CRA Competition Memo

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Scoring Unilateral Effects with the GUPPI: The Approach of the New Horizontal Merger Guidelines

The US Department of Justice and the Federal Trade Commission released the 2010 Horizontal Merger Guidelines on August 19, 2010.[1] This note explains the approach set out in the 2010 Merger Guidelines to evaluate a merger's potential for unilateral competitive effects by calculating a "gross upward pricing pressure index" or *GUPPI*.

In general, the merger of two firms can give rise to unilateral effects because the merger may provide an incentive for the merged firm to raise the price of the products of one or both firms.[2] Before the merger, if one of the merging firms considers raising the price of its products, that firm may be constrained from doing so because it would lose a "substantial" amount of sales to its prospective merger partner, among others. After the merger, that competitive constraint from its merger partner is eliminated, which may create incentives for the merging firms to raise their price.

To evaluate the potential for such unilateral competitive effects, the Guidelines analysis considers a variety of evidence. One type of evidence described by the Guidelines is the "value of sales diverted," which the Guidelines measure in proportion to "the lost revenues attributable to the reduction in unit sales resulting from the price increase." The Guidelines explain that this measure is useful for gauging the "upward pricing pressure" from a proposed merger. A way to do this calculation is to develop a metric to score the "upward pricing pressure" from a merger.

These technical concepts are explained in the Guidelines as follows:

> "Adverse unilateral price effects can arise when the merger gives the merged entity an incentive to raise the price of a product previously sold by one merging firm and thereby divert sales to products previously sold by the other merging firm, boosting the profits on the latter products. Taking as given other prices and product offerings, that boost to profits is equal to the value to the merged firm of the sales diverted to those products. **The value of sales diverted to a product is equal to the number of units diverted to that product multiplied by the margin between price and incremental cost on**

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[1] The Guidelines are available at **http://ftc.gov/os/2010/08/100819hmg.pdf**.

[2] Merger analysis generally focuses on two types of concerns that the Guidelines refer to as "unilateral" effects and "coordinated" effects. Unilateral competitive effects refers to the possibility that the merged firm might raise some or all of its prices, even if competitors do not change their prices. (Coordinated effects refers to the possibility that the merger might facilitate a coordinated price increase by all or several firms, even without an explicit agreement among the firms.)

> **that product.** In some cases, where sufficient information is available, the Agencies assess the value of diverted sales, **which can serve as an indicator of the upward pricing pressure** on the first product resulting from the merger. Diagnosing unilateral price effects based on the value of diverted sales need not rely on market definition or the calculation of market shares and concentration. The Agencies rely much more on the value of diverted sales than on the level of the HHI for diagnosing unilateral price effects in markets with differentiated products. **If the value of diverted sales is proportionately small, significant unilateral price effects are unlikely."** (*emphasis added*)

A footnote to the last sentence of this paragraph defines "proportionately."

> "For this purpose, **the value of diverted sales is measured in proportion to the lost revenues attributable to the reduction in unit sales resulting from the price increase.** Those lost revenues equal the reduction in the number of units sold of that product multiplied by that product's price." (*emphasis added*)

This concept of "value of diverted sales measured in proportion to the lost revenues attributable to the reduction in unit sales resulting from the price increase" can be converted into a metric for scoring the "upward pricing pressure" from the unilateral effects of a merger. Because this metric of upward pricing pressure does not take merger synergies or certain other factors into account, we refer to it as the *Gross* Upward Pricing Pressure Index or *GUPPI* for short.[3] This particular descriptive name for the metric is not used in the Guidelines, but the metric is in fact the measurement described by the Guidelines. As explained below, the *GUPPI* also is useful for defining the relevant market under the hypothetical monopolist test set out in the Guidelines.

Economists can gather data to estimate the value of the *GUPPI* as evidence relevant to the determination of the likelihood of unilateral competitive effects. The relevant data includes estimates of diversion ratios, incremental margins and prices. This same evidence also is used in defining the relevant market.

The Guidelines say that a merger is unlikely to raise significant unilateral effects concerns if the *GUPPI* is proportionately small. The Guidelines define "proportionately"—that is, "in proportion to the lost revenues attributable to the reduction in unit sales resulting from the price increase"—but they do not quantify "small." Elsewhere, when discussing market definition and the concept of a "small but significant and non-transitory increase in price," the Guidelines seem to quantify "small" as generally equal to 5%. This suggests that a *GUPPI* of less than 5% would be reasonably treated as evidence that "the value of diverted sales is proportionately small" and hence that the proposed merger is unlikely to raise unilateral effects concerns.

In contrast, it seems likely that a *GUPPI* of 10% or more would suggest more significant competitive concerns. Under certain common assumptions, a *GUPPI* of 10% implies that the merging products by themselves would satisfy the hypothetical monopolist test for market definition used in the Guidelines and thus could comprise a relevant antitrust market. In this sense, if the *GUPPI* is 10% or larger, the merger in

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[3] Steve Salop and Serge Moresi proposed the adoption of the *GUPPI* in November 2009 Comments on the proposed revision of the Guidelines. Steven C. Salop & Serge Moresi, "Updating the Merger Guidelines: Comments," Horizontal Merger Guidelines Review Project, November 2009 (available at **http://www.ftc.gov/os/comments/horizontal mergerguides/545095-00032.pdf**). *See* also the Hearing Statement of Professor Steven C. Salop and Dr. Serge Moresi (**http://crai.com/uploadedFiles/Publications/Updating-the-Merger-Guidelines-Hearings-Statement-Salop-Moresi.pdf**). The *GUPPI* measure was generalized to the case with asymmetric prices in section II of Serge Moresi, "The Use of Upward Price Pressure Indices in Merger Analysis," *Antitrust Source*, February 2010 (**http://www.crai.com/uploadedFiles/Publications/the-use-of-UPPIs-in-merger-analysis.pdf**). *See* also section 3.C of Joseph Farrell & Carl Shapiro, "Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition," *The B.E. Journal of Theoretical Economics*, Volume 10, Issue 1, Article 9, 2010 (**http://faculty.haas.berkeley.edu/shapiro/alternative.pdf**). Dan O'Brien and Steve Salop proposed a measure similar to the *GUPPI* for partial ownership interests. *See* Daniel P. O'Brien & Steven C. Salop, "Competitive Effects of Partial Ownership: Financial Interest and Corporate Control," *Antitrust L.J.*, Volume 67, pp. 559–614, 2000.

principle could be initially characterized as a merger to monopoly in a market comprised solely of the merging products.[4]

The Guidelines do not specify a standard such as 10% for establishing a presumption of significant competitive concerns. Moreover, because the *GUPPI* does not take into account several relevant factors—such as merger synergies (e.g., reductions in variable costs, increases in product quality, and faster innovation), competitor responses (e.g., entry and product repositioning), and other factors—a high *GUPPI* by itself would not prove that a merger would be anticompetitive. In other words, any type of presumption of anticompetitive effects flowing from a high *GUPPI* score would be rebuttable. But a high *GUPPI* would suggest that the transaction creates a greater risk of anticompetitive effects than a low *GUPPI* and thus invites closer scrutiny.

For further technical details, see the Appendix to this commentary.

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CRA has been using the *GUPPI* and related variants to score unilateral effects concerns in mergers and joint ventures for more than a decade. The analysis has been both practical to implement and extremely useful. CRA has employed various methodologies for estimating the conditional and unconditional diversion ratios that are required to calculate the *GUPPI*.

If you would like further information about GUPPIs or CRA's capabilities in mergers and joint ventures, please contact us.

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[4] Specifically, consider a merger of Firm A and Firm B, and assume that Firm A sells Product 1 and Firm B sells Product 2. There are three *GUPPIs* that need to be calculated: the *GUPPI* for a unilateral increase in the price of Product 1 holding the price of Product 2 constant; the *GUPPI* for a unilateral increase in the price of Product 2 holding the price of Product 1 constant; and the *GUPPI* for a uniform increase in the prices of both products (by the same percentage price increase). If any one of these three *GUPPIs* is larger than 10%, then the two merging products by themselves would constitute a relevant antitrust market under the hypothetical monopolist test with a 5% *SSNIP* (small and significant non-transitory increase in price). The Guidelines do not explicitly note this relationship. However, it likely will become more important over time as the relationship is recognized in articles, speeches and economists' submissions to the Agencies and courts.

Appendix: A Brief Technical Analysis of the *GUPPI*

The *GUPPI* measures the merged firm's incentive to raise price unilaterally post-merger (in the absence of merger-induced efficiencies, entry, and repositioning). There is a *GUPPI* for each product sold by the merging firms. For example, consider a merger of Firm A and Firm B, and suppose that Firm A sells Product 1 and Firm B sells Product 2. In this example, the merging firms are selling two products and therefore there are two *GUPPIs* (one for each product).[5] The *GUPPI* for Product 1 measures the merged firm's incentive to raise the price of Product 1, holding the price of Product 2 constant. The *GUPPI* for Product 2 is similar.[6] As we will explain below, there is also a *Uniform GUPPI* that measures the incentive to raise the prices of Product 1 and Product 2 together and by the same percentage price increase.

As discussed above, the *GUPPI* for a product sold by one of the merging firms (say, Product 1) can be defined as the value of sales diverted to the products sold by the other merging firms (i.e., Product 2 in our example) expressed as a percentage of the revenues on volume lost by Product 1 as a result of the price increase:

$$GUPPI\ for\ Product\ 1\ =\ \frac{value\ of\ sales\ diverted\ to\ Product\ 2}{revenues\ on\ volume\ lost\ by\ Product\ 1}$$

Section 6.1 of the 2010 Merger Guidelines explains how to calculate both the numerator and the denominator. That is:

$$value\ of\ sales\ diverted\ to\ Product\ 2\ =$$
$$number\ of\ units\ diverted\ to\ Product\ 2\ \times\ unit\ margin\ of\ Product\ 2$$

and

$$revenues\ on\ volume\ lost\ by\ Product\ 1\ =$$
$$number\ of\ units\ lost\ by\ Product\ 1\ \times\ unit\ price\ of\ Product\ 1$$

Using these definitions in the above *GUPPI* formula, Section 6.1 of the 2010 Merger Guidelines is in effect defining the *GUPPI* as follows:

$$GUPPI\ for\ Product\ 1\ =$$
$$\frac{number\ of\ units\ diverted\ to\ Product\ 2}{number\ of\ units\ lost\ by\ Product\ 1}\ \times\ \frac{unit\ margin\ of\ Product\ 2}{unit\ price\ of\ Product\ 1}$$

Notice that the first ratio on the right-hand side of this formula (that is, the number of units diverted to Product 2 divided by the number of units lost by Product 1) is the "diversion ratio" from Product 1 to Product 2. Notice also that the second ratio (that is, the unit margin of Product 2 divided by the unit price of Product 1) is equal to the percentage margin of Product 2 multiplied by the price ratio of Product 2 to Product 1.

[5] It is straightforward to extend *GUPPI* analysis to mergers involving more than two firms and/or more than two products.

[6] The *GUPPI* for Product 2 measures the merged firm's incentive to raise the price of Product 2, holding the price of Product 1 constant.

Therefore, the above informal definition can be rewritten as:[7]

$$\begin{aligned} GUPPI \ for \ Product \ 1 \ = \ & diversion \ ratio \ from \ Product \ 1 \ to \ Product \ 2 \\ & \times \ percentage \ margin \ of \ Product \ 2 \\ & \times \ price \ ratio \ of \ Product \ 2 \ to \ Product \ 1 \end{aligned}$$

In symbols, this can be written as follows:

$$GUPPI_1 \ = \ DR_{12} \ \times \ m_2 \ \times \ P_2/P_1$$

GUPPI$_2$ is defined analogously. This is the formal definition derived in Salop & Moresi (2009), based on the assumption of Bertrand price competition among profit-maximizing firms.[8]

The *GUPPI* is a useful metric because it is a rough measure of post-merger pricing incentives. In particular, under the assumption of linear demand and constant marginal costs, one can show that the post-merger profit-maximizing single-product price increase of Product 1 is equal to one-half of *GUPPI*$_1$ (ignoring price changes for other products in the market—including Product 2 of the merger partner—merger synergies, competitor responses and other factors).[9]

Furthermore, under the same assumptions, one can derive the formula for the post-merger profit-maximizing uniform price increase of Product 1 and Product 2. This in turn leads to a formula for the *Uniform GUPPI*. In the symmetric case, the *Uniform GUPPI* is equal to the *GUPPI* divided by "one minus the diversion ratio," or[10]

$$GUPPI_U \ = \ DR \ \times \ m \ / \ \left(1 - DR\right)$$

For the general case with asymmetric firms, the formula is more complicated.

The fact that the *GUPPI* is equal to twice the profit-maximizing *SSNIP* (assuming linear demand and constant marginal costs) implies a relationship between the *GUPPI* and the hypothetical monopolist test for market definition. If any one of the *GUPPIs* (e.g., *GUPPI*$_1$, *GUPPI*$_2$, or the *Uniform GUPPI*) is larger than 10%, then the merging products by themselves would constitute a relevant antitrust market under the hypothetical monopolist test with a 5% *SSNIP*.

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[7] It follows that *GUPPI* analysis requires information on prices, margins and diversion ratios.

[8] For mathematical details, *see* Moresi (2010) and Farrell & Shapiro (2010), *supra* note 3.

[9] *See* Moresi (2010), *supra* note 3.

[10] *See* the Hearing Statement of Professor Steven C. Salop and Dr. Serge Moresi, *supra* note 3. By "symmetric," we mean $DR_{12}=DR_{21}=DR$; $m_1=m_2=m$; $P_1=P_2$.