	\$4.5
1500	\$1.5
1625	\$0

The above data is plotted on Graph I above, as the actual Marginal Revenue Curve.

XV. Appendix G: Output with Less Elastic, *i.e.*, a Steeper Demand Curve

Since the equation for the Marginal Revenue Curve is

$$MR = - \frac{6}{500} Q + 19.25$$

the optimum level of output with the New Marginal Cost Curve can be determined by solving for Q in the following two equations:

New Marginal Cost Equation		Marginal Revenue Equation
3.60	=	- $\frac{6}{500} Q + 19.5$
$\frac{6}{500} Q$	=	19.5 - 3.60
Q	=	$\frac{15.9}{\frac{6}{500}}$
Q	=	$\frac{500 (15.9)}{6}$
Q	=	$\frac{7950}{6}$
Q	=	1325

Thus, with these productive efficiencies the quantity produced by the monopolist with the steeper demand curve would be 1325.

XVI. Appendix H: Monopoly Price with Less Elastic, *i.e.*, a Steeper, Demand Curve

The price charged by the monopolist is determined by the price indicated on the demand curve at the 1325 level of output with the steeper demand curve. This is determined by solving for price in the equation for the demand curve under the assumption of a 1375 level of production, as follows:

Demand Curve Equation

$$P = - \frac{3}{500} Q + 19.5$$

$$P = - \frac{3}{500} 1375 + 19.5$$

$$P = - \frac{4125}{500} + 19.5$$

$$P = - 8.25 + 19.5$$

$$P = 11.25$$

Thus, the precise price changed with the productive efficiencies and the steeper demand curve is \$11.25.

XVII. Appendix I: Competitive Output with Less Elastic, *i.e.*, a Steeper Demand Curve

The competitive output with the steeper demand curve can be determined by solving for Q in the following two equations:

Old Marginal Cost Equation		Equation for Steeper Demand Curve (See Appendix D)
4.50	$=$	$-\frac{3}{500}Q + 19.5$
$\frac{3}{500}Q$	$=$	$19.5 - 4.50$
Q	$=$	$\frac{15}{\frac{3}{500}}$
Q	$=$	$\frac{500(15)}{3}$
Q	$=$	$\frac{7500}{3}$
Q	$=$	2500

Thus, with the steeper demand curve and the Old Marginal Cost Curve, the competitive output would be 2500.