27. Mergers: Unilateral Effects

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Introduction

In the United States, anti-competitive concerns surrounding mergers could in principle be raised under Section 1 (conspiracies in restraint of trade) and/or Section 2 (monopolization) of the Sherman Act, or the vaguely worded Section 5 (unfair methods of competition) of the FTC Act, but are most directly addressed by the Section 7 of the Clayton Act (1914), as amended by the Celler-Kefauver Act (1950). Section 7 prohibits corporations from acquiring "the whole or any part of the stock or other share capital [or] the whole or any part of the assets of another corporation, where […] the effect of such acquisition may be substantially to lessen competition".[1]

Mergers between competitors (i.e., horizontal mergers) are challenged under two key theories of harm: unilateral effects and coordinated effects. Unilateral effects refers to the potential for post-merger price increases (or other degradations in consumer outcomes) by virtue of the fact that there will be one less competitor in the marketplace, even as each firm continues to act in its own unilateral best interest. Unilateral effects is the most prevalent of the two theories and is present to some degree in essentially all merger cases. The other theory of harm is coordinated effects, which is concerned with the possibility that the remaining firms in the marketplace may be better able to coordinate or collude once the acquiree is no longer independent. While much attention has been given to coordinated effects, arguably more than is warranted, coordinated effects are more of a concern when the acquiree is a maverick firm (i.e., a uniquely aggressive competitor) or when the number of remaining firms is very small.

Market Power vs. Efficiencies

In merger matters contested on unilateral effects grounds, it often comes down to a horserace between two key opposing effects – the loss of a competitor on one hand (the "market power effect") and

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[1] Clayton Act (1914) as amended by the Celler-Kefauver Act (1950), from 15 U.S.C. § 18. See Northern Securities Co. v. U.S., 193 U.S. 197 (1904) for an early test of the Sherman Act's reach in terms of mergers.

potential efficiency gains on the other (the "efficiencies effect"). Other factors, such as the potential for induced or pre-empted entry, the negotiating power of buyers, failing firm situations, etc., can be important in particular instances as well.

The market power effect is the effect of the merger on prices and other outcomes simply as a result of having one less competitor, while firms continue to act unilaterally. All else equal (and this is a very important qualification), economic theory predicts that prices will rise when there is one less competitor in a market.[2] The market power effect can range from strong to weak to non-existent depending on the nature of competition, including the availability of substitute products and services, the degree of differentiation between the various substitutes, the number of similarly-sized competitors competing with the merged firm, the presence or absence of barriers to entry, the intensity of innovative activity, and other factors. If there are many other substitutes to which consumers can switch, or other potential competitors stand ready to produce if the merged firm were to increase prices, then the merged firm cannot profitably increase prices in the first place. The market power effect in such a case would be small. On the other hand, if there are few viable substitutes to which consumers can switch, and no competitors stand ready to produce if the merged firm were to increase prices, then the merged firm could potentially significantly increase prices. The market power effect in such a case would be large.

The "all else equal" qualification above is important here. If indeed all else were equal, the merger results only in a market power effect and would be no different, economically speaking, than naked price fixing in most cases.[3] However, rarely is all else is equal in a merger case. Mergers generally come with a pro-competitive efficiency effect that can offset or even reverse the market power effect. Efficiencies can be as simple as increased economies of scale and scope or the elimination of redundant fixed costs, and as complex as business and technology complementarities that improve production methods, innovative capabilities, and the quality and availability of the final product. If efficiencies are strong enough, prices can fall and/or quality can rise overall even with one less competitor.[4]

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[2] Except in extreme cases such as textbook perfect competition and homogenous Bertrand competition, where this is only true for a merger to monopoly.

[3] There are circumstances in which even price fixing firms can experience cost efficiencies, for example, when firms operate platforms (e.g. Broadcast Music, Inc. v. CBS, Inc., 441 U.S. 1 (1979); National Bancard Corp. v. Visa U.S.A., 779 F.2d 592 (11th Cir. 1986), or the very many cases involving technology platforms such as Microsoft, Google, Amazon, etc. from the 1990s onward.

[4] See Williamson (1968).

It is generally problematic to test for unilateral effects without at least some simultaneous consideration of the efficiencies effect, since the overall impact on prices and other consumer outcomes depends on which is stronger. The analysis of unilateral effects was historically separated from the analysis of efficiencies, with efficiencies being treated as a countervailing or offsetting effect to be considered later in the process. In fact, efficiencies were given relatively little consideration by the courts throughout most of the twentieth century.

This can be traced back to an unfortunate early interpretation of the word "competition" used by the courts. This interpretation is critical since Section 7 prohibits mergers only if they may substantially lessen competition.

"Competition" as economists generally use that word refers to a process: the process by which firms work and innovate and improve to win the business of consumers, whether it be through lower prices, better products, better selection, added convenience, or other similar pursuits. The competitive process leads to improved consumer outcomes over time and is an important process worthy of protection.

It is fundamentally distinct, however, from the concept of "competitors". Individual competitors are often hurt at the same time that competition as a process is thriving, and the number of competitors can fall even as competition is strengthening. The number of competitors is generally a poor metric for measuring competition, though it has often been used for this purpose. The distinction between competition and competitors is an important one but has not always been well recognized by the courts.

To highlight the difference between competition and competitors, consider the early supermarket industry as a stark historical example. The growth of the supermarket industry in the early twentieth century led to significant gains for consumers on multiple levels. Instead of having to make separate trips to the butcher, baker, produce market, cheese shop, and other smaller or specialty food sellers, consumers could buy all their groceries in one place. The selection was significantly greater due to economies of scope and the prices were significantly lower due to economies of scale.[5]

Yet there was significant political opposition to supermarkets at the time, led by smaller food retailers who accused supermarkets of harming competition and pointed to a decline in the number of competitors as evidence of that claim. But the competitive process was not harmed. By the revealed

[5] See Tedlow (1990) or Ellickson (2015).

preference of consumers who freely chose to shop there, supermarkets outcompeted their smaller rivals by offering consumers more. The number of competitors fell overall, but those that remained were larger and better adapted to consumers' needs. In fact, few people today would long for the days where supermarkets did not exist so they could spend more time going to many different small stores to pay more money to try to get mostly the same thing.[6]

The political opposition to supermarkets at that time was not unlike the more recent political opposition to large big-box retailers such as Wal-Mart and large online retailers such as Amazon. These large retailers displaced many smaller firms, and attracted many lawsuits in the process, but are successful exactly because they won over consumers with a better offering.

The simple lesson is that competition and competitors are not the same thing, and competition cannot be measured by a simple count of the number of competitors.[7] Competition is a process – a process that routinely sees less efficient firms failing at the hands of more efficient firms at the same time that consumer outcomes improve.

Because competition was often interpreted as the number of competitors, the relevance of efficiencies in merger cases was not always recognized by the courts. In *Brown Shoe Co., Inc. v. U.S.* (1962), the Supreme Court affirmed a lower court decision to prohibit a (vertical) merger in part because the merger would "result in lower prices or in higher quality for the same price and the independent retailer can no longer compete."[8] The Court's concern here is placed squarely on protecting a less efficient competitor *from* the competitive process, instead of protecting the competitive process itself, and in so doing denies consumers the benefits of that process in terms of lower prices or higher quality. In *U.S. v. Philadelphia National Bank* (1963), the Court wrote that "a merger the effect of which may be substantially to lessen competition is not saved because, on some ultimate reckoning of social or economic debits and credits, it may be deemed beneficial."[9] Again, if the merger were socially and economically beneficial – i.e. a pro-

[6] The competitive process routinely leads to some consolidation in maturing industries when, due to technology improvements or other factors, the efficient scale of operation grows larger. Mergers are a natural part of this efficiency-improving process.

[7] The theoretical market power effect of a merger tends to be larger when there are fewer firms to begin with, while the efficiencies effect may get smaller or larger with fewer firms, hence the increased scrutiny of mergers in concentrated industries. Concentration and market share measures are not a substitute for a direct analysis, however.

[8] Brown Shoe Co., Inc v. U.S., 370 U.S. 294 (1962); and United States v. Brown Shoe Company, 179 F. Supp. 721 (E.D. Mo. 1959).

[9] U.S. v. Philadelphia National Bank, 374 U.S. 321 (1963).

competitive merger that improves consumer outcomes – then it cannot lessen competition where competition is the defined as the process that improves those outcomes. In *FTC v. Proctor Gamble Co.* (1967) the Court famously wrote that "Possible economies cannot used as a defense to illegality."[10] But here again, if efficiencies are sufficiently large that they are expected to reduce prices and/or improve other consumer outcomes, then the merger necessarily improves competition and does not lessen it, even though it reduces the number of competitors by one.

Simple differentiated-goods merger theory shows that the interests of consumers and the interests of the non-merging firms are often diametrically opposed in merger matters: pro-competitive mergers tend to improve consumer outcomes while at the same time harming non-merging firms' outcomes; anti-competitive mergers tend to harm consumer outcomes while at the same time improving non-merging firms' outcomes.

Fortunately, and beginning with the landmark *General Dynamics* (1974) case, courts have gradually moved towards a more balanced approach that goes beyond merely counting competitors and brings the focus back to consumer outcomes.[11] In *Cargill, Inc. v. Monfort of Colorado Inc.* (1986), the Supreme Court addressed merger-induced efficiencies directly, writing that "To hold that the antitrust laws protect competitors from the loss of profits due to such price competition would, in effect, render illegal any decision by a firm to cut prices in order to increase market share. The antitrust laws require no such perverse result."[12] In more recent decades, lower courts and the agencies have come to routinely consider efficiencies arguments and may often presume a baseline level of cost efficiencies (e.g., 5%) in their analysis.

The DOJ/FTC Horizontal Merger Guidelines

The Department of Justice (DOJ) and Federal Trade Commission (FTC) outline their general approach to evaluating mergers in a jointly issued merger guidelines document, as amended from time to time.[13] The 2023 Merger Guidelines ("Merger Guidelines") are a substantial revision over its 2010 predecessor, and

[10] FTC v. Proctor Gamble Co., 386 U.S. 568 (1967).
[11] U.S. v. General Dynamics Corp., 415 U.S. 486 (1974).
[12] Cargill, Inc. v. Monfort of Colorado, Inc., 479 U.S. 104 (1986). For a good review of court decisions involving efficiency defenses, see Kolasky and Dick (2003).
[13] U.S. Department of Justice and Federal Trade Commission (1968, 1982, 1984, 1992, 1997, 2010, 2023). The first such guidelines were published in 1968 and they are periodically updated to reflect more current practices. To date, horizontal merger guidelines were published in 1968, 1982, 1984, 1992, 1997, 2010, and 2023.

lists six general guidelines for evaluating horizontal mergers, plus five more applicable to certain situations.

The guidelines most relevant to unilateral effects are in Guidelines 1 and 2.[14] Guideline 2 simply states: "Mergers Can Violate the Law When They Eliminate Substantial Competition Between Firms". While worded in very general language, unilateral effects is the primary channel through which competition between firms can be substantially reduced or eliminated. Guideline 1 states that the agencies will presume harm, pending evidence to the contrary, in certain cases where industry concentration is sufficiently high: "Mergers Raise a Presumption of Illegality When They Significantly Increase Concentration in a Highly Concentrated Market." A merger is presumed to eliminate substantial competition if either the combined market share of the merging firms exceeds 30% or the Herfindahl-Hirschman Index (HHI, a measure of industry concentration) exceeds 1800, and if at the same time the change in the HHI exceeds 100.[15] If the merging firms do not surpass these thresholds, or even if they do but intend on pursuing the merger anyway (leading to a potential court challenge), a complete analysis is required to estimate likely effects.

In terms of process, merging firms that are "big enough" must notify the agencies of their intention to merge under the Hart-Scott-Rodino Act (HSR) of 1976.[16] Either the DOJ or the FTC, depending on past experience and the availability of resources, conducts a preliminary review and may issue what is called a Second Request if they have concerns. A Second Request is essentially a broad subpoena for detailed information that includes company documents and economic data on prices, quantities, and other relevant metrics that can be used in their own competitive analysis. If there are continued concerns after reviewing the additional data, the agencies may seek a court injunction to stop the merger. The European Union and many other countries, on a broad level, have a similar process.

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[14] Guideline 3 is specific to coordinated effects, and Guidelines 4 through 6, while involving unilateral effects, are about specific issues collectively known as countervailing effects (eliminating a potential entrant in a concentrated market, limiting access to products its competitors use to compete, and extending a dominant position). Efficiencies are often considered a countervailing effect as well but since they are so central to merger analysis, they are best considered simultaneously with the main unilateral effects analysis.

[15] The metrics, and thresholds for those metrics, have changed over the years. The 1968 Guidelines, for example, used four firm concentration ratios and market shares of the individual firms. The HHI was introduced in 1982 and its thresholds were amended in 2010 and again in 2023.

[16] There are separate thresholds for the size of the individual companies and for the size of the transaction.

Out of unknown thousands of mergers in the U.S. in a given year (the vast majority not being reportable), the agencies received 3,152 HSR notifications in 2022, about double the number from a decade earlier.[17] They issued Second Requests for 47 of them. The FTC itself challenged 24 mergers in 2022, 11 of which ended in settlements, 7 of which were abandoned or restructured, and 6 of which went either to an internal judicial review or to court. The DOJ challenged 26 mergers that year, 4 of which ended in settlements, 16 of which were abandoned or restructured, and 6 of which went to court. Merger challenges are rare and court battles even more rare.

Mergers can be challenged and potentially stopped or not challenged and allowed to proceed but not technically approved. The agencies can challenge a consummated merger at any time if it believes the merger is harmful to competition, whether or not it was subject to the HSR process. The obvious remedy in the case of an already-consummated anti-competitive merger is to break up the merged firm, but this is rarely done, as it can be messy and may inadvertently do even more harm than good in some cases.

Back on the issue of efficiencies, the Guidelines state that "To successfully rebut evidence that a merger may substantially lessen competition, cognizable efficiencies must be of a nature, magnitude, and likelihood that no substantial lessening of competition is threatened by the merger in any relevant market."[18] Cognizable efficiencies are those that are specific to the merger, verifiable, and accrue not only to the firm.

The recognition of efficiencies is substantially improved from early versions of the guidelines. In the 1968 Guidelines, efficiencies would be considered only in "exceptional circumstances", and in the 1982 Guidelines only in "extraordinary circumstances".[19] But in the 1984 Guidelines, while still requiring "clear and convincing evidence", the agencies explicitly note their unique importance: "The primary benefit of mergers to the economy is their efficiency-enhancing potential, which can increase the competitiveness of firms and result in lower prices to consumers."[20] The language continues to evolve with each new edition of the guidelines, but today there is a consistent recognition that efficiencies are important in merger matters. After all, a merger without efficiencies of any kind is not economically different than two firms price fixing at arm's length.

[17] U.S. Department of Justice and Federal Trade Commission (2022).
[18] 2023 Merger Guidelines.
[19] 1968 Merger Guidelines; 1982 Merger Guidelines.
[20] 1984 Merger Guidelines.

Approaches to Merger Analysis

Merger analyses are usually performed prospectively before the merger takes place rather than retrospectively after the merger takes place, so the primary goal of merger analysis is predict post-merger outcomes that have not happened yet. Since consumer outcomes in the post-merger world are not known with certainty, they must be estimated. They are then compared to consumer outcomes in the future counterfactual world without the merger, which are usually (though not always) assumed to be the same as currently. If the proposed merger is a response to ongoing and expected changes in the industry, the counterfactual must be estimated as well.

Merger Simulations

A theoretically-based method for predicting post-merger outcomes is the merger simulation.[21] Merger simulations generally assume that all firms (merging and non-merging alike) are profit-maximizing and will continue to be profit-maximizing after the merger. They generally assume stable market conditions in all regards except for the merging of the two firms, though expected changes in market conditions can be built into the model. Merger simulations allow for no efficiencies or for different assumptions about post-merger efficiencies.

The conceptual steps of a merger simulation are:

1. Estimate the demand curves for each product of the merging firms and for all possible substitutes (and ideally all possible complements) to those products, i.e. estimate the market demand system.
2. From the demand curves, derive the own-price elasticity of each product (how the demand for that product changes when its own price changes) and the cross-price elasticity between every two products (how the demand for one product changes when the price of another product changes). This will produce a matrix of pre-merger elasticities.
3. Solve for the theoretical profit-maximizing markups (and other relevant outputs) for each firm. This will produce a set of equations that relate to the pre-merger profit-maximizing markups (price minus marginal cost all divided by price) for each product to the full matrix of pre-merger own- and cross-price elasticities previously estimated. The exact form of these equations will

[21] See Hausman, Leonard, and Zona (1994).

depend on pre-merger ownership patterns and will change in the post-merger world. They also depend on the form of the demand system chosen.[22]

4. Given estimates of the matrix of pre-merger elasticities and the vector of known pre-merger prices, back out the vector of estimated marginal costs for each product for each firm.
5. If no cost efficiencies are assumed, keep this same vector of marginal cost estimates for use in the post-merger simulation to follow. If cost efficiencies are assumed, calculate the vector of expected post-merger marginal costs according to the assumption. Different assumptions can be used for different simulations.
6. Calculate the new matrix of own- and cross-price elasticities for the post-merger world, which will depend again on the form of the demand system chosen. The new matrix will be the same as the old matrix if isoelastic demands (i.e. logarithmic demands) are assumed.
7. Solve again for the theoretical profit-maximizing markups as a function of own- and cross-price elasticities for each firm, but this time using the post-merger ownership patterns. These will produce a set of equations that are necessarily different from the pre-merger situation, since ownership patterns have changed. One firm now controls the products of what used to be two firms, and jointly maximizes profits for all its products.
8. Given estimates of the matrix of post-merger elasticities and the vector of assumed post-merger marginal costs, as well as the new post-merger equations, back out the vector of estimated post-merger price increases.
9. The expected post-merger price increases are calculated as the differences between predicted post-merger prices and known current prices.

In practice, steps 1 through 4, and again steps 6 through 8, are generally estimated simultaneously. Steps 6 and 7 must be estimated simultaneously unless isoelastic demands are assumed.

The reliability of merger simulations, like all things, depends on the reasonableness of their underlying assumptions. As merger simulations can be complex, a common critique is that their underlying assumptions may not be readily apparent or may be difficult to assess.[23]

[22] These equations are known as Lerner indices.
[23] See Werden et al. (2004).

One key assumption relates to the form of the demand system to be estimated. Some common choices are linear demand systems, logarithmic demand systems, discrete-choice demand systems, and almost-ideal-demand systems (AIDS).

The former two are simpler but have significant implementation problems. They suffer from what is known as a "dimensionality" problem, meaning the number of elasticities to estimate from the data rises very fast when the number of products increases (at a rate of N^2). A market with 100 substitutes (which is not uncommon) has 10,000 elasticities to estimate.[24] Prices are endogenous in a supply-and-demand system, so instrumental variables or similar techniques are often required, and the large number of prices and required instruments makes estimation of the elasticity matrix difficult in practice.

Discrete choice models, such as logit, nested logit, and random coefficients models, attempt to solve the dimensionality problem by making additional assumptions. Logit models, the simplest, are notorious for producing elasticity matrices that are counterintuitive (suffering from the well-known Independence of Irrelevant Alternatives problem, and the lesser-known price-sensitive-luxury-good-buyers problem). Random coefficients models make fewer assumptions but are substantially more complex to solve and more difficult to illustrate to non-economists.[25] AIDS models, including AIDS, L-AIDS, and PCAIDS models, all perform in a similar way, making different but specific restrictions on the pattern of own- and cross-price elasticities.[26] With these more complex techniques, merger simulations can be seen as black-box-y to the outside observer.

Another critique of merger simulations is that they are often specific to estimating post-merger price changes in a "normal" equilibrium, whereas concerns may involve more complex issues such as potential entry deterrence, reinforcing a dominant position, refusing to deal with competitors, etc. However, these issues if clearly specified can be built into the simulation. For example, it is possible within a simulation to estimate the profitability of a merged firm if it does or does not continue to sell an important input product to a competitor. One can estimate price changes and profits in each case and determine the more profitable avenue for the merged firm. Concerns about outcomes other than prices, such as quality or availability, can be incorporated into a simulation as well.

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[24] In 2022, 279 models of cars (i.e. 279 substitutes) were sold in the U.S. https://www.goodcarbadcar.net/2022-us-vehicle-sales-figures-by-model/

[25] See Berry (1994), Berry et al. (1995), and Nevo (2000).

[26] See Deaton and Muellbauer (1980).

A related critique is that merger simulations are based on static equilibrium models, rather than dynamic equilibrium models, and thus cannot address coordinated effects and the potential for tacit collusion. Arguably, this is not a limitation of the model but a feature – its restriction to static models means that it is wholly focused on unilateral effects, and not the separate and more speculative issue of tacit collusion. Given the Folk Theorem's warning that both competition and tacit collusion (and anything in between) is possible in a dynamic game with sufficiently high discount factors, merger simulations are best suited to measuring unilateral effects in a single-equilibrium setting.[27]

Proponents of merger simulations argue that, when performed correctly, they add a scientifically-rooted piece of evidence to the overall body of evidence being considered. In the absence of merger simulations, one must still attempt to get at price effects and other effects through documentary evidence, fragmentary economic evidence, or even market share information based on questionable market definition exercises. Mentally converting documentary or fragmentary economic evidence into estimated merger effects still requires assumptions about interpretation and weight, and such assumptions may be more subjective or questionable than the explicit assumptions laid out in a merger simulation.

One of the key assumptions in a merger simulation relates to the size of the expected cost efficiencies. Economists are not always in the best position to measure potential cost efficiencies, which can be technology dependent in many cases. However, it is easy enough to perform several merger simulations under different efficiencies assumptions for comparison. Some economists propose a baseline presumption of a 5% cost efficiency absent evidence that would raise or lower it.[28]

There is a growing literature assessing the accuracy and robustness of merger simulations, generally comparing the predictions of merger simulations from pre-merger data with the actual ex-post experience in various situations (Peters, 2006; Weinberg, 2011; Weinberg and Hosken, 2013; Bjornerstedt and Verboven, 2016). These are important exercises to gauge the accuracy of merger simulations and point out areas in need of attention and improvement. The results of the literature are mixed and more research is needed. Studies find that sometimes merger simulations overestimate post-merger prices, sometimes underestimate them, and sometimes get them fairly close. The main challenge in performing retrospectives is that there are many real-world factors that change and evolve in the

[27] See Friedman (1971).
[28] Farrell and Shapiro (2010).

years following the merger, making it difficult to isolate just the effects of the merger itself, as the merger simulation sought to do.

Benchmarking

A popular approach to merger analysis that does not rely on simulations or theory is known as benchmarking. Benchmarking is the idea that one can estimate post-merger price changes for a given merger if one could find a very similar situation, already in existence today, that would mimic what the post-merger world would look like.

Hypothetically imagine that two firms operating in a given industry in one particular area already merged sometime in the recent past. Now imagine that two very similar firms from the same industry operating in a different but otherwise very similar area are contemplating their own merger. If the two markets contained a very similar set of competitors, with very similar market conditions, and very similar circumstances in every other regard, one could arguably perform a retrospective study of the earlier merger and use the known price changes from that merger as an estimate of the likely price changes for the current merger.

The obvious problem with this approach is that such a situation rarely to never exists. The firms at the center of the current merger are generally different than those in the benchmark case, their strategies may be different, their competitors may be different, their market conditions are almost always different, and so on. Many mergers are national in scope making such a benchmark even harder to find.

While benchmarking can be a valuable tool when making true apples-to-apples comparisons, it can also be misleading when the two situations differ in meaningful ways. The more that things are different, the less reliable the estimates.

A related benchmarking approach that has been used before is to look for a similar geographic area, not where there has already been a merger, but where there already happens to be one less competitor than in the area in question. The prices in that other area would then be used as a predictor of post-merger prices in the current area, given that the number of competitors in the current area will fall by one. The obvious problem with this cross-sectional approach is again that the two areas are unlikely to be “otherwise similar”. There is going to be a reason *why* there is one less competitor in that other area than in the current one. That underlying reason can – and generally does – affect market outcomes such

as prices independent of market power issues. One area could be lower demand which, by reducing economies of scale and increasing per-unit costs, would result in higher prices – and at the same time in fewer stores. The difference in prices would mistakenly be attributed to market power when it is really just the result of different cost conditions. Economists refer to this as an "omitted variables bias", and it can be especially strong in cross-sectional studies.

A well-known example of cross-sectional benchmarking was done in the *FTC v. Staples, Inc.* (1997) case.[29] The FTC challenged the Staples-Office Depot merger out of concern that there were only three major office supply superstores – Staples, Office Depot, and Office Max – and that a merger of two of them would substantially lessen competition.

Among the many analyses conducted was a benchmarking exercise in which the FTC calculated average prices in cities where only Staples existed (one-store markets), where only Staples and Office Depot existed (two-store markets), and where all three of the superstores existed (three-store markets). The benchmarking assumption was that prices in the three-store markets after the merger would be similar to prices in the two-store markets currently and that prices in the two-store markets after the merger would be similar to prices in the one-store markets currently. But since the different cities have different numbers of stores for a reason, such as cost differences and demand differences, they are not reliably comparable.

A second, more granular analysis examined prices at Staples stores based on their distance to the closest Office Depot store. While likely removing some of the unobserved omitted variables, the same basic problem remains. There is a reason *why* some stores are close together and others are not – maybe they cluster in high-demand areas with high economies of scale and scope and are more sporadic in outlying low-demand areas with low economics of scale and scope. These cost and demand differences can affect prices independent of market power. An even more granular analysis looked at the entry or exit of individual Staples or Office Depot stores over time, and while better, the same basic concern potentially remains. There is a reason why stores entered or exited when they did, such as increasing costs and decreasing demand, and this again affects prices over time.

Additional controls, regression discontinuity designs, and other econometric techniques can try to isolate the effect of the merger better and as much as possible. The best benchmarking analyses are

[29] FTC v. Staples, Inc. 970 F. Supp 1066 (D.D.C. 1997).

those that are able to isolate and remove the effects of confounding factors and make the most convincing apples-to-apples comparisons.

Piecewise Evidence

Merger simulations and benchmarking analyses are two types of "complete" analyses in the sense that they predict post-merger outcomes numerically using a scientific approach, provided they are reliably done. Other evidence can be used as well, but where the evidence is piecewise or fragmented, one must use caution in mentally converting each piece of piecewise evidence into numerical estimates of merger effects.

Some piecewise evidence is economic in nature. Diversion ratios (or their closely related cousins, own-price and cross-price elasticities) are fundamental building blocks of full-blown merger simulations but are often used in a piecewise fashion outside of that context. A diversion ratio between products *j* and *k* is the fraction of lost sales on product *j* after an increase in the price of product *j* that is captured by the owner of product *k*. If products *j* and *k* are owned by different firms pre-merger, the loss in sales on product *j* after a price increase on product *j* is lost to its owner forever. If instead products *j* and *k* are owned by the same firm post-merger, these sales are no longer lost at all, only shifted from one of the firm's products to another. Higher diversion ratios are likely to lead to higher post-merger price increases, as the merged firm stands to lose fewer customers overall when raising prices post-merger.

Diversion ratios are valuable pieces of information but due caution should be exercised when converting them into numerical merger effects, absent a guiding model, as the assumptions to go from one to the other can often be implicit or subjective. While full-blown merger simulations make their own assumptions on how to convert diversion ratios into post-merger price effects, those assumptions are generally explicit and testable.

Other piecewise evidence is documentary in nature. For example, documents of internal communications showing that firms were especially concerned about the pricing and choices of the other firm could be a piece of evidence suggesting that competition between the firms may have been strong pre-merger. Documents discussing potential efficiencies or post-merger restructuring plans could be a piece of evidence suggesting that meaningful cost efficiencies were expected. Again, due caution is advised in converting documentary evidence into final merger effects.

Upward Price Pressure and Merger Simulation Light

Other theory-based approaches to merger analysis are simpler to perform than merger simulations, but have limitations of their own. One popular tool for merger analysis is known as Upward Price Pressure (UPP), introduced by Farrell and Shapiro (2010). The authors promote UPP exclusively as an initial screen for merger analysis, in place of the usual market share and concentration measure screens, rather than as a full test of merger effects. However, some have suggested modestly expanding UPP to produce an estimate of merger effects sometimes called Merger Simulation Light.

It is well known that traditional merger screens based on market share and concentration measures are problematic due to the nature of the market definition exercise and the required declaration of each product as fully "in" or fully "out" of the market, when substitutability is really a matter of degree.[30] While economically speaking, there is no need for a market definition exercise in merger matters (since a properly done merger simulation determines which products are greater or lesser substitutes from the data itself), a market definition exercise remains a standard first step in most merger and antitrust cases.

Derived from first principles, UPP is designed to predict the direction of post-merger price changes, rather than the magnitude of those changes. Imagine that a single-product firm produces product *j* and another produces product *k* and they want to merge. The merged firm would then jointly maximize the sum of profits on *j* and *k*, instead of on each separate product:

$$\pi = q_j(p_j, p_k) * (p_j - c_j) + q_k(p_j, p_k) * (p_k - c_k)$$

where the *q*'s are demand functions, and the *c*'s are constant marginal costs.[31] The first derivative with respect to p_j is given by:

$$\frac{\partial \pi}{\partial p_j} = \left[\frac{\partial q_j}{\partial p_j} * (p_j - c_j) + q_j\right] + \frac{\partial q_k}{\partial p_j} * (p_k - c_k)$$

and similar for p_k. At pre-merger prices, the square-bracketed term is zero since that is how the original producer of product *j* would have set the pre-merger price p_j in the first place (by taking a first order

[30] Criticisms date back to Chamberlin (1950).

[31] The demand functions depend on the prices of all substitutes but only the merged firm's prices are necessary here, since UPP is limited to estimating the initial direction of price changes. The responses of other firms will only reinforce the initial price changes and not reverse their direction, and can thus be ignored for this purpose.

condition using only the first term of the profit function). Whether or not post-merger prices will increase depends on the sign of the second term, and it is this second term that forms the basis of UPP. Assuming substitute products (so that $\partial q_k / \partial p_j$ is positive) and no cost efficiencies, the second term is necessarily positive suggesting that prices are likely to increase (the market power effect).[32]

However, with cost efficiencies, there is also a downward force on prices – the efficiencies effect – which can offset or reverse the market power effect if large enough. After adding a term to account for cost efficiencies and performing some simple algebra, UPP is given by:

$$UPP_j = D_{jk} * (p_k - c_k) - E_j c_j$$

where D_{jk} is the diversion ratio from product *j* to product *k* and E_j is the efficiencies credit on product *j*. Farrell and Shapiro suggest a presumptive 5% efficiency credit.

There are variations on UPP. Salop and Moresi (2009) recommend scaling UPP into a percentage-based measure by dividing it by the pre-merger price p_j, which they call a Generalized UPP Index (GUPPI). Jaffe and Weyl (2013) develop a Generalized Price Pressure (GePP) that accounts for changes in the accommodating behavior of competitors. Schmalensee (2009) develops an amended UPP that accounts for cost efficiencies on both products when calculating UPP for any one product, and that accounts for "feedback" loops, noting that a price increase on one increases UPP on the other.

One key aspect of UPP that is cited both as a limitation and as a feature is that it does not actually seek to estimate post-merger price increases. Doing so would require making assumptions about the form of the demand system, and that in turn can lead to different and sometimes conflicting results.[33] Schmalensee (2009) argues that the step going from UPP to estimated post-merger prices is nonetheless important, since estimating post-merger price changes is ultimately the goal of merger analysis.

There is, of course, no reason UPP cannot do both – first be used as a pure screen independent of demand assumptions, and then be combined with reasonable demand assumptions to estimate at least a lower bound of potential price increases, in what Noel (2011) calls Merger Simulation Light (MSL). If the results of an MSL analysis all point to the same qualitative conclusion regardless of the specific demand function, the differences are immaterial. If they point to different conclusions, then the merger

[32] I abstract away from other types of efficiencies (e.g. quality efficiencies) for this exposition.
[33] The curvature of the demand curve in turn determines the pass-through rates of costs into prices.

may be questionable and, in some cases, additional data could be used to estimate the curvature of the demand system. The significant simplification going from a full-blown merger simulation to MSL is that MSL assumes that the prices of the non-merging firms will not change post-merger. While not likely to be true, it vastly simplifies the analysis vis-à-vis a full blown merger simulation and produces lower bound estimates of price increases. Miller et al. (2017) show that the estimated value of UPP itself actually gives a fairly close approximation of the estimated post-merger price changes for certain demand structures.

UPP first appeared in the 2010 Merger Guidelines and since that time it and its various extensions have been used extensively in merger analyses.[34]

Related Approaches

Other simplified approaches to merger analysis are commonly used at the market definition exercise stage rather than in the main unilateral effects exercise itself. The market definition exercise is based on the Hypothetical Monopoly Test (HMT), outlined in the Merger Guidelines, which defines a market as the smallest set of products and geographical area in which they are sold for which a hypothetical monopolist, controlling all those products, would be able to profitably increase prices by a small but significant and non-transitory amount (a "SSNIP").[35] The products of the proposed merged firm are placed at the center of that set of products, and the SSNIP is often taken to be 5%. Note that the HMT is a hypothetical merger-to-monopoly scenario and is different from the actual merger being reviewed, though they converge to one and the same if there are no good substitutes outside the merging firm.

It would be a significant undertaking to perform the HMT using its own merger simulation, given that it can involve very many firms and products, so the HMT generally proceeds with qualitative and piecewise evidence, supplemented with simplified merger analyses such as those below.

Harris and Simons (1989) propose a method they call Critical Loss. The authors derive a formula for the maximum sales a merged firm would be willing to lose on a product after a given post-merger price increase on that product, that would still make the price increase worthwhile. They call this "Critical Loss". If the firm's actual loss exceeds its Critical Loss, the firm would not be willing to increase prices by that amount, and if the firm's actual loss does not exceed its Critical Loss, it would. The Critical Loss

[34] 2010 Merger Guidelines.
[35] The 2023 Guidelines also introduce the (strangely named) SSNIPT test as well, to emphasize that not only prices but other consumer outcomes (i.e. terms) matter as well.

formula is very simple, equal to X / (X + M) where X is the given price increase of concern (often 5%), and M is the percentage markup of price over marginal cost. The formula shows that Critical Loss is lower with higher markups, though this would seem to counterintuitively suggest that firms with higher markups (and potentially greater market power) would be less likely to raise post-merger prices (since actual loss is now being compared with a smaller Critical Loss number).

O'Brien and Wickelgren (2003) and Katz and Shapiro (2003) criticize the use of the Critical Loss formula in isolation and derive comparable formulas for actual loss to use with it. By explicitly accounting for the effect of markups on both Critical Loss and on actual loss, they show that when markups rise, not only does Critical Loss fall, but actual loss falls as well. In fact, they show that actual loss falls even faster, reversing the unintuitive result. Firms with higher markups are more likely, and not less likely, to raise prices after the merger than those with lower markups, all else equal. Critical Loss is discussed in the Merger Guidelines.

Other simplified market definition exercises are available as well. Werden (1998) simply calculates the expected price change of a hypothetical monopolist using prices from a simple Lerner Index for a monopoly (i.e monopoly markups) and current prices. The precise results depend again on the choice of demand. Other variations on the theme are possible.

Efficiencies play no role in the market definition exercise since the exercise is purely about identifying substitutes and is not about actual price effects. This is not the case when evaluating the actual merger, however, once the market definition exercise is done.

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