



Economic Tools for Evaluating Competitive Harm in Horizontal Mergers

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This Note reviews the various economic tools set out in the Horizontal Merger Guidelines to assess whether and to what extent a merger between competitors is potentially anticompetitive.

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When a client decides to enter into an acquisition or merger with a competitor (commonly referred to as a horizontal merger), the federal antitrust agencies, either the Antitrust Division of the Department of Justice (DOJ) or the Federal Trade Commission (FTC), may review the transaction. One or more of the state attorneys general or other regulator, such as the Federal Communications Commission, may also review the deal. The antitrust agencies' key concern in reviewing a deal is whether the transaction is likely to reduce competition and harm consumers, also known as causing competitive harm.

While this Note focuses on competitive harm in the form of higher post-merger prices, competitive harm can manifest itself in other ways, such as through:

- Lower quality products.
- Reduced services.
- Decreased incentives to innovate.

The economic principles set out in the Horizontal Merger Guidelines provide a roadmap on how the antitrust agencies determine whether horizontal mergers cause competitive harm (see *Horizontal Merger Guidelines*). Generally, the large majority of mergers and acquisitions do not impose real risks for competitive harm.

Economic analysis of competitive harm relies on a variety of analytical tools designed to evaluate the likelihood of increased prices post-merger. Market concentration metrics, such as market shares and Herfindahl-Hirschman Index (HHI) levels, are often the starting point of predicting a merger's likely competitive effects (see *Practice Note, How Antitrust Agencies Analyze M&A: Market Shares and Concentration* (<http://us.practicallaw.com/3-383-7854>)). These metrics are most helpful in markets where the products are homogenous. However, concentration measures do not always properly capture different degrees of competition among differentiated products, such as consumer products like cars or smart phones, where there are many brands but the

products vary in physical attributes and features. As a result, especially in differentiated product markets, economists tend to put less weight on concentration measures and investigate other factors that consider interactions among different market players.

To evaluate a horizontal merger's competitive effects, both the antitrust agencies and the transacting parties often engage economists to apply a range of analytical tools to the available evidence. For each merger, economic analysis of competitive harm takes into account the relevant market's unique features, market participants and competitive dynamics. For more on the role of economists in the merger review process, see *Box, How Economists Help in Evaluating Competitive Harm*. For more on the merger review process, see *Practice Note, Corporate Transactions and Merger Control: Overview* (<http://us.practicallaw.com/9-507-2799>).

This Note addresses:

- The meaning of competitive harm.
- The economic tools and evidence commonly used by the antitrust agencies and economists in analyzing competitive harm for horizontal mergers.
- How to calculate the likelihood and magnitude of competitive harm.

COMPETITIVE EFFECTS

Merger-related competitive harm can result from either or both of the following two effects:

Coordinated effects. Coordinated effects address whether the merger will increase the likelihood that firms in the relevant market will jointly raise prices (see *Coordinated Effects*).

Unilateral effects. Unilateral effects address whether the merged firm will have an incentive to raise prices on its own even if competitors do not also raise their prices in response (see *Unilateral Effects*).

Coordinated Effects

Coordinated effects address whether the merger makes it more likely for a group of firms to coordinate and raise prices. Coordination does not require an explicit agreement reached in secret meetings. It can be an implicit understanding or parallel accommodating behavior among the market participants.

Conditions for Successful Coordination

Successful coordination does not always require the participation of every competitor in the market. Several conditions may significantly increase the likelihood that participants can successfully coordinate their pricing conduct, such as whether the participants are able to:

- Align their incentives and reach a common understanding, either explicitly or implicitly.
- Collectively raise market prices.
- Monitor and detect deviations from a common understanding or agreement.
- Punish deviations from the common understanding or agreement.

Evidence of Vulnerability to Coordinated Effects

Economic theory indicates that unconcentrated markets are less vulnerable to coordination. For mergers in concentrated markets, the antitrust agencies typically consider certain market characteristics as making successful coordination over time more likely, including:

- Previous experiences of coordination or attempts to coordinate.
- Commodities or other homogenous products.
- Price transparency that allows rivals to observe prices promptly and accurately.
- The ability of rivals to respond quickly to deviations and to punish defectors.
- Large and long term contracts with few customers that make it easy to maintain the status quo.
- High switching costs that deter price cuts because few customers could easily change suppliers.
- Consumers who are less sensitive to price increases (also known as markets with a low demand elasticity).
- A limited ability by firms outside the coordinated group to expand sales.
- A lack of powerful buyers who can demand individual negotiations and make prices less transparent.
- A lack of a maverick firm that has different pricing incentives (see *Loss of a Maverick*).

For examples of merger reviews where the antitrust agencies alleged that a market was vulnerable to coordination, see *What's Market, In the Matter of Koninklijke Ahold N.V./Safeway Inc. Consent Decree Summary* and *U.S. v. International Paper Company and Temple Inland Inc. Consent Decree Summary*.

Even if a market is vulnerable to coordinated conduct, most mergers are unlikely to result in coordinated effects. In many cases, market conditions remain largely the same after the merger, and the merger does not make it easier to align incentives among rivals, nor to monitor and punish potential deviations. To evaluate the likelihood of coordinated effects, economic analysis needs to assess the extent to which the merger changes interactions among market participants.

Loss of a Maverick

One type of merger where the antitrust agencies are particularly sensitive to coordinated effects is a merger involving a firm that may have helped prevent coordination in the past, commonly referred to as a maverick firm. A maverick firm typically has different pricing incentives and prices below the rest of the market, making coordination unprofitable for the remaining firms in the market. The antitrust agencies are likely to focus on how a proposed merger affects the pricing incentives for the maverick firm.

For examples of merger reviews where the DOJ analyzed the loss of an industry maverick, see *What's Market, U.S. v. Anheuser-Busch InBev SA/NV and Grupo Modelo S.A.B. de C.V. Litigated Case Summary* and *U.S. v. AT&T Inc. and T-Mobile USA, Inc. Litigated Case Summary*.

Unilateral Effects

A merger between two competing firms eliminates a rival in the market. As a result, it may increase the merged firm's incentive to raise prices, even if the firm's remaining rivals do not raise their prices. This is known as the merger's unilateral effects.

The basic concept behind unilateral effects is set out in the following example. Assume that firm A is acquiring a competitor, firm B. Before the merger, if firm A raised its price, it would lose customers to other firms in the market, including firm B. The fear of losing those customers and suffering lower profits limited firm A's incentive to raise prices. After the merger, however, firm A has different pricing incentives. Firm A's customers that switched (or diverted) to firm B in light of an increase in A's prices are now effectively recaptured because they are still purchasing from the merged entity. This recapture of diverted customers makes a price increase more likely to be profitable. The greater the number of sales diverted from firm A to firm B, the greater the recapture and the more profitable that price increase is likely to be. This is the essence of why a merger creates incentives for the merged firm to unilaterally increase price.

ECONOMIC METHODS IN EVALUATING UNILATERAL EFFECTS

There are a variety of methods to assess unilateral effects of a proposed merger. Commonly used methods include:

- Estimating a diversion ratio (see *Diversion Ratio*).
- Conducting merger simulations (see *Merger Simulation*).
- Using the Gross Upward Pricing Pressure Index (see *The Gross Upward Pricing Pressure Index*).

Diversion Ratio

The diversion ratio between two competing firms (firm A and firm B) measures the percentage of lost sales following a price increase by firm A that is captured by competing firm B. This statistic is typically viewed as a measure of the closeness of competition between the firms. A high diversion ratio indicates that the two firms' products are close substitutes and that a merger of the firms is more likely to result in significant unilateral effects.

For examples of merger reviews where the DOJ analyzed the diversion ratio between the transacting parties, see *What's Market*, *U.S. v. Cinemark Holdings, Inc.*, *Rave Holdings, LLC and Alder Wood Partners, L.P. Consent Decree Summary* and *U.S. v. H&R Block, Inc. and 2ss Holdings, Inc. Litigated Case Summary*.

Using Diversion Ratios to Analyze Competitive Effects: A Hypothetical Example

Assume in a market there are two brands of premium cars, BMW and Mercedes Benz, two brands of economy cars, Honda and Toyota, and other cars. When BMW increases its price, some consumers will switch from BMW to different cars. Assume that among those consumers that switch away from BMW:

- 60% switch to buy Mercedes Benz.
- 15% switch to Honda.
- 15% switch to Toyota.
- 10% switch to other cars.

In this case, the diversion ratio between BMW and Mercedes Benz is 60%, while the diversion ratios between BMW and Honda, as well as BMW and Toyota, is 15%. The diversion ratios indicate that more consumers think Mercedes Benz is a closer substitute for BMW than all the other cars.

Therefore, if BMW and Mercedes Benz were to merge, the merged firm would likely be successful in raising prices without too many customers switching to other car makers.

Common Methods to Estimate Diversion Ratios

Both qualitative and quantitative evidence are useful in estimating diversion ratios. Commonly used methods for estimating diversion ratios include:

- **Historic data on lost sales captured by rivals during a period of price increases in the past.** This can include lost sales to rivals where there were price increases in certain regions, and prices in other regions remained unchanged (commonly referred to as a natural experiment). This method of using the actual price increase data to estimate the diversion ratio is one of the antitrust agencies' preferred approaches.
- **Quantitative industry evidence.** This type of evidence may include company-maintained data that can be used to track rivals to which the company lost sales. For example, when a consumer switches her cell phone carrier, she may need to inform the old carrier where to port her phone number. As a result, the cell phone carrier can track the portion of business

lost to each competitor. Another example can be found in an industry where contracts are won through bidding, where the companies' win-loss data can provide insight into how much business is likely to be recaptured between the merging parties.

- **Qualitative industry evidence.** This type of evidence, which includes company documents generated during the normal course of business, sometimes provides direct evidence of diversion ratio. For example, company marketing plans and meeting notes often identify the biggest rival, describe the biggest threat to the company's business or summarize lost sales. Although the qualitative evidence does not provide the exact magnitude of the diversion ratio, the ranking of competitors offers useful rough estimation of that ratio.
- **Surveys conducted by trained professionals.** Surveys can help provide diversion ratio information by asking consumers properly designed questions about their preferences and switching patterns.
- **Market shares used as a proxy.** Market shares are sometimes used as a proxy for diversion ratio, where it would be assumed that losses in business at one firm would be distributed across other competitors in proportion to their market shares. For example, assume that firm A and firm B have market shares of 10% and 20%, respectively, and losses in business at firm A would be distributed across other suppliers in proportion to their market shares. Therefore, firm B would capture 22% of any business lost at A. This is calculated by taking B's market share and dividing it by the difference between 100% and A's market share ($20\% / (100\% - 10\%)$). The idea is that if firm A is not available, firm A's customers would scatter to other market suppliers in proportion to those suppliers' existing market share. This method assumes that all the products in the market are equally close substitutes, which is best reflected in a homogenous product industry such as milk, where there is little to no differentiation among brands. However, this method may be misleading when the products in the market are differentiated (see *Box: An Illustrative Example of the GUPPI Test*). One benefit of this method is that it does not require any additional data beyond market shares.
- **Econometric method.** Diversion ratio is closely connected with demand cross-elasticity. Demand cross-elasticity measures to what extent the price of product A affects the sales volume for product B. When there is a rich set of price and quantity data for all the relevant products considered by consumers, such as scanner data in retail business, economists can directly estimate a demand system and pinpoint the percentage of consumers captured by product 2 if there is a price increase in product 1. This method requires a large volume of data and assumes certain price setting behaviors.

Merger Simulation

Merger simulation uses standard economic tools to compare predicted prices before and after the proposed merger. Merger simulations usually take three steps:

- Estimating the demand system based on pre-merger information, similar to the econometric method described for estimating diversion ratio.
- Solving the supply function based on a specific oligopoly competition model (a market featuring a small group of competitors) and the pre-merger supply information such as marginal costs and margin.
- Calibrating the post-merger equilibrium prices and quantities, often by adjusting market shares to reflect the post-merger situation.

If the predicted post-merger price is significantly above the pre-merger price, it is an indication that the merger is likely to cause competitive harm.

Merger simulation is most often applied to branded consumer products where rich scanner data on price and quantity are available. When equipped with sufficient data and appropriate modeling, merger simulation can provide a direct estimate of the magnitude of unilateral effects. However, the findings are often sensitive to the underlying modeling assumptions, which typically focus on competition as to both prices and quantities. The selected model may not reflect other important aspects of competition (such as services, quality and delivery terms, among others) in the industry which are often rich and diversified.

The Gross Upward Pricing Pressure Index

The Gross Upward Pricing Pressure Index (GUPPI) test, also referred to as the upward price pressure test, is a tool that economists have refined in recent years to provide a quantifiable measure of a firm's post-merger incentive to raise prices. The GUPPI, described in the Horizontal Merger Guidelines (without using the term "GUPPI"), has been adopted by other jurisdictions including the European Union. It provides a simple benchmark to evaluate the magnitude of the merger's impact on the buyer's incentives to increase prices (see *Section 6.1 of the Horizontal Merger Guidelines*).

The GUPPI takes into account two important factors that affect a merging firm's post-merger pricing incentives:

- The firm's margin (or its profit) on the product that it sells.
- The diversion ratio of its customers to the merging partner (see *Diversion Ratio*).

By analyzing how many sales are recaptured (as measured by the diversion ratio) and the profitability of those recaptured sales (as measured by the margin), the GUPPI provides a measure of how much of the firm's profits from those lost sales are recaptured through the merger. This indicates the extent to which the merger leaves a firm more willing to impose a post-merger price increase.

One benefit of using the GUPPI is that it is based on principles that do not rely on the exact market definition of the merger (see *Practice Note, Analyzing a Relevant Market in Horizontal Mergers* (<http://us.practicallaw.com/6-518-5514>)). Therefore, the GUPPI can be a useful tool for assessing closeness of competition in situations where it may be difficult to determine how markets

should be defined, which is often the case in differentiated product markets.

GUPPI Formula

Assume that firm A is acquiring firm B. Firm A sells product 1 at price P1 and firm B sells product 2 at price P2. Although the formula for the GUPPI can be quite complicated in certain situations, in its most basic version, the GUPPI for product 1 is calculated using the following formula: $GUPPI = (\text{diversion ratio from product 1 to 2}) \times (\text{profit margin of product 2}) \times (P2/P1)$ (see *Box: An Illustrative Example of the GUPPI Test*).

The Horizontal Merger Guidelines indicate that a merger is unlikely to raise significant unilateral effects concerns if the GUPPI is proportionately small. In practice, that amount is often considered to be less than 5%. In contrast, if the GUPPI is 10% or more, absent offsetting efficiencies, a merger is likely to indicate significant unilateral effects. Therefore, when GUPPI is higher, the merged firm faces more pressure to raise prices.

This GUPPI formula indicates that, all else being equal:

- **The higher the diversion ratio, the higher the GUPPI.** In other words, when the merging parties' products are close substitutes, the number of lost sales recaptured by product 2 is higher. As a result, the merged firm is less worried about losing sales when it raises prices, compared to pre-merger.
- **The higher the margin, the higher the GUPPI.** The margin measures the profitability of product 2. It is calculated as the difference between the price and the marginal cost. Variable contribution margin (the difference between the price and the average variable cost) is often used because average variable cost is generally easier to calculate than marginal cost and acts as a proxy for the actual costs incurred from the increase in sales.
- **The higher the price ratio, the higher the GUPPI.** The price ratio of product 2 to product 1 changes the diverted value from dollars into percentages. This type of conversion allows for easier comparison across mergers.

There are different versions of the GUPPI formula that depend on different assumptions of specific industry details. The GUPPI formula stated in this section is in its most basic version. For example, there is a different GUPPI formula designed for firms competing in a bidding environment and another version for firms that compete on quality instead of price. Counsel and economists need to select the GUPPI formula that best fits the competitive conditions in the specific merger.

Potential Limitations in GUPPI

The GUPPI test is just one of several useful tools for assessing unilateral effects. When assessing the unilateral effects of a merger, GUPPI should be considered in conjunction with other analyses to fully understand likely competitive effects of a merger. The GUPPI test, like many other tests, is often a static analysis focused on demand side factors. Unless extended to include dynamic considerations, it may be misleading.

Like other tests, the GUPPI test has limitations, including that it:

- Does not account for merger specific synergies such as:
 - lower marginal cost;
 - higher product quality; or
 - faster innovation.
- Does not consider supply side responses such as:
 - entry; or
 - product repositioning.
- May not fit well for certain specific industries or mergers, including an industry that:
 - features many dynamic factors such as network effects or learning by doing;
 - involves many firms that each sells many products, where the test does not take into account the impact on pricing incentives of the merging firms' sales of other substitutable or complementary products; or
 - has potential pricing interdependencies, where the test might not account for how the merging firms' pricing initiatives might trigger particular responses by other firms.
- Does not consider efficiencies, without which almost every merger, regardless of the market shares or diversion ratios, will end up predicting at least some price increase.

Other Factors to Consider when Assessing Unilateral Effects

Unilateral effects analyses often provide a static view of how a merger will affect a firm's incentives to raise prices. If, however, market conditions are likely to change as a result of the merger or a post-merger price increase, then a simple unilateral effects analysis based on historical information may be misleading.

In particular, unilateral effects may be unlikely in the event of supply-side responses such as entry and product repositioning (see *Practice Note, How Antitrust Agencies Analyze M&A: Entry Analysis* (<http://us.practicallaw.com/3-383-7854>)).

Another important factor to offset unilateral effects is efficiencies. Efficiencies that reduce the merged firm's marginal costs increase a firm's profit for every unit sold, and therefore increase a firm's incentives to increase sales. One of the best ways to increase sales is a price reduction. Therefore, efficiencies provide strong incentives for post-merger price reductions that can reduce and even reverse a firm's incentives to raise prices due to diversion. For example, if the magnitude of the efficiencies is equal to or greater than the GUPPI, then the merger is unlikely to result in unilateral effects. For more on efficiencies, see *Practice Note, How Antitrust Agencies Analyze M&A: Efficiencies* (<http://us.practicallaw.com/3-383-7854>).

AN ILLUSTRATIVE EXAMPLE OF THE GUPPI TEST

Consider the example of cars in the section on *Diversion Ratio*. There are different brands of cars including BMW, Mercedes Benz, Honda, Toyota and other cars. Suppose through various discoveries, we collected the following information:

	BMW	Mercedes Benz	Honda	Toyota	Other Cars
Market share - all cars	10%	10%	30%	30%	20%
Market share - premium brands only	50%	50%	0%	0%	0%
Price	\$50,000	\$55,000	\$30,000	\$30,000	
Margin	25%	25%	10%	12%	
Historical Diversion from BMW		60%	15%	15%	10%
GUPPI		16.5%	0.9%	1.1%	

If BMW acquires Mercedes Benz, the GUPPI calculation ($GUPPI = (\text{diversion ratio from product 1 to 2}) \times (\text{profit margin of product 2}) \times (P2/P1)$) shows that GUPPI for BMW and Mercedes Benz is 16.5% ($60\% \times 25\% \times (\$55,000/\$50,000)$).

A GUPPI of 16.5% indicates a significant amount of upward pricing pressure. By this measure, BMW's acquisition of Mercedes Benz imposes a risk of significant price increase after the merger. This is consistent with a hypothetical merger of what might be viewed as close substitutes.

If BMW were to acquire Honda, the GUPPI test shows that the GUPPI for BMW and Honda is 0.9% ($15\% \times 10\% \times (\$30,000/\$50,000)$). A GUPPI of 0.9% indicates a small amount of upward pricing pressure. By this measure, BMW's acquisition of Honda is unlikely to lead to any significant price increase after the merger. This is consistent with a hypothetical merger of what might be viewed as distant (not close) substitutes.

These GUPPI calculations do not rely on the boundary of market definition that has lessened in importance in the most recent version of the Horizontal Merger Guidelines. It is unnecessary to determine whether a premium car market exists separately from an all cars market to determine whether BMW's incentive to raise prices is likely to increase after acquiring Mercedes Benz. The GUPPI results suggest that a merger between BMW and Mercedes Benz could cause significant unilateral effects regardless of the market definition. There would be significant risk of price increase after the merger, even when the relevant market is defined as the entire car market with the combined market share of BMW and Mercedes of only 20%.

This example also highlights the difference between using actual diversion ratios and market shares as a proxy. In this example, the actual diversion ratio of BMW and Mercedes Benz is 60%. However, using the firms' market shares as a proxy, which assumes all cars are equally close substitutes, the estimated diversion ratio of BMW and Mercedes Benz is only 11% (calculated as $(10\% / (100\% - 10\%))$).



HOW ECONOMISTS HELP IN EVALUATING COMPETITIVE HARM

Economists working with antitrust counsel commonly conduct competitive effects analyses. Economists can be helpful at various stages of the merger review process in many different areas. For example, economists can help:

- Screen potential merging partners and assess the antitrust risks.
- Identify documents and analyze data most relevant to antitrust review.
- Process documents and data to ensure compliance for the Second Requests or other government inquiries (see *Practice Note, Hart-Scott-Rodino Act Overview: Request for Additional Information (Second Request)* (<http://us.practicallaw.com/9-383-6234>)).
- Conduct a wide variety of competitive analyses to evaluate competitive harm and assess coordinated effects and unilateral effects depending on the documents and data available for the merger, including:
 - defining product and geographic markets;
 - calculating HHIs and market shares;
 - estimating demand elasticities;
 - assessing closeness of competition between different competitors;
 - estimating diversion ratios;
 - conducting merger simulation;
 - conducting GUPPI tests;
 - assessing the magnitude of efficiencies; and
 - evaluating entry and repositioning.
- Develop strategies by identifying potentially vulnerable areas.
- Communicate with the antitrust agencies, including their economists, by providing opinions in white papers or in meetings to address potential concerns.
- Identify potential merger remedies to mitigate significant competitive harm caused by the merger (see *Practice Note, Merger Remedies* (<http://us.practicallaw.com/6-521-6515>)).

For more information on the merger review process, see *Practice Note, Corporate Transactions and Merger Control: Overview* (<http://us.practicallaw.com/9-507-2799>).

The views expressed herein are those of the authors.

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