

Demystifying the Hypothetical Monopsonist Test: Defining Buyer Markets

Dr. Craig R Malam

1. Introduction

The Hypothetical Monopsonist Test (HMNT) is an important tool for defining buyer markets, a step in evaluating mergers or conduct that may affect buyer competition. While US agency merger guidelines indicate that the tool is analogous to the Hypothetical Monopolist Test (HMT), the existing literature has not thoroughly detailed the critical distinctions necessary for obtaining correct HMNT estimates.¹

2. Defining Markets Around Buyers

Mergers among buyers can reduce competition for the products or services that they purchase, harming those sellers which otherwise benefit from the competitive tension. For example, sellers of raw or intermediate inputs may be impacted when consolidation among manufacturers reduces competition for their products.² Although mergers among buyers have the potential to lead to lower prices in downstream markets, the 2023 Merger Guidelines make clear that the Agencies will not credit such benefits against potential harms from the lost buyer competition.³

■ **Dr. Craig Malam** is a Partner at Edgeworth Economics. The views expressed here are his own and do not necessarily represent the views of Edgeworth Economics or its clients. Dr Malam is grateful to the article editor, Dylan Carson for insightful comments and editing. For suggestions and feedback on earlier drafts of this paper, he thanks Sophie Meadows, Mike Kheyfets, Chuck Fields, Jesse David, Stephen Bronars, and Christopher Lau, and is grateful to Jonathan Stolorow for excellent research assistance.

¹ A recent paper by McCrary, Olivieri and McKee (2025) addresses how the test should be applied specifically in relation to labor markets, rather than for input markets more generally. They argue that even though “[o]n the labor market side, an analogous set of standard tools or shortcuts has not yet developed . . . this does not mean the existing HMT framework cannot be applied to labor markets using standard economic evidence.” Justin McCrary, Elisa Olivieri, & Graham McKee, *Applying the Hypothetical Monopsonist Test for Labor Market Definition*, 1-9 ANTITRUST SOURCE (May 2025), https://www.americanbar.org/groups/antitrust_law/resources/source/2025-may/applying-hypothetical-monopsonist-test/

² Indeed, merger parties downstream from input suppliers sometimes cite “procurement synergies” among the benefits expected to flow from their transaction, and this can include reduced competitive tension in purchasing. Some recent examples are: International Paper, *Further statement regarding possible offer for DS Smith plc*, PR NEWswire (April 4, 2024), <https://www.prnewswire.com/news-releases/further-statement-regarding-possible-offer-for-ds-smith-plc-302108300.html> (“operational procurement synergies from increased scale”); Press Release, *Knife River Completes Acquisition of Strata Corporation*, SEC (March 10, 2025), <https://www.sec.gov/Archives/edgar/data/1955520/000195552025000013/exhibit991-pressreleasedat.htm>; Press Release, *Piedmont Lithium and Sayona Mining To Merge*, PIEDMONT LITHIUM (November 19, 2024), <https://www.piedmontlithium.com/piedmont-lithium-and-sayona-mining-to-merge/> (“Optimized logistics and procurement with potential to deliver lower operating costs”).

³ See footnote 71 on p.33 of U.S. Dep’t of Justice & Federal Trade Comm’n, Merger Guidelines (Dec. 2023), (“2023 Merger Guidelines”), available at https://www.ftc.gov/system/files/ftc_gov/pdf/2023_merger_guidelines_final_12.18.2023.pdf.

Protecting competition in buyer markets is not novel in antitrust law.⁴ However, merger enforcement against buyer consolidation is less frequent than for sellers. Some explanations for this include: (i) inputs are often commodity products so antitrust markets are in many instances likely to be broad; (ii) merger challenges are only justified by likely harm to consumers;⁵ and (iii) theories of harm focused on protecting seller competition might also be available for the same merger where concerns are raised for buyer competition. These protections of seller competition may be more likely to succeed and ultimately achieve the enforcer's objective.⁶

Notably, under the new HSR filing rules, notifying parties are not required to disclose competitive overlaps in their purchasing, which stands in contrast to the same requirement in terms of competitive overlaps in sales.⁷ This indicates that the antitrust agencies currently view buyer consolidation as a concern that is less widespread than seller consolidation. Notwithstanding, there are many instances where agencies have raised concerns about this type of competitive overlap.⁸

One recent example is the Canadian Competition Bureau's assessment of the proposed Bunge and Viterra transaction, where the Bureau raised concerns based on relevant markets defined as the 'Origination of grain' (wheat and canola).⁹ Another example is the proposed acquisition of Simon & Schuster by competing book publisher Penguin Random House, where the US Department of Justice (DOJ) successfully persuaded the court that the transaction threatened competition in a relevant market defined around buyers of anticipated top-selling books.¹⁰

3. Economic Modelling for Market Definition

The 2023 Merger Guidelines describe the goal of applying either HMT or HMNT to define markets as evaluating whether a group of products or services is sufficiently broad to constitute a relevant antitrust market. In relation to both tests, the Guidelines specify that the task is to determine "whether eliminating the competition among the group of products by combining them under the

⁴ For an extensive survey of enforcement actions, both merger and non-merger, to protect buyer competition see C. Scott Hemphill and Nancy L. Rose, *Mergers that Harm Sellers*, THE YALE LAW JOURNAL 2078-2109 (2018), https://www.yalelawjournal.org/pdf/Hemphill-Rose_m2dfkbhr.pdf. ("The symmetric treatment of monopoly and monopsony in antitrust law protects the competitive process and the welfare of the merging firms' trading partners, whether purchasers or sellers.")

⁵ See comments addressing these reasons by Marius Schwartz at a 2004 DOJ/FTC Workshop "Should Antitrust Assess Buyer Market Power Differently Than Seller Market Power?", available at: <https://www.justice.gov/archives/atr/should-antitrust-assess-buyer-market-power-differently-seller-market-power#N4>

⁶ One example may be seen in the dissenting statements of FTC Commissioners Joshua Phillips and Christine Wilson in *Lifespan Corporation and Care New England Health System* (FTC File No. 2110031, Feb. 17, 2022): "Including the additional count would also add complexity to the litigation and demand further resources to try the case, without changing the relief the Commission will obtain from a successful challenge to the current product market case or improving the Commission's odds of success." Available at: https://www.ftc.gov/system/files/ftc_gov/pdf/2110031wilsonphillipslifespancestatement.pdf

⁷ The FTC initially proposed to include additional reporting requirements with respect to labor for filing parties, but not with respect to other purchases such as raw materials or components. The labor requirements were not included in the final Rulemaking.

⁸ E.g., Competitive Impact Statement, at 6, *U.S. v. George's Foods, LLC*, No. 5:11-cv-00043 (W.D. Va. June 23, 2011) ("The Complaint alleges that the reduction in the number of processors resulting from the Transaction would likely have the effect of enhancing George's incentive and ability to force growers to accept lower prices and less favorable contractual terms for grower services; in short, the Transaction would lead George's to exercise monopsony power."), available at: <https://www.justice.gov/atr/case-document/file/497376/dl>.

⁹ The Bureau also found that the purchasers were differentiated by grain elevator capabilities and associated processing facilities (e.g., canola crushing) and by geographic draw areas (100 km for elevators and 200-300 km for crushers). CANADIAN COMPETITION BUREAU, "Proposed Acquisition by Bunge Limited of Viterra Limited", Section 9 (Apr. 22, 2024), pp.34-46, available at: <https://competition-bureau.canada.ca/en/how-we-foster-competition/education-and-outreach/report-minister-transport-and-parties-transaction-pursuant-subsection-5322-canada-transportation-act>

¹⁰ *U.S. v. Bertelsmann SE & Co. KGaA*, 646 F.Supp.3d 1 (D.D.C. 2022).

control of a hypothetical monopolist[/monopsonist] likely would lead to a worsening of terms for customers[/buyers].”¹¹

Courts have accepted results from two key tests developed from economic models used to implement the HMT: Critical Loss and the Recapture Rate approach. Each of these can provide a quantitative basis for conclusions about relevant antitrust markets. The Merger Guidelines advise that these “same market definition tools and principles discussed [elsewhere] can be used for input markets The [HMNT] considers whether a hypothetical monopsonist likely would undertake a SSNIPT [small but significant non-transitory increase in price or other worsening of terms], such as a reduction in price paid for inputs, or imposing less favorable terms on suppliers.”¹²

Under both tests, a key parameter that requires estimation is the gross profit earned on sales of products in the market in question. However, this is not the correct metric for applying the HMNT, which models the profitability of purchases rather than sales. Before explaining the correct metric, it is instructive to briefly review how these tools implement the HMT.

a. The Critical Loss Approach. Introduced after the 1982 Merger Guidelines were issued, the Critical Loss approach is “an empirical structure to define relevant markets, as well as a method to aid in the full competitive effects analysis.”¹³

For a candidate set of products or services, the test begins by calculating a “breakeven” sales loss (the critical loss)—i.e., the maximum sales that can be lost for a given price increase without decreasing profit. This metric is given by the following formula (derived in the appendix):

$$CL = \frac{s}{(s + m)}$$

where s is the hypothesized price increase in percentage terms, and m measures the “gross margin,” also in percentage terms. The gross margin measures the difference between per unit price and incremental costs, expressed as a percentage of price, $m = \frac{(p - c)}{(p)}$.

The resulting CL threshold (also a percentage) is then compared to an estimated Predicted Loss (or “actual loss”) associated with the same price increase applied to the candidate set of products. This Predicted Loss metric is separately estimated by studying how demand for the candidate product set would respond to the hypothesized price increase.

The HMT is satisfied—meaning that a hypothetical monopolist would profitably increase prices across the candidate product set—if the Predicted Loss is less than the Critical Loss for the candidate set of products.

$$\text{Predicted Loss} < CL = \frac{s}{(s + m)}$$

This result would indicate that insufficient substitutes exist outside that set to prevent a profitable price increase, implying that the candidate set includes a sufficient number of the effective substitutes and is therefore a relevant antitrust market. Conversely, if the HMT fails, the candidate set likely does not encompass a sufficient number of the relevant substitutes that constrain the

¹¹ Merger Guidelines (2023), p.41.

¹² Merger Guidelines (2023), p.48.

¹³ “Critical Loss vs. Diversion Analysis: Clearing up the Confusion,” Malcolm Coate and Joseph Simons, December 2009, referring to the original paper which introduced the approach, Barry C. Harris & Joseph J. Simons, Focusing Market Definition: How Much Substitution is Enough, 12 RES. L. & ECON. 207 (1989). The Coate and Simons paper is available here: <https://www.competitionpolicyinternational.com/assets/Free/SimonsCoatesDEC-091.pdf>

profitability of such a price increase. In that case, the candidate set of products is expanded and the test is re-applied, with iteration continued until the test passes.

Since its introduction, the Critical Loss approach has been widely adopted for implementing the HMT. Over time, modifications and refinements have been proposed that scholars argue are better suited to the specifics of different circumstances. One of these, the Recapture Rate approach, has become an important additional tool.

b. The Recapture Rate Approach. A significant weakness in the Critical Loss approach means that additional analysis is often required before HMT results can be relied upon. In particular, when studying markets with high margins, the calculated Critical Loss will always be smaller. Given this, and because the Critical Loss calculation forms a minimum threshold, a range of (higher) Predicted Loss estimates can indicate the HMT is *not* satisfied, pointing to broader relevant markets. However, such results may be wrong, because when margins are high, a smaller predicted loss should also be expected.¹⁴

The expectation that high margins indicate that Predicted Loss could be low, comes from the well-known Lerner Condition in economics.¹⁵ The condition relates the relative markup over costs, or gross margin, m , introduced above, to the elasticity of demand, ε :

$$m = \frac{1}{\varepsilon}$$

$$\text{where } m = \frac{(p - c)}{(p)}.$$

The gross margin and elasticity are inversely proportional under the Lerner Condition: a company that sells at relatively high gross margins is likely to be facing a relatively lower elasticity of demand, and vice versa.

To address this weakness, Katz and Shapiro (2003) proposed the Recapture Rate approach as an additional means for implementing the HMT.¹⁶ The approach derives from the Critical Loss threshold but it incorporates the Lerner Condition.

Recall that the HMT passes under the Critical Loss analysis if:

$$\text{Predicted Loss} < CL = \frac{s}{(s + m)}$$

The predicted loss side of the analysis can be estimated based on the elasticity of demand, ε . The predicted loss will equal the elasticity multiplied by the price change.¹⁷ So for a price change, s , the predicted loss is simply s multiplied by ε .

$$\text{Predicted Loss} = s * \varepsilon$$

The Lerner Condition can be re-written as $\varepsilon = \frac{1}{m}$, so the predicted loss can itself be approximated by:

$$\text{Predicted Loss} = \frac{s}{m}$$

¹⁴ Katz and Shapiro (2003) first identified the potential for mistaken results and proposed the Recapture Rate approach as an important additional analysis that is likely to be required in many circumstances.

¹⁵ This condition is named after Russian-born economist, Abba Ptacher Lerner (1903-1982).

¹⁶ Another paper published around the same time independently made similar arguments and put forward essentially the same test, among others. Daniel O'Brien & Abraham Wickelgren, A Critical Analysis of Critical Loss Analysis, 71 ANTITRUST L.J. 161 (2003)

¹⁷ This is true for linear demand functions, which is likely to be a reasonable approximation for smaller price changes in most circumstances.

Substituting this estimate for Predicted Loss into the Critical Loss threshold equation above, and adding a variable R that measures the proportion of the predicted loss sales that the hypothetical monopolist would regain as sales of the candidate products, leads to:¹⁸

$$\text{Predicted Loss} = \frac{S}{m} (1 - R) < CL = \frac{S}{(s + m)}$$

This expression then simplifies to the Recapture Rate condition:¹⁹

$$\frac{S}{(s + m)} < R$$

which states that the HMT passes if the recapture rate exceeds the estimated breakeven sales loss.²⁰

The Recapture Rate is defined as the share of the sales lost due to the hypothesized price increase that are recaptured by the hypothetical monopolist, or equivalently, are diverted to become increased sales of other goods within the candidate market.²¹ Estimating recapture rates may be possible using data on sales opportunities, consumer surveys, or RFPs (“request for proposals” or bids). These types of data may in general be closer to hand in the course of an initial waiting period, as distinct from the more granular data often needed to estimate Predicted Loss.

Importantly, the Recapture Rate approach can serve as a robustness check on other analyses because of its equivalence with Critical Loss analysis. If the results of Critical Loss suggest, for example, that the HMT does not pass for a candidate set of products, but the Recapture Rate instead indicates that it does, this likely signals that further investigation is needed.

Note that the Lerner Condition plays a pivotal role in predicting the likely effect on substitution at the margin for the hypothesized price increase. The condition uses a key profitability variable, m , the gross margin, to predict the responsiveness of sales when applying the hypothesized price change. Importantly, integrating the Lerner Condition also forces the two calculations needed for the test to have greater internal consistency. In a high margin industry, for example, the test will tend to require that recapture rates be lower before a broader relevant market is signalled.

4. The Hypothetical Monopsonist Test (HMNT)

The economic modelling frameworks described above largely carry over to the HMNT with some critical distinctions.

First, the HMNT assesses *seller* substitution in response to a buyer decreasing the price, rather than assessing *buyer* substitution when a seller raises its price. Similar to the HMT, the resulting impact of that substitution on a hypothetical buyer’s profits is a key part of determining the appropriate boundary of a relevant antitrust market.

¹⁸ The Critical Loss is initially multiplied by $(1-R)$ because that is equal to the proportion of sales *not* recaptured.

¹⁹ The correct Critical Loss formula on the left depends on the exact implementation of the HMT. The formula above applies when a SSNIP is applied to *all products* in the candidate market. Daljord, Sørsgard & Thomassen (2007) showed that when the hypothetical monopolist applies the SSNIP *only to a single product*, the correct formula is s/m . See “The SSNIP Test and Market Definition with the Aggregate Diversion Ratio: A Reply to Katz and Shapiro,” *JOURNAL OF COMPETITION LAW & ECONOMICS*, 4(2), 263-270.

²⁰ The formula on the left is exactly the same as that used in the Critical Loss analysis, but for clarity, here it is referred to as the breakeven sales loss.

²¹ The authors originally referred to the recapture rate as the Aggregate Diversion ratio. Since then, the term “recapture” has been used extensively, potentially because it emphasizes the perspective of the Hypothetical Monopolist in control of the candidate market. Michael L. Katz & Carl Shapiro, *Critical Loss: Let’s Tell the Whole Story*, ANTITRUST, Spring 2003, at 49, (“Katz and Shapiro 2003”) <https://www.law.berkeley.edu/wp-content/uploads/2015/04/Katz-Shapiro-Critical-Loss-Lets-Tell-the-Whole-Story-2003.pdf>

Second, the appropriate profit measure for the test typically will involve the downstream output created with the purchased inputs in question. In economic analysis, companies are rarely viewed as the final purchasers; purchases by a business are usually viewed as intermediate inputs that contribute to the creation of an output on which a profit or return can be collected.²² An appropriate measure of profit is required under the test to model whether a hypothetical monopsonist “likely would” worsen terms with respect to its purchases of a given candidate set of products or services.

a. The Lerner Condition for Buyers. Deriving the Lerner Condition with respect to purchasing is important because it identifies the metric that can be used to predict substitution, and provides the measure of profit that is appropriate to gauge the hypothetical monopsonist’s incentive to lower the prices of the candidate goods or services.

The Lerner Condition for a monopsonist who pays price, r , for inputs is (see Appendix):

$$md = \frac{(MRP - r)}{r} = \frac{1}{\eta}$$

where the left-hand side is the *gross revenue markdown* (md) and η is the elasticity of *supply*.

The gross revenue markdown measures the difference between the marginal revenue product (MRP) of an input and the price paid for it, r , expressed as a percentage of r . The difference between MRP and r is a measure of the incremental profit made on each unit of the input purchased at the margin. This difference would otherwise be limited by competition with other buyers for the input, which would force the monopsonist to raise the purchase price r .²³

The elasticity of supply is the analogue to demand elasticity. It measures the responsiveness of supply to price changes. As for demand elasticity, this responsiveness conveys information about the likelihood that sellers have alternatives in the face of a price decrease for the purposes of market definition.

Note how the Lerner Condition here shows a similar inverse relationship as described earlier. When larger gross revenue markdowns are observed, this is likely to mean that the firm is facing a lower supply elasticity, which in turn indicates a likely smaller supply response to price changes at the margin. And conversely for a smaller gross revenue markdown: this implies that the supply elasticity is greater, and that supply is more responsive to price changes at the margin.

b. The Marginal Revenue Product. A key component needed for estimating the gross revenue markdown is the marginal revenue product, MRP. This measures the additional sales revenue per unit of output that may be attributed to the use of an incremental unit of input. In other words, it is the marginal product of the input, in units of output, then multiplied by the price at which the output is sold.

Consider the following concrete example, which is fictitious but is based on my experience working with companies across a range of industries. Suppose that a merger will combine two manufacturers of pre-cast concrete pipes, which uses fixed inputs of plant and equipment, as well as variable inputs of water, electricity, labor, and concrete. An estimate of the gross revenue mark

²² The test is difficult to conceptualize as a method to define markets in the absence of some notion of profits. For example, defining buyer markets around final consumers, perhaps as part of analyzing the potential effects of a consumer boycott, would require a different approach and is beyond the scope of this paper.

²³ The gross revenue markdown is widely used in the labor economics literature as one proposed measure of employer market power, where it is referred to as the “wage mark down.” Economic analysis generally makes no formal distinction between firms setting the prices of any inputs, labor or otherwise. See, for example, Chen Yeh, Claudia Macaluso, and Brad J. Hershbein, *Monopsony in the U.S. Labor Market*, AMERICAN ECONOMIC REVIEW, 112(7), 2099-2138 (2022).

down associated with the price either manufacturer pays for concrete may be used to implement an HMNT to assess a relevant antitrust market of concrete buyers.

Data from the manufacturer on the quantities of inputs utilized and outputs produced can be used to estimate the contribution that an additional ton of concrete makes to the production of concrete pipes, holding the contributions of the other inputs fixed. Suppose that an additional ton of concrete may be estimated as producing 0.04 additional pipes, holding other inputs fixed. Then, the marginal revenue product of the concrete is found by multiplying this estimated contribution by the market value of the pipes produced. If those pipes are valued at \$16,000, the marginal revenue product would be \$640. And given a purchase price for the concrete of \$580, an estimate of the gross revenue markdown is $(640-580)/580$ or 10%.²⁴

c. Critical Loss and Recapture Rate that Implement an HMNT. The gross revenue markdown, md , that is identified by the Lerner Condition can be used in largely equivalent terms for each of the profitability models outlined above under the HMT. This is because the measure shares the same properties as the gross margin related to profit maximization.

The following formula provides the Critical Loss / breakeven lost sales that uses the gross revenue markdown (see Appendix for full derivation):

$$CL = \frac{x}{(md + x)}$$

where x is the price decrease in percentage terms.

Following the Recapture Rate approach to implementing an HMNT, the candidate market is defined if:²⁵

$$CL = \frac{x}{(md + x)} < R$$

These formulas for implementing the HMNT mirror those widely used for the HMT, but instead include the gross revenue markdown metric, md , in place of the gross margin, m .

Using the concrete example from above, along with a 5% SSNIPT, leads to a candidate market passing the HMNT if recapture to other concrete buyers in the candidate market is greater than 50%.²⁶ Such a threshold could indicate that a relevant buyer market within the given geography should include other purchasers of concrete besides pre-cast pipe manufacturers, such as building and construction, public works and transportation agencies.

The intuition behind the thresholds is similar to the HMT. In markets where firms are paying input prices much lower than MRP, i.e. md is larger, the hypothetical monopsonist loses relatively greater profits on the margin if it lowers the price and makes fewer purchases, and this lowers the critical loss threshold, CL . Similarly for the Recapture Rate approach, when the gross revenue markdown md is larger, the threshold rate of recapture, R , is lower: the recaptured sales are worth more, reducing the share of recaptured sales needed for a given SSNIP to be profitable for the hypothetical monopsonist.

²⁴ In some circumstances it may be challenging to estimate the share of the incremental output attributable to a particular input. In the following section I provide some high-level guidance, then also describe how the approach may be applied to the public facts available about the proposed merger of Simon & Schuster with Penguin Random House.

²⁵ As mentioned above, it may be appropriate in some situations to model the hypothetical monopsonist raising the price of only a single product in the candidate market, in which case the threshold is $x / md < R$.

²⁶ In other words, for recapture rates above 50% a hypothetical monopsonist buyer of concrete likely would institute a SSNIPT of at least 5%.

The application of this test is likely to involve greater nuance in at least the following types of cases. First, downstream effects could be relevant, even though the Merger Guidelines specify that any impacts outside the candidate market be held constant.²⁷ To use the previous example again, lower purchases of concrete would result in reduced production of pipes, and downstream conditions could impact the profitability associated with the hypothesized SSNIPT.²⁸ Second, input markets may be prone to implicit price coordination under certain conditions, in which case additional care may be required.²⁹ In such cases input prices are depressed below the competitive level and the gross revenue markdown may be an inaccurate estimate of the supply elasticity (via the Lerner Condition). Finally, in situations where firms purchase inputs through auctions or bilateral negotiations, alternative modelling approaches may be more appropriate than monopsony.³⁰

5. Finding the Data to Implement an HMNT

As described above, data on quantities of inputs used and outputs produced may be used to estimate the marginal revenue product of a given input, using multiple regression analysis. However, if sufficient data are not available it may be possible to create a reasonable estimate using accounting data, or other information contained in the company's documents.³¹

Other company documents and information may be informative about the likely marginal revenue product *MRP* of given inputs. Businesses have strong incentives to minimize costs and to seek production efficiencies, and this may serve as a guide toward useful documents and data kept in the ordinary course of business. Estimating the marginal revenue product requires understanding how each unit of input contributes to revenues from final output, and this understanding can be gleaned from various types of internal business documents:

- **Sourcing and procurement teams** may generate or reference estimates provided by input suppliers. Companies may use these estimates for benchmarking different input sourcing and buying strategies.
- **Engineering documentation on testing of different inputs in production** can provide insights into their efficiency in manufacturing physical output. This can include “rules of thumb” estimates of the input's marginal revenue product which are used in the ordinary course of business.

²⁷ See p.42 of the Merger Guidelines (“For the purpose of analyzing [whether hypothetical profit-maximizing firm likely would undertake a SSNIPT], the terms of sale of products outside the candidate market are held constant.”)

²⁸ For example, downstream customers with minimum purchasing requirements could shift their entire purchasing, leading to much larger declines in downstream sales. These declines might be sufficient to affect the profitability of the input price decrease in the first place.

²⁹ The antitrust economics literature studies a range of conditions which enable firms to recognize their mutual interdependence and lead firms to them to coordinate their conduct, known as tacit coordination. Competing input buyers may recognize a shared strategic interdependence in cases where they also compete downstream. See for example, discussion in Green, Edward J., Robert C. Marshall, and Leslie M. Marx, ‘Tacit Collusion in Oligopoly’, in Roger D. Blair, and D. Daniel Sokol (eds), *The Oxford Handbook of International Antitrust Economics, Volume 2* (2014; online edn, Oxford Academic, 7 Apr. 2015),

³⁰ According to the Merger Guidelines the HMT implementation in such situations involves “the hypothetical monopolist [having] a stronger bargaining position that would likely lead it to extract a SSNIPT during negotiations, or . . . the bids submitted by the hypothetical monopolist would result in the purchasers of its products experiencing a SSNIPT.” See p.42.

³¹ Using the concrete pipe example once more, suppose that documents and information indicate that 2 tons of concrete is used to manufacture 2.25 tons of certain pipe that sells for a value of \$16,000, and that the other variable inputs needed for that increment of output cost \$15,200. In that case, an approximate value for the marginal revenue product for the 2 tons of concrete would be \$700. If the concrete was purchased for \$500, this implies a gross revenue markdown of 40%.

- **Sufficiently detailed production data**, including with respect to the contributions of different inputs to total production costs, could be used to estimate the marginal revenue product.³²

As is the case for estimating gross margins, there are likely to be challenges in preparing precise estimates of the gross revenue markdown during the first 30 or 60 days. Unlike gross margins, the marginal revenue product will generally not be observable from a company's standard cost accounting. Instead, data and information about inputs and production quantities like those described above may be viable sources of estimates. These sources are likely to be imperfect, but this is often equally true when estimating gross margins on sales.³³ Ultimately, analytical results derived from estimates should be sensitivity tested and can be informative when considered in the context of other economic evidence.³⁴

a. *U.S. v. Bertelsmann SE & CO. KGaA, et al.* Buyer market definition was at issue in the 2022 trial *US v Bertelsmann* concerning the proposed merger of Simon & Schuster and Penguin Random House. The DOJ was successful in its argument that the combination was likely to substantially lessen competition in a market for the acquisition of “publishing rights to anticipated top-selling books.”

The DOJ's evidence included an HMNT analysis with estimates of Critical Diversion ratios of around 76%, and Actual Diversion ratios to self-publishing measured at between 0.5% and 8.6%.³⁵ This implementation of the HMNT passed because “switching to self-publishing . . . in the event of a significant decrease in advances” was less than the “switching to self-publishing [that] would be necessary for the hypothetical monopsonist to not decrease advances significantly.”³⁶

Although the court ultimately accepted the DOJ's market definition, the court's assessment of the HMNT analysis was that it “shed[] no light on the contested issues.”³⁷ The court described one of the contested issues as the claim by defendants that the test was unable to address the “arbitrariness of the \$250,000 [advance] threshold for bounding the market,” among others.³⁸

The court record indicates that certain titles may have been subject to stronger competition among publishers and that this likely would result in higher total payments to authors.³⁹ Smaller gross revenue markdowns for such titles would imply that the HMNT test would pass at larger recapture rates.⁴⁰ And variation in mark-downs across titles would have produced varying critical diversion thresholds, which may have indicated certain publishers were closer competitors to one another, and potentially closer than the option of self-publishing.

³² There are likely to be a range of econometric approaches, but in general, total revenue from production / output over time could be regressed against the units used of the input, adding controls for the other inputs used.

³³ For a survey of the challenges in estimating gross margins see Seth B. Sacher and John D. Simpson “Estimating Incremental Margins for Diversion Analysis,” *ANTITRUST LAW JOURNAL*, Vol. 83 527-556.

³⁴ Writing about obtaining these estimates when labor is the input, McCrary, Olivieri and McKee (2025) argue that “we do not typically observe any proxies for the ‘wage markdown’ or ‘marginal revenue product of labor.’ For example, it could be difficult to evaluate how much less customers would buy if a store had fewer cashiers.” at p.4.

³⁵ See pp. 18-19 of “*US v. Bertelsmann 1:21-cv-02866-FYP US DEMONSTRATIVE 4*” available at: <https://www.justice.gov/atr/media/1254431/dl?inline>. (“US Demonstrative”) The demonstrative describes a “critical aggregate diversion ratio” which appears to be one minus the recapture rate, or the proportion of diversion outside the candidate market.

³⁶ US Demonstrative, p.18.

³⁷ See *U.S. v. Bertelsmann SE & Co. KGaA*, 646 F.Supp.3d 1, 40-42 (D.D.C. 2022).

³⁸ *Bertelsmann*, 646 F.Supp.3d at 42.

³⁹ *Id.* at 27.

⁴⁰ This is the same as saying smaller critical diversions outside the candidate market, which is the measure used in the US Demonstrative.

Ultimately, the HMNT played a limited role in this case, with the court noting that “. . . the test is a standard analytical tool in merger cases; and that it concededly supports the government’s definition of the relevant market.”⁴¹ However, there appears to have been scope for the approach presented here to address some of the disputed issues, had the DOJ’s HMNT presented varying critical aggregate diversion thresholds. This may be one question, among with others, that a future court could test in relation to an implementation of the HMNT.⁴²

6. Conclusions on Market Definition for Buyer Markets

This paper has outlined how the most common quantitative models should generally be adapted when applying the HMNT and described the likely sources for information to use. The approaches are consistent with the economic models that implement the HMT, which are well recognized, and have been accepted by courts in a range of cases.

The approach outlined here can be applied in a range of situations where defining markets for buyers may be a component of assessing potential harms to competition. For example, there is scope for this approach to offer a robust way to define input markets in vertical mergers where “customer foreclosure” is a concern.⁴³ In these cases, agencies may define markets around buyers to assess whether an ability or incentive for customer foreclosure exists.⁴⁴ In many cases the HMNT using the gross revenue markdown may be an appropriate approach to defining markets for this purpose. ●

⁴¹ *Bertelsmann*, 646 F.Supp.2d at 42.

⁴² Court guidance about the HMNT was similarly missing from another recent merger case involving buyer market definition, *FTC v. Kroger Co.*, where the court “tentatively [found] that the [buyer] market . . . is a plausible, relevant market for antitrust purposes” but that it was “not aware of any standard economic analyses” to “verify whether a market is appropriately bounded.” See *FTC v. Kroger Co.*, No. 3:24-cv-00347-AN, 2024 WL 5053016, at *34 (D. Or. Dec. 10, 2024).

⁴³ This issue is discussed at Section 2.5.A.2 of the Merger Guidelines.

⁴⁴ The agencies may designate a “related market” around the party who makes purchases from the other merger party. According to the guidelines, a substantial share of the related market could indicate scope to foreclose sellers that compete with the other merger party. *Id.*

Appendix

Critical Loss formula

The Critical Loss is defined as the maximum reduction in the quantity of products or services sold and the price paid for after the price increase, beyond which profits of the hypothetical monopolist would be lower than at the original price.

Before any price increase, total profit is:

$$\pi_0 = (P - C)q$$

where P is the price received for each unit of output, C is the per unit cost, and q is the number of sales.

The total profit on units sold after a percentage price increase of s is:

$$\pi_1 = (P(1 + s) - C)q$$

The maximum percentage reduction in sales, labelled as CL , will be defined by the point at which profits before and after the price increase are equal:

$$\pi_1(1 - CL) = \pi_0$$

Making the substitutions:

$$(P(1 + s) - C)q(1 - CL) = (P - C)q$$

Then simplifying:

$$(P - C + Ps)(1 - CL) = (P - C)$$

Finally, substituting for $m = \frac{(p - c)}{(p)}$ and rearranging leads to:

$$CL = \frac{s}{(s + m)}$$

Lerner Condition for Buyers

The profit equation for a company purchasing f units of an input may be written as:

$$\pi = p \cdot q(f) - r(f) \cdot f$$

where p is the price paid for output sold in the output market, $q(f)$ is the quantity of output sold, the price paid for f inputs is $r(f)$.

It is important to recognize that the price paid in the input market $r(f)$ is a function of the quantity f of inputs bought by this firm. $r(f)$ is the supply curve in the input market, and including it in the expression for profits reflects the fact that purchasers of inputs recognize their ability to affect price paid by demanding more or less of the input.⁴⁵

It is similarly important to note that the quantity sold in the output market is also function of f inputs used in production. $q(f)$ is a production function, which specifies the number of outputs produced using f inputs. Note that this function may include other inputs.

⁴⁵ More formally, this is the inverse residual supply function, and is the direct analogue to the inverse residual demand function. It provides the market clearing price from the input market as a function of the this firms' choice of input f to purchase.

Next, at any given level of prices in the output market, p , a profit-maximizing company will choose the level of input to purchase, f , to maximize total profits. Under the usual assumptions, this will be the solution to:

$$\frac{\partial \pi}{\partial f} = p \cdot \frac{\partial q(f)}{\partial f} - \frac{\partial r(f)}{\partial f} \cdot f - r(f) = 0$$

This expression can be rearranged as:

$$p \cdot \frac{\partial q(f)}{\partial f} = \frac{\partial r(f)}{\partial f} \cdot f + r(f)$$

Note that the left-hand side is equal to the marginal revenue product of the input f , or MRP . This is the incremental return, in terms of output market revenue, from purchasing and using one additional unit of input, f .

Relabelling the left-hand side, and further rearranging the right-hand side becomes:

$$MRP = r(f) \left(1 + \frac{\partial r(f)}{\partial f} \cdot \frac{f}{r(f)} \right)$$

Note that a component of the right-hand side $\frac{\partial r(f)}{\partial f} \cdot \frac{f}{r(f)}$ is equal to the reciprocal of the elasticity of supply, η :

$$\eta = \frac{\partial f}{\partial r(f)} \cdot \frac{r(f)}{f}$$

which can be used to relabel and then rearranged to become:

$$\frac{MRP - r}{r} = \frac{1}{\eta}$$

Critical Loss and Recapture Rate that Implement an HMNT

The Critical Loss is defined as the maximum reduction in the quantity of inputs purchased after the price decrease, beyond which profits of the hypothetical monopsonist would be lower than at the original price.

For present purposes the appropriate measure of profit on the input corresponds to the marginal revenue product earned, in terms of output, minus the price paid for the input.⁴⁶ This approach excludes from the modelling any changes in the output market, such as the price received on output sales, which is consistent with the approach to this issue described in the Merger Guidelines.⁴⁷

Before any price decrease, total profit is:

$$\pi_0 = (MRP - r)f$$

where MRP is marginal revenue product, r is the price paid per unit of input, and f is the units of input.

The total profit on units of input purchased after a percentage price decrease of x is:

$$\pi_1 = (MRP - r(1 - x))f$$

⁴⁶ As described earlier, this is a measure of the immediate impact on profits from a change to the price paid for the input at the margin, and it has a close relationship to the profit-maximizing price. In these respects, the measure is appropriate for modelling the profit incentives of the hypothetical monopolist, which determine what the hypothetical monopsonist *would do* in respect of a SSNIPT.

⁴⁷ The Guidelines state that for the purpose of analyzing the HMT, the terms of sale of other products outside the candidate market are held constant. See Merger Guidelines, p.42.

The maximum percentage reduction in units purchased which is labelled as CL will be defined by the point at which profits earned on the inputs is breakeven:

$$\pi_1(1 - CL) = \pi_0$$

Making the substitutions:

$$(MRP - r(1 - x))f(1 - CL) = (MRP - r)f$$

Then simplifying:

$$(MRP - r + rx)(1 - CL) = (MRP - r)$$

Finally, substituting for $md = \frac{(MRP - r)}{r}$ and rearranging leads to:

$$CL = \frac{x}{(md + x)}$$

To implement the Recapture Rate approach, recall that under the Lerner Condition, the Predicted Loss may be estimated using the gross revenue markdown:

$$\text{Predicted Loss} = \frac{x}{md}$$

The threshold condition is given by:

$$\text{Predicted Loss} = \frac{x}{md} (1 - R) < CL = \frac{x}{(md + x)}$$

Which simplifies to:

$$\frac{x}{(md + x)} < R$$