Critical Loss Analysis: Critically Ill?[*]

Introduction

In the last two decades, empirical analysis has played a continuously increasing role in competition policy. Several factors account for these developments such as the enhanced quantity and quality of data available as well as the increased focus on the possibility of competitive harm arising from "unilateral" market conduct. The accurate analysis and interpretation of quantitative evidence is essential in predicting and quantifying the magnitude of competitive harm that firms' conduct may induce in a market. In addition, it significantly enhances the focus, accuracy, and persuasiveness of the assessment analysis. The importance of empirical evidence may be given different weight by different decision-makers. Thus, quantitative evidence can be regarded as complementary to qualitative evidence and the two methods should be used jointly in the assessment of the effects of mergers.

One type of empirical analysis is the Critical Loss Analysis. Critical loss analysis is used in the definition of the relevant market. Critical loss analysis was introduced by Harris and Simons (1989)[1] who define the critical loss "for any given price increase as the percentage loss in sales necessary to make the specified price increase unprofitable."[2] It has gained increasing importance in competition law mainly because market definition plays a crucial role in assessing anticompetitive practices of firms.

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[1] Harris B. and Simons J. (1989), "Focusing Market Definition: How Much Substitution is Necessary?" *Research in Law and Economics* 12, pp. 207-226.

[2] Ibid. page 211.

The accuracy and outcome of the market definition process can substantially alter the assessment by the competition authorities of competitive harm since the evaluation of the degree of competition in a market crucially depends on how the boundaries of the market in product and geographical terms are defined.

The next section of this paper will deal with the mechanics of critical loss analysis, and present the formula to calculate critical loss as well as the rationale behind the implementation of critical loss analysis. Then we will briefly see how critical loss analysis can be applied in practice by looking at some cases in which it was used by the parties. Finally, we will address some of the criticisms that have been voiced in the academic literature regarding the accuracy of critical loss analysis.

Critical Loss Analysis: Mechanics

Critical loss analysis makes the SSNIP test (Small but Significant Non-transitory Increase in Price, also known as the hypothetical monopolist test) operational. According to the SSNIP test if a small (in the range of five per cent-10 per cent) permanent increase in the price of a good ("starting price") leads to such an increase in purchases of another good that renders the price increase unprofitable, then the two goods belong to the same market.[3] The test seeks to establish the smallest product group as well as the geographic area such that the hypothetical monopolist controlling that product group in that area to be able to profitably sustain prices that are higher than the competitive level of prices even by a small amount.[4] The equivalent analysis is applicable in cases concerning the concentration of buying power, where the starting point would then be the supplier, and the price test would identify the alternative distribution channels or outlets for the supplier's products.[5]

Critical loss analysis estimates how much the hypothetical monopolist's sales would have to fall in order to make the hypothetical price increase unprofitable. The price increase contemplated in the SSNIP test has two opposing effects on the hypothetical monopolist's profits. It has a negative effect on profits because sales will fall as some consumers substitute to rival firms' products in response to the increase in price. However, there is an offsetting positive effect on profits as the hypothetical monopolist now earns higher margins on all of the remaining sales. If the negative

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[3] See further: US Department of Justice and Federal Trade Commission Horizontal Merger Guidelines 1992. http://www.usdoj.gov/atr/public/guidelines/ horiz_book/5.html. 19th March 2003.
[4] Kokkoris I. (2005), "The Concept of Market Definition and the SSNIP test in the Merger Appraisal", *E.C.L.R.*, vol. 26, issue 4, April 2005 pp. 209-214. Page 210.
[5] "Commission Notice on the definition of the relevant market for the purposes of Community competition law", Official Journal: O.J. C 372 on 9/12/1997.

effect on profits is greater than the positive effect, then the price increase will be unprofitable for the hypothetical monopolist, and the relevant market is wider.[6] The critical loss is the percentage reduction in quantity such that these two effects just balance. If the reduction in unit sales is greater than the critical loss, then the price increase will reduce profits. If the reduction in unit sales is less then the critical loss, the price increase will increase profits for the hypothetical monopolist, and the relevant market must not be expanded.

As we have mentioned critical loss analysis estimates the necessary percentage price increase of a product, for the resulting percentage loss in unit sales to make the price increase unprofitable. According to critical loss analysis, the larger the profit margins are the greater is the reduction in profits from sales lost after a price increase. Thus, it takes a smaller critical loss to make a given price increase by a hypothetical monopolist unprofitable. For any given price increase, the critical loss is smaller the higher the gross profit margin. This is because when the gross margin is higher, there is a larger negative effect on profits arising from the fall in sales (caused by the increase in price). Thus, profit margins determine the amount of substitution needed to expand a provisional relevant market definition. The argument that the critical loss is smaller, the higher the gross profit margin is contested in this paper since large margins can be observed as a result of anticompetitive conduct as well as in industries with differentiated products in which, the products of different firms are not close substitutes. The latter argument will be further elaborated at a later section of this paper.

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[6] Lexecon, "Quantitative Techniques in Competition Analysis", *http://www.lexecon.co.uk/assets/ quantitative_techniques.pdf*, 01/11/2003, page 18.

The argument that the larger the profit margins are, the greater is the reduction in profits from sales lost after a price increase is contested by Katz and Shapiro (2003) who argue that the argument is incomplete because high margins also tend to imply that the actual loss is small, and thus a price increase might be profitable even when the critical loss is small.[7] They suggest an alternative approach based on the aggregate diversion ratio, the percentage of the total sales lost by a product, when its price increases, that is captured by all of the other products in the candidate market. They argue that an aggregate diversion ratio greater than the critical loss creates a presumption that the candidate product market is in fact a relevant antitrust market.

Although critical loss estimates the percentage loss in unit sales to make the price increase unprofitable, it does not clarify whether the reduction will actually occur. Thus, the second stage in the critical loss analysis is to calculate the actual loss in sales due to the price increase. This estimation requires analysis of the reaction of consumers (demand side of the market) as well as of the producers (supply side of the market).

The price effects of a merger depend crucially on the magnitude of the lost sales that would be diverted to competitors as the result of a price increase, and the allocation of these diverted sales among the competing firms. If the evidence on the likely loss of sales associated with a price rise (which can be compiled using a range of techniques, including demand estimation, shock analysis and switching surveys) suggests that the actual loss would be greater than the critical loss, then the products in question do not form a relevant market. Thus, the price increase would not be profitable and the

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[7] Katz M. and Shapiro C. (2003), "Critical Loss: Let's Tell the Whole Story", *Antitrust magazine*, spring 2003, a publication of the ABA Section of Antitrust Law. Page 50.

market must be expanded. Depending on the context, an actual loss greater than critical loss implies that a unilateral or coordinated price effect equal to the given price increase is not of concern, or that the goods involved do not form a separate antitrust market.[8] If the actual loss is lower than critical loss, then the price increase is profitable and the market must not be expanded.

In other words, critical loss analysis involves estimating the maximum amount (in percentage terms) by which sales of the products in question can fall following the hypothesised price increase and still ensure that the hypothetical monopolist's profits do not decline. Thus, critical loss analysis estimates the point at which the two opposing effects of a five per cent-10 per cent price increase on the hypothetical monopolist's profits cancel each other out.

The computational method used to calculate the critical loss is given by the following formula.

$$\text{Critical Loss: } [Y/(Y+PCM)]$$

where Y is the hypothesized percentage price increase and PCM is the price-cost margin, i.e. percentage incremental profit margin, which is equal to initial price minus the average cost and this outcome divided by the initial price.

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[8] Epstein R. and Rubinfeld D. (2004), "Technical Report Effects of Mergers Involving Differentiated Products", COMP/B1/2003/07, *http://europa.eu.int/comm/competition/mergers/others/effects_mergers _involving_differentiated_products.pdf*. Page 28.

As a quantity response to a price increase, critical loss analysis can be restated in terms of elasticities[9] if we assume that firms maximise profits by equalizing marginal cost with marginal revenue. Critical elasticity analysis greatly enhances the accuracy of econometrics-based market definition by providing a specific value with which to compare the estimated elasticity for a candidate market.[10] The industry elasticity facing the hypothetical monopolist should be smaller in magnitude than the price elasticity of each firm because the industry as a whole may face less competition than each firm individually.

Scheffman and Simons (2003) however, argue that firms seldom set price to equate marginal revenue[11] and marginal cost[12].[13] They claim that irregularities (kinks) in the industry demand curve or in marginal costs make this assumption unrealistic. They conclude that the actual loss for the hypothetical monopolist will be lower than for an individual competitor although they note that actual loss may also be substantially greater than critical loss.[14]

Let us turn now to how critical loss analysis has been applied in cases brought before the courts.

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[9] The economic concept of price elasticity of demand refers to the degree that the demand for a product changes as a result of a change in its price. If the market demand is inelastic/elastic, each individual firm's demand is also likely to be inelastic/elastic respectively. For a detailed definition of price elasticity, see further: Mas-Colell A., Whinston M. and Green J. (1995), "*Microeconomic Theory*", Oxford University Press, New York. Page 27.

[10] Werden G. and Froeb L. (2002), "Calibrated Economic Models Add Focus, Accuracy, and Persuasiveness to Merger Analysis", *www2.owen.vanderbilt.edu/luke.froeb/papers/sca10.pdf*, page 6.

[11] The revenue associated with one additional unit of production.

[12] The marginal cost of an additional unit of output is the cost of the additional inputs needed to produce that unit of output.

[13] The argument that firms maximise profits by setting marginal cost equal to marginal revenue is valid in a perfectly competitive market. The concept of a perfectly competitive market is a theoretical benchmark used in economics and does not resemble actual market conditions.

[14] Sheffman D. and Simons J. (2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand the Whole Story", available from *www.antitrustsource.com*, November 2003. Page 5.

Critical Loss Analysis: Practical Application

Before we address the complicated theoretical underpinnings of critical loss analysis let us briefly refer to cases that indicate how critical loss analysis has been applied in practice. The cases that we will analyse are *Federal Trade Commission, et al. v Tenet Healthcare Corporation, et al.*,[15] *Federal Trade Commission v Swedish Match North America Inc., et al.*,[16] *Federal Trade Commission v Occidental Petroleum Corp.*[17] and *US v SunGard and Comdisco*[18].

➢ *Federal Trade Commission v Occidental Petroleum Corp.*

In the United States the concept of critical loss first appeared in *FTC v Occidental Petroleum Corp.*, a 1986 merger trial in which the FTC sought to block a merger between producers of polyvinylchloride resin (PVC). According to the FTC the geographic market was confined to North American producers while the parties claimed it was much wider and should include foreign producers as well. A critical loss analysis indicated that a sufficient number would purchase foreign-produced PVC resins if domestic-produced resin's price increased by five per cent and that foreign producers had excess capacity and could supply the US market. The District Court concluded that geographic market for both types of PVC resin was wider than the USA.

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[15] *Federal Trade Commission, et al. v Tenet Healthcare Corporation*, 186 F. 3d 1045 (Eight Circuit 1999).
[16] *Federal Trade Commission v Swedish Match North America Inc.*, et al., 131 F. Supp. 2d 151, 160–62 (D.D.C. 2000).
[17] *Federal Trade Commission v Occidental Petroleum Corp.*, 1996–I Trade vs. (CCH) 67,071 (D.D.C. 1986).
[18] *US v SunGard and Comdisco*, 172 F. Supp. 2d 172, 182,186–92 and n.21 (D.D.C. 2001).

➤ *Federal Trade Commission, et al. v Tenet Healthcare Corporation, et al*

In *FTC v Tenet Healthcare Corp.* the FTC attempted to block a hospital merger of the only two hospitals in Poplar Bluff, a small Missouri city. The FTC sought to block the merger on the grounds that the geographic market was constrained to Poplar Bluff, suggesting that the merger would have removed the main competitive constraints that the two hospitals faced.

The parties submitted a critical loss analysis to support their argument that the market was wider than Poplar Bluff. The critical loss analysis included estimation of the contribution margin for the merging hospitals. The defendants argued that because the merging hospitals had very large margins, the percentage of patients they would have to lose to other hospitals to make a price increase unprofitable was not very large. The contribution margin was calculated by directly estimating the costs that would be saved by the hospital in the event of a decrease in quantity of 10 to 15 percent for a one-year period. The parties argued that a five per cent price increase would have been unprofitable if more than seven per cent of the merged hospital's patients switched in response to the price increase: i.e. the critical loss was seven per cent. Given that about fifty-five per cent of the merged hospital's patients would have come from areas where a significant proportion of patients already used hospitals outside Poplar Bluff, the defendants argued that the merged hospital would have lost more than seven per cent of their patients if they increased prices, and so the market was wider than Poplar Bluff.[19]

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[19] Lexecon, "Quantitative Techniques in Competition Analysis", *http://www.lexecon.co.uk/assets/ quantitative_techniques.pdf*, 01/11/2003, page 20.

The Court of Appeals, based on critical loss analysis, overturned the District Court and found for the defendants. It noted that "a critical loss analysis would identify the threshold number of patients who, by seeking care at other hospitals, could defeat a price increase by making it unprofitable. The purchasing behaviour of these patients or "marginal customers" would discipline or constrain any potential price increase by a merged entity".[20]

O'Brien and Wickelgren (2003) have argued that, as is often the case in standard critical loss analysis, the large margins asserted by the defendant's expert were not consistent with testimony about the willingness of customers to switch. In this case, a telephone survey presented by the experts purported to show that many patients would switch to other hospitals if faced with a five percent price increase.[21]

> *US v SunGard and Comdisco*

In 2001, in *U.S. v SunGard and Comdisco*, in a market with pervasive price discrimination the Court concluded that SunGard's acquisition of the computer disaster recovery assets of Comdisco was not likely to harm competition. The central issue in the case was whether alternatives, especially internally provided hotsites, a particular type of recovery services, potentially providing even more rapid recovery, were in the relevant market.

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[20] Harris B. (2004), "Recent Observations About Critical Loss Analysis", *http://www.ftc.gov/bc/mergerenforce/presentations/040217harris.pdf*. Page 5.

[21] They also present five possibilities that can explain this outcome. See O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, page 27.

The defendants presented the court with a critical loss analysis purporting to show that the critical loss was only five per cent because margins were extremely high. That analysis indicated that very little substitution was enough to defeat a price increase, and it was impossible for the Department of Justice to show that even such little substitution would not occur.[22] Consequently, all customers could credibly threaten to use these alternative services, which in turn meant that the appropriate antitrust market to evaluate the SunGard/Comdisco transaction needed to include the full range of alternatives already being used.

> ➢ *Federal Trade Commission v Swedish Match North America Inc., et al.*

In *Federal Trade Commission v Swedish Match North America Inc., et al.*, the FTC relied on a critical loss analysis to stop a proposed acquisition by Swedish Match of the loose leaf chewing tobacco business of National Tobacco Company. The defendant's expert report argued that because margins were high, a significant price increase by a hypothetical monopolist or by the merging firms after the merger was very unlikely. The report did not consider the fact that the high margins it found indicated that the amount of sales lost from a given price increase is likely to be quite small. The critical loss for a five percent price increase was compared to the actual loss implied by the estimate of the market elasticity of demand for loose leaf chewing tobacco. The estimated actual loss exceeded the critical loss, and thus a five percent price increase of loose leaf chewing tobacco by a hypothetical monopolist would be

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[22] Werden G., Froeb L. (2002), "Calibrated Economic Models Add Focus, Accuracy, and Persuasiveness to Merger Analysis", *www2.owen.vanderbilt.edu/luke.froeb/papers/sca10.pdf*, page 8.

unprofitable. Thus, the expert's conclusion was that the relevant product market should be wider and include moist snuff in addition to loose leaf chewing tobacco.[23]

The *Swedish Match* court explicitly addressed the possibility of using econometric analysis to estimate directly the elasticity of demand rather than inferring it from the observed gross margins.[24] Although the calculations of the margin in the critical loss analysis may be correct, the estimated market elasticity may be inconsistent with such high margins. Thus, econometric estimates of demand elasticities must be consistent with evidence about substitution, such as that implied by margins in order to be used accurately in econometric analysis.

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[23] O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, page 29.
[24] Katz M. and Shapiro C. (2003), "Critical Loss: Let's Tell the Whole Story", *Antitrust magazine*, spring 2003, a publication of the ABA Section of Antitrust Law, page 52.

Criticisms of Critical Loss Analysis

As we have seen critical loss analysis plays a crucial role in market. However, it entails drawbacks that mitigate the efficiency and accuracy of its application. Some of these criticisms concern the percentage change in the base price. The formulas for critical loss analysis indicate their dependence on the significance threshold for price increases and the price-cost margin[25] for the market. While a five per cent price increase would not be profitable for a hypothetical monopolist, a slightly larger price increase could be profitable. This can occur if some existing consumers are more responsive to price changes than others. Whether a five per cent relative price increase is profitable will depend on whether the loss of sales resulting from the price increase can be offset by the increase in profits. As the abovementioned analysis has indicated, it is not essential that all customers switch products as a result of the relative price increase, rather that an adequate number of customers do switch so as to make this price increase unprofitable.

Werden (2002) presents three scenarios in which critical loss analysis can be misleading.[26] In these scenarios, the application of the critical loss analysis formulas may indicate that the market is broader than it actually is. According to Werden (2002), the application of these formulas may mislead because they do not explore the extent to which the hypothetical monopolist would sacrifice his sales to customers with elastic demands in order to exploit customers with inelastic demands.

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[25] Price-cost margin is equal to price minus marginal cost, all divided by price. The marginal cost of an additional unit of output is the cost of the additional inputs needed to produce that unit of output.
[26] Werden G. (2002), "Beyond Critical Loss: Tailoring Applications of the Hypothetical Monopolist Paradigm", available from *http://papers.ssrn.com/sol3/papers.cfm?abstract_id=327281.*

These scenarios include cases where different uses of the product entail different elasticities. That may be due to the fact that the use of a product may present different substitution possibilities or different prices for substitutes and thus the demand for the product may be elastic for some customers and inelastic for some others.[27] The application of critical loss analysis may also be misapplied if the product has multiple uses. In addition, different marginal costs due to products being produced in many plants with different methods, as well as the disregard of the savings in fixed costs associated with ceasing the operation of plants, may also lead to erroneous results of critical loss analysis.

In addition to Werden (2002), Katz and Shapiro (2003) as well as O'Brien and Wickelgren (2003) have expressed reservations about the efficiency and accuracy of standard critical loss analysis.[28] In a series of papers they have criticised the "standard critical loss analysis". Their approach has, in turn, been criticised by Sheffman and Simons (2003). In this article we will deal with some of the issues that arise from these papers and have been given little or no attention. We will omit issues such as kinked demand curve and the appropriate economic model since these have been extensively addressed by the abovementioned papers.

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[27] Ibid. page 3.
[28] The principal articles raising questions concerning critical loss analysis are: Katz M. and Shapiro C. (2003), "Critical Loss: Let's Tell the Whole Story", *Antitrust magazine*, Spring 2003, a publication of the ABA Section of Antitrust Law, O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, Sheffman D. and Simons J. (2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand the Whole Story", available from *www.antitrustsource.com*, November 2003, Danger K. and Frech III H.W. (2001), "Critical Thinking about Critical Loss in Antitrust" *Antitrust Bulletin*, James Lagenfeld J. and Li W. (2001), "Critical Loss Analysis in Evaluating Mergers", *Antitrust Bulletin*. The issues raised in these papers are similar. This paper will deal with and expand on the issues raised in the first three papers.

O'Brien and Wickelgren (2003) argue that critical loss analysis fails to recognize that a firm's margin provides information about the magnitude of the sales that it is likely to lose from a price increase and ignores the importance of the degree of substitutability[29] among the products of the firm implementing the price increase. If margins are high, so that the diverted sales are highly profitable, the merged firm will have a relatively higher incentive to raise price absent offsetting entry, product repositioning, or efficiency gains.[30] Their most important result is that higher margins typically make it more likely that a price increase by merging firms will be profitable. Thus, because large gross margins may mean that the critical loss is small, it follows that the relevant market is wide.

However, this argument is contentious since large margins can be observed as a result of anticompetitive conduct as well as in industries with differentiated products in which, the products of different firms are not close substitutes. The degree of profitability of a price increase will depend on the elasticity of the product involved. If the product is highly elastic then any price increase will divert sales to substitute products and therefore significantly affect profits. Such a result will depend on the extent to which substitute products exist and can be offered to consumers. If the firms producing substitute products face capacity constraints such as significant costs or time constraints or new firms face barriers to entry in the market, then the price increase by the incumbent firm is likely to be very profitable.

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[29] The degree of substitutability between two products is indicated by the cross-price elasticity. The concept of cross-price elasticity of demand refers to the responsiveness of the quantity demanded of one good to changes in the price of another good. See further: Bannock G., Baxter R.E., Rees R. (1985), 3rd ed., "*The Penguin Dictionary of Economics*", Penguin Books, England. Page 106.

[30] O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, page 3.

O'Brien and Wickelgren (2003) also argue that the closer substitutes there are for a firm's product, the lower the firm's margin must be, and thus the lower the price,[31] to prevent customers from switching to those products.[32] However, as the abovementioned analysis indicates, the closeness of substitution between products does not only depend on the degree of differentiation of these products, but also on factors such as capacity constraints and barriers to entry and expansion.

An important assumption that O'Brien and Wickelgren (2003) make as regards the use of critical loss analysis in merger assessment is that the merger enhances the degree of coordination between the merging firms' products.[33] The authors also argue that when two or more substitutes come under common ownership, the degree to which competition is reduced is greater when margins are high than when margins are low.[34] Enhanced coordination is vital if the merging firms' products are substitutes, since any substitution between the two firms' products, due to the relative increase of one of the product's price, will merely redistribute revenues between the two partners of the merged firm after the merger. Prior to the merger such substitution between the merging firms' products would translate in a loss in the revenues of the firm that increased its price. After the merger, this loss in revenues will be mitigated by the increase in revenues due to consumers switching to the substitute product that post-merger belongs to the merged firm.

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[31] As mentioned above in this paper, the percentage incremental profit margin is equal to initial price minus the average cost and this outcome divided by the initial price. Thus, assuming costs remain the same, for the firm's margin to be lower the price must also be lower.
[32] O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, page 30.
[33] The authors make additional assumptions most of which are addressed by Sheffman D. and Simons J. (2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand the Whole Story", available from *www.antitrustsource.com*, November 2003.
[34] O'Brien D. and Wickelgren A. (2003), "A Critical Analysis of Critical Loss Analysis", available from *http://www.ftc.gov/be/workpapers/wp254.pdf*, page 31.

Thus, if the merging firms' products can be significantly coordinated, the merged firm in increasing its prices takes into account that, following the merger, any substitution prior to the merger between the two merging firms' products due to the increase of one of the product's price will merely redistribute revenues between the two partners of the merged firm in the post-merger market. A merger thus, mainly internalizes the competition between formerly separately owned firms.

The statement that the merger enhances the degree of coordination between the merging firms' products is quite restrictive since in order the degree of coordination between the merging firms' products to be enhanced, these products must not be highly differentiated. The higher the degree of differentiation between the two products, the less likely is their coordination to be successful. In addition, if the merging firms' products are complements,[35] then the increase in the price of one of the merging firms' products will lead to the reduction in the quantity of both goods. Thus, there will be no redistribution of the revenues, generated by the relative increase of one of the merged firm's products, between the two partners of the merged firm after the merger.

O'Brien and Wickelgren (2003) also argue that large margins imply that actual loss is low.[36] As Katz and Shapiro (2003) claim, if a firm makes more money per unit sold, an indication of large margins, then it will take fewer new sales to offset the profitability losses associated with a given price decrease. High margins indicate the supplier perceives demand for its product to be relatively insensitive to its own price

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[35] Two goods are complements if their cross price elasticity is negative. If the price of one good increases, then the quantity demanded of this good as well as of its complement good decreases.
[36] As outlined in Sheffman D. and Simons J. (2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand the Whole Story", available from *www.antitrustsource.com*, November 2003, page 4.

reductions.[37] As they further argue, high margins indicate that the product faces inelastic demand, a typical reason being that the product is differentiated from other products. When products are differentiated, those customers who like a particular brand's attributes will continue to purchase that brand even after its price increases by a small amount.

However, inelastic demand for the product may not be the only or the most important factor of high margins. Factors such as economies of scale and scope[38] as well as other efficiencies in production may also explain the high margins without giving any information regarding the price sensitivity of the firm's product. In addition, the extent of low elasticity of the product (inelastic demand) will crucially depend on the degree of differentiation of the products. Furthermore, the degree to which buyers will remain loyal to a product due to its characteristics even after an increase in the price of the product depends not only on the particular features of the product but on the magnitude of the price increase as well. Thus, no accurate conclusions can be drawn regarding the relationship and link between high margins and low elasticity as well as between high margins and low actual loss.

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[37] Katz M. and Shapiro C. (2003), "Critical Loss: Let's Tell the Whole Story", *Antitrust magazine*, Spring 2003, a publication of the ABA Section of Antitrust Law, page 51.
[38] Economies of scale refer to the situation where long run average costs of production decrease as output rises. See further: Begg D., Fischer S. and Dornbusch R. (1997), "*Economics*", 5th ed., McGraw-Hill, UK. Page 109.
Economies of scope refer to the situation where the joint output of a single firm is greater than the output that could be achieved by two different firms each producing a single product (with equivalent production inputs allocated between the two firms). See further: Pindyck R. and Rubinfeld D. (1998), "*Microeconomics*", 4th ed., Prentice Hall International, New Jersey. Page 227.
Economies of scope are conceptually similar to economies of scale. Economies of scale apply to efficiencies associated with increasing or decreasing the scale of production and refer to changes in the output of a single product type. Economies of scope refer to efficiencies associated with increasing or decreasing the scope of marketing and distribution and refer to changes in the number of different types of products. In addition, economies of scale refer primarily to supply-side changes (such as level of production) whereas economies of scope refer to demand-side changes (such as marketing and distribution).

A type of market structure in which price elasticity is low but margins are not necessarily high is a post-merger market that is prone to collective dominance. In order for a collusive equilibrium to arise and sustain, certain criteria need to be fulfilled including transparency, barriers to entry and exit, a small number of firms, ability to co-ordinate towards equilibrium, ability to enforce compliance as well as ability to monitor and deter any prospective maverick firms. In addition, consumers and competitors must be unable to counterbalance the collective dominant position by switching demand or by increasing their capacity respectively in response to a reduction in supply by the post-merger dominant firm. These criteria depend on features such as product homogeneity, low demand growth, low price sensitivity of demand, symmetric cost structures and multi-market contacts.[39]

Thus, a collectively dominant market may exhibit low price elasticity but firms may not necessarily benefit from high margins due to all the abovementioned factors that make the sustainability of high margins quite difficult. As an example, there may be collectively dominant firms facing significant costs, in a market with stagnant demand. These are just two of the many factors that may decrease the margins of firms. In addition, some firms may have higher costs than others although the market as a whole may exhibit low price elasticity. Such differences in costs induce some firms to lose more sales than their critical loss even though the group could collectively raise its profits, thus affecting the likelihood of firms adopting and adhering to a common conduct and consequently affecting the sustainability of a tacitly collusive equilibrium.

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[39] Kokkoris I. (2005), "The reform of the European Control Merger Regulation in the aftermath of the Airtours case. The Eagerly Expected Debate: SLC v Dominance test", *E.C.L.R.*, issue 1, vol. 26, pp. 37-47. Page 37.

In *Nestlé*,[40] the Commission argued that although in a price-inelastic market, the likelihood of collusion in prices is significant, the asymmetries in cost structure would inhibit parallel behaviour.[41] Thus, as we can see, in collectively dominant markets, the extent of high margins may differ among firms in a low elasticity market due to *inter alia*, differences in costs.

Critical loss analysis may also be used in the assessment of the likelihood of a merger leading to collective dominance. A firm's incentive to cheat is significantly influenced by the contribution margin and thus the level of its individual critical loss. The extent of this incentive is measured by the level of sales an individual firm can afford to lose before the price increase becomes unprofitable. If a firm expects that cheating will increase sales by more than its critical loss, it will cheat on the price agreement.[42] The incentive of the firm to cheat makes the tacitly collusive equilibrium unlikely to sustain and thus the merger is unlikely to lead to collective dominance.

Thus, critical loss analysis may assist in assessing the likelihood of coordinated behaviour to raise prices when not all members of a group of competitors adopt the same conduct. In addition, if different competitors face substantially different actual losses arising from a coordinated price increase, critical loss analysis might demonstrate that some competitors would not find it in their interest to participate in a coordinated price increase.[43]

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[40] Case IV/M190, *Nestlé/Perrier* [1992] OJ L356/1, [1993] 4 C.M.L.R. M17.
[41] *Nestlé/Perrier*, at §124.
[42] Harris B. and Veljanovski C. (2003), "Critical Loss Analysis: Its Growing Use in Competition Law", *E.C.L.R.*, issue 5, pp. 213-218. Page 217.
[43] Sheffman D. and Simons J. (2003), "The State of Critical Loss Analysis: Let's Make Sure We Understand the Whole Story", available from *www.antitrustsource.com*, November 2003. Page 2.

Although O'Brien and Wickelgren (2003) argue that large margins indicate a low actual loss, a determining factor of the importance of low actual loss in the presence of high margins, as we have seen, is the post merger structure of the market. Irrespective of whether the actual loss will be low or high, its importance for the firms will depend on their market share. In case that the post-merger market is one with no substantially dominant firm, then the implications of a decrease in the quantity demanded as a result of a price increase are likely to be more severe than in the case of a dominant firm which has a significant share in the market. In the former case, each firm will have lower incentives to increase prices even in the presence of high margins because the actual loss may have substantial adverse implications for the firm's profits. In the latter case, a single firm being the dominant player in the market will control a higher share of the market and thus have an enhanced ability to increase prices, and reduce the demanded quantity for its product, without significant adverse implications for its total profits and viability.

Thus, the adverse implications of actual loss will be less severe for a dominant firm, compared to the implications of actual loss for a non-dominant firm. So firms will not base their decision of increasing prices strictly on whether the critical loss is greater or smaller than actual loss but will take a decision based on the implications of the actual loss for the firms' profitability and viability.

Finally, in anticompetitive market structures, the cellophane fallacy may mitigate the efficiency and accuracy of critical loss analysis. The large margins may be a result of the fact that the firm already has market power and thus no accurate conclusions can

be drawn for the magnitude of the actual loss resulting from the increase in the prices

of the firm's products.

Concluding Remarks

Critical Loss Analysis is commonly used in delineating markets. It provides a simple technique which can add more rigour to the assessment of market definition and market power. The methodology for critical loss analysis needs to make more complete use of pre-merger market facts and focus attention on demand-side issues such as substitutability, degree of differentiation of products and in effect the extent to which the products in the candidate relevant market compete more directly with each other rather than with products outside the candidate market. Critical loss analysis remedies a number of deficiencies in the current approach to market definition, which focuses excessively on product characteristics and absolute price differences, and ignores the profitability of hypothetical price increase.

In this paper we also addressed the criticisms of critical loss analysis as these have been indicated in the academic literature. Although the papers by Katz and Shapiro (2003), O'Brien and Wickelgren (2003) and Sheffman and Simons (2003) address several of the drawbacks of standard critical loss analysis, some issues still remain unresolved and were analysed in this paper. Critical loss analysis based on demand or cost assumptions at variance with actual market conditions should not be considered accurate for the purpose of defining the market. Critical loss analysis remains an appropriate technique for market definition, provided that the actual loss associated with hypothesized exercises of market power is accurately estimated.