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# Critical Loss Analysis in the *Whole Foods* Case

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In the matter of the U.S. Federal Trade Commission (FTC) versus Whole Foods (hereinafter *Whole Foods*),<sup>1</sup> the economist for Whole Foods, Professor David Scheffman, applied “Critical Loss” (CL) analysis to the issue of market definition in the proposed merger of Whole Foods and Wild Oats. Our point in this comment is not to criticize the application of critical loss analysis to market definition in that particular case. Rather, we illustrate why the CL analysis used by Whole Foods’ economist is not useful as a general matter. In our view, the type of analysis he presented is so fundamentally flawed that it cannot be used as a tool of market definition.

### Professor Scheffman’s Approach to Critical Loss Analysis

Scheffman’s analysis begins with the calculation of the CL—the minimum percentage reduction in sales that would make a “small but significant non-transitory increase in price” (SSNIP) by a hypothetical monopolist unprofitable. As he and others have pointed out, this part of the analysis is “just arithmetic”. If a hypothetical

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<sup>1</sup> *Federal Trade Commission v. Whole Foods Market, Inc.* 502 F.Supp. 2d (D.D.C. 2007).

monopolist of a given set of products were to raise price, then there would be two effects on its profits. First, at the higher price the monopolist sells fewer units, reducing profits. Second, the units that buyers still purchase fetch a higher price, raising profits. The CL is the reduction in sales that balances these two effects, leaving the hypothetical monopolist's profits unchanged. Any "Actual Loss" (AL) larger than the CL would make the price increase unprofitable. One may calculate the CL from the hypothetical monopolist's margin,  $m$ , and the magnitude of the hypothetical increase in price,  $X$ . The formula for CL is:

$$(1) \quad CL = \frac{X}{X + m} .$$

For example, if  $X = 0.05$  and the hypothetical monopolist's margin is  $m = 0.40$ , then  $CL = 0.11$ —a reduction in quantity of greater than 11 percent would make the postulated price increase unprofitable.

The next step in Scheffman's analysis is a lengthy review of qualitative evidence that, he asserts, proves that the AL for a hypothetical monopolist would greatly exceed the CL threshold. He concludes that consumers are too price-sensitive to make the proposed SSNIP profitable. He provides no quantitative evidence for the magnitude of the AL that could be compared to these thresholds, and no methodology for calculating the AL. He simply asserts that the AL would "far exceed" the threshold.

However, it is not clear how such evidence—whether quantitative or qualitative—could ever convincingly establish his conclusion that a hypothetical monopolist would not find it profitable to raise price by a small amount. The key ingredient in the critical

loss calculation is the initial margin,  $m$ , of one of the merging firms. A well-known result of basic economics is that a profit-maximizing seller sets price so that the actual percentage reduction in quantity sold from a small percentage increase in price is equal to  $1/m$ . This means that the seller's margin already reflects the actual loss in sales that a firm, with explicit knowledge of the market and of the responsiveness of buyers to price changes, would expect if it raised price. In other words, the actual loss from a small increase in price by one of the existing firms must be roughly *equal* to the critical loss, because that is the balance a well-informed seller considers in setting price. Scheffman's claim that consumers are too price sensitive to warrant a price increase starting from the current margin literally means that margins cannot be as high as they actually are. Moreover, since we use the margin of one of the existing firms as the starting point of the analysis, and since the firm faces competition from within the putative market in the pre-merger world, the actual loss of the hypothetical monopolist must be even smaller because fewer substitutes are, by definition, available to consumers when sellers merge and all substitution must occur outside the putative antitrust market.

Scheffman's analysis ignores this basic fact and the tension it creates for his "evidence". If he is correct about the size of the actual loss, and the actual loss of sales from a price increase is far larger than the critical loss, then sellers are pricing too high and their margins are too large to be consistent with profit maximization. If sellers *are* maximizing profits (which CL analysis assumes), then his conclusions about actual loss *must* be wrong. Either way, his analysis is inconsistent with the evidence on which it is based.

Every piece of evidence Scheffman offers to argue that consumers would be very sensitive to a price increase by the hypothetical monopolist applies with equal (in fact greater) force to show why consumers would be very sensitive to price *reductions* by the existing firms. That is, if it is not profitable to raise price because the actual loss is so large, then it must be profitable to *reduce* price because the gain in sales would be larger than a threshold “Critical Gain” (CG). Again, his arguments imply that the seller is not maximizing profits.

Katz and Shapiro (2004) and by O’Brien and Wickelgren (2003) raised this exact issue in their critiques of the misuse of CL analysis.<sup>2</sup> In a paper with Joseph Simons,<sup>3</sup> Scheffman responded to the Katz-Shapiro critique and argued that it is *possible* that the hypothetical monopolist would not want to increase price even if the existing firms do not want to decrease price—consumers might respond more to price increases than they do to price decreases—a phenomenon referred to as the “kinked demand curve”. It is true that this *ad hoc* pattern of consumer responses would reconcile things, but what is the evidence? Economic theory makes no prediction that consumers would respond more to price increases than to decreases, and in *Whole Foods*, Scheffman cited no evidence of such an asymmetric response for the markets in question, or any others.

The prediction that existing firms should cut price is problematic because the theory Scheffman uses to predict that a hypothetical monopolist would not raise price

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<sup>2</sup> Michael L. Katz and Carl Shapiro, *Further Thoughts on Critical Loss*, ANTITRUST SOURCE (Mar. 2004) and Daniel P. O’Brien & Abraham L. Wickelgren, *A Critical Analysis of Critical Loss Analysis*, 71 ANTITRUST L.J. 161–84 (2003).

<sup>3</sup> David T. Scheffman & Joseph I. Simons, *The State of Critical Loss Analysis*, ANTITRUST SOURCE (Nov. 2003). See also Daniel P. O’Brien & Abraham L. Wickelgren, *The State of Critical Loss Analysis: Reply to Scheffman and Simons*, ANTITRUST SOURCE (Mar. 2004).

implies that existing firms would earn greater profits if they charged lower prices. He provides no explanation or evidence for why sellers would forego these profits. Since his “model” predicts that existing firms will price lower than they actually do, it will almost certainly under-predict the price that a hypothetical monopolist would charge. Both predictions are based on precisely the same framework and exactly the same “evidence”.

In fact, there is an important reason to believe that sales would be more sensitive to price decreases by existing firms than to price increases by the hypothetical monopolist. Existing firms have the ability to draw sales from other firms in the putative market whereas, by definition, the hypothetical monopolist does not. The ability to draw sales from other firms within the putative market makes individual firms’ sales even more sensitive to price than would be the sales of the hypothetical monopolist (to price decreases or price increases). This observation—that a hypothetical firm controlling all of the capacity in the market would face less elastic demand than would the individual firms—is the centerpiece of horizontal merger policy.

### **Market Definition in Merger Cases Is about Changes in Pricing Incentives**

One approach to “fixing” the CL analysis presented by Scheffman in *Whole Foods* is to find out what causes his model to understate the incentive for firms to raise price. For example, he might overstate the initial level of a seller’s margin,  $m$ . Then his estimate of the CL in (1) is too small, as is the implied threshold for the CG. This could reconcile actual pricing decisions with his qualitative claims about consumers’ high degree of price sensitivity. But this raises a new problem for his approach: he must show that the price sensitivity falls right in the range where the AL for the hypothetical

monopolist is more than the CL while the actual gain for the individual competitors is smaller than the CG. He is caught in the middle, having to fight against both ends. In *Whole Foods*, this would mean establishing that the gain to existing firms from cutting price is less than 2.5 percent of sales for each one percentage point reduction in price while the loss in sales to the hypothetical monopolist from raising price would be greater than 2.2 percent for each percentage point increase in price. Proving that price sensitivity falls precisely in the required range based on the type of qualitative evidence produced by Scheffman is impossible, as would be finding econometric evidence of sufficient precision.

There is a better solution. One can perform a useful analysis of the relevant market that is consistent with the current behavior of existing firms without precise evidence on the level of price sensitivity faced by the hypothetical monopolist. The key idea is that the amount by which a hypothetical monopolist would be able to increase price above its current level depends on how the incentive to raise price *changes* when the hypothetical monopolist replaces individual sellers, who would price unilaterally. Focusing on how incentives change allows us to take maximum advantage of the available evidence on pricing incentives by calibrating the model to the observed pricing behavior of actual firms. In our opinion, the evidence on margins from the actual market provides the best economic evidence on price sensitivity and pricing incentives. Focusing on how the merger changes incentives leverages this information. If the incentive to raise price does not change when we switch from the independent firm to the hypothetical monopolist, then the hypothetical monopolist would not find it profitable to increase

price. Then the candidate market would not qualify as a relevant antitrust market under the SSNIP test.

Pricing incentives will typically change when we postulate the hypothetical monopolist. When a single firm raises price, it will increase the profits of its competitors by shifting sales in their direction or by allowing them to increase price as well. Since the hypothetical monopolist (the sole price setter) sets prices to maximize the joint profits of all of the firms in the market, this sole seller will “internalize” the gains of other firms in its pricing decision, and so it will have a greater incentive to raise price than did the individual firms, who were unable to “internalize” their diversions towards one another.

To assess whether it would be profitable for the hypothetical monopolist to increase price by some critical amount,  $X$ , above the current level, we simply need to determine whether the profit increase to other firms in the proposed market more than compensates for the profit loss suffered by the candidate firm that raises its price. The amount of profits gained by the other firms in the market can be directly assessed if we know two things. First, we need to know what fraction of any sales lost by the firm raising price will be captured by other firms in the candidate market; these are sales that would be lost to an individual firm raising price, but would be retained by the hypothetical monopolist. This is commonly referred to as the “aggregate diversion ratio”. Second, we need to know the incremental profit on these transferred sales. Together, the diversion ratio and the profit margin will determine how much the other firms gain when an individual firm raises price.

A larger fraction of sales diverted to other firms in the market or a larger profit



margin on these sales will make the incentive to increase price greater for the hypothetical monopolist. Note that the information used in a correctly formulated CL analysis is about how the incentives to increase price change when we allow all firms in the industry to “merge”, as they do in the hypothetical monopolist test. But this is exactly what should matter in a merger case: how do pricing incentives change as we combine firms?