

Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition[†]

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Abstract

We propose a simple, new test for making an initial determination of whether a proposed merger between rivals is likely to reduce competition and thus lead to higher prices. Under current antitrust policy, the government can establish a presumption that a proposed horizontal merger will harm competition by defining the relevant market and showing that the merger will lead to a substantial increase in concentration in that market. However, this approach can perform poorly in markets for differentiated products, where market boundaries are unclear and the proximity of the products sold by the merging firms is a key determinant of the merger's effect on competition. Our test looks for upward pricing pressure (UPP) resulting from the merger. We develop a simple diagnostic for UPP based on the price/cost margins of the products sold by the merging firms and the magnitude of direct substitution between the two firm's products. We argue that our approach is well grounded in economics, workable in practice, and superior to existing methods in a substantial class of mergers.

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In recent years, the Antitrust Division of the Department of Justice (DOJ) and the Federal Trade

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initially on “unilateral effects” (described below) and assessing the change in pricing incentives due to the proposed merger.⁷

1. Problems with the Presumption Based on Concentration

For almost half a century, merger control policy has relied on the presumption that a merger which substantially increases market concentration is likely to be anti-competitive. In the landmark 1963 *Philadelphia National Bank* case, the Supreme Court held:⁸

This intense congressional concern with the trend toward concentration warrants dispensing, in certain cases, with elaborate proof of market structure, market behavior, or probable anticompetitive effects. Specifically, we think that a merger which produces a firm controlling an undue percentage share of the relevant market, and results in a significant increase in the concentration of firms in that market, is so inherently likely to lessen competition substantially that it must be enjoined in the absence of evidence clearly showing that the merger is not likely to have such anticompetitive effects.

This “structural presumption” drew on the then-dominant structure-conduct-performance paradigm in industrial organization economics, which linked increases in concentration to declines in market performance. In recent decades, however, industrial organization scholars and the courts have been more apt to stress that high concentration can be compatible with vigorous competition and efficient market performance. Thus, while *Philadelphia National Bank* has never been overruled, its presumption has greatly weakened over the past 30 years.⁹

As explained in their *Horizontal Merger Guidelines* (“Guidelines”), the agencies consider two basic theories of anti-competitive effects.¹⁰ “Coordinated effects” arise if the merger would increase the likelihood of (perhaps tacit) collusion with other firms. “Unilateral effects” arise if the merger would give the merged entity a unilateral incentive to raise prices (or otherwise harm consumers).¹¹ The DOJ and the FTC have perhaps the largest concentrations of Ph.D. industrial organization economists in the world, and they do not mechanically rely on concentration and market shares, but seek flexibly to understand the economics of the industry. Economic analysis of unilateral effects, in particular, has advanced greatly in recent decades, but the Guidelines remain oriented towards invoking the *Philadelphia National Bank* presumption in litigation (despite its decreasing force), and try to shoehorn modern economics into the structural

⁷ On aspects of merger policy beyond the immediately proposed merger see e.g. Lyons (2002) and Nocke and Whinston (2008). Since firms, like other human organizations, probably do not reliably optimize, policy could consider a less intense focus on incentives and more focus on biodiversity-like concepts of resilience; but here we stick to the standard approach.

⁸ *United States v. Philadelphia National Bank*, 374 U.S. 321, 363 (1963).

⁹ On the decline of the structural presumption, see Jonathan Baker and Carl Shapiro (2008).

¹⁰ The Guidelines are available at <http://www.usdoj.gov/atr/public/premerger.htm>.

¹¹ In practice the concept of “unilateral effects” is sometimes interpreted as “effects within a static oligopoly model.” A more general definition, which we adopt here, is “effects of a change in the merging firms’ choices, holding fixed

framework. Thus the Guidelines begin by defining the relevant market, and stress market concentration as a signal of competitive effects. This mismatch has created a tangle of problems.

The problems are particularly pronounced in the large class of mergers in which the merging firms sell differentiated products and the agencies are concerned about unilateral effects. This class probably includes most mergers in retailing, branded consumer products, computer hardware and software, and information content (magazines, newspapers, music, video programming). Because of the differentiation, defining the relevant market can be problematic, and the link between market shares and competitive effects can be weak and/or confusing. When Amazon.com teamed up with Borders on-line, was the relevant market on-line book retailing or all book retailing? When Miller acquired Coors, was the relevant market domestic beer, all beer, all alcoholic beverages, or all beverages? Such definitional questions are typically central in court, while economists wonder how the outcome of a merger case can turn on an inevitably somewhat artificial and arbitrary line-drawing exercise.¹²

Seeking to address this arbitrariness, the Guidelines offer a specific and theoretically well-defined algorithm for market definition, the so-called “hypothetical monopolist” test, under which a “relevant market” is a collection of substitute products that could profitably be monopolized. When gross margins are substantial, Shapiro (1996) and Katz and Shapiro (2003) showed that this algorithm often leads to relatively narrow markets.¹³ But the merging parties (who typically argue for broader markets, in which their shares are smaller) can point to some

willing to pay \$18.50 [per share] for a company that has lost \$60 million in the last six years. If we can't eliminate those stores, then Wild Oats, frankly, isn't worth buying."¹⁶

Seeking to block the merger, the FTC tried to assert the structural presumption, requiring it to establish "the relevant market." As the Court of Appeals later noted, there was strong evidence that Whole Foods and Wild Oats were especially close competitors among supermarkets. "Whole Foods's internal projections, based on market experience, suggested that if a Wild Oats near a Whole Foods were to close, the majority (in some cases nearly all) of its customers would switch to the Whole Foods rather than to conventional supermarkets."¹⁷ Seeking to express this closeness in the language of market definition, the FTC argued that Whole Foods and Wild Oats competed in a market for "premium natural/organic supermarkets."

But of course Whole Foods' customers can buy groceries—even many organic foods—at Safeway too: patrons of Whole Foods and Wild Oats also "cross shop" at traditional supermarkets. Thus the District Court ruled that "...the FTC has not met its burden to prove that 'premium natural and organic supermarkets' is the relevant product market in this case for antitrust purposes."¹⁸ The Court stated (at 5):

[If] the relevant product market is, as the FTC alleges, a product market of "premium natural and organic supermarkets" consisting only of the two defendants and two other non-national firms, there can be little doubt that the acquisition of the second largest firm in the market by the largest firm in the market will tend to harm competition in that market. If, on the other hand, the defendants are merely differentiated firms operating within the larger relevant product market of "supermarkets," the proposed merger will not tend to harm competition.

Whether or not the merger between Whole Foods and Wild Oats was anticompetitive, the market definition inquiry addressed that question at best indi

2.Pricing Pressure Effects of a Merger

Merger investigation usually begins by considering the merger's effects on pricing incentives, holding fixed the set of firms (except for the change due mechanically to the merger) and of their products.²⁰ When rivals merge, there are two direct effects on pricing incentives. First, the merging firms no longer compete with each other to attract customers: this generically encourages higher prices.²¹ Second, the firms' assets can now be managed jointly to achieve

Using the implicit function theorem, the change in the profit-maximizing level of s resulting from the merger can be gauged by $\pi_B'(s)/[-\pi_A''(s)]$.²² But, as we discuss in Section 3, estimating the second derivative, $\pi_A''(s)$, is often particularly difficult. In the case of a single firm setting its price, the second derivative of the firm's profits with respect to its price depends upon the curvature of the residual demand curve facing the firm. In an oligopoly context, this second derivative no longer depends upon the properties of a single-firm optimization problem. One must account for how Firm A's rivals will respond if Firm A changes its price, leading to an equilibrium comparative statics problem. This is not the stuff of simple rules on which presumptions can be based. We thus propose that a test to establish a presumption of harm to competition should not rely on merger-specific estimates of the magnitude of the merger's effects on competitive variables such as price.

Instead, we quantify the merger's effects by conc

Proposition 2 below characterizes the tax that supports the new profit optimum, but calculating it requires knowing the price effects of the merger, so it is not helpful in estimating those effects. But it is simple to calculate the first-round value of the tax—that is, the inter-division externality

calculated at pre-merger prices and outputs. This first-round tax on Product 1 is $\bar{t}_1 \equiv \left. \frac{d\pi_B}{dX_1} \right|$, or

$$\bar{t}_1 \equiv \left. \frac{d\pi_B}{dX_2} \right| \frac{dX_2}{dX_1}. \quad \text{Here } \frac{d\pi_B}{dX_2} \text{ is the marginal profit of Product 2 at pre-merger prices and outputs.}$$

mergers involving some Product 1 with $\bar{\tau}_1 > 0$, and it would presumably be wasteful overkill to flag all such mergers as presumptively problematic. Rather, one would look for $\bar{\tau}_1$ to be in some sense “substantial,” and indeed the Clayton Act refers to a “substantial” harm to competition.

In Subsections B and C, we present a clean and simple interpretation of what is “substantial” that fits well with widespread assertions that (a) merger enforcement’s goal is to protect consumers against price increases due to loss of competition, and that (b) there is no “tolerance” for small anticompetitive price increases. We then discuss some broader interpretations.

B. Merger Efficiencies

By permitting combinations of factors that it would be hard to bring together across organizational boundaries, a merger can lead to cost savings. If it reduces marginal cost, this factor mitigates and can reverse the upward pricing pressure $\bar{\tau}_1$ just discussed. Because $\bar{\tau}_1$ is a virtual marginal cost, it is directly comparable with marginal-cost efficiencies.

In principle one could use all available information to quantify marginal-cost efficiencies from a proposed merger. But merger-specific efficiencies are often very hard to predict, even for the firms themselves but especially for antitrust agencies and courts. Since we are seeking a simple screen, we propose (in line with current practice) postponing any detailed evaluation of merger efficiencies until the post-screen stage discussed in Section 4 below. But there could be a range of ways to establish a default estimate of marginal-cost efficiencies.

The simplest approach would credit some default level of marginal-cost efficiencies for each overlap product, effectively presuming that merger synergies will reduce the marginal cost of each overlap product by some given fraction E , so that the efficiencies for Product 1 are assumed to be $E\bar{C}_1$. Following Warren-Boulton (1985), we call this the “standard deduction,” meaning that merging parties need not prove this level of efficiencies (“itemize”) to be credited with them.²⁶ The standard deduction could be set based on evidence of the efficiencies that commonly result from horizon6TJa.a8e

C. Net Pricing Pressure

In its pure form, our test asks whether, on balance, the merger causes upward pricing pressure, which it does for Product 1 if the cannibalization term \bar{t}_1 exceeds the marginal-cost efficiencies credited at the screening stage, for instance through the standard deduction. This test thus flags mergers that “may significantly” harm competition in the sense that, net of credited efficiencies, they create upward pricing pressure.²⁸

If the merger creates net UPP for Product 1, basic economic theory unambiguously predicts that the price of Product 1 will rise, holding fixed other prices. Given a demand curve for a product, the inference that an increase in marginal cost leads a profit-maximizing firm to set a higher

concentration may not accurately gauge competitive effects. In the simple case of a merger between two single-product, Bertrand price-setting firms, the proposed merger creates net upward pricing pressure for Product 1 if

$$12 \left(\frac{\bar{c}_2}{2} \right) > \frac{\bar{c}_1}{2}$$

E. Simple Test Understates Competitive Concerns

The full cannibalization effects are augmented by three forces not reflected in inequality (1):

- If the price of Product 2 rises (as it will if there is net UPP on both products), that will raise the margin on Product 2 and elevate the cannibalization term for Product 1.
- If the merger lowers the marginal cost of Product 2, it will raise the margin on Product 2 and thus raise the cannibalization term for Product 1, \bar{t}_1 .
- These effects operating on Products 1 and 2 reinforce each other.

Due to these effects, inequality (1) understates the competitive concerns, causing some false negative test results. As the cost of some complexity, these errors can be reduced.

In path breaking work, Werden (1996) calculates the “critical efficiencies” just sufficient to compensate for the loss of competition in a Bertrand industry taking this feedback into account. If actual or presumed efficiencies are below the critical levels, the Bertrand equilibrium prices of both products will rise. Based on Werden’s analysis, one can show that both prices will rise if

$$D_{12}(\bar{P}_2 - \bar{C}_2) + D_{12}D_{21}(\bar{P}_1 - \bar{C}_1) > E\bar{C}_1(1 - D_{12}D_{21}) \quad (3)$$

for Product 1 and likewise for Product 2.³²

Inequality (3) comes from solving two markup equations simultaneously. These calculations require no more information than our simpler condition (1) applied to Products 1 and 2, and need not intimidate economists.³³ Inequality (3) might, therefore, be very suitable for use within the DOJ and the FTC as they exercise their prosecutorial discretion.

However, in those rare cases where mergers are litigated, it may be overly optimistic to expect that inequality (3) would be readily accepted by generalist judges, who have to wrestle with the possibility of biased or incompetent testimony when faced with analysis that they have difficulty in understanding.³⁴ We believe that it should be possible to explain to an attentive judge the basic economic logic of viewing $D_{12}(\bar{P}_2 - \bar{C}_2) - E\bar{C}_1$ as a measure of net upward pricing pressure, but the complexities of full equilibration may quickly lose transparency. For this reason, we focus on inequality (1), while not excluding the prospect that inequality (3) could be used.

In the symmetric case, inequality (3) becomes

³² In particular, one can compare Werden’s equation (5) on p. 411 with the default efficiency level E .

³³ Inequality (3) does require measuring diversion ratios in both directions. Inequality (1) only requires measuring the diversion ratio resulting from changes in the price of Product 1.

³⁴ At the FTC’s Unilateral Effects Workshop in February 2008, a highly regarded merger litigator mocked our much simpler inequality (1) as overly complex for litigation purposes. But inequality (1) seems no more complex than the HHI calculations commonly used to measure market concentration.

$$\frac{D}{1-D} > E \frac{1-\bar{M}}{\bar{M}}, \quad (4)$$

which is easier to satisfy, but not appreciably more complex, than inequality (2).³⁵

F. Non-Bertrand Pricing Behavior

We derived our basic test, inequality (1), under the assumption of classic, Bertrand price setting behavior. What if the merging firms and their rivals do not behave according to static Bertrand competition? For instance, suppose these firms typically respond to one another's price initiatives.

With general oligopoly behavior, the change in Firm B's profits when Firm A initiates a change in P_1 will involve both a change in the sales of Product 2, X_2 , and a change in its price, P_2 .³⁶

The change in X_1 from a given change in P_1 will also be affected by price responses.

Intuitively, the more pre-merger "accommodation" there is, the smaller is the loss of competition due to the merger, and hence the smaller is the marginal-cost efficiency that will compensate.³⁷

One could try to estimate all these effects, bu

In taking this position we stress that if the industry is clearly not Bertrand, and if that plainly exculpates the merger, then the firms will readily be able to rebut any presumption, and, foreseeing that, the agencies will presumably not go to court. The substantive question therefore is whether one's concern about a merger for which (1) holds should be assuaged if there is only murky evidence on whether the industry can sensibly be modeled as Bertrand, and/or a lack of clarity on whether using a more precise model of the industry would eliminate the concern.⁴⁰

We thus propose that a merger should be presumed to be anticompetitive if inequality (1) holds, and that arguments to the effect that (1) does not have predictive power in this industry should be considered later, as part of the back-end rebuttal or detailed analysis. We also note that the concentration approach to screening shares the feature, or bug, that it does not capture differences across industries in their pre-merger patterns of pricing dynamics.

G. Measurement Issues

Our test requires that one measure pre-merger gross margins (most obviously by measuring prices and marginal costs), and the diversion ratios between the two products. While this may not be easy or perfect, we stress that these variables must also be measured for so-called Critical Loss analysis, a leading quantitative technique of market definition.⁴¹

1. Measuring Gross Margins

Gross margins are also quantified in at least two other contexts.⁴²

In predatory pricing litigation, Areeda and Turner (1975) famously argued that marginal cost may be hard to observe, and indeed even the sign of gross margins is often disputed. But in predatory pricing litigation, almost by definition (under current rules), cost is relatively near price and small differences between “just above” and “just below” matter a lot. In many mergers, gross margins are fairly high, and the test result may not be especially sensitive to the measurement of marginal cost.⁴³

Meanwhile, a large empirical industrial organization literature treats gross margins (typically at a relatively aggregated level such as the industry) as a dependent variable.⁴⁴ This literature has

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become less fashionable, and one reason is a recognition that gross margins may be hard to measure in academic cross-sectional studies. But firms have an incentive to keep track of their

were often two of the leading bidders, suggesting a substantial diversion ratio. Since gross margins were very high, this merger likely would have generated a positive test result using our methods.

3. Sensitivity Analysis

For clarity we have presented our test in terms of point estimates for the gross margin, the diversion ratio, and the presumed efficiencies. But because the logic of the test is explicit, one can use sensitivity analysis intelligently. For example, suppose that documents indicate that the relative gross margin is between one-third and one-half. Using the illustrative efficiency parameter of $E = 10\%$, with a relative gross margin of one-third, equation (2) holds if the diversion ratio is at least 20%; with a relative gross margin of one-half, equation (2) holds if the diversion ratio is at least 10%. Then one could infer upward pricing pressure if the diversion ratio is clearly more than 20%, and need not develop a precise estimate.⁵⁰

3.Pass-Through: From Pricing Pressure to Competitive Effects

Applying Proposition 2 to a merger that generates the default efficiencies, $E\bar{C}_1$ and $E\bar{C}_2$, the post-merger price increases are those that would result from an increase in marginal cost of $t_1^* - E\bar{C}_1$ on Product 1 and $t_2^* - E\bar{C}_2$ for Product 2, with no changes in other market participants' cost functions. This observation does not provide a constructive method of calculating post-merger prices, because the t^* themselves depend on post-merger prices. But it shows how we can think of the price effects of a merger as resulting from a cost shift for the merging firms' products, without any change in industry structure.

B. Pass-Through Rates Are Complex and Hard to Estimate

This discussion shows the importance of the rate at which cost increases are passed through into higher prices. Importantly, this is not the pass-through rate for industry-wide uniform cost increases:⁵³ the relevant cost increases apply only to the merging firms' products. Moreover, we are concerned with the oligopoly *equilibrium* pass-through rates: how much do equilibrium prices rise, including equilibration of all price responses?

Pass-through of a single-product cost shock, holding fixed other prices, is complex but well understood. Consider a firm facing demand $X(P)$ with point elasticity $\varepsilon(P) = -\frac{P}{X} \frac{dX}{dP} > 1$.

Assume for simplicity that marginal cost C is constant in the relevant range. Bulow and Pfleiderer (1983) show that the pass-through rate,

These formulae imply that even R is inherently difficult to estimate: it depends on the *second* derivative of the demand function, which is typically hard to determine in a simple manner suitable for establishing presumptions. This complexity is unavoidable if one seeks to quantify the price effects of a merger: Proposition 2 tells us that the price effect of the merger is the same as the price effect resulting from cost shocks to the merging firms' products.⁵⁴

But quantifying the equilibrium price effects of cost shocks involves even more complexity: it also requires that one account for pricing responses by rival firms. If the direct effect is a price increase, then with upward sloping reaction schedules in Bertrand oligopoly, rivals increase their prices in an accommodating manner. This implies higher pass-through rates than in the single-firm case, but in a complex way that depends on oligopoly behavior and the whole demand system. And these effects matter a lot. Froeb et al. (2005) simulated the effects of the proposed MCI-Sprint merger using different demand systems, and found that the estimated effect using constant-elasticity demand was over seven times greater than that using linear demand.

Estimating equilibrium pass-through rates of asymmetric shocks using historical data might be possible in those happy circumstances where cost shocks applying just to the merging firms (possibly including previous mergers) have taken place and their price effects can be observed.⁵⁵ But in our experience these circumstances are relatively rare, plus it is not clear that R_1 is constant. As Froeb et al. (2005) observe, because demand curvature is difficult to estimate, it is almost always *assumed* via the choice of functional form for the demand system.⁵⁶ This modeling choice imposes a link between estimated point elasticity and estimated curvature.

Because the magnitude of predicted price effects varies so much with these somewhat arcane assumptions, for reasons that are opaque to non-economists, the methodology is hard to make robust and transparent. For this reason we believe it is better to base a presumption of harm to competition on the magnitude of the cannibalization term, leaving the difficult and problematic debate about pass-through rates to later investigation, if ever.

C. Test Based on a “Significant” Price Increase

Under current practice, before considering efficiencies at all one asks whether the proposed merger, *without efficiencies*, would lead to a “significant” price increase, such as at least a fraction G of the pre-merger price. This might seem a natural method of “raising the bar” for the government to establish a presumption that the merger is anti-competitive. Raising the bar

⁵⁴ The idea that the price effect resulting when a group of competing firms set their prices to maximize joint profits can be evaluated as the pass-through of a cannibalization term can also be applied to the hypothetical monopolist in the *Guidelines* for the purpose of market definition. See Farrell and Shapiro (2009).

⁵⁵ Baker and Bresnahan (1988) rely on such idiosyncratic cost changes to estimate a firm's residual demand curve.

⁵⁶ Commenting on merger simulation, Froeb et al. (2005) observe that the estimated pass-through of merger efficiencies depends on the choice of demand system (and show that this dependence can matter quite dramatically), and that demand systems that yield higher estimates of pass-through of efficiencies also yield higher “competitive h4(f)noencies,

$$D\bar{M} - E(1 - \bar{M}) > \frac{G}{R}$$

where R is now the pass-through rate for cost increases applying to both products.

To illustrate how this might work, suppose that a “significant” price increase is taken to be 5%, so $G = .05$. Then, with $R = 1/2$, a merger would be presumed to raise price if NUPPI is at least 10%. If we use $E = 0.1$, in the symmetric case NUPPI becomes $(D + 0.1)\bar{M} - 0.1$, so NUPPI is at least 10% if $(D + 0.1)\bar{M} > 0.2$. With $M = 0.4$, NUPPI would exceed 10% if $D > .40$. With $M = 1/2$, NUPPI would exceed 10% if $D > .30$.

Clearly, using inequality (6) with $G > 0$ is more permissive than using (1), especially if a low pass-through rate R_1 is used. Like (1), it illuminates the fact that unilateral concerns are strongest not only when the diversion ratio is high but also when gross margins are high.

Inequality (6) also illuminates the highly roundabout way in which efficiencies enter current practice under the Guidelines.⁶⁰ One first asks whether the merger, without any efficiencies, would lead to a “significant” loss of competition—which we broadly translate into “significant price increase.” This is akin to evaluating inequality (6) with E_1 temporarily set to zero, i.e., using inequality (5). As we have stressed, this requires one to form a (usually implicit) view on R_1 . If (6) holds with E_1 temporarily set to zero, one *then* asks whether the likely efficiencies outweigh the gross upward pricing pressure.⁶¹

when the broad industry is arguably “fairly competitive” and a full analysis (including investigation of pass-through) may exculpate it. This is just like the established practice of flagging concentrating mergers in highly concentrated industries but standing ready to let them through if the parties adduce (in the language of *Philadelphia National Bank*) “evidence clearly showing that the merger is not likely to have such anticompetitive effects.” Under our simple and clean test (1), the magnitude of the predicted effect is not relevant, but if a mixed test such as (6) is used, it would be open to merging firms to show that R_1 is small.

4. Rebuttal of the Presumption

Real-world mergers are complex, and the merging parties should be able to rebut any presumption based on a simple test. The strength of any presumption should depend upon how meaningful and powerful the test results are judged to be in the case at hand. If net upward pricing pressure has been demonstrated, there are a number of routes that the merging firms can take to rebut a presumption of harm.⁶⁷

A. Challenge to Estimated Variables in the UPP Test

Firms might show that, contrary to the government’s calculations, the test correctly applied does not identify net UPP. For example, they might show that the pre-merger marginal costs are higher (and thus closer to prices) than the government had claimed. Alternatively they might show that likely efficiencies are much higher than the standard deduction.⁶⁸

B. Pressure But No Significant Movement

As discussed above, merging firms might argue that, even with net upward pricing pressure, there will be no “significant” price increase because the relevant pass-through rates are low. This is irrelevant under our pure test.⁶⁹

C. Mixed Test Results

Proposition 1 tells us that a merger with the default level of efficiencies will lead to higher prices in Bertrand duopoly if there is UPP for both products. Proposition 1 does not apply if there is

⁶⁷ We are describing here a rebuttal process if the case is litigated in court. Of course we anticipate that the agencies would study these issues before suing to block a proposed merger, so these may be out-of-equilibrium rebuttals.

⁶⁸ An interesting procedural question is whether the government should have an opportunity to argue that the merger will not generate even standard-deduction efficiencies, or (very similarly) whether the efficiencies presumed at the screening stage must be shown to be credible and merger-specific at the later, more detailed stage.

⁶⁹ Stepping back from the consumer-surplus standard towards a total-surplus standard, one can note that if mergers are motivated by increases in profit, and if there is little or no anticompetitive effect, one can infer that there must be another profit motive, such as cost savings (though not necessarily in marginal costs). Janusz Ordover and Robert Willig (1993) state that “the potential magnitude of [unilateral] effects is likely to be small if the combined share of the parties is not substantial [$<35\%$], so that the transaction is likely driven by its creation of efficiencies rather than

net UPP for one product and not for the other, as for instance if inequality (1) holds for Product 1 (say) but not for Product 2. We nevertheless tentatively propose that a positive test result for any (significant) product should be enough to establish the rebuttable presumption. Obviously this implies that one strand of rebuttal from mixed UPP test results would be to argue that there will be no price increase on either product.

Another strand of rebuttal would argue that a price decrease on Product 2 will outweigh (from a consumer surplus standpoint) any price increase on Product 1.⁷⁰ We have not yet developed specific methods by which this could be shown, short of a full back-end analysis estimating the price effects of the merger, but it may be fruitful to explore the working assumption (related to assuming equal pass-through rates) that the ratio of the price increase for Product 1 to the absolute value of the price decrease for Product 2 is equal to the ratio of the UPP for Product 2 to the DPP for Product 2. For small price changes, the change in consumer surplus is proportional to the change in price times the number of units purchased. Armed with information about the quantities sold of Products 1 and 2, a simple calculation could illuminate whether aggregate consumer surplus would likely rise or fall. If this approach is taken, it will be important that the efficiencies used reasonably reflect the likely efficiencies for the two products.

D. Full Analysis of Competitive Effects

In the end, any merger case may come down in the end to the most complete feasible analysis of competitive effects. As under current practice, this back-end analysis could consider product repositioning, entry, and efficiencies, as in Sections 3 and 4 of the Guidelines.

5. Comparison with Merger Simulation

For many economists, a natural alternative to the market definition approach would be to (a) model the industry and the nature of competition, (b) calibrate the model using pre-merger data, and then (c) use the calibrated model to predict post-merger prices.⁷¹ This general approach is often called “merger simulation.” Our analysis uncovers the fact that merger simulation must implicitly or explicitly estimate the pass-through rate of the asymmetric cost shock described in Proposition 2. It is therefore unsurprising that, as Froeb et. al. (2005) found, the price predictions resulting from merger simulation depend very strongly on the demand system used. This often creates a battle of the experts, and although merger simulation is used by the antitrust agencies and by merging parties arguing before the agencies, we are not aware that any judge has accepted merger simulation as primary evidence on whether a merger would harm competition.⁷²

⁷⁰ This is presumably what is (explicitly or implicitly) argued when the plan of the merger is to shut down Product 1, as in Whole Foods or Oracle.

⁷¹ Another alternative is to exploit “natural experiments” in which we can observe market outcomes with and without competition between the merging parties. This could make it unnecessary to engage separately in market definition or other preliminary diagnostics, including ours. The Staples case is often cited as a prime example of this approach, although in that case the FTC still built its case by defining a relevant antitrust market.

⁷² For a recent survey of the use of merger simulation in litigation, see e.g. Budzinski and Ruhmer (2008).

Merger simulation also takes on more than necessary: it seeks to fit a structural model to historical industry data (back-casting) and then use that model to predict price levels after the merger (fore-casting). As such, it tries to explain price *levels*. In simple industries this may be all very well, but in more complex markets it risks mis-specification by omitting the less immediate and concrete aspects of firms' objectives and conduct.⁷³ Our focus on pricing pressure at the marginal-cost level automatically nets out such complexities that are present both before and after the merger, because it focuses on the *net change* in marginal cost, which is simple to calculate at pre-merger price and cost levels and robustly gives us a sufficient condition for prices to rise, while admittedly not telling us by how much.

6. Comparison with Market Definition

We have emphasized that our approach does not require estimating the pass-through rate. In this respect, our approach is simpler than the market definition methodology in the Guidelines. Like merger simulation, the "hypothetical monopolist test" in the Guidelines hinges on pass-through rates, although this fact is not generally appreciated. Indeed, Guidelines market definition is closely related to the simulation of a hypothetical merger that combines all of the products in a proposed relevant market within a single firm.⁷⁴

What should one make of situations in which our test indicates UPP but the merger does not lead to a significant increase in concentration in what appears to be the relevant market? One answer is that there may well be a narrower relevant market, using the methodology of the Guidelines, in which the merger would lead to a large increase in concentration. For instance, in *Whole Foods*, if the gross margins were moderate and the diversion ratio between Whole Foods and Wild Oats was large, then the FTC's narrow market definition was likely legitimate under the Guidelines. But the *Whole Foods* case itself illustrates that the courts can be uncomfortable with the relatively narrow markets implied by the Guidelines, preferring broader markets that include all "reasonable substitutes." In practice, courts find something peculiar about excluding from the relevant market products that clearly offer some meaningful competition for those of the merging firms. This problem is most severe when the merging firms offer very close substitutes but there is no clear gap in the chain of substitutes.

Our approach could be implemented without requiring that the courts abandon the use of market definition, and without requiring that the courts embrace the narrower relevant markets implied by the Guidelines. The government could define the relevant product market relatively broadly; this might correspond to a product market consisting of all supermarkets in the *Whole Foods*

⁷³ Merger simulation sometimes "backs out" estimates of marginal costs from firms' pricing choices, in which case it might capture these effects through the back door. As far as we know, however, this has not been thoroughly explored in the merger simulation literature.

⁷⁴ Like merger simulation, market definition, as performed in practice using critical loss analysis, often fails to focus on the *change* in pricing incentives. By instead attempting to model the pricing incentives of a hypothetical monopolist from scratch, some experts engaged in critical loss analysis have been led to opine that a hypothetical monopolist would face such elastic demand that it would have an incentive to lower the price below pre-merger levels, a glaring problem with the methodology. Werden (2008) calls this "Critical Loss Analysis by Defendants."

case. Within that market, the government could obtain its presumption by applying the pure version of our test, inequality (3), i.e., by asking whether the merger will create upward pricing pressure. If the modified version of our test reflected in inequality (6) is to be used, the government could obtain its presumption by showing that the net upward pricing pressure index, NUPPI, exceeds some threshold. The relevant product market would provide the context in which the merger would be analyzed, especially for any back-end analysis.

The government might need to explain to the court how the merger would lead to price increases for the products sold by the merging firms, even though their market shares in the relevant market are modest. This response might simply rely on the relatively low market concentration thresholds found in the Guidelines (§1.51(c)): “Where the post-merger HHI exceeds 1800, it will be presumed that mergers producing an increase in the HHI of more than 100 points are likely to create or enhance market power or facilitate its exercise.” For instance, a seven to six merger in a symmetric industry would raise the HHI from 1429 to 1837. True, it might well startle today’s antitrust community if the agencies actually challenged a symmetric seven-to-six merger.⁷⁵ In part, the low enforcement rate for mergers in this range reflects the fact that any structural presumption may be overcome by other factors. But it also reflects the relatively narrow relevant markets under the Guidelines. Modest increases in concentration in those markets are less likely to harm competition than are comparable increases in broader markets.

In cases where there is UPP but the market shares of the merging firms in the broad market are too low to establish any structural presumption, the government would need to explain how the merger would lead to the loss of important, localized competition between the two merging firms. Diversion ratios would undoubtedly be central to this explanation. The government might also need to clarify that the price increases resulting from the merger would not apply uniformly to the entire relevant market. And, of course, the merging parties could rebut the government’s case by showing, for example, that firms in the broader market could rapidly reposition their products, deterring or offsetting any localized post-merger price increases.

Many of these ideas relating to localized competition could be expressed in market-definition language using the concept of a “submarket.” In the *Whole Foods* case, this would correspond to a submarket of premium natural and organic supermarkets, within the larger competitive space of all supermarkets. Indeed, the Court of Appeals in *Whole Foods* seemed to revive the notion of submarkets, which had fallen out of favor. It remains to be seen whether the use of submarkets

⁷⁵ The FTC reports that between 1996 and 2005 it investigated 37 mergers for which the post-merger HHI was between 1800 and 2400 and the change in HHI was between 100 and 300, of which it took an enforcement action for only 18. See Table 3.1 from “Horizontal Merger Enforcement Data: Fiscal Years 1996-2005,” available at <http://www.ftc.gov/os/2007/01/P035603horizmergerinvestigationdata1996-2005.pdf>. The FTC’s universe was 188 mergers for which a second request was issued under a horizontal theory of harm to competition. As shown in Table 2, these mergers involved 976 total relevant markets. This study therefore omits mergers that involved significant increases in concentration but for which no second request was issued. Table 4.1 slices the data based on the FTC’s assessment of the number of significant competitors rather than the HHI. These numbers almost certainly overstate recent merger enforcement, since they only report on merger cases assigned to the FTC and merger enforcement at the DOJ has been significant more lax than at the FTC in recent years; see Baker and Shapiro (2008). Of course, as our discussion stresses and as antitrust practitioners are well aware, such statistics depend heavily on the market definition used, and the FTC’s market definition was simply asserted in most of these 37 mergers.

by the *Whole Foods* court will revive this concept or come to be seen as a peculiar throwback to the 1960s. If the submarket concept is revived, this could afford the government a way to establish the structural presumption in a Guidelines market, i.e., in a *submarket*, even in cases where the court is unwilling to define the relevant *market* so narrowly, perhaps because it concludes that a broader group of products must be considered in the overall analysis. Carefully used, the revival of submarkets could thus be a positive step. However, the market definition exercise would still be roundabout in comparison with our approach, it would still depend upon the pass-through rate, and it would still fundamentally be a line-drawing exercise based on poorly-justified parameters such as the HHI thresholds and the size of the SSNIP.

7. Tailoring and Transparency

We have put forward a simple test to flag horizontal mergers that, based on fundamental economics, *seem likely* to raise prices or similarly harm competition. As discussed above, we envision that if the simple screen goes awry, the merging parties (or, in the case of false negatives, the government) should be able to show this by detailed analysis of the merger’s likely effects (as they can now with the screen based on concentration). Even so, errors in the screen may be socially costly. Should the screen itself seek to incorporate more of the possible complexities that will certainly arise in the detailed back-end analysis?

This is a question of judgment more than of economic analysis as such. Our antitrust experience suggests to us that a simple and transparent screen, combined with the prospect of more detailed analysis later in the process, is probably more realistic than trying to anticipate many of the nuances at the screening stage.

As an example, one can ask how the test should be modified if the merging firms control multiple products prior to the merger. If Firm A owns just Product 1 while Firm B owns Products 2, ..., n ,⁷⁶ the cannibalization term should be:

$$\bar{t}_1 = \sum_{j=2}^n D_{1j} (\bar{P}_j - \bar{C}_j).$$

This shows how one could modify inequality (1) when Firm B sells several products that are substitutes to Product 1. In practice one can often simplify by aggregating “products.” For example, if Firm B owns several (narrowly defined) products with roughly equal absolute gross margins, the test only requires that one estimate the diversion ratio from Product 1 to those products as a group. Similarly, if Firms A and B primarily compete for customers who then buy multiple (narrowly defined) “products,” it may be adequate to evaluate the gross profit margin on “a customer” and the diversion ratio in customers. Accounting for such factors at the screening stage seems practical and relatively straightforward.

approach.⁷⁹ It is much more solidly grounded in the underlying economics of unilateral effects than the market definition/concentration approach.

While we believe our analysis is original and our proposed test is a significant departure from the *Guidelines*, it is also not so new: it recognizes and systematizes what we believe is an instinct shared by many industrial organization economists, including some at the agencies, that there is a robust core behind the regrettably labile predictions of structural merger simulation, and that this core deserves to emerge from behind the curtains for use in unilateral-effects cases. At the FTC Workshop on Unilateral Effects earlier this year, several former government officials indicated that the agencies often look for evidence of competitive effects, somewhat along the lines of our test, and then “back out” a market definition as necessary for litigation.⁸⁰ This suggests that, in such cases, the market definition exercise is a distracting appendage to the “real” analysis of mergers with unilateral effects. And if the agencies are not consistently following their own *Guidelines*, transparency and honesty call for a revision.

⁷⁹ Ideally, the reliability of different methods of evaluating proposed mergers should be gauged by an intelligent combination of theoretical analysis and empirical evaluation. The most direct way to do the latter is to compare the observed changes from completed mergers against pre-merger predictions. Regrettably, retrospective studies of merger effects have been scarce and limited, and have seldom compared observed effects with *ex ante* predictions, although see Peters (2006) and Weinberg and Hosken (2008). Dennis Carlton (2007) recently called for just this type of empirical research program. See Pautler (2003), Kaplow and Shapiro (2007), and Weinberg (2007) on merger retrospectives more generally.

⁸⁰ A similar approach has been used in recent years in UK competition policy. See, for example, the U.K. Competition Commission (2005).

References

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Appendix

Proof of Proposition 1

Since there is UPP for Product 1, we have $D_{12}(\bar{P}_2 - \bar{C}_2) > E\bar{C}_1$, which can be written as

$D_{12} \frac{\bar{P}_2 - \bar{C}_2}{\bar{P}_2} \frac{\bar{P}_2}{\bar{P}_1} \frac{\bar{P}_1}{\bar{C}_1} > E$. Define the pre-merger relative gross margin of Product 1 as

$M_1 = (\bar{P}_1 - \bar{C}_1) / \bar{P}_1$ and likewise for Product 2. Note that $\frac{\bar{P}_1}{\bar{C}_1} = \frac{1}{1 - M_1}$

If prices and gross margins are the same for all products in a candidate market, it exactly meets the breakeven-SSNIP requirement if, in response to a 1% increase in the price of one such product, say Product 1, $\frac{1}{M+S}$ percent of its demand would be lost to products outside the market, where S is the size of the SSNIP. From the Lerner Equation, we can assume that $\frac{1}{M}$ percent of Product 1's demand would be lost to it, so the difference, or $\frac{S}{M(M+S)}$ percent, is "diverted" within the candidate market. The aggregate diversion ratio within the market is then equal to that expression as a fraction of the total lost demand, or $\frac{S}{M(M+S)} / \frac{1}{M} = \frac{S}{M+S}$.

If Product 1 has a market share equal to Z_1 and Product 2 has a share of