

A New Era of Midnight Mergers: Antitrust Risk and Investor Disclosures

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Antitrust authorities search public documents to discover anti-competitive mergers. Thus, investor disclosures may alert them to deals that would otherwise go undetected, creating disincentives for managers to divulge certain transactions. We study this behavior in publicly traded US companies. First, we employ a regression discontinuity approach to estimate the effect of mandatory disclosures. We find that releasing information to investors poses antitrust risk. Second, we introduce a method for measuring undisclosed mergers that relies on financial accounting reporting requirements. We find that undisclosed mergers total \$1.85 trillion between 2002 and 2016.

JEL: G3, L4, M4

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To police mergers, antitrust authorities must learn about them at their inception.¹ By law, large transactions must be reported to the federal government, but most are not, forcing agency staff to search alternative sources of information to discover pending deals. Separate from these considerations, efficient capital markets require detailed and timely information about corporate developments (Fama et al., 1969; Fama, 1970), including mergers. In other words, the same disclosures needed by investors can also alert antitrust authorities to illegal mergers that might have otherwise escaped detection. Thus, we argue that investor disclosures can pose antitrust risk and, by extension, that management will refrain from publicly reporting some anticompetitive deals. As a result, harmful deals may avoid scrutiny, and commonly cited measures of mergers may severely understate their prevalence.

The question of whether management conceals mergers harks back more than a century in the United States. Even after Congress prohibited mergers between

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¹See, e.g., statements by Senator Philip Hart [1976] and Bill Baer, former director of the Bureau of Competition Baer (1996). Empirical evidence is described later in this section.

competitors in 1914, many firms continued to acquire rivals, albeit quietly enough to avoid immediate detection. The resulting transactions—pejoratively called “midnight mergers”—were typically discovered only after the parties had shared information and commingled assets, making unwinding infeasible (Baer, 1996). The practice abated in 1976, due to the establishment of the US Premerger Notification Program, which requires firms to notify the government in advance of large mergers. However, Congress exempted many deals in the original legislation, and it greatly expanded exemptions in 2001 (Wollmann, 2019). As a result, most US acquirers today face similar incentives to those faced 70 years ago.² This presents a concern, given recent evidence that even relatively small mergers can consolidate economically important industries and harm consumers (Wollmann, 2021) as well as “kill” innovation (Cunningham, Ederer and Ma, 2021).

We examine the relationship between investor disclosures and antitrust risk in publicly traded US companies. Our analysis begins with a model that presents the conceptual issues and motivates our empirical analysis. At its core, managers face trade-offs when deciding to disclose profit-enhancing mergers. Bound by fiduciary duty, they seek to maximize the wealth of current shareholders,³ most of whom will not hold their shares indefinitely. Disclosure causes the firm’s share price to rapidly reflect the value added by the transaction (assuming it is completed), while failing to disclose causes the share price to rise gradually, as higher profits are eventually realized, meaning many shareholders at the time of the merger will not participate in the gains.⁴ Thus, disclosures produce benefits. However, they can also be costly, alerting antitrust authorities to mergers that would have otherwise escaped scrutiny. On average, these costs are highest for horizontal mergers, in which the target and acquirer operate in the same industry, since these deals are more likely to involve acquisitions of competitors.

To produce empirically relevant predictions, we incorporate deterrent effects. This is essential in light of recent work, which shows that firms are so acutely aware of antitrust risks that intense government scrutiny results not in enforcement actions but rather anticompetitive mergers never being attempted in the first place.⁵ We also characterize four distinct levels of disclosure, ordered by the amount and timeliness of the released information. First, premerger notifications are antitrust-specific filings required under the Hart-Scott-Rodino Antitrust Improvements (HSR) Act. They fully inform the government about transactions in advance of closing but cover only a small fraction of deals, which we call *HSR mergers*. Second, *Item 2* reports are required under the Securities and Exchange

²The same holds true for firms headquartered abroad, since many other developed nations have witnessed similar legislative changes over the last two decades (Morzenti, 2020).

³See Section II for a brief discussion of agency issues.

⁴Prior studies on M&A announcements find that bidder shareholders earn zero returns at the takeover announcement (Moeller, Schlingemann and Stulz, 2004), but these works exclude small deals and private targets, which are our focus. When private target announcement returns are examined, acquirer returns are found to be significantly positive, consistent with our assumption (Netter, Stegemoller and Wintoki, 2011).

⁵See Wollmann (2019) for evidence of deterrence.

Act (SEA). Management must file them immediately after closing certain deals. Notably, premerger notifications and Item 2 reports are based on different criteria, so the sets of deals covered by them are neither mutually exclusive nor perfectly overlapping. We categorize all other disclosures meeting a minimum bar in terms of informativeness as *basic* and refer to remaining mergers as *undisclosed*.

Our model yields four predictions. The first applies to non-HSR mergers. It states that the share of horizontal mergers is lower among transactions that require mandatory investor disclosures. It also suggests a straightforward falsification test. By definition, HSR mergers involve premerger notifications, which render Item 2 reports uninformative for enforcement purposes. Thus, if we restrict attention to HSR mergers, then the first proposition should not hold. The second prediction is that management finds nondisclosure profitable for at least some mergers. The third is that a higher share of undisclosed mergers are horizontal. The fourth provides an expression for the expected antitrust-related cost of investor disclosures, which is strictly positive.

We take these predictions to data from 2002 to 2016. To test the first, we rely on transaction-level merger data and restrict attention to non-HSR mergers. However, doing this presents a challenge: identifying the effect of investor disclosures is hard because management typically decides which deals to publicize, making the release of information endogenous. To exogenously shift investor disclosures, we exploit a distinctive feature of securities law. It stipulates that, if a publicly traded US company completes a merger valued 10% or more of the acquirer's assets, then management must promptly announce the deal in an Item 2 report. We employ a fuzzy regression discontinuity research design, comparing mergers just above and below the threshold. As the transaction-value-to-acquirer-assets ratio (i.e., the running variable) crosses the cutoff value, the share of mergers with Item 2 reports should surge. In turn, if investor disclosures pose antitrust risk, then the horizontal share of mergers should drop.

We find precisely these patterns in our data. As the transaction-value-to-acquirer-assets ratio reaches 10%, the share of mergers with Item 2 reports abruptly rises by 31%, while the share of horizontal mergers falls just as sharply by 12%. These figures equate to a local average treatment effect of 37%. The estimate is significant at the 5% level, and subsequent analyses reveal robustness to various alternative specifications (e.g., different assumptions on kernel shape).

To conduct the falsification test, we restrict attention to HSR mergers—ones typically valued at or above \$50 million-\$90 million, depending on the year. For these deals, the horizontal share of mergers should trend smoothly through the cutoff, although the share of mergers with Item 2 reports should still rise sharply at the threshold. We find that the data exhibits both patterns. We then present various other tests (e.g., density plots and placebo experiments) to assess other assumptions imposed by the model.

To test the second prediction, we measure the extent of undisclosed mergers. Doing so presents another challenge: gauging undisclosed merger activity involves

measuring the volume of deals for which no individual public records exist. Our solution relies on reporting requirements imposed by the Financial Accounting Standards Board (FASB), which mandates that firms report their total value of cash mergers annually, irrespective of whether any deal-specific information about the underlying transactions was released. We show how to use this information to calculate the value of undisclosed mergers each year.

We find that nearly \$2 trillion in undisclosed mergers were completed between 2002 and 2016. This amounts to 38% of the total value of mergers completed during the period. Although year-to-year changes track the business cycle, undisclosed mergers show no sign of slowing. In fact, the trend is positive, with the highest value recorded most recently. We estimate that undisclosed mergers account for \$427 billion to \$702 billion of "gross" consolidation. For perspective, this is 29%-48% of the total change in four-firm revenue concentration economy-wide over the sample period. Consistent with theory, undisclosed mergers prevail in "local" service industries, where smaller deals can produce meaningful changes in market power. For instance, mergers among healthcare providers are near the top of the list, regardless of whether one sorts industries by the share or volume of undisclosed deals.

Our findings stand at the intersection of two current, contentious policy debates. One involves efforts to increase the information available to antitrust authorities. In February 2020, for instance, the Federal Trade Commission (FTC) compelled the five largest US technology companies to disclose *all acquisitions over the past decade*. Published 18 months later, the results revealed over 1,000 previously unreported mergers. Many of these deals would have been reported if the thresholds completely accounted for other forms of consideration (e.g., debt, deferred compensation, and milestone payments to sellers). Of course, the competitive effects of those transactions remain an open question. State governments may also start requiring merger-related disclosures. For instance, in May 2023, the Illinois General Assembly passed House Bill 2222, which requires that all healthcare mergers—regardless of size—be reported the state's attorney general.

The other debate involves decreasing information available to investors. For instance, in January 2021, the Securities and Exchange Commission (SEC) reduced the amount of merger-related information that public companies must report. The stated goal was to limit the cost and complexity of reporting (SEC, 2020). Interestingly, these developments highlight the tension that exists between agencies with potentially conflicting goals (e.g., the SEC, whose mission is to protect investors, and the FTC, whose mission is to protect consumers). This subtle point is not lost on experienced attorneys. A statement by the chair of the NYC Bar Association's Committee on Mergers supporting the recent SEC rule change is especially striking. He states, "Premature disclosure of synergies could also complicate registrants' relationship with their regulators," adding that "in some cases, *increased market power might be a form of 'synergy' that is extremely sensitive*" (emphasis added) (Norwitz, 2019).

This paper contributes to several streams of literature. A rapidly growing body of work reveals secular trends in investment, income, and profits. For example, Karabarbounis and Neiman (2013) and Elsby, Hobijn and Şahin (2013) show that the historically stable share of national income received by labor has declined since the 1980s, while Gutiérrez and Philippon (2016) show business investment has fallen relative to Tobin's Q since 2000. De Loecker, Eeckhout and Unger (2020) find that markups have risen since 1980 and revenue-weighted net profit margins have increased even faster since around 2001. Moreover, Barkai (2020) and Autor et al. (2017) show that changes in the labor share are associated with increases in industry concentration. Yet, few explanations have been given as to why these changes are occurring. Shifts in antitrust enforcement is one possibility. Peltzman (2014) argues that lax enforcement, inspired by the work of Robert Bork and codified in the 1982 merger guidelines, has contributed. Wollmann (2019, 2021) more recently argues that expanding exemptions to premerger notification programs have played an important role.⁶ A 2001 law change in particular raised the size threshold below which mergers need not be reported to the federal government, putting industries at risk of "stealth consolidation." Our findings suggest that prior studies understated the volume of below-the-radar transactions by half.

We also contribute to work that studies firms' recent movement away from public equity markets and toward alternative sources of capital. For example, Leuz, Triantis and Wang (2008) show that many firms de-registered from the SEC in the early 2000s. Since then, firms have increasingly been acquired and de-listed (Doidge, Karolyi and Stulz, 2017), and private firms have been much more likely to be acquired than go public (Bayar and Chemmanur, 2012; Gao, Ritter and Zhu, 2013). Prior work mostly argues that compliance costs have driven the going dark/going private phenomena. Our findings suggest another motivation: publicly traded companies face reporting requirements that increase antitrust risk. Notably, our findings also imply that incentives increased around 2001, as described in Section V.

Our paper also relates to empirical work demonstrating the real effects of mandatory capital market disclosures and accounting standards (Leuz and Wysocki, 2016; Barrios, Lisowsky and Minnis, 2019; Roychowdhury, Shroff and Verdi, 2019). This research posits that the measurement and disclosure rules that govern the functioning of a firm's information system (i.e., which transactions to measure, how they are measured and aggregated, and what to disclose) significantly impact managerial decision-making. For example, Christensen et al. (2017) find that requiring firms to disclose mining accidents in their annual reports changes their safety behavior. These arguments extend to alternative disclosure regulations in other markets (Loewenstein, Sunstein and Golman, 2014). For instance, Johnson

⁶These explanations are not mutually exclusive. For additional support of the first view, see Nocke and Whinston (2020). In support of the second, see Cunningham, Ederer and Ma (2021), Kepler, Naiker and Stewart (2020), and Morzenti (2020). See Section V for further discussion.

(2020) finds that publishing worker safety violations decreases occupational injuries, while Jin and Leslie (2003) find that publishing restaurants' hygiene scores improves product quality. Our findings highlight how regulators' actions in one market may affect the design and efficacy of regulation in another (Oates, 1999). Most work in this area focuses on local and national delegation of regulatory powers (Musgrave, 1959; Oates and Schwab, 1988; Traub and Sigman, 2007), balancing the benefits and costs of decentralization versus centralization (Hedge and Scicchitano, 1994). We extend this literature by documenting the coordination issues at the federal level that may develop from regulators' differing policy objectives.

The paper is organized as follows. Section I provides institutional details. Section II presents the model. Section III describes the data. Section IV investigates whether investor disclosures pose antitrust risks, while Section V measures the value and proportion of undisclosed mergers. Section VI concludes.

I. Institutional details

A. Merger control

The US has witnessed repeated attempts by firms to avoid antitrust scrutiny. The Sherman Act of 1890 banned anticompetitive agreements between firms (e.g., price fixing), so rivals responded by merging. The Clayton Act of 1914 banned acquisitions of competitors, so firms instead acquired each others' underlying assets. The 1950 Celler-Kefauver Amendment closed the asset sale loophole. Hence, rivals stopped publicizing anticompetitive deals and instead merged quietly and covertly so that, when the government eventually learned of the deals, the parties had already shared information and combined assets, making unwinding as hard as "unscrambling eggs" Baer (1996). The country had entered what is pejoratively called the era of "midnight mergers."

The practice abated around a quarter of a century later when Congress passed the Hart-Scott-Rodino Act of 1976, which requires firms interested in merging to notify the FTC and U.S. Department of Justice (DOJ) in advance of closing.⁷ However, the HSR Act *exempts most mergers* based on their size. As initially written, mergers valued below \$15 million were nonreportable, though Congress abruptly raised the threshold to \$50 million in 2001 and indexed its growth to gross national product beginning in 2005. At the time of writing, the exemption cutoff stands at over \$111 million. Moreover, the threshold is four times higher for deals involving negligible physical capital (e.g., transactions including only intellectual property).⁸

⁷At the time of writing, several states are in the process of establishing premerger notification programs targeting smaller transactions in specific industries. To the best of our knowledge, the only state-level program in existence during our sample period was in Connecticut, which reviewed acquisitions of physician groups. Its scope is sufficiently limited that we can abstract away from any effect it had in this paper.

⁸To be precise, the HSR Act requires the target and acquirer to separately notify the DOJ and FTC of

As a result of these changes, most acquirers face the same incentives today to escape detection that they would have faced in the middle of the last century. This point is not lost on experienced attorneys. For instance, in a 2013 practice note, titled "Considerations and Strategies in Non-HSR Reportable Transactions," Mason and Kam (2013) state,

In addition to the level of substantive antitrust risk associated with the deal, the likelihood of detection also informs the transacting parties' antitrust strategy . . . any public report about the deal, including a company press release or newspaper article, can notify the antitrust agencies about the deal.

Similarly, Buterman et al. (2017) state, "As a general matter, when thinking about the risks that attach to an antitrust-sensitive transaction, parties tend to think in terms of 'detection risk' (that is, the risk that anyone will notice the strategic issues at all)." These statements suggest that counsel should anticipate mandatory disclosures, such as those required by securities law. Consistent with this prediction, Kling and Nugent (2005) state,

If [a] transaction is of the type that requires public disclosure, it may present disclosure issues even after its initial announcement, particularly with respect to matters that may affect the likelihood of the deal closing.

The authors state that this is especially true "in a transaction with significant antitrust or other regulatory issues."

For publicly traded companies, most disclosures are unrelated to antitrust law and instead result from capital market considerations. Many of them are mandated by capital market regulators. We describe these issues below.

B. Capital market regulation

Corporate disclosures crucially influence the functioning of an efficient capital market (Healy and Palepu, 2001). Absent market imperfections or externalities, firms have incentives to optimally trade off the costs and benefits of voluntary disclosure and to produce an efficient level of information for investors.⁹ However, information asymmetry between investors and managers and incentive problems

all mergers affecting US commerce unless explicitly exempt. Reporting requirements can be summarized as follows. If the target has at least \$22 million in assets (or in sales if the target is a manufacturer), then the merger must be reported if the transaction value exceeds \$111 million. If the asset (or sales) criteria is not met, which typically occurs when the assets consist mainly of intellectual property, then the merger must be reported if the transaction value exceeds \$445 million.

⁹There is a large literature in financial economics on corporate transparency and its impact on the firm's cost of capital. Several papers demonstrate more efficient pricing of securities, due to reduced information asymmetry among market participants (e.g., Diamond and Verrecchia (1991); Easley and O'hara (2004); Lambert, Leuz and Verrecchia (2007); Verrecchia (2001)). All these authors show that the cost of equity is less for firms with more corporate disclosure.

within the firm impede the efficient allocation of resources. As a result, regulators like the SEC and Financial Accounting Standards Boards (FASB) have been created to facilitate timely, credible public disclosure.

One of the tenets of the SEC Act of 1934 was the promotion of full public disclosure of relevant company information. Thus, the SEC requires public companies to publicly disclose information about their financial and managerial conditions. The 8-K report alerts shareholders and the public to potentially significant corporate events.¹⁰ We study acquisitions, and so we focus on Item 2 of Form 8-K, which reports "Completion of Acquisition or Disposition of Assets."¹¹ Whenever a publicly traded firm completes a non-ordinary acquisition of a "significant" amount of assets, it must file an Item 2 report within four business days of the deal's closing.¹² To determine which transactions are significant and therefore must be disclosed, the SEC uses standards based on the relative size of the target to that of the acquirer. The main determinant is whether the transaction value reaches 10% of the acquirer's total assets.

In addition to Form 8-K filings, the SEC requires firms to file annual reports that include FASB-compliant financial statements. This type of regulation reduces processing costs for financial statement users by providing a common language that managers can use to communicate with investors. As a result, publicly traded US companies must file a balance sheet, income statement, and statement of cash flows both quarterly and annually. These regulated reports provide new and relevant information to investors (Kothari, 2001). Critical to our study is Accounting Standards Codification 230, which requires entities to classify cash receipts and payments on a "cash flow statement" (or very similarly named statement).¹³ Specifically, it requires firms to report the total cash flows associated with all mergers and acquisitions during the period as one item *regardless of whether the firm has ever or will ever disclose the existence of the underlying transactions*. This requirement allows us to capture the total cash spent by firms on acquisitions throughout the year. This is especially informative because about two-thirds of mergers in our sample involve only cash and more than half of the remaining ones

¹⁰These events include a change in control of the registrant, an acquisition or disposal of assets, bankruptcy or receivership, a change in a registrant's certifying accountants, resignation of a registrant's directors, a change in the fiscal year-end, and other unspecified events deemed important as well as any related exhibits and financial statements.

¹¹Item 2 was re-numbered Item 2.01 as of August 23, 2004, so we technically study Item 2.01 for most of the panel. The re-numbering did not affect how the event is reported, so we use the term "Item 2" throughout the paper (for succinctness).

¹²Most transactions reported under Item 2 are classified as acquisitions of "assets." However, this term reflects idiosyncrasies of administrative law, not economic reality. Laypeople would call the vast majority "businesses." When assets are acquired, the transaction-value-to-acquirer-assets test is the sole determinant. When businesses are acquired, one must also test whether the target's income or assets reaches 10% of the acquirer's income or assets, respectively. However, satisfying the transaction-value-to-acquirer-assets test typically ensures meeting the income test.

¹³The "Cash Flows from Operations" section pertains to the firm's core business (in contrast to peripheral activities such as investing or borrowing). The "Cash Flows from Investing" section reports inflows and outflows from investments. Finally, the "Cash Flows from Financing" section pertains to transactions with the company's owners or lenders.

involve some amount of cash consideration.

C. Trade-offs

The facts cited above produce trade-offs from the perspective of a firm's management that is about to acquire a close competitor. Assuming that the deal will close, theory predicts profits will rise. Further assuming the market for ownership stakes in the firm is liquid (and the acquirer has not bid such a high price that all producer surplus goes to the seller), news of the merger will cause share prices to incorporate that information rapidly. However, broadcasting the transaction may alert antitrust authorities, who might otherwise not have detected it. As a consequence, the merger may then be investigated, challenged, abandoned by the parties, or even blocked by the courts.

How does detection occur in practice? In response to this question from the Senate Judiciary Subcommittee On Antitrust, Competition Policy, and Consumer Rights, Assistant Attorney General Delrahim stated, "The Division has a number of ways in which it may learn of non-reportable transactions that may raise anticompetitive issues. . . . Staff in [the Division's civil litigation] sections actively monitor developments in their assigned industries."¹⁴ The Antitrust Division Manual provides more detail, stating that "investigations arise from a variety of sources including . . . press reports of various practices that come to the Division's attention through the monitoring of a variety of media, including the Internet, newspapers, journals, and the trade press."¹⁵ Likewise, the FTC states in its Strategic Plan that "for mergers not subject to HSR notification . . . the FTC relies on other tools such as referrals, the trade press, consumer and competitor complaints, and other means to identify potential or ongoing harm to competition."¹⁶

Are investor disclosures relevant? The Antitrust Division Manual states that it uses information from SEC filings—it explicitly names 8-K reports—when evaluating transactions. Hence, it is reasonable to assume they may use these means to detect mergers. However, this is by no means necessary for investor disclosures to pose antitrust risk. It suffices for agency staff to monitor news articles that are the immediate consequence of filings, such as Item 2 reports. Many aggregators exist that alert subscribers to relevant articles in narrowly defined industries and republish their contents. According to the Division Manual, "the Antitrust Library contains general and specialized reporters . . . [as well as] trade, business and census publications necessary to monitor industry activity."¹⁷ It equally suffices for agency staff to respond to complaints from customers or

¹⁴The question came from Senator Blumenthal, who asked: "How does DOJ learn of potentially anticompetitive mergers that fall beneath the reporting thresholds?" See page 35 of Delrahim (2019).

¹⁵See page III-6 of the Manual (<https://www.justice.gov/sites/default/files/atr/legacy/2015/05/13/atrdvman.pdf>).

¹⁶See page 14 of the Plan ([https://www.ftc.gov/system/files/ftc.gov/pdf/fy-2022-2026-ftc-strategic-plan.pdf](https://www.ftc.gov/system/files/ftc%20gov/pdf/fy-2022-2026-ftc-strategic-plan.pdf)).

¹⁷For references to 8-K reports, see pages III-34, and, for a description of what the Antitrust Library contains, see page VI-5.

suppliers, who in turn learned about an incipient transaction through an article generated by an investor disclosure.¹⁸

These facts also create tension between regulators. To see this, compare the mission statements of the nation's securities regulator to that of its antitrust authorities.¹⁹ The former states:

The mission of the SEC is to protect investors; maintain fair, orderly, and efficient markets; and facilitate capital formation.

However, the latter two state,

The mission of the Antitrust Division is to promote competition in the U.S. economy through enforcement of, improvements to, and education about antitrust laws and principles,

and

The FTC Mission [is to] prevent business practices that are anticompetitive or deceptive or unfair to consumers; to enhance informed consumer choice and public understanding of the competitive process; and to accomplish this without unduly burdening legitimate business activity.

Put differently, while the goal of the SEC loosely translates to protecting a businesses' owners, the goals of the FTC and DOJ equate to protecting a businesses' customers. With respect to the creation and maintenance of market power, these may be opposing aims.

D. Disclosure levels

Information can travel to antitrust authorities or investors in various ways. Nonetheless, the preceding discussion suggests a few standardized, salient ways that mergers are publicized. For tractability in our analytical analysis, we characterize four relatively distinct levels of disclosure, which are ordered by the amount and timeliness of the released information.

¹⁸To illustrate, consider *US v. Bazaarvoice*, a rare case in which the agency revealed the origins of its investigation into a nonreportable merger. DOJ Attorney Jim Tierney stated that he discovered it "in June 2012" from a "press report that Bazaarvoice had acquired PowerReviews for \$170 million" (see <https://globalcompetitionreview.com/guide/the-obama-trials/the-obama-trials/article/reflections-us-v-bazaarvoice>). The merger required an Item 2, which was published on June 12 and followed immediately by news articles. For the Item 2 to have caused the investigation, it is not necessary for Tierney or his staff to have been monitoring 8-Ks. It suffices for the "press report" he references to be a wire service summary of the Item 2 or a news article that directly resulted from it.

¹⁹See mission statements of the SEC, DOJ Antitrust Division, and FTC at <https://www.sec.gov/about/reports/sec-fy2014-agency-mission-information.pdf>, <https://www.justice.gov/jmd/organization-mission-and-functions-manual-antitrust-division>, and <https://www.ftc.gov/sites/default/files/documents/reports/annual/one-page-ftc-performance-snapshot/2012snapshotpar.pdf>, respectively.

Premerger notifications. The "Notification and Report Form for Certain Mergers and Acquisitions" (i.e., the filing required under the HSR Act) is the earliest and most comprehensive disclosure to antitrust authorities. In terms of timing, merging parties must file premerger notifications before closing—usually about three to four weeks. This allows agency staff to assess the competitive consequences of the proposed transaction. In terms of completeness, very little potentially relevant data may be withheld. For instance, premerger notifications must include "all studies, surveys, analyses and reports which were prepared . . . for the purpose of evaluating or analyzing the acquisition with respect to market shares, competition, competitors, markets, potential for sales growth or expansion into product or geographic markets," regardless of who prepared or presented the materials, where they were presented, and whether they contain confidential information.²⁰

Item 2 reports. The "Current Report" of the "Completion of Acquisition or Disposition of Assets" (i.e., Form 8-K Item 2) is second in terms of timeliness and completeness.²¹ It covers effectively "every purchase, acquisition by lease, exchange, merger, consolidation, succession or other acquisition" other than those "in the ordinary course of business" (provided that the transaction meets the reporting requirement), and it must be filed within four business days of the event. The report must clearly describe the transaction: the assets involved, the seller, any relationship between the acquirer and seller, the "nature and amount of consideration," and, in cases where they are measurable, the financial statements of the target.

Basic disclosures. We classify all other disclosures that meet a minimum informativeness threshold as "basic" disclosures. For the purposes of this paper, a basic disclosure is discretionary and ensures that a comprehensive, transaction-level dataset covering mergers reports the identity of the target and acquirer, the industry in which both operate, and the value of the deal. We approximate this dataset using the transactions compiled and published by Thomson/SDC, as discussed in Section III.B and the references provided therein.

No disclosure. We define mergers without even basic disclosures as "undisclosed." These deals represent cases where management did not provide any transaction-specific information. (This is an option, even for publicly traded US companies, as discussed in Section I.B.) However, we emphasize that regardless

²⁰A concise description of the materials required is provided by the Premerger Notification Office at [https://www.ftc.gov/system/files/attachments/form-instructions/hsr'form'instructions'9-25-19.pdf](https://www.ftc.gov/system/files/attachments/form-instructions/hsr%20form%20instructions%209-25-19.pdf).

²¹Interestingly, the US Office of Management and Budget ("OMB") provides additional support for this claim, at least as long as preparation time is roughly proportional to information conveyed. OMB estimates that premerger notifications take, on average, 37 hours to complete, whereas 8-K reports take 9.21 hours. The latter still presumably exceeds the relatively short statements provided by firms that constitute "basic disclosures," described immediately below.

of what transaction-specific information managers provide, they will be forced to report the aggregate (cash) value of all mergers annually on the firm's cash flow statement.

II. Model

This section presents a conceptual framework that guides our empirical analysis. Since premerger notifications fully inform the antitrust authorities about the potential merger, rendering other disclosures uninformative from an enforcement standpoint, we initially focus on non-HSR mergers. We will revisit HSR mergers later in this section.

A. Setup

Merger opportunities arise between targets and acquirers. Each is described by a tuple (θ, a, μ) . $\theta = H$ if the merger is horizontal and $\theta = NH$ otherwise. a captures how much the merger appears to reduce competition, with higher values corresponding to more anticompetitive deals. a is drawn from a distribution $F_\theta(a)$, which has infinite support, and is bounded from below by zero. Following economic theory and agency guidelines (Stigler, 1964; US Department of Justice and Federal Trade Commission, 2010), horizontal mergers appear more anticompetitive than nonhorizontal ones. Specifically, we assume $F_H(a)$ reverse hazard rate dominates $F_{NH}(a)$.²² μ characterizes mandatory disclosure. $\mu = 1$ if the SEC requires an Item 2 report and $\mu = 0$ otherwise.

The timing of the game is as follows. When a merger opportunity arises, the acquirer's management must first decide whether to pursue it.²³ If it does, then $Y = 1$. Otherwise, $Y = 0$ and the game ends. Second, assuming the game continues, management must decide whether to disclose details, D , about the merger to investors. For simplicity, we assume that $D = 0$ for no disclosure, $D = 1$ for basic disclosure, and $D = \bar{D}$ for an Item 2 report, with $\bar{D} > 1$. Third, the antitrust authority must decide whether to block it.²⁴

To be blocked, a merger must reduce competition *and* be discovered by the antitrust authority. Investor disclosures are public, so D is in the authority's information set, i.e., it may aid in the process of discovery. Thus, perceived anticompetitiveness and investor disclosures are complements with respect to

²²Reverse hazard rate dominance means $f_H(a)/F_H(a) > f_{NH}(a)/F_{NH}(a)$. It implies that if one knows a merger is at least of type a , then the relative probability of observing a merger of type H just above a is greater than the relative probability of observing a merger of type NH just above a . This, in turn, means there is relatively more density to the right of a for H than NH . It is in this sense that we state "horizontal mergers appear more anticompetitive."

²³To ease exposition, we allocate all decision-making power and payoffs to the acquirer's managers and owners, respectively.

²⁴To be precise, the FTC and DOJ only challenge mergers. If the transaction is litigated, then its fate is up to a judge or jury. We implicitly assume that overcoming a challenge is so comparatively costly for a non-HSR merger that the parties will abandon it. Alternatively, we could implicitly assume that the authorities only challenge mergers that the courts will find anticompetitive.

antitrust enforcement. Interacting these factors provides a natural way to capture their relationship. We assume that an attempted merger is blocked if and only if the product of a and D meets or exceeds some threshold b^* , where $b^* > 0$.

If the merger is attempted and completed, then the acquirer earns incremental profit from it of π_θ each period, which recurs indefinitely. In contrast, if the merger is not attempted or if it is attempted but blocked, then the acquirer earns zero incremental profit.

B. Costs and benefits of disclosure

Disclosure may be costly. To see this, consider a horizontal merger for which $a > b^*$ and no Item 2 is required by the SEC, and assume a positive discount rate of r . If management makes a basic disclosure, then the merger is blocked, and the acquirer receives zero incremental profit. In contrast, if management stays silent, then the merger is completed, and the acquirer receives incremental profit whose present value equals π_H/r .

Disclosure may also be beneficial. If management discloses a merger, then its share price rapidly rises to reflect the value added by the deal, assuming it will be completed.²⁵ If it does not, the share price will instead rise gradually as higher profits are eventually realized.²⁶ However, many shareholders will have sold their stock before the full value of the transaction is realized. We assume managers are bound by fiduciary duty to maximize the wealth of current shareholders.²⁷

To formalize this, we define σ as the fraction of investors who sell each period, with $\sigma \in (0, 1)$. If the acquirer earns zero, then its shareholders earn zero. If the merger is attempted and completed, then the expected payoff to current shareholders depends on disclosure. If $D \geq 1$, then they earn $\frac{\pi_\theta}{r}$. However, if $D = 0$, then they earn $\frac{\pi_\theta(1-\sigma)}{r+\sigma}$ when $d = 0$. Notice that $\frac{1}{r} > \frac{1-\sigma}{r+\sigma}$, so disclosure is always beneficial in the absence of antitrust risk.

C. Implications

Correctly characterizing management's decisions requires accounting for deterrence. Recent work shows that firms are so acutely aware of antitrust risks that intense government scrutiny results in anticompetitive mergers never being attempted (Wollmann, 2019). In the current setting, this finding indicates that a is known by management when it decides whether to merge and that draws of a

²⁵Acquirer announcement returns are negative for large, public targets. However, they are positive and significant for small, private targets, which are relevant to the present discussion (Fuller, Netter and Stegemoller, 2002; Capron and Shen, 2007; Netter, Stegemoller and Wintoki, 2011).

²⁶The same logic prevails if unexpectedly large earnings are paid out as dividends rather than retained.

²⁷We abstract away from agency problems. However, when incentives are misaligned, managers typically place even more weight on short-term share price appreciation (Stein, 1989; Gibbons and Murphy, 1992; Bebchuk and Stole, 1993).

above b^*/D are deterred, not proposed and then blocked.²⁸

We can now derive empirically relevant predictions. Our first proposition states that if one restricts attention to transaction-level data, then the share of horizontal mergers falls when the SEC requires an Item 2 report.

Proposition 1. Let $\psi(\mu)$ denote the horizontal share of mergers in transaction-level data. $\psi(1) < \psi(0)$.

To see this, notice that when a merger necessitates an Item 2 report, the probability that a merger of type θ appears in transaction-level data falls from $F_\theta(b^*)$ to $F_\theta(b^*/\bar{D})$. Horizontal mergers are more anticompetitive—or, more precisely, since F_H reverse hazard rate dominates F_{NH} —the share of horizontal mergers that are deterred when their visibility to antitrust authorities increases is higher than the share of nonhorizontal ones. Please see Appendix 8 for a formal proof of this proposition and the ones that follow.

Notably, our setting provides a falsification test. A premerger notification fully informs the antitrust authority about a merger prior to its completion. This renders an Item 2 report uninformative for enforcement purposes and, as a result, irrelevant to the decision of whether to merge. Thus, among mergers for which premerger notifications are required, the horizontal share in transaction-level data should not vary with Item 2 reporting requirements. In other words, Proposition 1 will not hold for HSR mergers.

Next, we expand the scope of our analysis to all mergers (rather than focusing on ones exempt from premerger notification). To distinguish between HSR and non-HSR mergers, we append to the tuple (a, θ, μ) an additional term, ρ . $\rho = 1$ if the merger requires premerger notification and $\rho = 0$ otherwise.

The following propositions treat μ and ρ as random variables. Our second proposition states that so long as some deals require neither an Item 2 report nor a premerger notification, transaction-level data will incompletely measure total mergers. That is, management will intentionally withhold some mergers from the public.

Proposition 2. Assume the distribution of a does not depend on μ or ρ . If $Pr.(\mu = 0, \rho = 0) > 1$, then $Pr.(D = 0|Y = 1) > 0$.

When $\mu = 0$ and $\rho = 0$, management chooses $Y = 1$ regardless of a . In the event that $a > b^*$, management then chooses $D = 0$, or else the merger will be blocked. Since a is unbounded from above, this event occurs with positive probability. Thus, some completed mergers receive no investor disclosure.

The final two propositions are untestable in our data but require minimal additional assumptions and have important economic consequences. The third

²⁸Implicitly, we assume there is at least some sunk cost associated with organizing a merger. Absent that, management would simply opt to pursue all opportunities, resulting in many blocked deals. However, we do not observe this in the data. See Appendix 6 for a more complete discussion of deterrence, including its relation to observed rates of antitrust enforcement.

proposition states that horizontal mergers are more common among undisclosed mergers than disclosed ones and that undisclosed mergers are more anticompetitive on average than disclosed ones.

Proposition 3. Assume the distribution of a does not depend on μ or ρ . $Pr.(H|D = 0, Y = 1) > Pr.(H|D \neq 0, Y = 1)$.

If Proposition 3's assumption holds, then analysis based solely on disclosed mergers implicitly selects on relatively benign transactions—ones that are less likely to increase concentration. This fact has clear implications for applied work, which often implicitly selects on disclosed mergers, as we discuss in Section V.

The fourth proposition states that mandatory investor disclosures reduce the value of the firm.

Proposition 4. Assume the distribution of a does not depend on μ or ρ . The expected cost of Item 2 reporting requirements equals

$$(1) \quad Pr.(\mu = 1, \rho = 0) \left[Pr.(\theta = H) \frac{\pi_H}{r} (1 - F_H(b^*/\bar{D})) + Pr.(\theta = NH) \frac{\pi_{NH}}{r} (1 - F_{NH}(b^*/\bar{D})) \right] > 0.$$

Proportion 4 follows from the fact that the expected per-merger cost of investor disclosures equals the product of the probability that an Item 2 report is required and the cost of the Item 2 report, which depends on the chance of a merger with an Item 2 report is blocked. It indicates that even if there are no direct expenses associated with investor disclosures (i.e., there are no "compliance costs"), there are still indirect, antitrust-related costs. By extension, public companies would pay to avoid certain reporting requirements. By further extension, there is an advantage to alternative capital sources, including private equity. We revisit this issue in Section V.

III. Data

A. Scope

Our data cover domestic mergers between January 1, 2002, and December 31, 2016. The start date was chosen because 2002 marks the first full calendar year following an amendment to the US premerger notification program, the contours of which are important to our estimation strategy. The end date was chosen to exclude very recent years where mergers may be incomplete due to lagged recording. Throughout the analysis, all currency-denominated figures are reported in 2019 constant dollars (unless otherwise stated). The sample comprises publicly traded US companies with two main exceptions. We exclude banks, since mergers

involving depository institutions are reviewed by their particular regulators, and we exclude real property owners (e.g., REITs), since they are exempt from premerger notifications.²⁹

B. Sources

Individual mergers. Thomson Reuters Mergers and Acquisitions Database, commonly also referred to as SDC, tracks global ownership transfers.³⁰ For each merger, we observe announcement and completion dates, the transaction value, the size of the ownership stake, and information about the target, acquirer, and their intermediate and ultimate parents. This information includes the firm's name, CUSIP, primary four-digit SIC, the nation in which they are headquartered and incorporated, and organization type (e.g., public company, private company, subsidiary, government-owned entity, etc.).³¹ We typically also observe the assets of the acquirer and the type of consideration paid to the seller (e.g., cash, stock, or other securities). We extract all deals that were completed within our sample date range.

We generically refer to the resulting set of records as the "transaction-level merger data." Implicitly, this assumes that Thomson/SDC provides the approximate universe of disclosed mergers. Several facts support this claim. For instance, it is by far the most commonly used source in both academic and private sector research. It also forms the basis of widely cited "league tables," which are relied upon to periodically rank law firms and investment banks by deal volume. For additional support, please see Appendix 2.

Transparent record creation by Thomson/SDC also helps minimize concerns that arise in our setting.³² One concern relates to our research design, which exploits variation around thresholds at which mergers must be reported to investors. If our data provider relies on these filings, then our findings may be shaped by its collection efforts more than economic phenomena. Thomson/SDC reports the source from which it learns about each deal. Very rarely is an 8-K the sole source. Another concern relates to the timing of disclosures. Agencies must learn about mergers in their incipiency to police them effectively, so if management announces them long after completion and our data reflects these announcements, then our empirical tests will not comport with the theory it was designed to test. Thomson/SDC reports the date each deal was added. Almost all deals were disclosed within days of completion. For a more complete discussion of the

²⁹The reason is that real property ownership is assumed to be too fragmented for lessors to exert market power, evidenced by the lack of merger-related enforcement actions brought against the real estate industry.

³⁰What we call "Thomson/SDC" goes by many other names, depending mostly on the interface that provides access. These include Refinitiv, Eikon, and Securities Data Corporation, i.e., SDC. However, at present, all refer to the same core set of transaction records, which are uniquely identified by an *SDC Deal Number*.

³¹CUSIPs are codes that identify the company's publicly traded stock. They facilitate matching records across data sources. SICs are codes that identify the primary industry in which the firm operates.

³²We thank an anonymous referee for encouraging us to explore these issues.

advantages of using Thomson/SDC data, please see Appendix 3.

Item 2 reports. Wharton Research Data Services’ SEC Analytics Suite compiles 8-K forms filed with the SEC along with the specific items reported and the exhibits they contain. We collect all occurrences of Item 2, which report the “Completion of the Acquisition or Disposition of Assets.”³³ For each occurrence, we observe the legal name of the registrant, the date of the filing, and the date of the event being referenced.

Cash flows for acquisitions. S&P Capital IQ’s Compustat Annual Snapshot North America provides firm-year level financial data. We accessed the data through WRDS. Each record provides the registrant’s legal name, fiscal year, CUSIP, the month of fiscal year-end, as well as various measures of financial performance described below. The most important for our purposes are revenue, cash paid for acquisitions, and other cash flow related to investing activities.

C. Construction and summary statistics

Transaction-level data on mergers. To assess whether investor disclosures pose an antitrust risk, we exploit variation in the transaction-level data. Specifically, we merge Thomson/SDC deals with Item 2 reports based on two criteria. First, we match the standardized company name in Thomson/SDC matches to the standardized SEC registrant name. Second, we require the event reported to the SEC to fall within one day prior and four days after the completion date of the merger date recorded by Thomson/SDC. This range allows for modest measurement error in report and completion dates and accounts for the four day grace period afforded firms by the SEC.

Table 1 summarizes this dataset. Panel A covers non-HSR mergers, which are the basis for our main results. The sample comprises 7,286 deals between 2002 and 2016. Non-HSR mergers are those whose transaction values falls below the thresholds set forth in the act, so deal sizes are relatively small—the average is around \$20 million. The mean transaction-value-to-acquirer-assets ratio is close to 10%. In 26% of cases, the ratio meets or exceeds the 10% threshold above the SEC requires management to file an Item 2 report. Reassuringly, the share of mergers with Item 2 reports, 29%, is close to that amount. One-third of the sample comprises horizontal mergers—deals where the target and acquirer occupy the same industry. Mergers are spread evenly over the longitudinal dimension of the panel.

Panel B covers HSR mergers, which are the basis for our falsification test. Naturally, they are larger than the ones summarized in Panel A, since they meet

³³Recall from Section I that this event was enumerated “Item 2” prior to August 23, 2004 and “Item 2.01” thereafter. Thus, we technically collect all occurrences of Items 2 and 2.01. (The re-numbering did not affect how this event is reported.)

TABLE 1—SUMMARY OF TRANSACTION-LEVEL DATA

Panel A: disclosed non-HSR mergers						
	N	Mean	Median	Std. Dev.	Min.	Max.
Transaction Value	7,286	20.30	15.00	17.12	1	83
Acquiror Assets	7,286	7,290.35	420.86	69,193.41	1	1,945,467
Trans. val./acq. assets $\times 100$	7,286	9.72	3.56	15.69	.00015	1.0e+02
Trans. val./acq. assets $\geq 10\%$	7,286	0.26	0.00	0.44	0	1
Item 2 report	7,286	0.29	0.00	0.45	0	1
Horizontal merger	7,286	0.33	0.00	0.47	0	1
% of trans. val. paid in cash	7,286	66.01	62.98	34.16	0	100
Year completed	7,286	2,007.77	2,007.00	4.17	2,002	2,016
Panel B: disclosed HSR mergers						
	N	Mean	Median	Std. Dev.	Min.	Max.
Transaction Value	6,402	754.61	220.00	2,317.72	50	67,186
Acquiror Assets	6,402	32,139.94	3,338.80	147,622.50	68	2,220,866
Trans. val./acq. assets $\times 100$	6,402	17.03	8.54	21.08	.003	1.0e+02
Trans. val./acq. assets $\geq 10\%$	6,402	0.46	0.00	0.50	0	1
Item 2 report	6,402	0.41	0.00	0.49	0	1
Horizontal merger	6,402	0.34	0.00	0.48	0	1
Year completed	6,402	2,008.81	2,008.00	4.33	2,002	2,016

Note: The unit of observation is a transaction. "Trans. value/acquirer assets $\times 100$ " means the transaction-value-to-acquirer-assets ratio scaled up by two orders of magnitude (for the sake of readability). "Trans. value/acquirer assets $\geq 10\%$ " is an indicator whose value equals one if the ratio meets or exceeds the cutoff value at which management must produce an Item 2 report. "Horizontal merger" is an indicator whose value equals one if the target and acquirer operate in the same four-digit SIC industry and zero otherwise. "Item 2 report" is an indicator whose value equals one if management filed an Item 2 report. All dollar values are reported in millions of 2019 constant dollars.

or exceed the size-of-transaction test threshold stipulated in the act. Acquirers are on average larger as well, reflecting a very weak association between target and acquirer size. The mean transaction-value-to-acquirer-assets ratio is 0.17. In about 46% of HSR mergers, securities law requires an Item 2 report, and in about 41% of mergers, management files one. As in Panel A, horizontal mergers comprise roughly one-third of the sample, and deal-making is spread evenly over the panel. Notably, the cash value of *disclosed* mergers falls far short of the cash value of *all* mergers. This discrepancy is explored in detail in Section V.

Firm-year level data on the value of mergers. To assess whether management withholds the existence of some mergers from the public, we construct a dataset consisting of firm-year levels of cash deal values. We start with transaction-level merger data, described immediately above, and assign each deal a fiscal year. To compute the cash value of disclosed mergers, we multiply each transaction value by the proportion paid in cash and sum across transactions. To compute the stock value of disclosed mergers, we replicate the process but multiply by

one minus the portion paid in cash (rather than the proportion itself). These computations effectively collapse the data to the level of the firm and fiscal year. Separately, we obtain the cash value of all mergers—disclosed and undisclosed—off the cash flow statement, which Compustat reports at the firm and fiscal year level. We then merge the Thomson/SDC-derived data with Compustat.

Table 2 summarizes the resulting panel. A more comprehensive discussion of these figures and how they compare is left to Section V. The dataset comprises about 33,000 observations. Most firm-year observations do not include any acquisitions. (The median value in the first three rows is zero.) The average firm records \$4 billion of revenue and about \$250 million of capital expenditures. Observations are spread evenly over the panel.

TABLE 2—SUMMARY OF FIRM-YEAR LEVEL DATA

	N	Mean	Median	Std. Dev.	Min	Max.
Stock val. of disclosed mergers	33,468	68.53	0.00	1,109.25	0	92,172
Cash val. of disclosed mergers	33,468	90.39	0.00	887.64	-20,418	53,002
Cash val. of all mergers	33,468	145.58	0.41	926.74	-8,579	51,406
Acquiror revenue	33,468	4,469.83	631.16	16,696.57	-5.2	521,672
Acquiror capital expenditures	33,387	258.22	22.35	1,145.34	-479	41,686
Fiscal year	33,468	2,008.54	2,008.00	4.21	2,002	2,016

Note: The unit of observation is a firm-year. The stock and cash values of disclosed mergers come from Thomson/SDC. The cash value of all mergers comes from firms' cash flow statements, which are combined and published by Compustat. All figures except those in the final row are reported in millions of 2019 constant dollars. Negative values in the second, third, and fifth rows represent divestitures. The negative value in the fourth row reflects a rare case where charge backs exceeded gross sales, resulting in negative net revenue.

IV. Do investor disclosures pose antitrust risk?

A. Methodology

Proposition 1 states that the horizontal share of non-HSR mergers in transaction-level data is lower when the SEC requires an Item 2 report than when it does not. Thus, to test the first proposition, we restrict attention to non-HSR mergers and estimate the effect of Item 2 reports on the share of horizontal mergers. The obvious challenge is that mergers requiring Item 2 reports may differ from those that do not on a host of unobservable dimensions, some of which could influence the horizontal orientation of the deal or be co-determined by them.

Our estimation strategy exploits variation in the amount of information disclosed to investors using a fuzzy regression discontinuity (RD) research design.³⁴ When a merger's transaction value reaches 10% of acquirer assets, the SEC requires an

³⁴Lee and Lemieux (2010) describe the properties of fuzzy RD estimators.

Item 2 report. Hence, the running variable in our setting is the transaction-value-to-acquirer-assets ratio. (In practice, the ratio is somewhat right-skewed, so our initial graphical representation of the RD relies on the log of the ratio and cutoff value; however, subsequent tables and figures show that our results are insensitive to this choice.) The effect of an Item 2 report is determined by the jump in the share of horizontal mergers divided by the jump in the share of Item 2 reports at the discontinuity.

To formalize this, let z denote the running variable and $\bar{z}$ denote the cutoff. $ITEM2$ is an indicator variable that takes a value of one when the merger has an Item 2 report and zero otherwise, and H is an indicator variable that takes a value of one for horizontal mergers and zero otherwise. The estimator is given by

$$(2) \quad \tau = \frac{\lim_{z \downarrow \bar{z}} \mathbb{E}[H|z] - \lim_{z \uparrow \bar{z}} \mathbb{E}[H|z]}{\lim_{z \downarrow \bar{z}} \mathbb{E}[ITEM2|z] - \lim_{z \uparrow \bar{z}} \mathbb{E}[ITEM2|z]}.$$

τ corresponds to the local average treatment effect of $ITEM2$ on H at $\bar{z}$. In the theory model, this translates to shifting D from 1 to $\bar{D}$.

We estimate the four limits in equation 2 with local linear regressions. That is, we solve

$$(3) \quad \min_{\alpha_{k,\downarrow}, \beta_{k,\downarrow}} [k - \alpha_{k,\downarrow} - \beta_{k,\downarrow}(z - \bar{z})]^2 \mathbb{I}_{(\bar{z}-h_k) < z \leq \bar{z}}$$

and

$$(4) \quad \min_{\alpha_{k,\uparrow}, \beta_{k,\uparrow}} [k - \alpha_{k,\uparrow} - \beta_{k,\uparrow}(z - \bar{z})]^2 \mathbb{I}_{\bar{z} \leq z < (\bar{z}+h_k),}$$

for $k \in \{ITEM2, H\}$. h_k denotes an MSE-optimal bandwidth (Calonico, Cattaneo and Farrell, 2020). Our estimate of the local average treatment effect is then given by

$$(5) \quad \hat{\tau} = \frac{\hat{\alpha}_{H,\downarrow} - \hat{\alpha}_{H,\uparrow}}{\hat{\alpha}_{ITEM2,\downarrow} - \hat{\alpha}_{ITEM2,\uparrow}}.$$

Our approach requires three assumptions. The first is that management does not manipulate transaction-value-to-acquirer-asset ratios so as to avoid Item 2 reports. SEC rules are the limiting factor. The numerator incorporates contingent consideration, whose expected value is audited by external certified public accountants, so management cannot affect the test by substituting one type of consideration for another (e.g., out-of-the-money warrants for cash). Thus, manipulation requires that the seller receives a lower payment than it would otherwise obtain, placing the acquirer's management in unenviable position.³⁵ Likewise, the denominator

³⁵The acquirer's management can either explain the motivation behind their offer to the target's

is read directly off the most recent audited balance sheet, so this figure has also been authenticated by a certified third-party.

To be transparent, we are not claiming that manipulation has never occurred in practice. Rather, we are arguing that it is costly and difficult, making it infrequent enough to not meaningfully affect our results. Moreover, if manipulation were a problem, then we would expect a spike in density just to the left of $\bar{z}$. Yet, this pattern is absent from the data, as evidenced by figures referenced later in the section. For a more complete discussion, including how Item 2 avoidance compares to HSR avoidance, please see Appendix 4.

The second assumption is that merger opportunities just below the cutoff resemble those just above. This is plausible so long as the window around the cutoff is narrow enough. We let the data determine the bandwidth, selecting h to minimize mean squared error (Calonico, Cattaneo and Farrell, 2020). Alternative choices yield similar estimates of τ . Moreover, our placebo experiments support this assumption, the details of which follow.

The third assumption, which relates to deterrence, is that Item 2 reports do not affect management's decision of whether to attempt a merger, except through the antitrust risk it might pose. In terms of model parameters, μ affects the probability of encountering H , conditional on $Y = 1$ only by affecting the probability that a meets or exceeds b^*/D . The strongest support for this assumption derives from the falsification test described in Section II. Premerger notifications fully inform the antitrust authorities about incipient mergers, rendering Item 2 reports uninformative for enforcement purposes. Thus, if we restrict attention to HSR mergers, then our third assumption restricts the share of horizontal mergers to trend smoothly through the point at which the running variable crosses the cutoff. This is precisely what we observe, as described below.

B. Main results

Panel A of Figure 1 reports the first stage relationship between the distance to the cutoff and the share of mergers with an Item 2 report. The plot exhibits a fuzzy discontinuity. The share of mergers with Item 2 reports rises smoothly into the cutoff from the left, reaching 35%, jumps discontinuously to 73%. $\hat{\alpha}_{ITEM2,\downarrow}$ and $\hat{\alpha}_{ITEM2,\uparrow}$ is roughly 37 percentage points.³⁶

Although the proportion of mergers with Item 2 reports more than doubles as z crosses $\bar{z}$, it is worth noting that compliance is imperfect. This can occur for various reasons, as discussed in more detail in Appendix 5. As one example, when the purchase price of the target includes shares of the acquirer, the transaction value

attorneys, management, or owners, which amounts to an explicit discussion with an unaffiliated party about how to subvert antitrust laws, or not do so, in which case its proposal amounts an unfair low ball offer over which it is unwilling to negotiate.

³⁶We replicate this figure but construct the running variable in level values rather than log values of the transaction-value-to-acquirer-assets ratio. We report the result in Appendix 1, which shows that the sizes of the jumps resemble the ones presented here.

fluctuates with the acquirer's stock price. In such cases, even if Thomson/SDC records the terms of the deal accurately, the time at which it measures the price of the acquirer's shares may differ from what is required for Item 2 reporting. It is also worth noting that measurement error in *ITEM2* can attenuate the first-stage discontinuity and introduce an upward bias to $\hat{\tau}$. We conducted a thorough inspection of a substantial number of observations around the threshold. Inevitably, however, some measurement error still occurs. Readers should keep this in mind when interpreting our estimates.

Panel B of Figure 1 reports the reduced form relationship. This plot also exhibits a discontinuity. Consistent with the idea that disclosures pose antitrust risk, which in turn deter anticompetitive deals, the share of horizontal mergers falls abruptly as the running variable crosses the threshold.³⁷ We find that $\hat{\alpha}_{H,\downarrow}$ and $\hat{\alpha}_{H,\uparrow}$ equal 30 and 42 percent, respectively, meaning the horizontal share of mergers falls by 12 percentage points at $\bar{z}$.

Table 3 reports the result of estimating equation 5. Under the modeling choices used to generate Figure 1, we find that $\hat{\tau} = -0.37$, shown in column 1. To assess robustness, we assume a uniform or Epanechnikov kernel instead of a triangular one, and we construct the running variable from levels rather than log values of the transaction-value-to-acquirer-assets ratio. Columns 2-6 show that the alternative specifications yield similar estimates. $\hat{\tau}$ ranges from from -0.37 to -0.33. All but one is significant at the 1% level.

TABLE 3—ESTIMATES OF τ

VARIABLES	(1) Horizontal	(2) Horizontal	(3) Horizontal	(4) Horizontal	(5) Horizontal	(6) Horizontal
RD.Estimate	-0.373*** (0.129)	-0.374*** (0.133)	-0.357*** (0.119)	-0.332*** (0.125)	-0.334** (0.133)	-0.335*** (0.126)
Observations	7286	7286	7286	7286	7286	7286
Kernel Type	Triangular	Uniform	Epan.	Triangular	Uniform	Epan.
Robust p-value	0.006	0.007	0.003	0.007	0.016	0.009
BW Loc. Poly. (h)	1.102	0.868	1.153	1.935	1.493	1.707

Note: The top row reports estimates of τ . In columns 1-3, the running variable in the fuzzy RD equals log of the transaction-value-to-acquirer-assets ratio minus the log of 0.1. In columns 4-6, the running variable is based on level rather than log values. Within those groups, the estimates differ based on the kernel type—triangular, uniform, or Epanechnikov. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

In Appendix 1, we examine robustness and heterogeneous treatment. First, two-digit SIC codes are coarser than the four-digit ones, so mergers in which the target and acquirer occupy the same SIC2 are less likely to reduce competition than the mergers involve SIC4 overlap. Thus, if we base H using SIC2s rather

³⁷In Appendix 1, we replicate Panel B but construct the running variable from level rather than log values. As with the first stage estimates, the size of the jump is robust to the change.

than SIC4s, then we should obtain lower estimates of τ . Consistent with that prediction, Appendix Table A.7 reports $\hat{\tau}$ falls by around two-thirds when we do so. Second, Democratic Party members typically support merger-related enforcement more than members of the Republican Party, so all else equal, τ should be larger under Barack Obama’s Presidency than under George W. Bush’s. Appendix Table A.4 shows that the data supports this hypothesis. Third, we assess whether τ is larger when the target’s or acquirers industry is prone to enforcement or whether the acquirer is engaged in a contemporaneous HSR merger. In both cases, we obtained higher estimates of $\hat{\tau}$, though the differences were relatively small in some cases.³⁸

Finally, by making additional assumptions that allow us to extrapolate out from the vicinity of the cutoff, we estimate the volume of transactions deterred by mandatory investor disclosures. Appendix Table A.10 reveals that approximately 300 mergers are deterred annually, amounting to around \$5.4 billion over the full sample period. These additional analyses and insights significantly contribute to the richness of our findings, further emphasizing the significance and broader implications of the research.

C. Falsification test, density plots, and placebo experiments

Figure 2 reports the result of our falsification test. It is an exact replication of Figure 1, except that the underlying sample comprises HSR rather than non-HSR mergers. Consistent with the fact that reporting requirements imposed by antitrust law do not directly affect those imposed by securities law, both figures exhibit similar jumps in the share of mergers with Item 2 reports. However, in line with the fact that premerger notifications fully inform the government about transactions, rendering Item 2 reports uninformative for antitrust purposes, the horizontal share of mergers trends smoothly through the cutoff. In other words, the discontinuity at $\bar{z}$ exhibited in Figure 1 is absent here. Consequently, estimates of τ are very small.³⁹ These findings further support the assumption that investor disclosures only affect the horizontal share of mergers through the antitrust risk they pose.

In Appendix 1, we present a density plot of the running variable for non-HSR mergers. Consistent with our model and underscoring our main results, the figure reveals a sharp drop in horizontal mergers at the threshold, reflecting deals that are deterred by antitrust risk posed by Item 2 reporting requirements. However, there is no evidence that firms are sorting around the threshold. There is neither a spike just to the left of $\bar{z}$ nor a trough just to the right of it. Consistent with

³⁸We study whether τ varies based on whether the target’s industry is the principal responsibility of the FTC or DOJ. Appendix Table A.8 reports somewhat larger coefficients for the DOJ than FTC, but due to the wide confidence intervals, we cannot reach any definitive conclusion. We also assess whether τ varies based on whether the target or acquirer is engaged in manufacturing or services but $\hat{\tau}$ did not vary much across sectors.

³⁹In Appendix 1, we replicate Table 3 for HSR mergers, which reports estimates ranging from -0.0577 to 0.0202.

the idea that mergers among nonrivals do not present competitive threats and face a very low threat of enforcement, nonhorizontal mergers exhibit neither a discontinuity nor sorting at the cutoff. We also replicate this analysis for HSR mergers, and the results mirror those for nonhorizontal non-HSR mergers, further supporting our previous assumptions.

We also present various placebo experiments. That is, we estimate the reduced form relationship between the distance to the running cutoff and various transaction attributes, which include the following: the date of merger completion,⁴⁰ a dummy variable indicating the deal was structured to transfer assets rather than shares,⁴¹ the proportion of the transaction value paid in cash, a dummy variable indicating that all of the transaction value was paid in cash, the transaction value, and the assets of the acquirer. The first four are placebo outcomes in the standard sense—the timing, legal structure, and type of consideration do not affect the causal relationship between investor disclosures and the likelihood of the DOJ or FTC arresting the deal. The final two fully determine the running variable but are very weakly correlated with one another. To facilitate comparisons with our prior results, we used MSE-Optimal bandwidths and triangular kernels. The resulting point estimates are small, and all 95% confidence intervals contain zero. P-values range from 0.45 to 0.86.

V. How much merger activity is undisclosed?

The previous section finds that investor disclosures pose antitrust risk. In light of Proposition 2, this result begs the question of whether management withholds the mere existence of mergers from the public. This section explores the prospect of undisclosed mergers in the data. Specifically, we propose a method for measuring undisclosed mergers, take this method to the data, assess the robustness of our measurements, and discuss the implications.

A. Methodology

Undisclosed mergers are hard to quantify, since they include deals lacking public records. Our measurement strategy exploits the fact that the management of publicly traded US companies must disclose the total cash spent on acquisitions annually (irrespective of whether they provide any transaction-level information about those deals).

To formalize the approach, index acquirers by f , years by t , and mergers by i . Let $\mathcal{J}_{ft}^{\text{DIS}}$ denote the set of disclosed mergers and $\mathcal{J}_{ft}^{\text{UND}}$ denote the set of remaining (undisclosed) deals, so $\mathcal{J}_{ft} = \mathcal{J}_{ft}^{\text{DIS}} \cup \mathcal{J}_{ft}^{\text{UND}}$. Let v_i denote the value of

⁴⁰Completion dates are measured in fractional years. For instance, July 1, 2005, equates to 2005.5.

⁴¹Among non-HSR mergers, Thomson/SDC indicates that about two-thirds of deals are structured to transfer ownership of assets rather than ownership of securities that provide cash flow and control rights to those assets. This distinction is irrelevant for the purpose of antitrust and unrelated to how the deal is classified for reporting purposes.

merger i , and let c_i denote the fraction paid in cash, with the remainder paid in the stock of the acquirer. Given this notation, the cash value of disclosed mergers, C_{ft}^{DIS} , equals $\sum_{i \in \mathcal{J}_{ft}^{\text{DIS}}} v_i c_i$, while the stock value of disclosed mergers, S_{ft}^{DIS} , equals $\sum_{i \in \mathcal{J}_{ft}^{\text{DIS}}} v_i (1 - c_i)$. Finally, define the total value of disclosed mergers as

$$(6) \quad M_{ft}^{\text{DIS}} = C_{ft}^{\text{DIS}} + S_{ft}^{\text{DIS}},$$

and define M_{ft}^{UND} , C_{ft}^{UND} , S_{ft}^{UND} , M_{ft} , C_{ft} , and S_{ft} analogously.

Paying for the target using shares of the acquirer involves a large, fixed overhead expense,⁴² so most small acquisitions are typically all-cash transactions. In the data, among mergers that require neither a premerger notification nor an Item 2 report, cash accounts for over three-quarters of all consideration. Thus, for simplicity, we assume $i \in \mathcal{J}_{ft}^{\text{DIS}}$ whenever $c_i \neq 1$. (Note that if this condition does not hold, then our approach *understates* undisclosed mergers.) The restriction implies that $S_{ft}^{\text{UND}} = 0$, $S_{ft}^{\text{DIS}} = S_{ft}$, and $M_{ft}^{\text{UND}} = C_{ft}^{\text{UND}}$.

We can now express the value of undisclosed mergers for year t in terms of observable objects:

$$(7) \quad M_t^{\text{UND}} = \sum_f C_{ft} - \sum_f \sum_{i \in \mathcal{J}_{ft}^{\text{DIS}}} v_i c_i.$$

We take C_{ft} from the statement of cash flows, and we take v_i and c_i from the transaction-level merger data. If we further assume that the value of disclosed mergers is higher than the value of undisclosed ones (in a first-order stochastic dominance sense), then we can also bound from below the proportion of undisclosed mergers:

$$(8) \quad \text{Pr.}(D = 0 | Y = 1) \geq \frac{1}{FT} \sum_f \sum_t \frac{M_{ft}^{\text{UND}}}{M_{ft}}.$$

Proposition 2 states that this share is positive so long as some mergers fall outside Item 2 and premerger notification reporting requirements.

Notice that equations 6, 7 and 8 depend on accurately measuring the product of v_i and c_i relative to C_{ft} . We assess the accuracy of our data below.

B. Main results

Figure 3 plots mergers over time. Consistent with the model, many transactions are never publicized. Undisclosed mergers total \$1.85 trillion between 2002 and

⁴²There are several reasons for this, including that public companies must prepare and submit additional filings, such as Form S-4, with the SEC anytime there is a nonpublic issuance of stock. Cash consideration involves no such expenses.

2016. Also, while year-to-year changes follow cyclical patterns of macroeconomic expansion and contraction, there is no indication that undisclosed mergers are slowing. In fact, their value peaks toward the end of the sample.

Undisclosed deals also account for a large share of all mergers. For a better sense of their contribution, we turn to Figure 4. The average share of undisclosed mergers, weighted evenly across firm-years is two-thirds. Since larger mergers are more likely to be disclosed, the share of undisclosed mergers weighted by volume is lower (38%).

C. Potential impact

To gauge how much output is affected by undisclosed mergers, we scale their value using price-to-sales ratios obtained from the data. To be precise, we compute the ratio of target revenue to transaction value for each merger in our data, where available, and then compute the median of this ratio for four subsets of transactions: all mergers, non-HSR mergers, mergers without Item 2 reports, and non-HSR mergers without Item 2 reports. Median values range from 0.60 to 0.99. Finally, we scale the value of undisclosed mergers by the aforementioned median ratios. Holding fixed all other environmental factors, this approach implies that undisclosed mergers affected \$1.1 to \$1.8 trillion of output from 2002 to 2016.

To extend these calculations even further, we compute the horizontal share of non-HSR mergers without Item 2 reports, which equals 0.32, and then apply this figure to undisclosed mergers. (According to Proposition 3, which states that $Pr.(H|D = 0, Y = 1) > Pr.(H|D = 1, Y = 1)$, this is too conservative an assumption in the sense that it understates the horizontal share of undisclosed mergers.) The caveats required to translate these figures into non-transitory economy-wide changes in market structure are too numerous to list. Nonetheless, if public acquirers are their industries' largest firms, barriers are high enough to preclude entry and other environmental factors are relatively stable, then undisclosed horizontal mergers account for \$360 billion-\$592 billion of gross consolidation. To put this figure in perspective, this range is 24%-39% of the total change in four-firm concentration between 2002 and 2016, according to the US Census.⁴³

For another point of comparison, we plot investment—or more precisely, capital expenditures—over the sample period. To do so, we used precisely the same firm-year observations in this exercise that we used to calculate M^{UND} , so the series are directly comparable. Firms invest an average of \$575 billion each year, i.e., \$8.6 trillion over the panel. Thus, the amount of assets acquired through organic means is only 4.6 times the amount acquired through undisclosed mergers.

⁴³The denominator equals \$1.503 trillion, which is the approximate total change in C4 between 2002 and 2016. ("C4" means the total US revenue accounted for by the four largest firms at the six-digit NAICS code level, according to the Economic Census.) To obtain this figure, we compute the mean C4 in both periods, weighted by revenue, for all two-digit NAICS code sectors. We then remove real estate (less than 5% of output). Finally, we compute the difference in C4 across the periods at the sector level, multiply by 2016 sales to obtain a change in output, and inflate the figure to 2019 dollars using the CPI.

Moreover, whereas standard measures of mergers, which omit undisclosed mergers, would indicate that capital expenditures exceed mergers, our measures reveal the opposite.

For a sense of what markets are affected, Table 4 lists 15 industries where undisclosed mergers are especially common. Several facts stand out. Service firms competing locally are over-represented. When we sort on share, grocery stores occupy the top spot, with trucking/warehousing companies, engineering services, auto dealers, and wholesalers, which are typically regional distributors, also making the list. When we sort on value, business services appears first. This broadly defined group includes employment agencies, equipment lessors, building cleaning and maintenance companies, and collection agencies. Perhaps most striking, health services appears on both lists—tenth in terms of share and ninth in terms of value. Notice that these patterns are consistent with theory: market segmentation, especially across geography, permits even small acquisitions to concentrate ownership.

This is not to say that manufacturing industries are absent. For example, when sorted by value of undisclosed mergers, chemical companies, producers of industrial, electronic, and transportation equipment, and stone and clay (including concrete) providers all occupy top spots. In each of these cases (except building materials providers), differentiation in product offerings and quality is even more likely to influence segmentation than geography. Descriptively, the industrial variation in undisclosed mergers points to the potentially severe competitive problems that mergers may present in segmented markets in addition to traditional homogeneous markets.

D. Implications

These results relate to the recent debate around secular trends in market structure and market power, which we surveyed briefly in the introduction. Motivated in part by evidence that the historically stable share of national income received by labor has declined (Karabarbounis and Neiman, 2013; Elsby, Hobijn and Şahin, 2013), subsequent work documents, for example, that investment has declined relative to Tobin's Q since 2000 (Gutiérrez and Philippon, 2016) and markups and net profit margins have increased since around 1980 and 2001, respectively (De Loecker, Eeckhout and Unger, 2020). Further, at least a portion of these changes relates positively in the cross-section to rising industry concentration (Barkai, 2020; Autor et al., 2017). Yet few explanations have been put forth.

Shifts in mergers, driven by changes in the intensity of antitrust enforcement, are an important exception. Theory predicts that increasing the frequency at which rivals can acquire one another consolidates ownership, drives up markups and profit margins, reduces incentives to invest, and even depresses wages (either relative to profits or through oligopsony power). Two theories have emerged, which are not mutually exclusive. Peltzman (1976) argues that the problem—at least in the US—lies on the intensive margin of enforcement. In short, the guidelines

determining the agencies' response to merger-induced market structure changes were amended in 1982 to reflect the views of Chicago School scholarship and emphasize consumer welfare over competition, the ultimate effect of which was to treat horizontal mergers more leniently. In support of this view, Nocke and Whinston (2020) provide industry-specific evidence that enforcement rates are too low. Wollmann (2019, 2021) argues that the problem lies on the extensive margin. To enforce the guidelines, the agencies must discover deals in their incipency, but the premerger notification program exempts most deals from reporting requirements, putting industries at risk of stealth consolidation. The threat has been especially pronounced since 2001, when exemption thresholds rose sharply, resulting in an abrupt 70% drop in notifications. Cunningham, Ederer and Ma (2021) and Kepler, Naiker and Stewart (2020) offer additional industry-specific support of this view, while Morzenti (2020) argues that stealth consolidation threatens markets abroad as well.

Evaluating either argument starts with an accurate measure of horizontal mergers. For instance, ascertaining whether non-HSR mergers can meaningfully contribute to the sort of economy-wide changes in the market structure described above requires a precise measure of how much output they affect. Yet, Figures 3-4 indicate that even comprehensive datasets ignore a significant share of transactions. At the same time, Proposition 3 holds that the omitted deals are especially likely to involve firms that occupy the same industry. To illustrate, Wollmann (2019) states that, between 1994 and 2012, non-HSR horizontal mergers consolidated \$407 billion of US output. However, this statement reflects only disclosed mergers, so it severely undercounts below-the-radar transactions. Our data suggests the true number is at least twice as high. This point applies equally to the many tabulations and infographics published by media outlets, consulting companies, and think tanks, which also influence public opinion and policy.

Our findings also relate to how capital is sourced. Mandatory investor disclosures (e.g., Item 2 reports) restrict the set of deals that publicly traded US companies can complete, which creates incentives to operate in more opaque informational environments. According to Proposition 4, firms will pay at least $Pr.(\mu = 1, \rho = 0)[Pr.(\theta = H)\frac{\pi_H}{r}(1 - F_H(b^*/\bar{D})) + Pr.(\theta = NH)\frac{\pi_{NH}}{r}(1 - F_{NH}(b^*/\bar{D}))]$ to avoid Item 2 reporting requirements. Notably, these incentives rose sharply in 2001 with changes to the premerger notification program, which coincides with a widely documented decrease in public stock market listings and an increase in private equity (Leuz, Triantis and Wang, 2008; Doidge, Karolyi and Stulz, 2017; Bayar and Chemmanur, 2012; Gao, Ritter and Zhu, 2013; Stulz, 2020).⁴⁴ For instance, Strömberg (2008) shows that, out of 21,397 leveraged buyouts between 1970-2007,

⁴⁴The HSR Amendment, effective February 2001, abruptly raised the threshold below which mergers are exempt from premerger notification. For instance, a merger with a transaction value of \$40 million was reportable in mid-2000 but unreportable in mid-2001. This means that an Item 2 report posed no additional antitrust risk to such a deal in mid-2000 but did pose a risk one year later. Note, however, that public companies also experienced a sharp rise in compliance costs around this time as a result of the Dodd-Frank Act.

more than 40% occurred after January 1, 2004. Moreover, since 2009, companies have consistently raised more money in private markets than in public ones. Equally illustrative, companies raised \$3.0 trillion in private markets during 2017, double the amount they raised in public markets. Our findings suggest that some of these firms may have opted to go dark or go private so as to avoid public disclosures that pose antitrust risk, especially since acquisitions sponsored by private equity funds receive unique exemptions under the HSR Act and Rules (Asil, Barrios and Wollmann, 2023).

E. Measurement

The conclusions drawn from our measurement exercise depend on accurately capturing the value of disclosed cash mergers, relative to the value of all cash mergers. C_{ft} represents an audited figure whose misrepresentation constitutes fraud and whose misstatement invites litigation, so it is safe to assume it is measured without error. However, C_{ft}^{DIS} depends on the quality of Thomson/SDC's records, so it does not provide similar assurances. Since the cash value of disclosed mergers is a sum over firm-year pairs of the product of transaction values and the proportion of those values paid in cash, there are two main sources of error, c_i and v_i . To assess how well c_i is measured, we temporarily assume v_i is measured without error and make comparisons within subsets of the data that are informative about the proportion of transaction values paid in cash. Then, to assess how well v_i is measured, we follow an analogous process. Both are detailed below.

Measuring the proportions of transaction values paid in cash. Let c_i be measured with error so that instead of observing c_i we instead observe $\tilde{c}_i$, which equals the true value plus i.i.d. noise, ϵ_i . Also, suppose that v_i is measured without error. To facilitate comparisons in the data, select firm-year pairs such that there is exactly one disclosed merger in the transaction-level data and the merger's c_i lies strictly between zero and one. For this subset of the data,

$$(9) \quad C_{ft} = v_i(\tilde{c}_i - \epsilon_i) + C_{ft}^{\text{UND}},$$

where i is understood to correspond to (f, t) . We can re-write equation 9 as

$$(10) \quad \frac{C_{ft}}{v_i} - \tilde{c}_i = -\epsilon_i + \frac{C_{ft}^{\text{UND}}}{v_i}.$$

Averaging over a large number of firm-year pairs for which $v_i = v$, we have

$$(11) \quad \frac{1}{n} \sum_{f't'} \left[\frac{C_{f't'}}{v_i} - \tilde{c}_i \right] \xrightarrow{p} -\mathbb{E}[\epsilon] + \frac{\mathbb{E}[C^{\text{UND}}|v]}{v}.$$

(f', t') corresponds to i such that $v_i = v$, and n denotes the number of firm-year pairs for which this is true. Equation 11 shows that if ϵ is mean zero, then two things are true. First, when v is small, $\frac{1}{n} \sum_{f't'} [C_{f't'}/v_i - \tilde{c}_i]$ is positive. Second, as v grows large, $\frac{1}{n} \sum_{f't'} [C_{f't'}/v_i - \tilde{c}_i]$ tends to zero.

Panel A of Figure 5 reports precisely this relationship in the data. To produce it, we bin the data into equally sized cells based on values of v_i . We compute the log of v_i and plot its average within each cell along the x-axis, and we compute $\frac{1}{n} \sum_{f't'} [C_{f't'}/v_i - \tilde{c}_i]$ and plot its average within each cell along the y-axis.⁴⁵ Consistent with negligible measurement error, we see that the difference is positive for small v but that the difference tends to zero as v grows large.

Measuring transaction values. Let v_i be measured with error such that instead of observing v_i we observe $\tilde{v}_i$, which equals the true value plus i.i.d. noise that is approximately proportional to the true value. Specifically, let $\tilde{v}_i = v_i e^\eta$ (so that $\tilde{v}_i \approx v_i + v_i \eta$). Also, suppose c_i is measured without error. To facilitate comparisons, select firm-year pairs that satisfy two criteria: $c_i = 1$, and there is no merger activity in the previous or subsequent year. The second condition ensures the likelihood of an undisclosed merger completed by f in t is very low. We can then write $\tilde{v}_i e^{-\eta_i} = C_{ft} - C_{ft}^{\text{UND}}$, which implies

$$(12) \log(\tilde{v}_i) = \mathbb{I}\{C^{\text{UND}} = 0\}(\log(C_{ft}) + \eta_i) + \mathbb{I}\{C^{\text{UND}} \neq 0\}(\log(C_{ft} + C_{ft}^{\text{UND}}) + \eta_i).$$

Averaging over many firm-year observations for which $C_{ft} = C$, we have

$$(13) \frac{1}{n} \sum_{i'} \log(\tilde{v}_{i'}) \xrightarrow{P} \Gamma \mathbb{E}[\log(C) + \eta] + (1 - \Gamma) \mathbb{E}[\log(C + C^{\text{UND}}) + \eta] \\ \approx \mathbb{E}[\log(C)] + \mathbb{E}[\eta].$$

Γ represents $Pr.(C^{\text{UND}}=0)$, i' corresponds to (f, t) such that $C_{ft} = C$, and n denotes the number of firm-year pairs for which this is true. In this subset of the data, $\Gamma \approx 0$, so the second expression approximately equals the third. Equation 13 shows that if η is mean zero, the average of $\log(\tilde{v}_{i'})$ over firm-year pairs for which $C_{ft} = C$ converges in probability to $\log(C)$.

Panel B of Figure 5 reports the relevant result. To produce it, we bin the data into 15 equally sized cells based on values of C_{ft} . We compute the log of C_{ft} and $\tilde{v}_{i'}$ and plot their averages within each cell on the x- and y-axis, respectively. Consistent with small measurement error, we see that the plotted points lie very close to the 45-degree line throughout the range of C_{ft} .

⁴⁵The decision to report log rather than level values along the x-axis is based entirely on legibility. Transaction values are highly skewed to the right.

VI. Conclusion

In this paper, we find that investor disclosures pose antitrust risk and that, as a result, managers of publicly traded US companies do not disclose many of their acquisitions. From 2002 to 2016, the volume of undisclosed mergers totals nearly \$2 trillion. While our data does not reveal the characteristics of these transactions, our model suggests that they are more likely to reduce competition than disclosed mergers, all else equal. Based on these findings, we conclude that recent work significantly underestimates economy-wide stealth consolidation.

Questions arise for future work. For instance, if previous studies have omitted many transactions, then what are the consequences of accounting for them? From an antitrust perspective, has insufficient enforcement played a more significant role in the economy than previously believed? From a corporate finance standpoint, are the returns to mergers higher than previously thought? Separately, is there other merger-like activity (e.g., exclusive licenses, co-development arrangements, and co-marketing agreements) that is still unaccounted for?

Furthermore, our research indicates that private sources of capital, such as buyout funds and venture capitalists, offer advantages to firms seeking to acquire close competitors. This raises concerns about retrospective analysis of publicly traded companies, particularly estimates relying on datasets like Compustat, which may unintentionally rely on selected samples of relatively benign acquisitions, particularly since 2001. It also suggests that closer attention should be paid to acquisitions backed by private equity sponsors.

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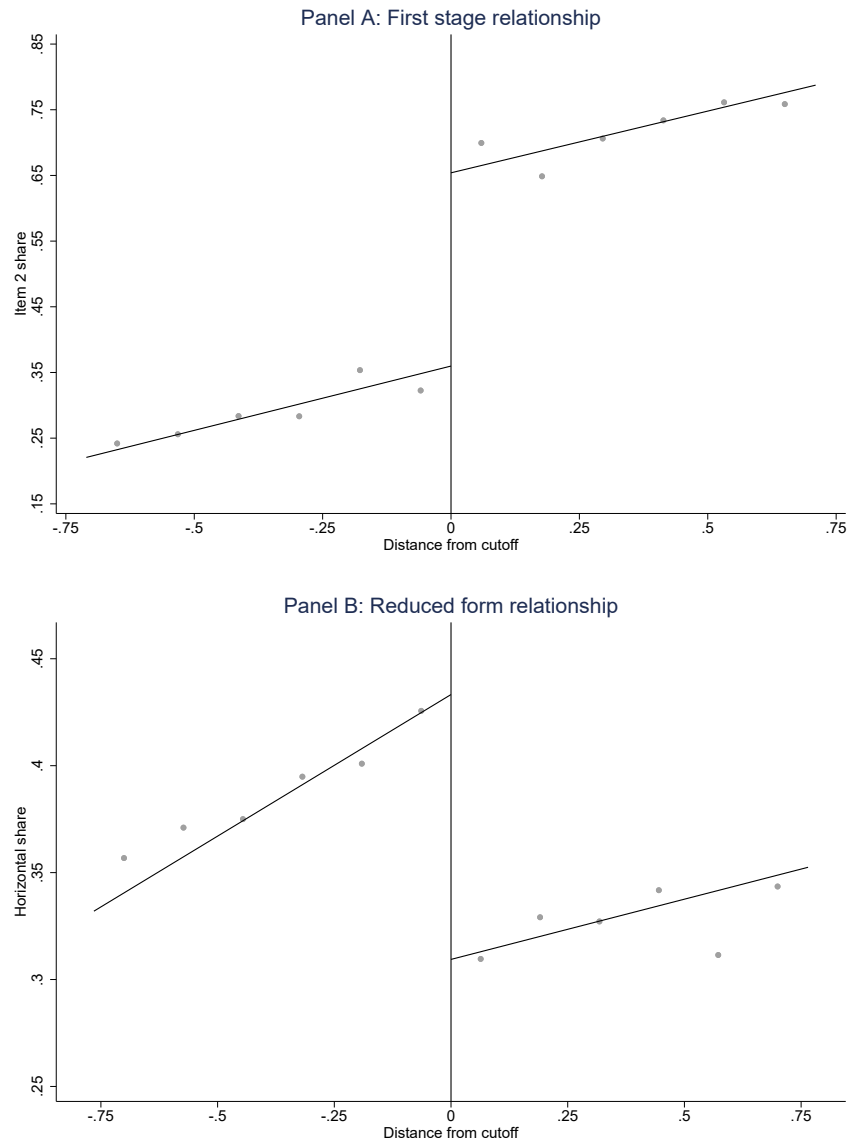


FIGURE 1. ITEM 2 REPORTS RISE AT THE CUTOFF, WHILE HORIZONTAL MERGERS FALL.

Note: The cutoff corresponds to a 10% transaction-value-to-acquirer-assets ratio. Panel A plots the share of mergers with Item 2 reports, while Panel B plots the share of horizontal mergers. In each, we assign observations to one of six evenly spaced bins on either side of the cutoff and plot averages within the bins on the y-axis. Bandwidths determining the support of the running variable are MSE-optimal. Panel A shows that proportion of deals with Item 2 reports rise at the cutoff, but compliance is incomplete. Panel B shows that mandatory investor disclosures deter mergers between competitors.

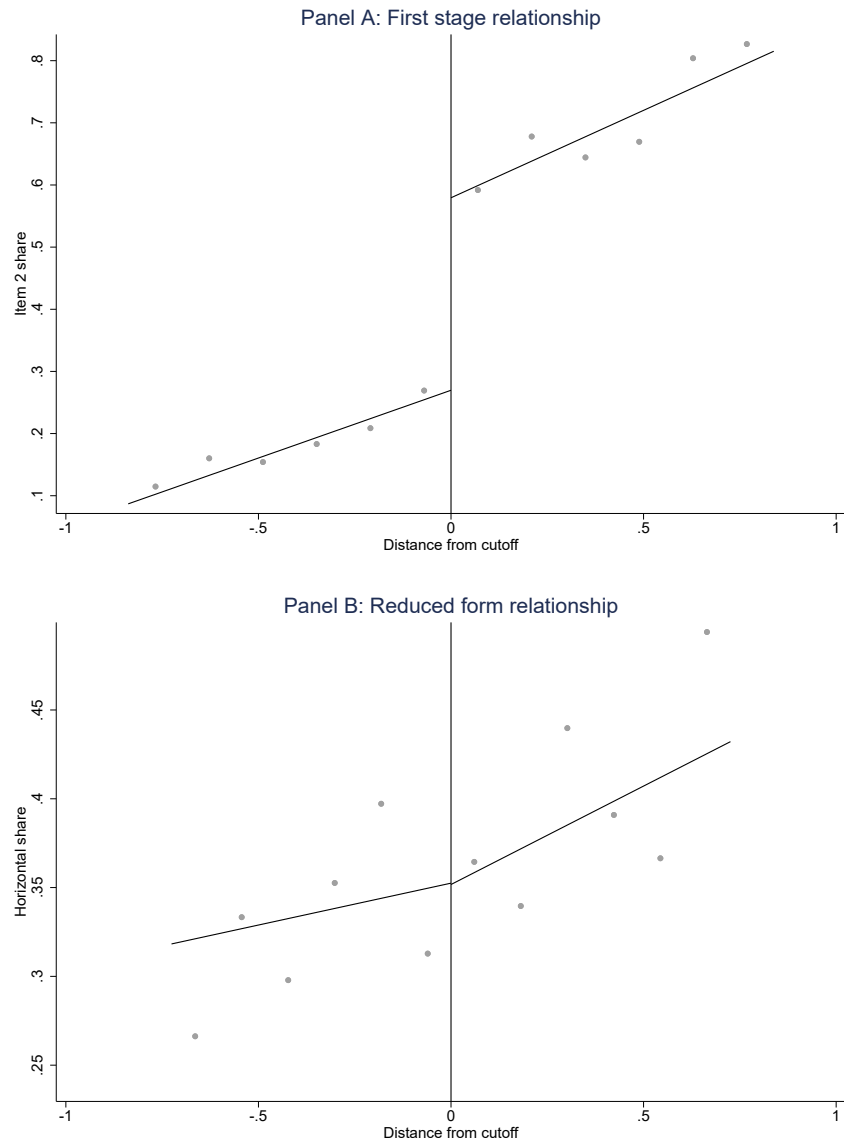


FIGURE 2. FALSIFICATION TEST

Note: This figure replicates Figure 1, except that the underlying sample here comprises HSR mergers rather than non-HSR mergers. In each panel, we assign observations to one of six evenly spaced bins on either side of the cutoff and plot the average share of mergers with an Item 2 report on the y-axis. Bandwidths determining the support of the running variable are MSE-Optimal. Panel A reports a rise in Item 2 reports at the cutoff that resembles the one reported in Figure 1. However, Panel B reports no rise in horizontal mergers at the cutoff, supporting our methodological approach.

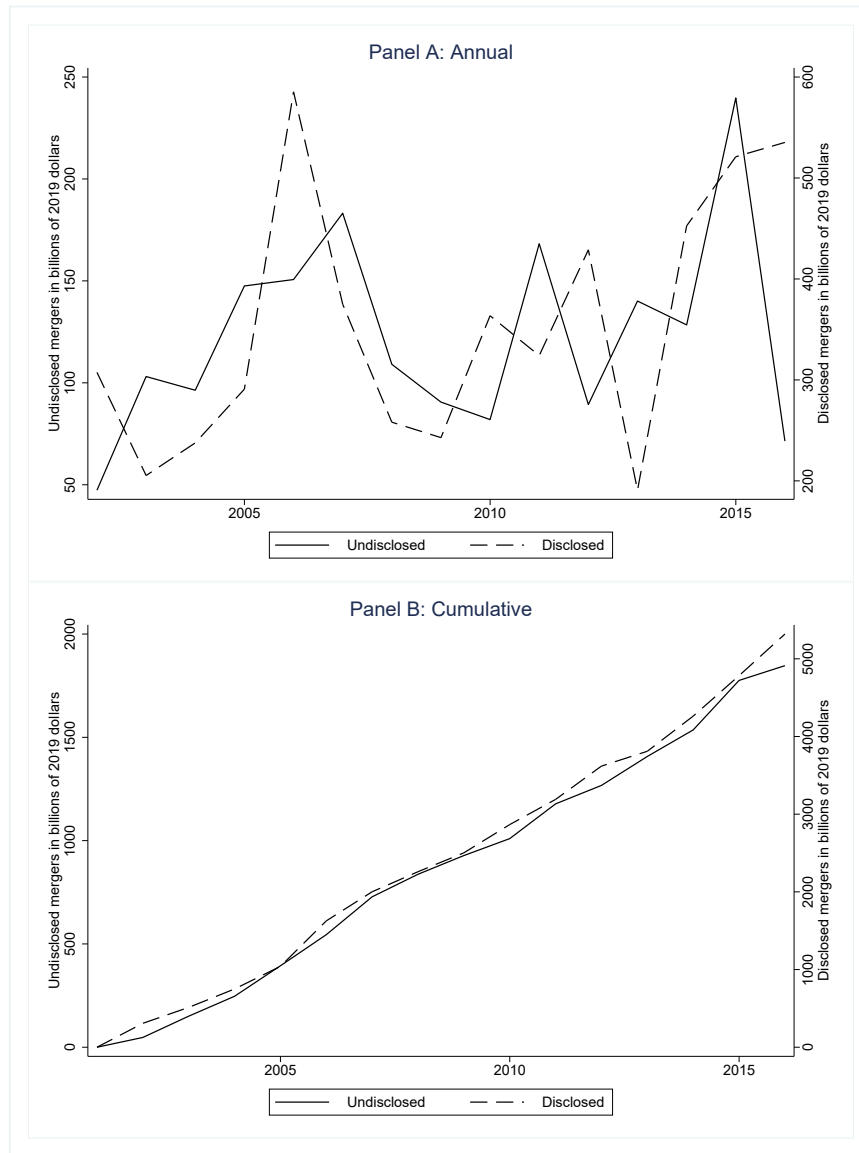


FIGURE 3. VALUES OF DISCLOSED AND UNDISCLOSED MERGERS ANNUALLY

Note: This figure reports the value of mergers over the sample. Panel A reports annual values, while Panel B reports cumulative ones. Solid lines reflect undisclosed mergers. All figures are in 2019 constant dollars.

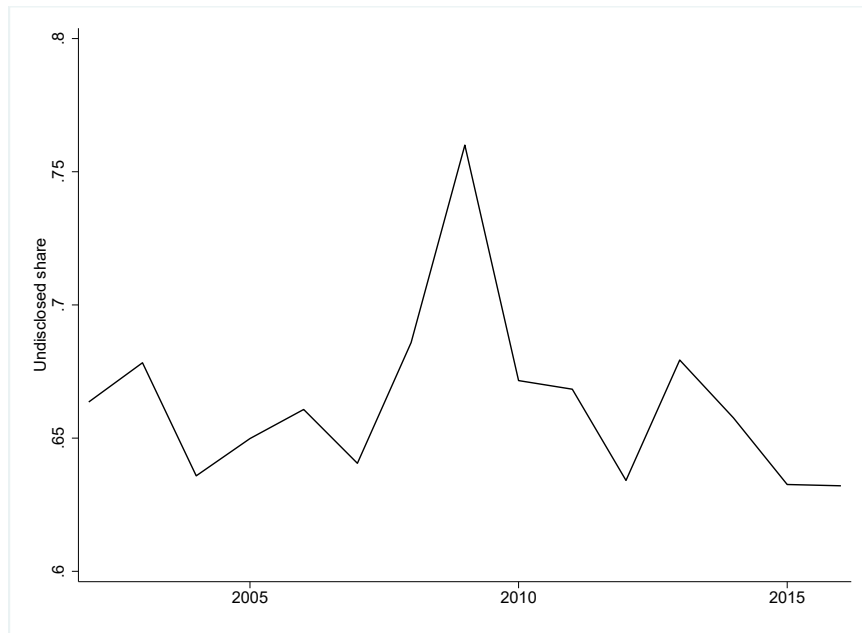


FIGURE 4. PROPORTION OF UNDISCLOSED MERGERS ANNUALLY

Note: This figure plots the average ratio at the firm-year level of the value of disclosed cash mergers to the value of all mergers annually.

TABLE 4—DISTRIBUTION OF UNDISCLOSED MERGERS ACROSS TOP INDUSTRIES

Panel A: Sorted by share undisclosed					
Order	Industry	Value Total	Value Disclosed	Value Undisclosed	Share Undisclosed
1	Food Stores	16.47	9.60	6.87	41.73
2	Eating & Drinking Places	15.18	8.96	6.22	40.97
3	Trucking & Warehousing	15.20	9.11	6.09	40.08
4	Pipelines, Except Natural Gas	46.53	28.67	17.85	38.37
5	Wholesale Trade – Durable Goods	88.26	54.55	33.70	38.18
6	Food & Kindred Products	282.48	191.14	91.34	32.33
7	Automotive Dealers & Service Stations	53.72	37.41	16.30	30.35
8	Engineering & Management Services	53.63	37.45	16.17	30.15
9	Health Services	160.73	112.69	48.03	29.88
10	Apparel & Other Textile Products	34.39	24.15	10.24	29.77
11	Transportation Equipment	92.09	65.54	26.55	28.83
12	Business Services	786.59	565.40	221.19	28.12
13	Lumber & Wood Products	29.33	21.57	7.75	26.45
14	Stone, Clay, & Glass Products (incl. Concrete)	13.62	10.09	3.52	25.87
15	Electronic & Other Electric Equipment	334.74	248.68	86.05	25.70

Panel B: Sorted by value undisclosed					
Order	Industry	Value Total	Value Disclosed	Value Undisclosed	Share Undisclosed
1	Business Services	786.59	565.40	221.19	28.12
2	Chemical & Allied Products	1061.23	945.10	116.12	10.94
3	Communications	604.59	507.00	97.59	16.14
4	Industrial Machinery & Equipment	575.62	479.55	96.07	16.69
5	Food & Kindred Products	282.48	191.14	91.34	32.33
6	Electronic & Other Electric Equipment	334.74	248.68	86.05	25.70
7	Instruments & Related Products	530.76	456.33	74.42	14.02
8	Electric, Gas, & Sanitary Services	488.53	418.73	69.79	14.28
9	Health Services	160.73	112.69	48.03	29.88
10	Miscellaneous Retail	177.11	137.73	39.37	22.23
11	Insurance Carriers	394.07	357.96	36.11	9.16
12	Wholesale Trade – Durable Goods	88.26	54.55	33.70	38.18
13	Transportation Equipment	92.09	65.54	26.55	28.83
14	Pipelines, Except Natural Gas	46.53	28.67	17.85	38.37
15	Wholesale Trade – Nondurable Goods	89.68	73.00	16.68	18.60

Note: This table lists top industries sorted by the share of all mergers that are undisclosed (in Panel A) and value of undisclosed mergers (in Panel B). For the purposes of this figure, "industries" equate to two-digit SIC codes. All figures are in 2019 constant dollars.

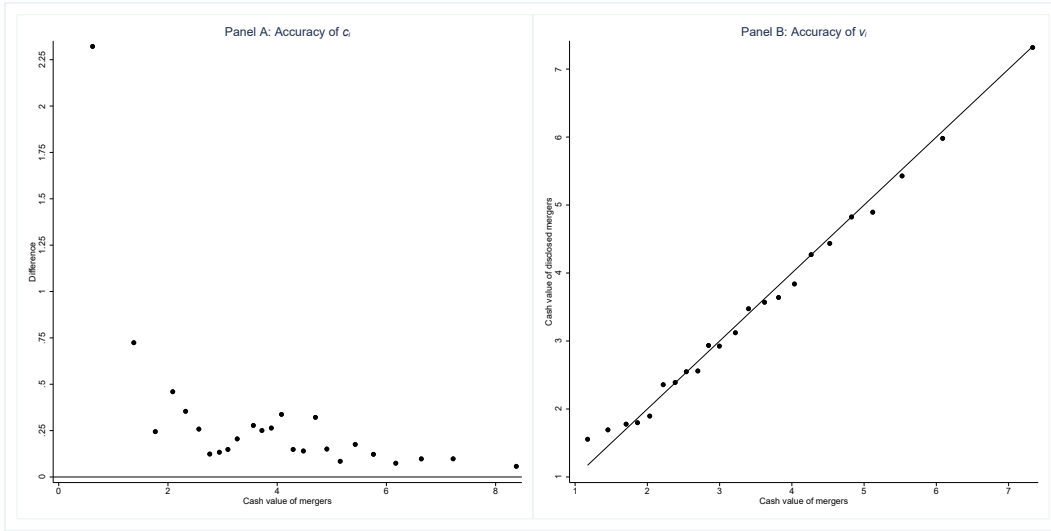


FIGURE 5. ACCURACY OF CASH SHARES AND TRANSACTION VALUES

Note: In Panel A, we restrict attention to firm-years with exactly one disclosed merger where the cash share lies strictly between zero and one. The x-axis measures the log of v , while the y-axis measures $\frac{1}{TF} \sum_t \sum_f [C_{ft}/v_i - \tilde{c}_i]$. In Panel B, we restrict attention to firm-year pairs for which there were no cash mergers in the previous or following years. The x-axis measures the log of C_{ft} , while the y-axis measures C_{ft}^{DIS} . In both panels, we bin the data according to x-axis values and plot averages within the bins along the axes.