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## MARKET DEFINITION AND THE MERGER GUIDELINES

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# Market Definition and the Merger Guidelines

Louis Kaplow\*

## *Abstract*

The recently issued revision of the U.S. Horizontal Merger Guidelines, like its predecessors and mirrored by similar guidelines throughout the world, devotes substantial attention to the market definition process and the implications of market shares in the market that is selected. Nevertheless, some controversy concerning the revised Guidelines questions their increased openness toward more direct, economically based methods of predicting the competitive effects of mergers. This article suggests that, as a matter of economic logic, the Guidelines revision can only be criticized for its timidity. Indeed, economic principles unambiguously favor elimination of the market definition process altogether. Accordingly, the 2010 revision is best viewed as a moderate, incremental, pragmatic step toward rationality, its caution being plausible only because of legal systems' resistance to sharp change.

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# Market Definition and the Merger Guidelines

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## 1 Introduction

In 2010, the U.S. Federal Trade Commission and Department of Justice completed a process to revise their joint Horizontal Merger Guidelines, prior versions of which have been emulated by competition regimes throughout the world and also have had a significant influence on U.S. courts and legal practice, including the work of economic experts on particular cases.<sup>1</sup> The revised Guidelines reflect an incremental approach, perhaps in part reflecting actual, updated views regarding best practices but also to an unknown extent displaying pragmatic political judgment in light of the legal system's reluctance to embrace what it would regard as radical change.

Central to the Horizontal Merger Guidelines, old and new, are a method for defining markets and a statement of the implications of market shares in the markets so defined. Regarding the former, the now famous technique, followed closely in other jurisdictions as well, is as follows:

The hypothetical monopolist test requires that a product market contain enough substitute products so that it could be subject to post-merger exercise of market power significantly exceeding that existing absent the merger. Specifically, the test requires that a hypothetical profit-maximizing firm . . . that was the only present and future seller of those products (“hypothetical monopolist”) likely would impose at least a small but significant and non-transitory increase in price (“SSNIP”) on at least one product in the market . . . . (U.S. Horizontal Merger Guidelines 2010 [hereinafter HMG], §4.1.1.)<sup>2</sup>

In basic settings, one begins with a narrow, homogeneous goods market and asks whether a hypothetical monopolist thereof would find it profitable to raise price above the preexisting level by at least 5% (HMG, §4.1.2). If so, that is deemed to be the relevant market. If not, one expands the market by adding the nearest substitutes and repeats the test. If it is passed, the process is complete and that redefined market is selected. If not, the process is repeated until the test is satisfied

Once the market is thereby defined, one computes the postmerger Herfindahl-Hirschman

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<sup>1</sup>Dennis Carlton (2010, p. 619) states: “The [U.S.] Horizontal Merger Guidelines . . . have had an enormous influence not just on how U.S. antitrust agencies conduct merger policy but also on how courts and antitrust agencies throughout the world make decisions about the antitrust consequences of mergers.” Readers of the EU's Guidelines on the Assessment of Horizontal Mergers (2004), for example, will note striking similarities.

<sup>2</sup>See also DG Competition Discussion Paper (2005, ¶14), on the European competition authority's use of the SSNIP test for market definition, especially in merger cases, and the Commission Notice on the Definition of Relevant Markets (1997, ¶¶15–17).

Index (HHI) in that market, and also the increase in the HHI due to the merger, in order to determine the presumptive level of danger. For example: “Mergers resulting in highly concentrated markets [with an HHI above 2500] that involve an increase in the HHI of more than 200 points will be presumed to be likely to enhance market power.” (HMG, §5.3.) The 2010 Guidelines reflect some change in this regard; specifically, the targets have been raised (previously this high-danger zone began at an HHI of 1800 and only required an increase of 100). In addition, however much the U.S. agencies are in fact influenced by market shares or HHIs, it seems clear that courts place significant weight on market definition and resulting market shares.<sup>3</sup>

One of the most noted changes in the 2010 revision is that a number of statements indicate the agencies’ inclination to embrace alternative, more direct economic methods for predicting the competitive effects of mergers, whether using merger simulations or critical loss analysis. (E.g., HMG, §§4.1.3, 6.1.) Furthermore, there are suggestions that these alternatives may sometimes supplant market definition.<sup>4</sup> To a significant extent, these statements may merely reflect what has come to be standard operating procedure. However, inclusion in the Guidelines seems designed to signal both greater internal use of market definition alternatives in the future and a desire to induce the courts to be more open to such methods.<sup>5</sup>

This set of changes regarding market definition, in turn, has generated some criticism. During the revision process, commentators suggested that the greater willingness to substitute more direct methods for the market definition process may be going too far—or perhaps the concern is not that the revision in fact goes too far but that it may lead to further shifts that would exceed the bounds of sound economic judgment.<sup>6</sup> In addition, some particular techniques, such as Farrell and Shapiro’s (2010) method of assessing the presence of upward pricing pressure in differentiated products mergers, have been criticized as being untested and too difficult to employ by comparison to more traditional market definition methods.<sup>7</sup> It is unclear at this point, however, whether the overall sense of the competition policy community is that the move made by the 2010 Guidelines is sound or somewhat excessive.

The thesis of this article is that the changes with regard to market definition have not, in principle, gone nearly far enough. As a matter of sound economics, the market definition—really, redefinition—process should never be employed. As a consequence, it makes sense not simply to increase reliance on alternatives here and there, when particularly good data

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<sup>3</sup>For a range of references supportive of this familiar point, see Kaplow (2010, p. 439 n. 2).

<sup>4</sup>“The Agencies’ analysis need not start with market definition. Some of the analytical tools used by the Agencies to assess competitive effects do not rely on market definition, although evaluation of competitive alternatives available to customers is always necessary at some point in the analysis.” HMG §4. “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.” HMG §6.1.

<sup>5</sup>For example, the Guidelines indicate that one purpose is to “assist the courts in developing an appropriate framework for interpreting and applying the antitrust laws in the horizontal merger context” (HMG §1). In principle and to some extent in practice, U.S. courts are more open to alternatives to market definition than most commentators ordinarily suppose. See Kaplow (2010, §VI.E).

<sup>6</sup>See the references below, in note 27.

<sup>7</sup>See, for example, Carlton (2010).

of the right kind happens to be available, but to use them across the board. Related, if the market definition process is indeed bankrupt, arguments that various alternatives are inferior to existing techniques carry a very high burden of proof. The analysis here does not endorse any particular method of assessing the competitive impacts of horizontal mergers, offer reasons why one or another may be superior in particular settings, or suggest that formal economic techniques are usually superior to more informal methods, such as predicting competitive effects based on the views of industry players (notably, large sophisticated purchasers) or inferences from the merging firms' internal documents. Instead, the claim is that any and all evidence should focus explicitly on the determinants of competitive effects and eschew the attempt to define a relevant market.

Section 2 critiques the general logic of the market definition process, drawing on Kaplow (2010). First, it argues that it is counterproductive to redefine markets because there does not exist any way to interpret market shares in such markets—which, after all, was the whole point. There do exist ways to interpret market shares in homogeneous goods markets under certain assumptions; redefined markets bring in substitutes, creating heterogeneous goods markets, and there is no economic method of interpreting shares in such markets.<sup>8</sup>

Second, there is no meaningful way to choose which is the better (relevant) market without assuming that one already has in hand a best estimate of market power, however good or bad it might be; but this renders the market definition exercise pointless—since the whole purpose is to make market power inferences. In saying that one market definition is superior to another, one is essentially asserting that the error involved in choosing the former is less than that associated with the latter. But to measure either error, one needs to determine the difference between the market power one would infer in the market *and the value of one's best estimate of market power*. However, if we have the latter, we should be done. Hence, choosing between markets is pointless. Unfortunately, it is usually worse because, once we have chosen a market, we derive our market power inference in part from the choice we have just made, and such inference is, by definition, different from our best estimate. (Our just-mentioned measure of the error is, after all, the difference between this inference and our best estimate.) Accordingly, we are employing a market power measure that is, by the nature of the process, necessarily worse than our best estimate. This approach is always a mistake, and if the mistake is sufficiently large, it may tip the outcome—whether or not to challenge a merger—thereby transforming the economic mismeasurement into an inferior legal decision.

Section 3 applies and extends the analysis to the specific method employed in the U.S. Horizontal Merger Guidelines—the hypothetical monopolist test—and shows that it by nature leads to anomalous results. Put another way, it generates determinacy at the expense of coherence. Of course, given the analysis in section 2, it could not be otherwise. Section 3 also considers three basic merger settings—concerns with coordinated effects, and cases with unilateral effects, in both homogeneous and differentiated products industries—and explains how, on reflection, the market definition process (and, specifically, the hypothetical monopolist

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<sup>8</sup>The language in the text here and throughout largely speaks in terms of product market definition. For the most part, similar analysis is applicable to geographic market definition.

test) is useless, or worse, in each instance.

In summary, the market definition process is fundamentally defective, so much so as to render it inappropriate in all settings. The hypothetical monopolist test cannot, a priori, solve this problem, and in practice it often produces arbitrary results. Fortunately, the hypothetical monopolist test in particular and market definition in general are wholly unnecessary in the assessment of the competitive effects of horizontal mergers—or in other competition policy settings, for that matter.<sup>9</sup> For economists, the message is to continue or accelerate work on other ways of determining market power. For competition authorities and courts, the lesson is to be open to alternatives, whether proffered by the government or by merging parties, and to encourage rather than resist sound analysis whenever it is offered.

## **2 Bankruptcy of the Market Definition / Market Share Paradigm**

### **2.1 The Impossibility of Market Share Inferences in Redefined Markets**

Under the familiar market definition / market share paradigm, one first defines the relevant market and then uses market shares in that market to make market power inferences. This subsection focuses on the second element, market share inferences (deferring the first element to subsection 2.2). In addressing this question, one should begin at the beginning: How is it that market shares bear on market power?

This question, on its surface, is perplexing because market power is not defined by market shares. Rather, market power is ordinarily defined by the ability of firms to profitably elevate price ( $P$ ) above a competitive level, taken to involve price equal to marginal cost ( $MC$ ). For example, the Lerner index ( $L$ ) is the price minus the marginal cost (at the prevailing level of output), which difference is divided by the price. Hence, if one wishes to measure market power, it would seem that one would be estimating price and marginal cost.

Although the measurement of price is not without problems (particularly with product differentiation and when products are bundled with each other or with services), measurement of marginal cost is notoriously difficult in many settings, especially due to the need to determine which costs are variable in the pertinent time frame and the problem of allocating joint costs. Accordingly, economists have often sought other means of inferring market power.

An important approach relies on firms' profit maximization calculus, from which one can deduce that static maximization implies the equation of the Lerner index with the inverse of (the absolute value of) the firm's elasticity of demand. Hence, an approach toward market power assessment is to measure firms' elasticities of demand. This endeavor can also be daunting.

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<sup>9</sup>This is not to say that use of a market metaphor might not sometimes be helpful. Nor is it suggested that judgments never have to be made, say, about how widely to collect data (on how broad a range of products) for purposes of estimating a demand system. Such uses are qualitatively different from the definition of a relevant market for purposes of making a market power inference from the shares therein.

Moving yet a step further from our definition of market power, it is common to employ a model in which a dominant firm sells a homogeneous good, subject to the constraint of demand substitution and the supply response of a competitive fringe. In this model, the market power relationship is given by the following familiar expression:<sup>10</sup>

$$L = \frac{P - MC}{P} = \frac{1}{|\varepsilon_f|} = \frac{S}{|\varepsilon_d| + (1 - S)\varepsilon_r}.$$

In this formula, the firm's elasticity of demand is  $\varepsilon_f = (dQ/dP)(P/Q)$ , where  $Q$  denotes the quantity of the firm's output; the market elasticity of demand is  $\varepsilon_d = (dX/dP)(P/X)$ , where  $X$  denotes total market demand; and the rivals' collective elasticity of supply is  $\varepsilon_r = (dY/dP)(P/Y)$ , where  $Y$  denotes rivals' total supply. Finally,  $S$  is the dominant firm's market share and hence  $1 - S$  indicates rivals' aggregate share.

We now have an explicit indication of the functional relationship between a firm's market share and its market power—although, as will be elaborated momentarily, this relationship holds only under certain assumptions, most importantly for present purposes, the assumption of a homogeneous goods market. In this formula, a higher share indeed indicates greater market power. When a dominant firm's share is larger, it benefits more from the price elevation that results from its reduction in output. Moreover, a higher dominant firm share implies a lower share for rivals and hence a lesser impact of a given rivals' elasticity of supply.

This formula has some further properties that are well known but do not always seem to be appreciated. Notably, the formula works regardless of how many demand substitutes exist or how strong those substitutes are. These factors determine the overall market elasticity of demand: the market elasticity equals one plus the revenue-weighted sum of all cross-elasticities. And this market elasticity, capturing all sources and strengths of demand substitution, appears in our formula. Hence, the formula properly depicts market power regardless of the particulars of demand substitution. It follows immediately that there is no point whatsoever in redefining markets to capture the influence of substitutes.

The situation, however, is worse with regard to market redefinition. Suppose, as is commonly done, that one does decide to redefine the market, supplementing our original homogeneous goods market with markets for one or more close substitutes. Moreover, assume that this market redefinition is appropriate under whatever criterion one chooses, such as the U.S. Horizontal Merger Guidelines' hypothetical monopolist test, and that the result is indeed the sought-after relevant market. In this redefined market, we can compute the dominant firm's new, reduced market share.<sup>11</sup> But what do we do with that share? That is, what formula are we to use to assess the firm's market power in this expanded market?

We have not merely, as they say, jumped out of the frying pan into the fire. We have

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<sup>10</sup>See, for example, Stigler (1940), Landes and Posner (1981), and Kaplow and Shapiro (2007).

<sup>11</sup>The choice of whether to calculate the share in terms of units sold, value, or some other criterion is more consequential since we are no longer in a homogeneous goods market. The argument in the text sets this and other problems to the side.

started in a situation in which a valid market power inference may be drawn—regardless of the nature of demand situation—and moved to one in which we can make no inference whatsoever. The problem is that there exists no valid economic way to infer the firm’s market power in this broader market, using its market share in that market or otherwise.

We cannot simply apply our old formula because it is only valid in a homogeneous goods market—such was assumed in the profit-maximizing derivations that underlie it. If we nevertheless attempt to apply the formula, what are we to insert for the elasticity of market demand and of rivals’ supply? We cannot use the initial elasticities, for they apply to the narrower, homogeneous goods market. So, what is the market elasticity of demand for the combined market? One could ask, as under the hypothetical monopolist test, how many sales a firm that raised price in both markets would lose to substitutes outside the combined market, but that elasticity answers the wrong question (on which more in section 3). That is, we want to know the *dominant firm’s* market power—or, in other settings, perhaps the market power of postmerger firms that, say, now coordinate on price in the initial market.

There is, it turns out, a unique number we can insert for the market elasticity of demand in this combined market that gives us the right market power answer (assuming that we also handle rivals’ supply elasticity properly, a subject considered momentarily). To see what this elasticity is, assume for simplicity that rivals’ supply elasticity is zero. In that case, the market elasticity that works is our original market elasticity—computed in the narrower, homogeneous goods market—multiplied by the ratio of the new, lower share to the former, higher share. When the new, lower share is divided by that scaled-down market elasticity, as commanded by our formula, the result is (by construction) equal to the original market share divided by our original market elasticity. And, moreover, we know that this latter fraction does properly indicate market power, since our formula works for the narrower, homogeneous goods market. Clearly, any other market elasticity we insert will give the wrong answer.

This fact establishes the following proposition: The only way to apply our formula in the broader, redefined market to yield the correct market power inference is to insert a particular, phantom market elasticity of demand that is determined in such a way as to undo entirely the effect of the market redefinition. In other words, the only way to make a valid market power inference in the redefined market is to ignore this supposedly relevant market and go back to where we began.

It should be immediately apparent that the same logic applies with regard to rivals’ elasticity of supply. There is no obvious definition of this concept for our broader, redefined market. We could ask what is the weighted average response across all of the (nonhomogeneous) products when the price of all is elevated by the same proportion, but that again would be answering the wrong question. To determine the right phantom rivals’ supply elasticity to insert into our formula, we can assume that the market elasticity of demand is zero and then scale down our original supply elasticity for the homogeneous goods market so that, when inserted into the formula with the new, lower market share, we get the same answer as we obtained in our original, homogeneous goods market. This answer again is unique, and it likewise undoes the market redefinition. Finally, when neither elasticity is in fact zero, it should



be clear that making both of these adjustments will work in all cases.<sup>12</sup>

What we have learned is that the only valid way to make market power inferences from market shares in redefined, nonhomogeneous goods markets is to undo the market redefinition. This conclusion raises the question of what we—economists, agencies, courts, and others—have been doing all along in the myriad instances in which we have redefined markets and purported to make inferences from market shares in the combined markets. This question has sometimes been addressed, and occasionally suggestions have been made that one might somehow interpret market shares in broadened markets so as to yield the same answers as one would obtain from the higher market shares in narrower markets.<sup>13</sup> And some commentators have observed that there is no such thing as a “relevant market” in industrial organization textbooks, and no economics literature standing behind inferences of market power from market shares therein.<sup>14</sup> So it is indeed a wonder how the present state of affairs arose and has persisted until now, especially in economists’ writing and in their work in government agencies and as testifying experts.

## 2.2 The Impossibility of Choosing the Best Market without Already Having a Best Estimate of Market Power

As just noted, the market definition / market share paradigm proceeds in two steps: defining a relevant market and then making market power inferences from market shares in that market. The preceding subsection explains how the second step is impossible, short of undoing any market redefinition. This subsection demonstrates that the first step is likewise impossible, in this instance without already having in hand one’s best estimate of market power—thereby undermining the *raison d’être* of the paradigm, which is to enable a market power inference. Moreover, using the market power inference from the chosen, relevant market discards information contained in one’s best estimate and, as a result, produces a worse inference.

To begin, it is necessary to state what one means by the relevant market. That is, in choosing between (say, for simplicity) two candidate markets, one needs a criterion for which market definition is better. Remarkably, it is almost impossible to find explicit statements of what this criterion might be—remarkable since economists, agencies, courts, and others have been purporting routinely to choose best markets for over half a century, and in the process presenting, engaging, and resolving disputes about which market definition is best in myriad particular cases. How can one conduct such debates and reach conclusions without a decision-making standard?

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<sup>12</sup>See Kaplow (2010, pp. 454–458).

<sup>13</sup>See Landes and Posner’s (1981) important article and the discussions in responses by Schmalensee (1982) and Kaplow (1982). Schmalensee in particular criticizes Landes and Posner’s attempts to employ (as is) the formula relating market shares to market power in redefined, heterogeneous goods markets as if the formula were still valid.

<sup>14</sup>See, for example, Fisher (1987) and Kaplow and Shapiro (2007). Werden (1983, p. 526) has noted that “[e]conomic theory does not require the delineation of markets, and most economists would not know how to begin to delineate one,” but he goes on to state that the U.S. Merger “Guidelines employ the concept of an ‘antitrust market,’ a market delineated for the sole purpose of antitrust analysis.”

The discussion here will employ the criterion that the best market is that which results in the most accurate market power inference. (As will be discussed in section 3, the hypothetical monopolist test differs and, on that account, should be viewed as inferior.) So, suppose that we are choosing between a narrower market,  $N$ , and a broader market,  $B$ , and we wish to know which choice is superior. As background, we should imagine that there may have been other candidate markets as well, and we have somehow managed to narrow our list to these two choices. Moreover, suppose that we believe that the truth lies somewhere in between; that is, market power is less than we would infer from the larger market share in the narrower market  $N$  and more than we would infer from the smaller market share in the broader market  $B$ . This setting abstracts from how the narrowing decisions were made, and we may presume that they used the same criterion that will now be scrutinized. And the choice between  $N$  and  $B$  is only interesting if the truth lies somewhere in between, for otherwise it will be obvious which of the two markets to choose, and the real question would be the choice between that market and one on the other side of the truth. Of course, this setting is quite familiar; once issues have narrowed in a government agency's analysis of a merger, or in a legal dispute in court, ultimately the disagreement usually comes down to precisely such a choice.

A preliminary problem with the choice has already been evaded in this setup, for it is supposed that *some* market power inference will be made in market  $N$  and in market  $B$  and, moreover, that these inferences will differ, for otherwise the choice would be moot. But, given the analysis in subsection 2.1, such inferences are infeasible—that is, unless in each case one is in or reverts to the homogeneous goods market, in which event market definition would be unnecessary. Suppose that, somehow, this problem has been overcome, and we indeed have some distinct market power inference associated with each of our two choices.

The next step is to determine which choice results in the most accurate inference of market power, which is to say, the smallest error. Accordingly, we must now measure (estimate) this error. By definition, the error in each instance is the difference between the level of market power we would infer in the market in question and whatever is our best estimate of market power.<sup>15</sup> Having measured the two errors, we may now determine which is smaller. If it is the error resulting from choosing the narrower market  $N$ , then  $N$  is the relevant market, and our market power inference is that associated with  $N$ . If the error is instead lower with the broader market  $B$ , then  $B$  is our choice and we infer market power accordingly.

A moment's reflection on the foregoing reveals the fundamental defect of the market definition process that renders it always unnecessary and inferior to dispensing with it entirely: In order to choose the best market, a necessary input is our best estimate of market power. But our best estimate of market power is, well, our best estimate.<sup>16</sup> In sum, any coherent method of choosing a relevant market must take, as a preexisting input, some best estimate of market power. So why don't we just stop and declare victory, quitting while we are ahead?

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<sup>15</sup>It should be obvious that the present analysis does not depend on a symmetric loss function that only depends on the magnitude of the error and not its sign, on whether the loss function is linear, on how one takes into account uncertainty in the best estimate, and so forth.

<sup>16</sup>Moreover, it must be that it was obtained without first choosing the relevant market, for if it were not, we would have an entirely circular process.

In advancing the foregoing argument, note that nothing has been said or needs to be said about how this best estimate of market power is obtained or about how good the estimate is. It might in one case be developed with subtle econometric techniques applied to high-quality data, in another by observing a natural experiment, in another by interviewing sophisticated purchasers, and in yet another from firms' internal documents.<sup>17</sup> Most often, there will be a combination of types of evidence of varying qualities. In some cases, our estimate may appropriately be viewed as a guesstimate. Furthermore, the quality of the best estimate will depend greatly on the procedural context: As a preliminary screen by an agency deciding, say, whether to solicit further information, the estimate will often be extremely crude; essentially, if it seems almost certain that market power is negligible, the investigation will cease. At the stage of challenging a merger, the estimate may be much better, yet still quite imperfect. And so forth.

The key point for present purposes is that, whatever is the stage, the nature of available information, or its quality, decisionmakers need to make some estimate. Their best estimate is simply the best they can do under the circumstances. Now, whatever is this best estimate, that is what one would wish to use in choosing which market definition was better, *N* or *B*. (One could use some other estimate, but by definition, that would be inferior.) Accordingly, regardless of the quality of the estimate or the setting, it is always the case that the pertinent best estimate is a necessary input to choosing the best market definition. And since the only reason to define a market is to make a market power inference, which by assumption one already has (and what one has is best), why bother?

Unfortunately, matters are worse. The reason is that the market power inference one draws from the best market one can define is not the same as our best estimate; it is inferior. Recall our setup. Even if we have succeeded in coming down to the two markets that give rise to the most accurate market power inferences, we are in a situation where the inference from one market (*N*) is too high and that from the other market (*B*) is too low. If we chose the former, we overestimate market power, relative to our best estimate. If we choose the latter, we underestimate market power, relative to our best estimate. To be sure, if we make the right choice, we will have chosen the lesser of two evils. But our choice is still evil—specifically, because a more virtuous choice was available: eschewing market definition altogether and sticking with our best estimate. That is, the market definition process necessarily entails discarding information and substituting an inferior conclusion.<sup>18</sup>

In addition, employing a worse market power inference will sometimes lead to the wrong legal conclusion. Suppose that *N* is our choice. In that instance, market power is overstated. In some cases—specifically, those in which the level of market power we infer is just above our threshold for action whereas our best estimate is below this threshold—we will mistakenly challenge or condemn behavior. Similarly, when *B* is our choice, there will be cases in which we mistakenly permit behavior that should have been challenged or condemned. These undesirable outcomes, it is now obvious, are both inevitable (with market definition) but entirely avoidable

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<sup>17</sup>The U.S. Horizontal Merger Guidelines advance a highly catholic approach toward the types of evidence that will be considered. HMG §2.1.

<sup>18</sup>Necessarily, that is, unless we make market power inferences that do not depend on which market we choose, in which case it is obviously pointless to define markets.

(without market definition).<sup>19</sup> Of course, employing our direct estimate directly does not eliminate the possibility of error since our estimate is only that, an estimate. But the expected cost of error is minimized when we use our best estimates rather than employing knowingly inferior alternatives. With market definition, less is more, and the optimum is a corner solution: none at all.

### 3 Uselessness of the Hypothetical Monopolist Test

#### 3.1 Determinacy at the Expense of Coherence

In the current version of the U.S. Horizontal Merger Guidelines—as well as in previous versions going back to the 1980s and in the merger guidelines in other jurisdictions—the market definition / market share paradigm is instantiated by two mechanisms: the hypothetical monopolist test, used to define the relevant market, and numerical levels of the postmerger HHI and the merger-induced increment to the HHI, used to determine a level of danger that triggers further analysis (bringing in other factors) and may provide a presumptive basis for an ultimate challenge. What is striking is that, although such guidelines tend to be explicit that the purpose of most or all of the analysis is to estimate the competitive effects of mergers, there is no direct statement of what competitive effects are necessary or sufficient for a challenge.<sup>20</sup>

To bring this point home, suppose that the merging parties' and the government's separate analyses both concluded that a merger would elevate price on a sustained basis by 1.8%. Who wins? Which is to say, does the government challenge or allow the merger, and if a court faithfully followed the Guidelines, would the merger be enjoined or approved? Looking at the Guidelines, we simply do not know the answer.

This state of affairs should be regarded as both puzzling and problematic. After all, the entire purpose of the Guidelines' analysis—including application of the hypothetical monopolist test to define markets and other inquiries (directed, for example, at entry)—is to enable predictions about how much the merger will elevate price (taken here for simplicity, as is often true in the Guidelines themselves (HMG §1), as the unidimensional target). Moreover, various HHI thresholds are offered. One might have imagined that they would have been chosen based on the likely price effect associated with various HHI levels and increases brought about by a merger. But one would indeed be imagining, for such is never presented, either in the Guidelines or in supporting analysis or policy statements.<sup>21</sup> So, we have most of the Guidelines,

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<sup>19</sup>Actually, there is a way to avoid legal error while still employing market definition: making the choice of the relevant market an ex post conclusion—after determining liability (whether to challenge or prohibit a merger)—rather than an input to the conclusion. That is, one can estimate market power and use that estimate to determine the right legal outcome. Then, after the outcome is determined, one can choose a market definition that is consistent with the conclusion already reached.

<sup>20</sup>This lacuna permeates competition law throughout the world. See Kaplow (2011).

<sup>21</sup>One reason for this omission may be that a wide range of levels of market power is consistent with given HHI figures, even in properly defined markets, a point brought to life in examples in Landes and Posner (1981). Of course, this fact makes the use of the market definition process and stated HHI thresholds all the more dubious.

and the market definition component in particular, designed to answer a question—the predicted price effects of a merger—but we would not know what to do with an answer if we had one. In this light, it is unclear how one can assess whether one or another version of the hypothetical monopolist test, or any other market definition mechanism for that matter, is a sensible or silly means of addressing the problem.

One way to offer a partial evaluation of an approach under such circumstances is to test it for internal consistency. To do so, we can consider some plain vanilla applications of the test, that is, in basic situations in which various complications do not arise. We might suppose that, at a minimum, the test would yield consistent conclusions in such cases. Specifically, if a merger is condemned (actually, viewed as presumptively problematic) in one case, then surely in another involving a greater price elevation, it would likewise be impermissible. Similarly, if a merger readily is allowed to go forward under certain assumptions, then if we change the case such that price elevation would be even less, it should continue to be permissible. Such, however, is not the case.

As a first cut, consider some simple, rough comparisons involving Cournot (quantity) competition with homogeneous goods, where the only concern is with unilateral market power. In case one, the hypothetical monopolist test is passed. Indeed, such a firm would elevate prices tremendously, by hundreds of percent, because the demand elasticity is so low—and we will ignore supply responses for simplicity. Nevertheless, as long as the postmerger HHI is sufficiently low (now below 1500, HMG §5.3), the merger would not be seen to raise questions. This is true even though a merger could elevate price significantly, say, 20%, in such as case. (For any shares, as low as we like, we can find a low enough elasticity so that this result holds.) In case two, the hypothetical monopolist test again passes, but such a firm would elevate prices only 5.1%. Clearly, any merger, no matter how high the resulting HHI and increase in HHI—indeed, even a merger to monopoly—cannot raise price more than 5.1%. Hence, we would condemn mergers that we know raise price less than 5.1% while allowing one that raises price 20%.

One can readily generate other anomalies. If the 5% test is barely met, then under HMG §5.3 a merger that results in an HHI of more than 2500 and raises the HHI by more than 200 is presumed likely to enhance market power. A merger raising the HHI from 2301 to 2502 meets that test. To assess this case more explicitly, it is helpful to use the formula appearing, for example, in Ordover, Sykes, and Willig (1982) and Kaplow and Shapiro (2007), which indicates that the industry-wide average, output-weighted margin equals  $HHI/|\epsilon_d|$  (where the HHI is represented in ten-thousandths, so that its range is from 0 to 1).<sup>22</sup> Therefore, the premerger elevation would roughly equal 0.23 divided by the market elasticity of demand, whereas a hypothetical monopolist, which we have supposed can raise price 5% over the prevailing level, has a Lerner index equal to 1.0 divided by that elasticity. These relationships are consistent with an elasticity of approximately 15, a premerger elevation of about 1.49%, and a postmerger elevation of approximately 1.62%, for a merger-induced elevation of 0.13%, that is, under two

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<sup>22</sup>There are important qualifications (respects in which this formula oversimplifies), as established in Farrell and Shapiro (1990), but these problems are largely orthogonal to the present point.

tenths of one percent. By contrast, if the hypothetical monopolist can only raise price 4.9%, we expand the market, and if the first set of substitutes involves far more revenue than does the original market, then even a merger to monopoly would not trigger scrutiny, even though such merger would raise price 4.9%, which is to say, over thirty-five times more than the preceding merger that is presumptively condemned.

One could attempt to avoid this embarrassment by resort to other factors, but that is no consolation. After all, we can imagine cases in which they are inoperative—or in which they have the same relative impact on our two scenarios, leaving the ordering unchanged. Indeed, we can imagine cases where, say, entry is a greater factor in lower-elevation cases, worsening the comparison—unless entry is large enough to lead to exoneration there too, but of course, we have no idea how strong it must be since we have no stated target anticompetitive effect.

One might instead object to employing different market elasticities of demand. But such differences are common and, indeed, the core purpose of the hypothetical monopolist test is to address precisely the factor of demand substitution. If it fails to do this very well, it is not clear what purpose it serves. To elaborate, we might imagine that, once we have a relevant market in which the hypothetical monopolist test succeeds—i.e., once we have the narrowest market in which the hypothetical monopolist can profitably elevate price at least 5%—we would inquire further into the actual market elasticity of demand, and then use that elasticity to determine the magnitude of the predicted price increase due to the merger. Such analysis would be sensible indeed. But note that (a) it is necessary in all cases, in order to know whether we might otherwise be condemning mergers with small price effects or allowing mergers with large ones, and (b) once one goes this route, the hypothetical monopolist test is rendered moot. That is, if we are going to measure the demand elasticity directly and employ it to compute the price effect directly, we do not need to bother defining the market, using the hypothetical monopolist test or otherwise. Accordingly, there is a dilemma: Either the hypothetical monopolist test has significant bite, in which case it often leads to senseless answers, or it does not. One hopes the latter, which is to say that the test in fact plays little or no real role in analyzing horizontal mergers.

Consider now cases in which the hypothetical monopolist test fails in the first round, which is to say that a hypothetical monopolist cannot profitably raise price 5% in the homogeneous goods market. Continuing with situations in which our concern is with unilateral price elevation in a Cournot setting, we now have a maximum on the possible price increase for our merging parties. Indeed, using the above formula, we can at this point compute what the price increase would be. So why aren't we done? Specifically, suppose that we don't stop and instead follow the hypothetical monopolist test, expanding the market until we reach the point at which the test is met. What are we to do with the market shares in *that* market? The shares in the homogeneous goods market allow us—along with our demand elasticity estimate from the first stage of the hypothetical monopolist test—to determine price elevation. The shares in this expanded, heterogeneous goods market do not allow us to do this. (Note that this criticism is very close to that raised in subsection 2.1.) In other words, the hypothetical monopolist test yields a so-called relevant market that is not relevant to anything.

### 3.2 Is the Hypothetical Monopolist Test Ever Useful?

The hypothetical monopolist test entered the competition policy scene through merger guidelines and, as noted, is widely employed in that context.<sup>23</sup> The foregoing analysis already indicates that market definition is pointless, or worse, and that this test in particular has additional flaws. To round out the discussion and provide further concreteness, it is helpful to review the three main settings in which the test is meant to be employed.

Beginning with unilateral effects and, in particular, the effect of a horizontal merger in a market with homogeneous goods and Cournot (quantity) competition, we have already seen from subsection 3.1 that the hypothetical monopolist test goes awry. Consider again the formula presented there under which the markup is given by the HHI divided by the market elasticity of demand. The first step in applying the test involves asking how much the hypothetical monopolist would elevate price in the homogeneous goods market. Whatever is that answer, it is clear from the formula in subsection 2.1 that this result gives us  $\varepsilon_d$ , the market elasticity of demand. Indeed, this elasticity would be the basis for the price elevation estimate. At this point, we are indeed finished. That is, given this elasticity and the postmerger HHI, we can determine the postmerger price elevation. And using instead the premerger HHI, we can determine the premerger price elevation. Subtracting, we have the price elevation due to the merger. This logic, note, has nothing to do with whether the hypothetical monopolist could or could not elevate price by 5% or more in the homogeneous goods market. And, if it cannot, the analysis has nothing to do with which substitutes we add next, what the ultimate relevant market under the hypothetical monopolist test turns out to be, or what the merging firms' shares in that market are. We do not have any reason to find out.

Consider next unilateral effects with product differentiation. Here, as is now familiar, the way to predict the price elevation resulting from the merger is to determine the diversion ratio between the firms' products (suppose, for simplicity, that each sells only one) and use the levels of the premerger markups for each to determine how much price will rise. These ideas are long familiar from critical loss analysis—e.g., Baker and Bresnahan (1985), Harris and Simons (1989), O'Brien and Wickelgren (2003)—and have recently gained added attention due to Farrell and Shapiro's (2010) article. No market definition is involved.

Can the hypothetical monopolist test nevertheless somehow be used to illuminate this question? Suppose that we start with some cluster of products, including at least the merging firms' two products. If this market is drawn narrowly to include only those two products, then the first stage of the hypothetical monopolist test replicates the foregoing. In this market, the merged firm is a monopolist. As with unilateral market power in a homogeneous goods market, however, there is no reason to proceed. The first stage asks how much the hypothetical monopolist can raise price. At that point, we are done: in this case, instantly. Now, if the original market includes other products, the first stage would either indicate how much the

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<sup>23</sup>It is used more broadly as well, but such applications will not be addressed here. Needless to say, given the general critique of market definition in section 2 and the specific criticism of this test in subsection 3.1, as well as the points developed here, broader consideration would indicate that it is not useful in any setting.

hypothetical monopolist of all the products could elevate all of the prices simultaneously—which is the wrong question—or it would consider subcases, including those focusing on one or both of the merging firms’ products, in isolation, which replicates the scenario in which we initially consider the narrower market with only those two products. As above, there is never any reason to broaden the market and repeat the test. Market definition in general, and the hypothetical monopolist test for the relevant market in particular, is of no use in predicting the price effects of a merger between firms that sell differentiated products.

Finally, consider the prospect of coordinated price elevation. As a practical matter, coordination tends to be plausible, if at all, in homogeneous goods markets (or ones that are nearly homogeneous).<sup>24</sup> In applying the hypothetical monopolist test, this is where one starts. And, in light of where the concern lies, this is where one should stop. The measure of the price elevation by such a monopolist would (roughly) equal the elevation that would be achieved by perfect coordination. This is another instance in which our first-step answer to the price elevation question—stopping short of any market redefinition—tells us all that we need to know.<sup>25</sup> Again, there is no reason to contemplate market redefinition, using the hypothetical monopolist test or otherwise.

Considering these three cases together, we can see that, in all relevant contexts, the hypothetical monopolist test—and market definition more generally—has nothing to offer. The general lessons about market definition in section 2 and the particular criticisms of the hypothetical monopolist test in subsection 3.1 are consistent with this conclusion, and the prior analysis is suggestive of most of the specific points made here.<sup>26</sup>

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<sup>24</sup>This common view is supported by the fact that nearly all price-fixing prosecutions, which involve secret communications, involve homogeneous goods. See Connor (2007, pp. 136–53), Harrington (2006, pp. 98–102), and Hay and Kelley (1974, pp. 29–38). Since coordination with differentiated products is much harder, one would assume that the need for explicit discussions would be greater, leading to a higher detection rate in such cases. Hence, the very low observed proportion in this sample suggests that coordination is quite infrequent in such settings. (It is possible that attempts are more frequent but not prosecuted because they fail, but since the concern in reviewing mergers is with the prospect of realized anticompetitive effects, this possibility is not particularly important.)

<sup>25</sup>Despite the statement in the preceding footnote, in some cases it might be imaginable that a merger would facilitate coordinated price elevation involving different goods. In such cases, it would be sensible to consider how high prices would thus be elevated taking the two (or more) homogeneous goods markets in combination. But the purpose of the analysis would not be to choose one or another market, but rather to assess the particular concern. Relatedly, it would not matter whether or not the particular combination considered was the market that would be chosen under the hypothetical monopolist test.

<sup>26</sup>It is sometimes suggested that the use of market definition—whether implemented via the hypothetical monopolist test or otherwise—might, despite its limitations, be useful as a quick screen, especially to eliminate cases in which the prospect of anticompetitive effects is clearly negligible. This argument is likewise mistaken, although not that mischievous. It presupposes that one can somehow be sure that, say, a very broad market definition, in which the merging firms’ shares are trivial, is obviously correct. But such a conclusion would have to be grounded in the view that the elasticity of demand for the merging firms’ products was very high. At that point, as the preceding text explains, our analysis would be complete. Adding the conclusion that the proper market is some particular broader market does not help, which follows directly from the analysis in subsection 2.2 indicating the need for a best estimate of market power—which estimate may in some contexts be based on very limited information—as a prerequisite to any market definition. Also, quick, intuitive, broad market definitions can be mistaken. For example, in the *Staples* and *Whole Foods* mergers, regardless of what one ultimately thinks of the



A further observation is that the Guidelines themselves—which mostly consist of motivations and explanations rather than mere statements of the mechanical test—and surrounding commentary really do not address how it is thought that the hypothetical monopolist test, or any means of defining markets, is useful. This characterization seems apt regarding most of the discussion of the test itself and of the particular applications to unilateral and coordinated effects (HMG §§6, 7). And commentary on the hypothetical monopolist test, whether praise or criticism, likewise does not really attend to just how it is imagined that the resulting market definition will be useful.

A related point is that criticisms of the revised Guidelines' greater acceptance of alternatives to market definition, in general or regarding particulars, are obscure in an important respect.<sup>27</sup> Most are grounded in the implicit assumption that defining markets, including through use of the hypothetical monopolist test, is feasible and sensible, and that the resulting choice of a relevant market and the market shares measured therein can be interpreted coherently, so as to provide a more useful means of inferring market power—the predicted price elevation due to the merger—than that given by the alternative under consideration. All such criticism, on reflection, should be viewed as deeply problematic, at least regarding the comparison. To be sure, one or another proposed method of predicting the competitive effects of mergers may sometimes, often, or always be difficult and inferior to various other techniques. The point of this article is that market definition—in general and through the Guidelines' hypothetical monopolist test—is not one of them. Put another way, the debate should shift from one about market definition versus alternatives to a comparative assessment among those alternatives: all of them, or at least those that continue to survive scrutiny.

#### 4 Conclusion

The U.S. Horizontal Merger Guidelines from the beginning embraced the market definition / market share paradigm and in the 1980s put the hypothetical monopolist test on the world stage, emulated by competition authorities around the globe. The 2010 revisions contain a handful of statements suggesting greater openness to alternatives and devote a modest portion of the official text to mentioning a few. Even ignoring the critique advanced in this article, one could view this movement as tepid. After all, economists, legal commentators, and courts have long viewed the paradigm as having significant defects, and economists over the past twenty-five years have devoted considerable energy toward developing alternatives.<sup>28</sup> Against this

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merits, the narrow markets seemed obviously wrong to many, whereas direct assessment of market power suggested that this may not have been true.

<sup>27</sup>For links to comments on the original questions issued by the DOJ and FTC in the Guidelines revision process and, respectively, to comments on the proposed revision (which is close to the promulgated version), see <http://www.ftc.gov/bc/workshops/hmg/index.shtml>, and <http://www.ftc.gov/os/comments/hmgrevisedguides/index.shtm>.

<sup>28</sup>On the former, sharp criticism predates widespread use of the paradigm. See Chamberlin (1950, pp. 86–87): “‘Industry’ or ‘commodity’ boundaries are a snare and a delusion—in the highest degree arbitrarily drawn, and, wherever drawn, establishing at once wholly false implications both as to competition of substitutes within their limits, which supposedly stops at their borders, and as to the possibility of ruling on the presence or absence of oligopolistic forces by the simple device of counting the number of producers included.” Regarding the latter, see

background, it may seem surprising that the revisions do not go further in this direction. Another view would be that the new Guidelines' modest statements launch the evolution of merger review (further) down a slippery slope and therefore are dangerous, threatening to throw the process and court scrutiny into disarray. From this perspective, what matters less are the words themselves; reading between the lines, a more momentous shift may be underway.<sup>29</sup>

This article offers an entirely different perspective. The market definition / market share paradigm is not merely clumsy and sometimes misleading. Rather, it is entirely bankrupt. As section 2 explains, there is no economically justifiable way to infer market power from market shares in redefined, heterogeneous goods markets—that is, without reversing the market redefinition and returning to the homogeneous goods market where one began. In addition, it demonstrates that there is no way to determine whether one market definition is better than another without first having a best estimate of market power in hand. But in that event, why ever bother to define markets rather than simply using that best estimate as one's bottom line? Moreover, choosing a market and (somehow) inferring market power from shares in that market results in a worse market power inference—worse, that is, than the best estimate with which one started. As a consequence, mistakes will be made, sometimes challenging or condemning mergers that are benign according to one's best estimate, and sometimes allowing mergers that are detrimental given that best estimate.

Section 3 explains that the hypothetical monopolist test is no better and in some respects worse. It achieves determinacy at the expense of coherence. In particular, it does not consistently order cases by their relative danger, even in very simple settings. Moreover, consideration of each of the main merger scenarios in which the test is employed—unilateral market power with homogeneous goods, unilateral market power with differentiated products, and coordinated effects—reveals that there is never anything to be gained (aside from confusion and erroneous results) from use of the hypothetical monopolist test.

As a purely conceptual matter, market definition should be abandoned entirely, both across the board and, in particular, in merger analysis. A related point is that these deficiencies—which go to the core logic of the paradigm rather than presenting merely practical concerns of varying weight in different cases—raise a significant question about current practice. For example, it was noted that there is no economically legitimate way to infer market power in redefined markets, so how have economists, whether in agencies or testifying as experts in court, been doing so for decades? One could argue that any proffered expert's market definition testimony should be inadmissible (in U.S. federal courts, under the *Daubert* test) since the field of economics offers no basis for such analysis, and, indeed, as demonstrated here, affirmatively contraindicates its use.

It does not follow, however, that the agencies revising the U.S. Horizontal Merger Guidelines should be criticized for timidity. Perhaps they should be; perhaps not. Ultimately,

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Whinston (2006) for a survey.

<sup>29</sup>Many would argue that this shift has been going on for a long time and that the Guidelines revision merely ratifies this fact. Indeed, one stated rationale for the revision emphasizes the need for the Guidelines to better reflect current practice.

that judgment depends on pragmatic political considerations. Had the revisions gone further, much further, and entirely jettisoned the market definition / market share paradigm, along with the hypothetical monopolist test, there may have been a backlash from lawyers, experts with entrenched interests due to their experience using existing techniques, and courts that might have been shocked by the sudden shift. And such a reaction would have been counterproductive. So, instead, the drafters might have consciously chosen to proceed more slowly.

Nor is such gradualism an obvious constraint, for agencies or for the courts. As the Guidelines mention at various points, one may pursue traditional market definition and alternatives of all sorts in parallel, allowing each to inform the other.<sup>30</sup> That mixing of methods may provide sufficient cover to give little or no weight to traditional market definition. Likewise, courts that find direct evidence of competitive effects convincing and that view parties' disputes about market definition to be metaphysical and unhelpful are free to decide as they wish and to ratify their decisions through an essentially *ex post* choice of market definition. That is, if they wish to reject a merger because they believe that it is anticompetitive they can—essentially for that reason—choose the narrow market definition, and conversely if they believe the opposite. Indeed, they are probably to some (unknown) extent doing so already.<sup>31</sup>

With regard to market definition, the 2010 revision to the U.S. Horizontal Merger Guidelines can be viewed as half empty or half full. Only time will tell. Eventually, “half” may no longer be an apt characterization.

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<sup>30</sup>“For example, evidence that a reduction in the number of significant rivals offering a group of products causes prices for those products to rise significantly can itself establish that those products form a relevant market. Such evidence also may more directly predict the competitive effects of a merger, reducing the role of inferences from market definition and market shares.” HMG §4. “The Agencies normally consider measures of market shares and market concentration as part of their evaluation of competitive effects. The Agencies evaluate market shares and concentration in conjunction with other reasonably available and reliable evidence for the ultimate purpose of determining whether a merger may substantially lessen competition.” HMG §5. Furthermore, Kühn (2002, p. 316) suggests that the European Commission “appears to be open to the general trend of moving toward a practice of joint determination of market definition and market power instead of insisting on a mechanical two-step exercise of market definition and market share assessment.”

<sup>31</sup>Moreover, as Kaplow (2010, §VI.E) documents, U.S. courts are not so obviously wedded to market definition as seems usually to be imagined. In addition, mainstream legal commentators seem increasingly willing to forgo market definition, at least for mergers in markets with differentiated products. See Areeda and Hovenkamp (2009, pp. 84–88).

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