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

Antitrust authorities search public documents to discover anticompetitive mergers. Thus, investor disclosures may alert them to deals that would otherwise escape scrutiny, creating disincentives for managers to divulge transactions. We study this behavior in publicly traded US companies. First, we estimate a regression discontinuity that exploits mandatory disclosure thresholds stipulated by securities law. We find that releasing information to investors poses antitrust risk. Second, we present a method for measuring *undisclosed* merger activity that relies on financial accounting reporting requirements. We find that undisclosed mergers total \$2.3 trillion between 2002 and 2016.

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1 Introduction

To police mergers, antitrust authorities must learn about them in their incipiency.¹ Large transactions are required by law to be reported to the federal government, but most are not, forcing agency staff to scan 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 news surrounding recent mergers. In other words, the same disclosures needed by investors to accurately value assets can also alert antitrust authorities to illegal mergers that would have otherwise escaped detection. Thus, we argue that investor disclosures can pose antitrust risk and, by extension, that managers will refrain from reporting some anticompetitive deals to the public. As a result, harmful deals may avoid scrutiny, and commonly cited measures of mergers activity may severely understate their prevalence.

The question of whether managers conceal merger activity hearkens back more than a century in the US. Even after Congress banned mergers between 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 the unwinding process infeasible [Baer, 1996]. The practice abated in 1976, due to legislation establishing a 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 accumulate to consolidate economically important industries and harm consumers [Wollmann, 2021] as well as “kill” innovation [Cunningham et al., 2021].

We examine the relationship between investor disclosures and antitrust risk in publicly traded US companies. Our paper 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

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

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 3 for a brief discussion of agency issues.

the value added by the transaction (assuming it is completed), while not doing so 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, where the target and acquirer occupy 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 relatively 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 (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 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 not mutually exclusive. We categorize all other disclosures meeting a minimum bar in terms of informativeness as *basic* and refer to remaining mergers as *undisclosed*.

Under these definitions, the model yields four predictions. The first applies to non-HSR mergers. It holds that the share of horizontal mergers is lower among transactions that require mandatory investor disclosures. It also suggests a straightforward falsification test. HSR mergers require premerger notifications, which fully inform the government about a transaction, rendering *Item 2* reports uninformative for enforcement purposes. Thus, if we restrict attention to HSR mergers, the first proposition should not hold. The second prediction is that managers find nondisclosure profitable for at least some mergers. The third is that a higher share of undisclosed mergers than disclosed ones are horizontal. The fourth provides an expression for the expected antitrust-related cost of investor disclosures, which are 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, this exercise presents an challenge:

⁴While the literature on M&A announcements finds that bidder shareholders earn zero returns at the takeover announcement [Moeller et al., 2004]. These studies explicitly exclude small deals and private targets, which are the focus of our current study. When private target announcement returns are examined, acquirer returns are found to be significantly positive, consistent with our underlying assumption [Netter et al., 2011].

⁵See Wollmann [2019].

identifying the effect of investor disclosures is hard because managers typically have discretion over which deals to publicize, making the release of information an endogenous object. 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 the data. As the transaction-value-to-acquirer-assets ratio reaches 10%, the share of mergers with Item 2 reports abruptly rises by 34%, while the share of horizontal mergers falls just as sharply by 11%. These figures equate to a local average treatment effect of 32%. The estimate is significant at the 5% level, and subsequent analyses reveals 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 \$50-90 million, depending on the year. Since the government is already fully apprised of HSR mergers, Item 2 reports pose no additional antitrust risk. Thus, for this subset of 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 of these 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. This exercise presents another empirical 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 managers report the total value of cash mergers annually, irrespective of whether any deal-specific information about the underlying transactions is released. We show how to use this information to calculate the value of undisclosed mergers each year, and we validate its use by way of comparisons within a subset of the data.

We find that the cumulative value of undisclosed mergers exceeds \$2.3 trillion between 2002 and 2016. This equates to over 30% of all mergers on a value basis or 77% of transactions over the sample period. Although year-to-year changes track the business cycle, there is no evidence that undisclosed

merger activity is slowing. In fact, the overall trend is positive, with the highest value recorded toward the end of the panel. We estimate that undisclosed mergers account for \$427 billion to \$702 billion of “gross” consolidation. For perspective, this is 28% to 47% of the total change in four-firm revenue concentration economy-wide over the sample period. Consistent with theory, undisclosed mergers are most prevalent in “local” service industries, where relatively small 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 their 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) issued special orders that compelled the five largest US technology companies to disclose *all acquisitions over the past decade*. Published 18 months later, the resulting reporting revealed over 1,000 previously unreported mergers. Moreover, it highlights that many of these deals would have been reported if the thresholds incorporated 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. In July 2021, for example, the New York Senate passed the “Twenty-First Century Anti-Trust Act,” the first general, state-level premerger notification program. If it becomes law, then mergers involving target firms with \$9.2 million or more in New York state sales or assets will need to be reported to the Attorney General prior to completion.

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 in support of the recent SEC rule change is a case in point. He stated, “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” [Norwitz, 2019].

This paper contributes to several streams of literature. A recent, rapidly growing body of work reveals secular trends in investment, income, and profits. For example, Karabarounis and Neiman [2013] and Elsby et al. [2013] show 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 et al. [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, for example, these changes are occurring. Shifts in antitrust enforcement are one possibility. On the one hand, Peltzman [2014] argues that lax enforcement, inspired by the work of Robert Bork and codified in the 1982 merger guidelines, has contributed. On the other hand, Wollmann [2019, 2021] argues that expanding exemptions to the premerger notification programs has 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 work 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 towards alternative sources of capital. For example, Leuz et al. [2008] show that many firms de-registered from the SEC in the early 2000s. Since that time, firms have increasingly been acquired and de-listed [Doidge et al., 2017], and private firms have been much more likely to be acquired than go public [Bayar and Chemmanur, 2012, Gao et al., 2013]. Prior work mostly argues that compliance costs drive the going dark/going private phenomena. Our findings suggest another motivation behind this behavior: publicly traded companies face reporting requirements that increase antitrust risk. Notably, our findings also imply that incentives increased around 2001, as described in Section 6.

We also contribute to an empirical literature demonstrating the real effects of disclosure mandates imposed by capital market regulation and accounting standards [Leuz and Wysocki, 2016, Barrios et al., 2019, Roychowdhury et al., 2019]. This research posits that the measurement and disclosure rules that govern the functioning of a firm's information system (i.e., which economic transactions are measured, how they are measured and aggregated, and what is disclosed to capital markets) 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 as well [Loewenstein et al., 2014]. For instance, Johnson [2020] finds that publishing worker safety violations decreases occupational injuries, while Jin and Leslie [2003] find that publishing restaurants' hygiene scores improves product quality.

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 et al. [2021], Kepler et al. [2020], and Morzenti [2020]. See Section 6 for further discussion.

Finally, our analysis of the potential spillovers between markets from regulators' actions speaks to a literature on regulatory spillovers and design [Oates, 1999]. While most of this literature 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 decentralized and centralized structures [Hedge and Scicchitano, 1994], we extend this literature by documenting the critical coordination issues at the national level that may develop from regulators' differing policy objectives. Moreover, merging regulators' differing policy objectives with spillovers in their actions improves understanding of the organization of regulatory authority and the overall welfare efforts of regulations.

The paper is organized as follows. Section 2 provides institutional details. Section 3 presents the model. Section 4 describes the data. Section 5 investigates whether investor disclosures pose antitrust risks, while Section 6 measures the value and proportion of undisclosed mergers. Section 7 concludes.

2 Institutional details

2.1 Merger control

US history had witnessed repeated attempts to avoid antitrust scrutiny. The Sherman Act of 1890 banned anticompetitive agreements between firms (e.g., price fixing), so rivals merged into single organizations. The Clayton Act of 1914 banned acquisitions of competing firms, so firms instead acquired each others' underlying assets. The 1950 Celler-Kefauver Amendment closed the asset sale loophole. Hence, rival firms stopped publicizing anticompetitive deals—merging quietly and covertly so that, when the government eventually learned of the deals, the parties had already shared information and combined assets, making the unwinding of the transactions 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 establishes a premerger notification, thereby requiring firms interested in merging to notify the FTC and U.S. Department of Justice (DOJ) in advance of closing. 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 slated it to grow with gross national product beginning in 2005. At the time of writing, the exemption cutoff stands at over \$92 million. Moreover, the threshold is four times higher for deals involving negligible

physical capital (e.g., transactions including only intellectual property).⁷

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." They add 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 result from capital market considerations. Many of these are mandated by capital market regulators. We describe these issues below.

2.2 Capital market regulation

Corporate disclosures play a crucial role in 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 the efficient level of information for investors.⁸ However, information asymmetry between investors and managers and incentive problems

⁷To be precise, the HSR Act requires the target and acquirer to separately notify the DOJ and FTC of all mergers affecting US commerce unless explicitly exempt. Reporting requirements can be summarized as follow. If the target has at least \$18.4 million in assets (or in sales, if the target is a manufacturer), then the merger must be reported if the transaction value exceeds \$92 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 \$376 million.

⁸There 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 et al. [2007], Verrecchia [2001]). All these authors show that the cost of equity is less for firms with greater corporate disclosure.

within the firm impede the efficient allocation of resources in a capital market economy. As a result, institutions like the SEC and Financial Accounting Standards Boards (FASB) have been created to facilitate the timely and credible disclosure between managers and investors.

One of the key 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 disclose information to the public about their financial and managerial conditions. The 8-K report alerts shareholders and the public to potentially significant corporate events.⁹ We study acquisitions, so we focus on Item 2 of Form 8-K, which reports "Completion of Acquisition or Disposition of Assets."¹⁰ 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. 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.¹¹

In addition to Form 8-K filings, the SEC requires firms to file annual reports that include financial statements whose presentation meets FASB standards. This type of regulation reduces processing costs for financial statement users by providing a commonly accepted language that managers can use to communicate with investors. As a result, publicly traded firms in the U.S. must file a balance sheet, income statement, and statement of cash flows both quarterly and annually. These regulated financial 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).¹² 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 mere existence of the underlying transactions*. This requirement allows us to capture the total cash spent by firms on acquisitions throughout the year.

⁹These events include a change in control of the registrant, an acquisition or disposal of assets, bankruptcy or receivership, change in registrant's certifying accountants, resignation of registrant's directors, a change in fiscal year-end, and other unspecified events deemed important, as well as any related exhibits and financial statements.

¹⁰Item 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).

¹¹Most transactions reported under Item 2 are classified as acquisitions of "assets," not "businesses." (This classification reflects idiosyncrasies of administrative law and not economic reality; a layperson 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 reach 10% of the acquirer's income or assets, respectively. However, even when these tests are employed, meeting the transaction-value-to-acquirer-assets threshold ensures meeting the other two.

¹²The operating section includes cash flows associated with the firm's core business, instead of peripheral activities such as investing or borrowing. The cash flows from investing section shows the amount of cash the firms devoted to investments. Finally, the financing section includes any cash transaction with the company's owners or lenders.

2.3 Trade-offs

The institutional details cited above produce trade-offs from the perspective of the management of a firm that has recently acquired a competitor. Assuming the deal is completed, theory predicts profits will rise. Further assuming the market for ownership stakes in the firm is liquid, news of the merger will cause share prices to incorporate that information rapidly (assuming the merger is completed). However, broadcasting the transaction may also alert antitrust authorities to a merger that would otherwise have gone undetected.

Interestingly, these facts create tension between regulators. To see this, compare the mission statements of the nation's securities regulator to that of its antitrust authorities.¹³ 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 business owners, the goals of the FTC and DOJ equate to protecting businesses' customers. With respect to the creation and maintenance of market power, these are opposing aims.

2.4 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

¹³See 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.

by the amount and timeliness of the released information.

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—which 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 require the target and acquirer to 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.¹⁴

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.¹⁵ 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 identity of 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 categorize all other disclosures meeting a minimum bar in terms of informativeness as “basic.” 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 at least an estimate of the value of the deal. For a host of reasons provided in Section 4, we argue that the universe of these transactions is compiled and published by Thomson/SDC, at least to a close approximation.

¹⁴A 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.

¹⁵Interestingly, the US Office and 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.

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 2.2.) However, we emphasize that regardless of what transaction-specific information managers provide, they will nonetheless be forced to report the aggregate (cash) value of all mergers annually on the firm’s cash flow statement.

3 Model

This section presents a conceptual framework that structures our empirical analysis. Since premerger notifications fully inform the antitrust authorities about the potential merger, thereby rendering other disclosures uninformative from an enforcement standpoint, this presentation initially restricts attention to non-HSR mergers. We return to them later in the section.

Setup. Merger opportunities arise between targets and acquirers. Each is described by a tuple (θ, a, μ) . $\theta = H$ if the merger is horizontal, meaning the target and acquirer operate in the same industry, 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 $F_\theta(a)$, has infinite support, and is bounded from below by zero. Following economic theory and agency guidelines,¹⁶ horizontal mergers appear more anticompetitive than nonhorizontal ones. Specifically, we assume $F_H(a)$ reverse hazard rate dominates $F_{NH}(a)$.¹⁷ The last descriptor, μ , characterizes the amount of information that must be disclosed, as defined in more detail below.

When a merger opportunity arises, managers (of the acquirer) face up to two decisions.¹⁸ First, they must decide whether to attempt the merger. $Y = 1$ if they do and $Y = 0$ otherwise. If $Y = 1$ and the merger is completed, then the acquirer earns positive profits of π_θ each period, which recur indefinitely. Alternatively, if $Y = 1$ and the merger is blocked or if $Y = 0$, then the acquirer earns zero profits. Second, if managers attempt the merger, they must also decide how much information to disclose to investors,

¹⁶As an example of the former, see a long literature on coordinated and unilateral effects following Stigler [1964]. As an example of the latter, see US Department of Justice and Federal Trade Commission [2010].

¹⁷Reverse hazard rate dominance means $\frac{f_H(a)}{F_H(a)} > \frac{f_{NH}(a)}{F_{NH}(a)}$. 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 . In turn, this 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.”

¹⁸To ease exposition, we allocate all decision-making power and payoffs to the acquirer’s managers and owners, respectively.

denoted d . For simplicity, $d = 1$ if they make a basic disclosure and $d = 0$ otherwise.

For some merger opportunities, securities law requires specific information to be released to investors immediately upon completion. This occurs via Item 2 reports. μ denotes the amount of information that the SEC requires the management to disclose: $\mu = \bar{\mu}$ if the agency requires an Item 2 and $\mu = 0$ otherwise. Following the preceding section's discussion, Item 2 reports are at least as timely and comprehensive as basic disclosures, so $\bar{\mu} > 1$.

Finally, it is useful to define D as the amount of information ultimately disclosed to investors. Formally, $D = \max\{d, \mu\}$. Since we are initially restricting our attention to non-HSR mergers, this is also the amount of information available to the antitrust authorities evaluating the transaction.¹⁹

Disclosure benefits. If management discloses a merger to investors, the firm's share price rapidly reflects the value added by the deal (assuming completion).²⁰ If management remains silent, then the share price will rise gradually as higher profits are eventually realized. Bound by fiduciary duty, management's disclosure decision maximizes the wealth of current shareholders. Since many investors will have sold their shares before the merger's value is fully realized, investor disclosures are beneficial.²¹

To formalize this, define σ as the portion of investors who sell each period and r as the discount rate. (σ lies between zero and one, and r is positive.) If the firm earns zero, then payoffs to current shareholders are zero. If $Y = 1$ and the attempted merger is completed, then the expected payoff to current shareholders is $\frac{\pi_\theta}{r}$ when $d = 1$ and $\frac{\pi_\theta(1-\sigma)}{r+\sigma}$ when $d = 0$. Since $\frac{1}{r}$ always exceeds $\frac{1-\sigma}{r+\sigma}$, if we temporarily put aside antitrust risk, then the management prefers to disclose mergers.

Disclosure costs. To be blocked, a merger must not only appear to reduce competition but also be discovered by the antitrust authorities. For this reason, perceived anticompetitiveness and investor disclosures are complements with respect to antitrust enforcement. Interacting these factors provides a

¹⁹It is also possible that customers of the merging parties could also alert the antitrust authorities. However, most means of incorporating this behavior would not change the model's predictions. Moreover, antitrust attorneys have devised tactics to ensure customers do not complain to the agencies while the merger is incipient, limiting complaints in the most competitively sensitive cases. As an example of these tactics, see Hemli et al. [2016].

²⁰Netter et al. [2011] confirm earlier studies, showing that there are announcement return differences between deals involving public and private targets (e.g., Fuller et al. [2002], Capron and Shen [2007]). Specifically, acquirer announcement returns are typically negative for large and public targets, whereas they are significantly positive for small and private targets. Our focus on smaller private targets suggests that management would observe positive returns from the announcements of these transactions. Moreover, in an untabulated analysis, we find that the announcement returns are positive for the acquirer in our sample of announced deals.

²¹We 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].

natural way to capture their relationship. Hence 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 $b^* > 0$. Thus, investor disclosures may also be costly.

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 not in enforcement actions but rather anticompetitive mergers never being attempted in the first place [Wollmann, 2019]. In the current setting, this finding indicates that a is known by management when they decide whether to merge and that draws of a above b^*/D are deterred, not proposed, and then blocked.²²

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. $\psi(\bar{\mu}) < \psi(0)$.

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 $F_\theta(b^*/\bar{\mu})$. Since mergers of type H appear more anticompetitive than those of type NH (or more precisely, since $F_H(a)$ reverse hazard rate dominates $F_{NH}(a)$) the share of horizontal mergers that are deterred when their visibility to antitrust authorities increases is higher than the share of nonhorizontal ones. The online appendix provides the formal proof of this proposition and the ones that follow.

Notably, our setting provides a falsification test. Specifically, Proposition 1 should not hold for HSR mergers. To see why, append to the tuple (θ, a, μ) an additional term ρ , which denotes the amount of information required by the HSR Act. Let $\rho = \bar{\rho}$ when a premerger notification is required and $\rho = 0$ otherwise. Premerger notifications ensure D does not depend on μ , since $\bar{\rho} > \bar{\mu}$, and they ensure that Y does not depend on μ , since Y depends only on whether $a < b^*/\bar{\rho}$. In words, premerger notifications ensure that mergers appear in transaction level data *and* fully inform the antitrust authorities about the deals, rendering Item 2 reports uninformative for enforcement purposes and irrelevant to the decision to merge. Thus, there is no reason for the share of horizontal mergers in transaction level data to vary

²²Implicitly, we are assuming there is at least some sunk cost associated with organizing a merger. Absent this cost, management would simply opt to pursue all merger opportunities. This would result in many blocked deals. However, this view is not born out in the data, which shows the opposite, making this alternative unrealistic.

with Item 2 reporting requirements when they require premerger notification.

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. If $\Pr.(\mu = 0, \rho = 0) > 1$, then $\Pr.(D = 0|Y = 1) > 0$.

When $\mu = 0$ and $\rho = 0$, management choose $Y = 1$ regardless of a . In the event that $a > b^*$, management then choose $d = 0$ or else the merger will be blocked. Since a is unbounded from above, this event occurs with positive probability. Thus, there are completed mergers that 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 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. If the distribution of a does not depend on μ or ρ , then $\Pr.(H|D = 0, Y = 1) > \Pr.(H|D \neq 0, Y = 1)$.

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 6.

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

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

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

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 6.

4 Data

4.1 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. 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.²³ Throughout the analysis, all currency-denominated figures are reported in 2019 constant dollars (unless otherwise stated).

4.2 Sources

Individual mergers. Thomson Reuters Mergers and Acquisitions Database, commonly also referred to as SDC, tracks global ownership transfers.²⁴ For each merger, we observe announcement and effective 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, nation in which they are headquartered and incorporated, and

²³The 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.

²⁴What we call "Thomson/SDC" goes by many other names, depending mostly on the interface that provides access. These include Eikon, Refinitiv, 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 a "master deal number."

organization type (e.g., public company, private company, subsidiary, government-owned entity, etc.).²⁵ 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.

Throughout the paper, we generically refer to the resulting set of records as “transaction level data on mergers,” which assumes that Thomson/SDC provides universal coverage of disclosed mergers (i.e., ones for which $D \geq 1$). Several facts support the claim. Thomson/SDC is by far the most widely used source in both academic private sector research. For instance, Bollaert and Delanghe [2015] report that “in the top four finance journals from 2000 to 2012, more than 75% of papers use [Thomson/SDC].”²⁶ Moreover, the primary alternative data provider, Zephyr, is employed mainly to study non-US mergers, which are outside the scope of our study. These findings mirror prior academic comparisons. Netter et al. [2011] report that as early as 1989, Thomson/SDC was “complete” relative to Grimm, the leading alternative at the time. Other studies indicate Thomson/SDC provides not only comprehensive data but also accurate records.²⁷ Perhaps most compelling, Thomson/SDC publishes the most widely cited “league tables” in the investment industry. These periodic tabulations of advisory and legal fees are used to measure the performance and judge the reputation of investment banks and law firms, which creates strong incentives to report delays if permitted to do so.

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.”²⁸ 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.

²⁵CUSIPs 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.

²⁶Our informal, updated tally of “top four” finance journals indicates the figure is even higher after 2012.

²⁷Barnes et al. [2014] and Fuller et al. [2002] compare Thomson/SDC’s acquisition dates to hand-collected data in large random samples (e.g., 500 observations in the latter paper). Both find an exact match in 85% and 93% of cases, respectively.

²⁸Recall from Section 2 that this event was enumerated “Item 2” prior to August 23, 2004 and “Item 2.01” thereafter. Thus, we technically collect all occurrences of Item 2 and Item 2.01. (The re-numbering did not affect how this event is reported.)

4.3 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 to 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 effective date of the merger date recorded by Thomson/SDC. This range allows for modest measurement error in report/effective dates and accounts for the four day grace period that the SEC affords firms after each event in which to file the report.

Table I 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 about one-quarter 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. (We discuss compliance in more detail in the following section.) 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.

[Table I about here.]

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 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 46% of mergers, managers file 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 6.

Firm-year level data on the value of mergers. To assess whether managers withhold the mere 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 II summarizes the resulting panel. A more comprehensive discussion of these figures and how they compare is left to Section 6. The dataset comprises about 40,000 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 \$246 million of capital expenditures. Observations are spread evenly over the panel.

[Table II about here.]

5 Do investor disclosures pose antitrust risk?

The goal of this section is to evaluate Proposition 1 using the data described immediately above. We begin by describing our research design and estimation strategy.

5.1 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.²⁹ As described in Section 1, when a merger's transaction value reaches 10% of acquirer assets, the SEC requires an 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

²⁹Lee and Lemieux [2010] describe the properties of fuzzy RD estimators.

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 be an indicator variable that takes a value of one for horizontal mergers and zero otherwise. The estimator is given by

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

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 $\bar{\mu}$.

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

$$\min_{\alpha_{k,\downarrow}, \beta_{k,\downarrow}} [k - \alpha_{k,\downarrow} - \beta_{k,\downarrow}(z - \bar{z})]^2 \mathbb{1}_{(\bar{z}-h_k) < z \leq \bar{z}} \quad (3)$$

and

$$\min_{\alpha_{k,\uparrow}, \beta_{k,\uparrow}} [k - \alpha_{k,\uparrow} - \beta_{k,\uparrow}(z - \bar{z})]^2 \mathbb{1}_{\bar{z} \leq z < (\bar{z}+h_k)}, \quad (4)$$

for $k \in \{ITEM2, H\}$. h_k denotes an MSE-optimal bandwidth [Calonico et al., 2020]. Our estimate of the local average treatment effect is then given by

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

Our approach requires three assumptions. The first is that managers do not manipulate transaction-value-to-acquirer-asset ratios so as to avoid Item 2 reports. In practice, SEC rules inhibit manipulation.³⁰ To calculate the numerator, management must use the total compensation paid to the target's owners. Thus, one cannot affect the test by substituting one type of consideration for another (e.g., out-of-the-money warrants for cash). Instead, manipulation requires the target's owners receive a lower payment than what would otherwise be obtained, putting the acquirer's management in an unenviable position; managers can either explain the motivation behind their offer to the target's 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 their proposal amounts an unfair low ball offer over which

³⁰To be clear, we are not claiming manipulation is impossible. Rather, we think manipulation is sufficiently hard that it will not meaningfully affect our results. Data presented later in this section supports this assertion.

they are unwilling to negotiate. The denominator meanwhile cannot be manipulated. Acquirer assets can be read directly off the most recently published balance sheet, which is audited by a licensed third-party. If this assumption is violated so that firms are sorting above/below the threshold, then we would expect to see a spike in density just to the left of \bar{z} and a trough just after it. This pattern is absent from the data, as evidenced by figures referenced later in the section.

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 et al., 2020]. Alternative choices yield similar estimates of $\hat{\tau}$. Placebo experiments also 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 merge except through the antitrust risk they 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 3. 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.

5.2 Main results

Panel A of Figure I 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 37%, jumps discontinuously to 71%, and increases at similar rate and smoothness thereafter. We find that the difference between $\hat{\alpha}_{ITEM2,\downarrow}$ and $\hat{\alpha}_{ITEM2,\uparrow}$ is roughly 34 percentage points.³¹

[Figure I about here.]

Though the share of mergers with Item 2 reports double as z crosses \bar{z} , compliance is nonetheless imperfect. For a clearer sense of what drives noncompliance, we carefully inspected a large number of

³¹In the online appendix, we replicate this figure but construct the running variable in level values rather than log values of the transaction-value-to-acquiror-assets ratio. The sizes of the jumps are similar to the ones we present here.

individual transactions at random. The fuzzy nature of the discontinuity is mainly due to measurement error in z . When the running variable falls short of the cutoff and we observe an Item 2 report, the discrepancy is typically due to our data overstating acquirer assets. This is hardly surprising—Thomson/SDC cannot be expected to always draw acquirer financial statements from the most recent quarterly report. When the running variable exceeds the cutoff and we fail to observe an Item 2 report, the discrepancy is also commonly due to inaccurately measured acquirer assets, although other factors play a role. For example, in a small number of cases, the transaction consists of the acquirer licensing marketing, production, and/or development rights from the target. Such deals have the economic consequences of mergers but often fall outside the scope of Item 2 reporting requirements. The remaining fuzziness—about 15%—is due to mismeasurement of *ITEM2*. This attenuates the first stage discontinuity, biasing $\hat{\tau}$ away from zero in absolute value terms. Readers should bear this fact in mind when interpreting the subsequent estimates.

Panel B of Figure I 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.³² We find that $\hat{\alpha}_{H,\downarrow}$ and $\hat{\alpha}_{H,\uparrow}$ equal 42 and 31 percent, respectively, meaning the horizontal share of mergers falls by 11 percentage points at \bar{z} .

Table III reports the result of estimating equation 5. Under the modeling choices used to generate Figure I, we find that $\hat{\tau} = 0.395$, 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. Coefficients range from from 0.32 to 0.43. All are significant at the conventional 5% level.

[Table III about here.]

5.3 Falsification test, density plots, and placebo experiments

Figure II reports the result of our falsification test. It is an exact replication of Figure I, 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 witness similar jumps in the share of mergers with Item 2 reports. However, in line with

³²In the online appendix, we replicate Panel B but construct the running variable in levels of the transaction-value-to-acquirer-assets ratio rather than log values. As with the first stage estimates, the size of the jump is robust to the change.

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} witnessed in Figure I is absent here. Consequently, estimates of τ are very small.³³ These findings further support the assumption that investor disclosures only affect the horizontal share of mergers through the antitrust risk they pose.

[Figure II about here.]

In the online appendix, we provide a density plot of the running variable for non-HSR mergers. Consistent with our model and reflective of 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 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 then replicate this figure for HSR mergers. HSR mergers exhibit patterns similar to nonhorizontal non-HSR mergers, further supporting the preceding assumptions.

In the online appendix, 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 that the merger was completed,³⁴ a dummy variable indicating the deal was structured to transfer assets rather than shares,³⁵ 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 0.34 to 0.77.

³³In the online appendix, we replicate Table III for HSR mergers, which reports estimates ranging from -0.018 to 0.006.

³⁴Completion dates are measured in fractional years. For instance, July 1, 2005, equates to 2005.5.

³⁵Among 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.

6 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 managers withhold 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 of these results.

6.1 Methodology

Undisclosed mergers are fundamentally hard to quantify, since they include deals for which there are no public records. Our measurement strategy exploits the fact that the managers 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 merger i , and let c_i denote the portion paid in cash, with the remainder paid in the stock of the acquiror. 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

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

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,³⁶ 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 merger activity.) The restriction implies that $S_{ft}^{\text{UND}} = 0$, $S_{ft}^{\text{DIS}} = S_{ft}$, and $M_{ft}^{\text{UND}} = C_{ft}^{\text{UND}}$.

³⁶There are several reasons for this, not the least of which is that public companies must prepare and submit additional filings (e.g., Form S-4) with the SEC anytime there is a nonpublic issuance of stock. Cash consideration involve no such expenses.

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

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

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:

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

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 . As a result, we carefully assess the accuracy of our data later in the section.

6.2 Main results

Figure III plots mergers activity over time. Consistent with the model, many transactions are never publicized: undisclosed mergers exceed \$73 billion every year between 2002 and 2016, totalling \$2.3 trillion by the end of the sample. Also, while year-to-year changes follow cyclical patterns of macroeconomic expansion and contraction, there is no indication that undisclosed merger activity is slowing. In fact, its value peaks toward the end of the sample.

[Figure III about here.]

Undisclosed deals also account for a large share of all mergers. For a more accurate sense of their contribution, we turn to Figure IV. Weighted by value, undisclosed mergers account for 30% of all transactions. Unweighted, they account for a much higher share—nearly 80%—which reflects the smaller size of disclosed mergers, relative to disclosed ones. Predictably, weighted and unweighted shares exhibit slightly counter-cyclical patterns, reflecting higher valuations in expansionary periods that force some otherwise-undisclosed mergers to require either an Item 2 report or premerger notification.

[Figure IV about here.]

6.3 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. Medians 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 \$1.34 to \$2.20 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 nontransitory 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 mergers account for \$427 to \$702 billions of gross consolidation. To put this figure in perspective, this range is 28% to 47% of the total change in four-firm concentration between 2002 and 2016, according to the US Census.³⁷

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 \$646 billion each year, i.e., \$9.7 trillion over the panel. Thus, the amount of assets acquired through organic means is only about 4.4 times the amount acquired through undisclosed mergers. Moreover, whereas standard measures of merger activity, 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 IV lists 15 industries where undisclosed mergers are especially common. Several facts stand out. Service firms engaged in local competition are over-represented. When we sort on share, trucking/warehousing companies occupy the top spot, with grocery stores, engineering services, auto dealers, and wholesalers, which are typically regional

³⁷The 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. (It is <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.

distributors, also making the list. When we sort on value, business services appears first with \$844 billion in undisclosed mergers. This broadly defined group includes, among other things, employment agencies, equipment lessors, building cleaning/maintenance companies, and collection agencies. Perhaps most striking, health services appears on both lists—#12 in terms of share and #9 in terms of value. Notice that these patterns are consistent with theory: market segmentation, especially across geography, permits even small acquisitions to concentrate ownership.

[Table IV about here.]

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.

6.4 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 et al., 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 et al., 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 merger activity, 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 puts downward pressure on 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 favorably. 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 incipiency, 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 et al. [2021] and Kepler et al. [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 III-IV 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 publicly traded US companies can complete, which creates incentives to operate in more opaque information environments. According to Proposition 4, firms will pay at least $Pr.(\mu = \bar{\mu}, \rho = 0)[Pr.(\theta = H)\frac{\pi_H}{r}(1 - F_H(b^*/\bar{\mu})) + Pr.(\theta = NH)\frac{\pi_{NH}}{r}(1 - F_{NH}(b^*/\bar{\mu}))]$ 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 decline in public stock market listings and a terrific rise in private equity [Leuz et al., 2008, Doidge et al., 2017, Bayar and Chemmanur, 2012, Gao et al., 2013, Stulz, 2020].³⁸ For instance, Strömberg [2008] shows that, out of 21,397 leveraged buyout transactions between 1970-2007, more than 40% took place after January 1, 2004. Moreover,

³⁸The changes abruptly raised the threshold below which mergers do not need to be reported to the DOJ and FTC. 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.

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 suggests that some of these firms may have opted to go dark or go private so as to avoid public disclosures that might alert the antitrust authorities to deals that would have otherwise escaped scrutiny.

6.5 Measurement

The conclusions drawn from our measurement exercise depend on accurately measuring 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 observations 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 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 an i.i.d. noise, ϵ_i . Also, suppose that v_i is measured without error. To facilitate comparisons in the data, select firm-year observations such that there is exactly one disclosed merger in the transaction level data and that merger's c_i lies strictly between zero and one. For this subset of the data,

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

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

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

Averaging over many firm-year observations with the same v , we have

$$\frac{1}{FT} \sum_t \sum_f \left[\frac{C_{ft}}{v_i} - \tilde{c}_i \right] \xrightarrow{p} -\mathbb{E}[\epsilon] + \frac{\mathbb{E}[C^{\text{UND}}|v]}{v}. \quad (11)$$

Equation 11 shows that if ϵ is mean zero, then two things are true. First, when v_i is small, $\frac{1}{FT} \sum_f \sum_t [C_{ft}/v_i - \tilde{c}_i]$ is positive. Second, as v_i grows large, $\frac{1}{FT} \sum_f \sum_t [C_{ft}/v_i - \tilde{c}_i]$ tends to zero.

Panel A of Figure V reports precisely this relationship in the data. To produce it, we bin the data into 12 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 $\frac{1}{FT} \sum_f \sum_t [C_{ft}/v_i - \tilde{c}_i]$ and plot its average within each cell along the y-axis.³⁹ Consistent with negligible measurement error, we see that for small v the difference is positive, but as v grows the difference tends to zero.

[Figure V about here.]

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 an i.i.d. noise that is approximately proportional to the true value. Specifically, let $\tilde{v} = ve^\eta$ (so that $\tilde{v} \approx v + v\eta$). Also, suppose c_i is measured without error. To facilitate comparisons, select firm-year observations that satisfy two criteria: (a) $c_i = 1$, and (b) there is no merger activity in the previous or subsequent year, which significantly reduces the likelihood of an undisclosed merger. Due to the first criteria, $C_{ft} = v_i e^{\eta_i} + C_{ft}^{\text{UND}}$, so we can write

$$\log(C_{ft}) = \mathbb{1}\{C_{ft}^{\text{UND}} = 0\}(\log(v_i) + \eta_i) + \mathbb{1}\{C_{ft}^{\text{UND}} \neq 0\}(v_i^{\eta_i} + C_{ft}^{\text{UND}}). \quad (12)$$

Due to the second criteria, if we average over a large number of firm-year observations with the same v , then we have⁴⁰

$$\frac{1}{FT} \sum_f \sum_t \log(C_{ft}) \xrightarrow{p} \log(v) + \mathbb{E}[\eta]. \quad (13)$$

Equation shows that if η is mean zero, the average of $\log(C_{ft})$ over a large number of transactions valued at v converges in probability to $\log(v)$.

Panel B of Figure V 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 C_{ft}^{DIS} and plot their averages within each

³⁹The decision to have the x-axis measure the log rather than level of v_i is based entirely on legibility. Transaction values are highly skewed right.

⁴⁰To see this, notice $\frac{1}{FT} \sum_f \sum_t \mathbb{1}\{C_{ft}^{\text{UND}} = 0\}(\log(v_i) + \eta_i) + \mathbb{1}\{C_{ft}^{\text{UND}} \neq 0\}(v_i^{\eta_i} + C_{ft}^{\text{UND}})$ converges in probability to $(1 - \Gamma)(\log(v) + \mathbb{E}[\eta]) + \Gamma \mathbb{E}[\log(v^\eta + C^{\text{UND}})|v]$, where Γ denotes the proportion of firm-year observations with an undisclosed merger. We selected firm-year observations to minimize the likelihood of an undisclosed merger, so $\Gamma \approx 0$.

cell on the x- and y-axis, respectively. Consistent with small measurement error, we see that plotted points lie very close to the 45-degree line throughout the range of C_{ft} .

7 Conclusion

In this paper, we study whether investor disclosures pose an antitrust risk and whether, as a result, managers withhold news of mergers from investors, especially if those deals involve acquiring a rival. Thus, a trade-off arises for management, who would otherwise prefer to release good news about future cash flows as quickly and thoroughly as possible, resulting in many mergers going undisclosed.

We employ data from publicly traded US companies to empirically investigate these issues and find support for our arguments. For instance, the SEC requires management to produce immediate public disclosures of “significant” mergers—ones that cross certain bright line thresholds. The threat of enforcement deters mergers, so if investor disclosures pose antitrust risk, then one would expect to see mergers between firms occupying the same industry to fall abruptly at those thresholds. We witness precisely this in the data.

We then exploit a facet of financial accounting standards to measure the total value of mergers, which include deals for which no transaction level data exists and enable us to infer undisclosed mergers. We find that firms completed over \$2.3 trillion of undisclosed mergers between 2002 and 2016, representing almost 80% of all transactions (and about 30% when those transactions are weighted by their value).

The findings suggest, among other things, that prior work underestimates the extent of stealth consolidation by half, which could have important implications for research and policy. However, it raises further questions that we leave to future work. For example, if previous studies omitted a large number of selected transactions, then what are the consequences of accounting for them? From an antitrust perspective, has insufficient enforcement played a more prominent role in the economy than previously believed? From a corporate finance perspective, are the returns to M&A activity greater than once thought? Separately, is there other merger-like activity (e.g., exclusive licenses, co-development arrangements, co-marketing agreements) that is still unaccounted for? Also, our work indicates that private sources of capital—buyout funds, venture capitalists, etc.—offer advantages to firms looking to acquire close competitors. This raises the concern that retrospective analysis of public traded companies (e.g., estimates relying on Compustat) unwittingly depend on selected samples of relatively benign acquisitions, especially since 2001. If so, should more scrutiny be applied to private equity investors,

whose share of investment capital has risen substantially over the last two decades?

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Figures

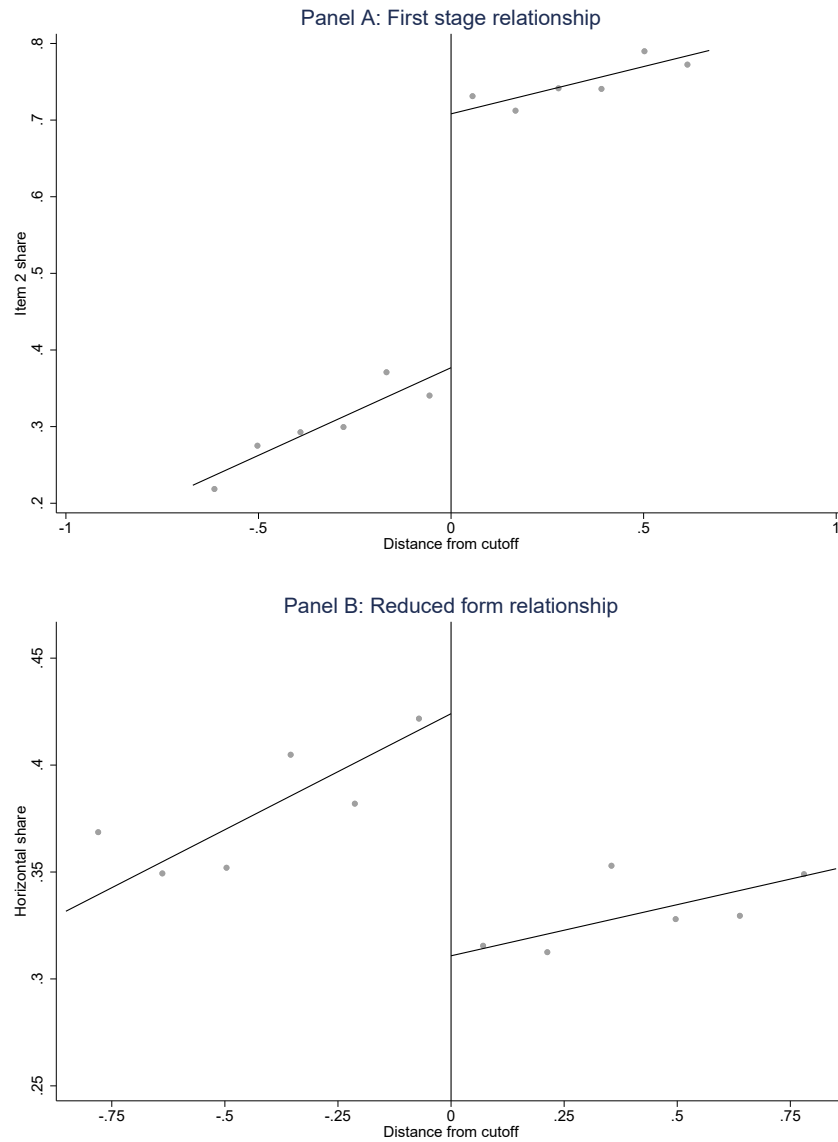


Figure I: The share of Item 2 reports rise while the share of horizontal mergers fall at the cutoff.

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 mergers that are horizontal. 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 show 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.

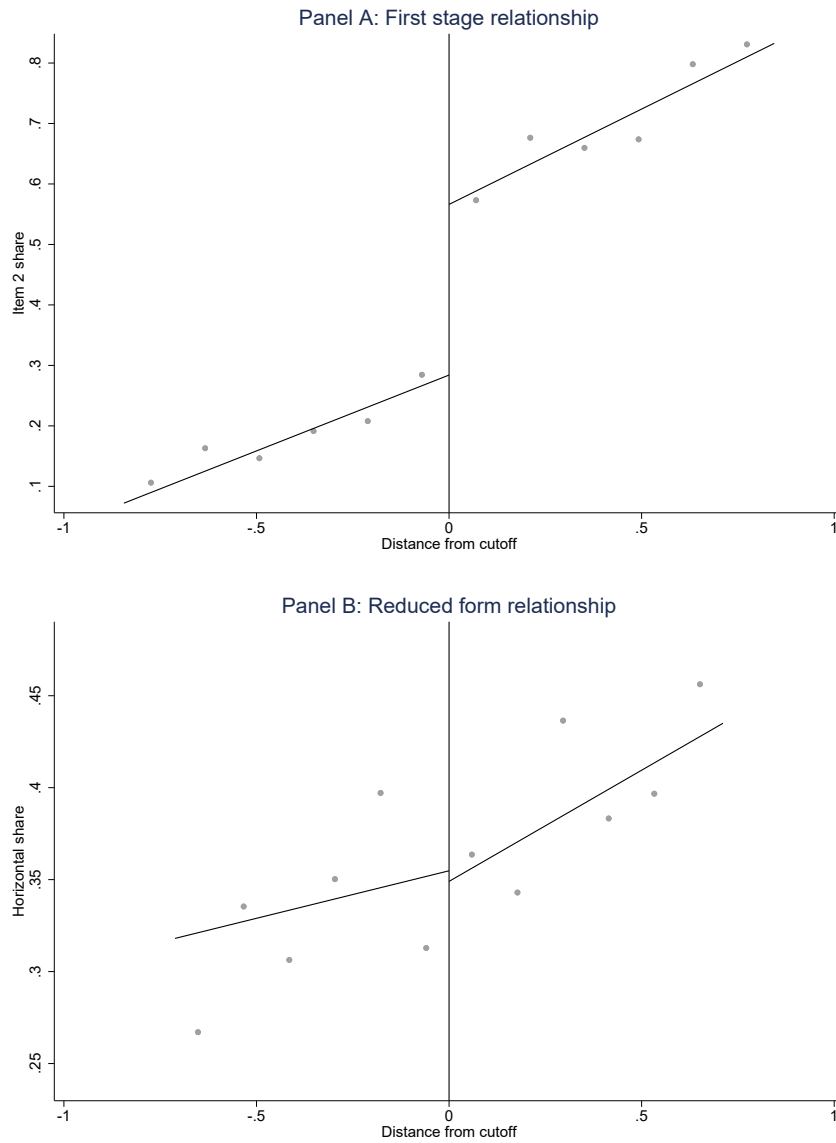


Figure II: Falsification test

This figure replicates Figure I, 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 I. However, Panel B reports no rise in horizontal mergers at the cutoff, lending support to our methodological approach.

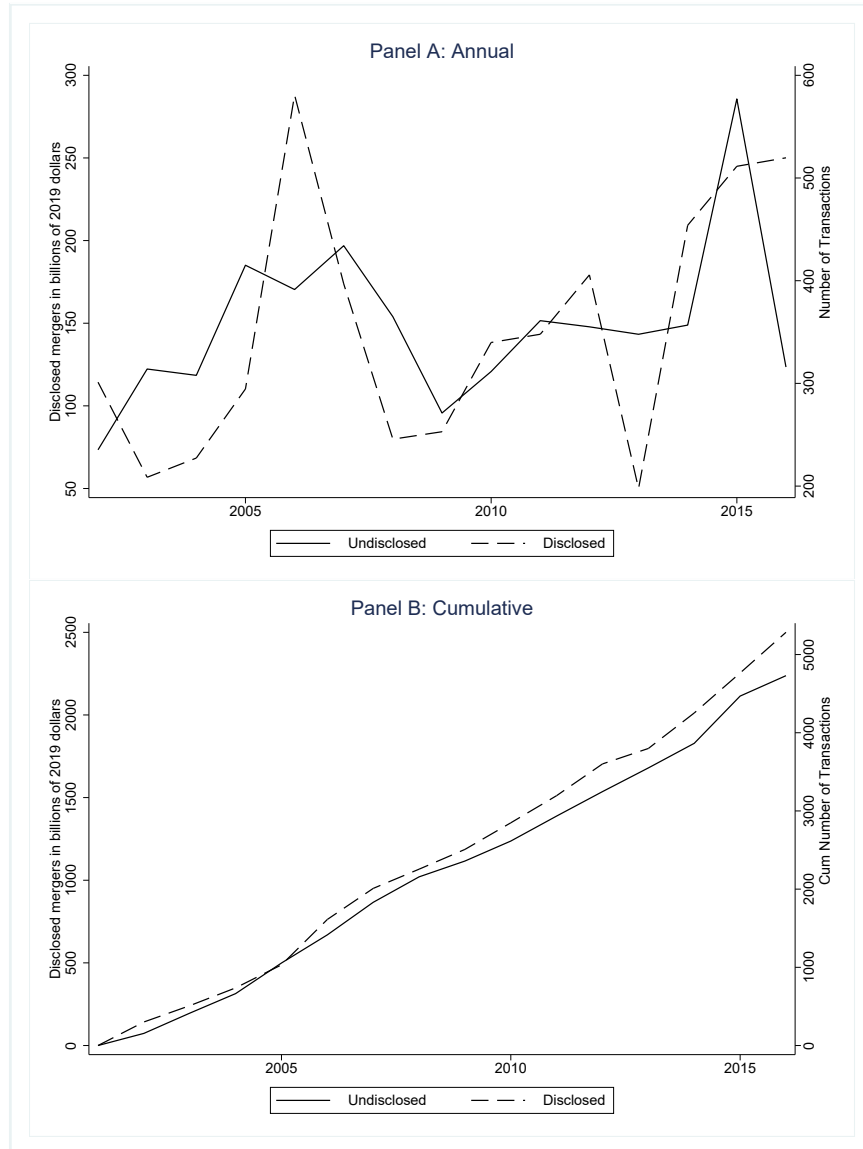


Figure III: Undisclosed mergers total \$2.3 trillion between 2002 and 2016.

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

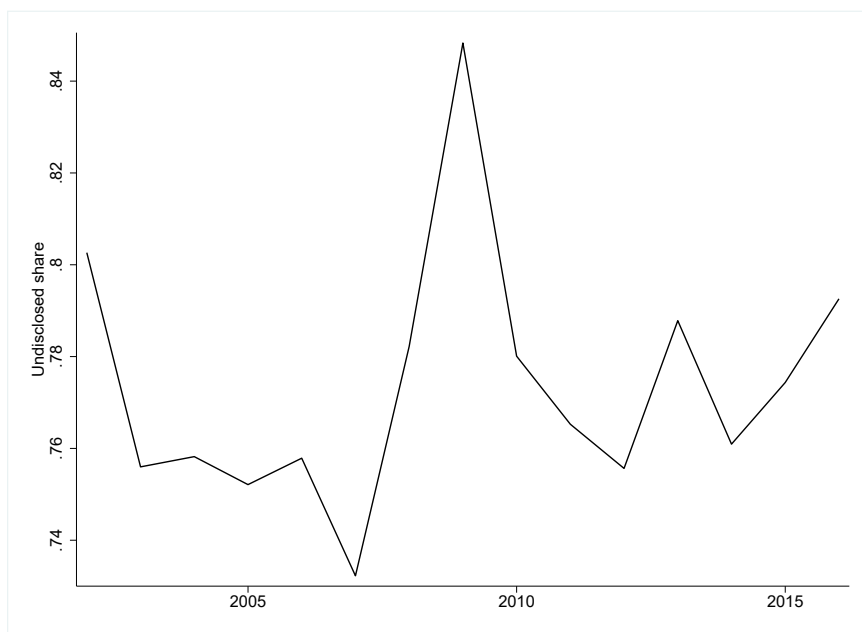


Figure IV: Approximately 80% of mergers are undisclosed.

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

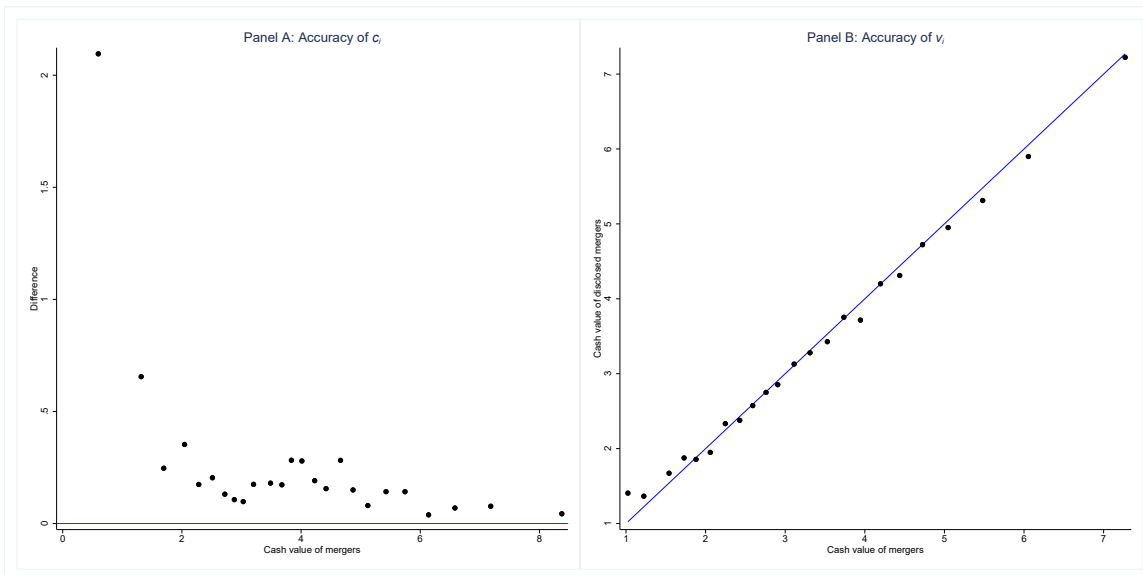


Figure V: Accuracy of cash shares and transaction values

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 $\frac{1}{TF} \sum_t \sum_f [C_{ft}/v_i - \bar{c}_i]$. In Panel B, we restrict attention to firm-year observations 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.

Tables

Table I: Summary of transaction-level data

Panel A: disclosed non-HSR mergers						
	N	Mean	Median	Std. Dev.	Minimum	Maximum
Transaction Value	7,286	20.30	15.00	17.12	1	83
Acquiror Assets	7,286	7,290.59	421.33	69,193.39	1	1,945,467
Trans. value/acquiror assets $\times 100$	7,286	9.70	3.56	15.69	.00015	1.0e+02
Trans. value/acquiror 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
Percent of trans. value paid in cash	7,286	66.02	63.32	34.15	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.	Minimum	Maximum
Transaction Value	6,402	754.58	220.00	2,317.73	50	67,186
Acquiror Assets	6,402	32,141.07	3,337.10	147,622.44	68	2,220,866
Trans. value/acquiror assets $\times 100$	6,402	17.02	8.54	21.08	.003	1.0e+02
Trans. value/acquiror 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	0.35	0.00	0.48	0	1
Percent of trans. value paid in cash	6,402	70.31	87.90	34.26	0	100
Year completed	6,402	2,008.81	2,008.00	4.33	2,002	2,016

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.

Table II: Summary of firm-year level data

	N	Mean	Median	Std. Dev.	Minimum	Maximum
Stock value of disclosed mergers	39,405	58.55	0.00	1,004.12	0	90,514
Cash value of disclosed mergers	39,405	76.17	0.00	796.81	-20,051	52,049
Cash value of all mergers	39,405	132.22	0.00	873.44	-8,425	50,481
Acquiror revenue	39,405	4,075.10	551.65	15,457.92	-1,789	512,287
Acquiror capital expenditures	39,295	246.87	19.70	1,104.95	-470	40,936
Fiscal year	39,405	2,008.52	2,008.00	4.23	2,002	2,016

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.

Table III: Estimates of τ

VARIABLES	(1) Horizontal	(2) Horizontal	(3) Horizontal	(4) Horizontal	(5) Horizontal	(6) Horizontal
RD_Estimate	-0.395** (0.156)	-0.430** (0.181)	-0.382** (0.151)	-0.345*** (0.132)	-0.320** (0.139)	-0.342** (0.133)
Observations	7286	7286	7286	7286	7286	7286
Kernel Type	Triangular	Uniform	Epan.	Triangular	Uniform	Epan.
Robust p-value	0.019	0.038	0.017	0.010	0.016	0.011
BW Loc. Poly. (h)	0.887	0.533	0.870	1.711	1.589	1.590

The top row reports estimates of τ . In columns 1-3, the running variable in the fuzzy RD is log of the transaction-value-to-acquirer-assets ratio minus the log of 0.1. In columns 4-6, the running variable is constructed using level values rather than logs. 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.

Table IV: Distribution of undisclosed mergers across top industries

Panel A: Sorted by shared undisclosed					
Order	Industry	Value Total	Value Disclosed	Value Undisclosed	Share Undisclosed
1	Trucking & Warehousing	20.58	9.00	11.57	56.23
2	Food Stores	19.38	9.90	9.47	48.90
3	Eating & Drinking Places	18.89	9.73	9.15	48.47
4	Lumber & Wood Products	45.29	25.70	19.58	43.24
5	Pipelines, Except Natural Gas	57.40	32.69	24.71	43.04
6	Engineering & Management Services	66.55	38.36	28.19	42.36
7	Wholesale Trade – Durable Goods	89.33	54.15	35.18	39.38
8	Transportation Equipment	112.55	69.02	43.53	38.67
9	Food & Kindred Products	302.90	193.32	109.57	36.17
10	Rubber & Miscellaneous Plastics Products	52.74	33.68	19.05	36.13
11	Stone, Clay, & Glass Products (incl. Concrete)	15.39	9.91	5.47	35.57
12	Health Services	174.11	112.49	61.62	35.39
13	Business Services	843.50	579.58	263.91	31.28
14	Paper & Allied Products	71.33	49.02	22.31	31.27
15	Automotive Dealers & Service Stations	53.93	37.17	16.75	31.06

Panel B: Sorted by value undisclosed					
Order	Industry	Value Total	Value Disclosed	Value Undisclosed	Share Undisclosed
1	Business Services	843.50	579.58	263.91	31.28
2	Chemical & Allied Products	1167.80	948.47	219.32	18.78
3	Industrial Machinery & Equipment	630.60	473.00	157.59	24.99
4	Communications	652.77	531.62	121.14	18.55
5	Food & Kindred Products	302.90	193.32	109.57	36.17
6	Electric, Gas, & Sanitary Services	538.78	438.94	99.84	18.53
7	Electronic & Other Electric Equipment	345.55	247.78	97.76	28.29
8	Instruments & Related Products	525.13	447.75	77.37	14.73
9	Health Services	174.11	112.49	61.62	35.39
10	Insurance Carriers	416.79	361.79	54.99	13.19
11	Miscellaneous Retail	185.40	135.66	49.74	26.82
12	Transportation Equipment	112.55	69.02	43.53	38.67
13	Wholesale Trade – Durable Goods	89.33	54.15	35.18	39.38
14	Engineering & Management Services	66.55	38.36	28.19	42.36
15	Pipelines, Except Natural Gas	57.40	32.69	24.71	43.04

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.

A Online Appendix: Supplementary tables and figures

The following are a list and brief description of the supplementary tables and figures. Interpretations of the results are found in the body of the paper.

1. Figure A.1 replicates the main result from Section 5 (i.e., Figure I) except that we construct the running variable from level rather than log values of the transaction-value-to-acquiror-assets ratio. Similar results obtain, which mirrors comparisons of the first three and last three columns of Table III in the body of the main text.
2. Table A.1 provides estimates of τ under the falsification test. That is, it replicates Table III except that the underlying sample is HSR rather than non-HSR mergers. Estimates of τ are near zero, reflecting the fact that the horizontal share of mergers trends smoothly through the cutoff value.
3. Figure A.2 plots the density of the running variable among non-HSR mergers. Consistent with investor disclosures posing antitrust risk, the plot exhibits a discontinuity at the cutoff among horizontal mergers. Consistent with non-horizontal mergers facing an extremely low threat of enforcement, no discontinuity is present among those transactions.
4. Figure A.3 replicates the prior figure except that the underlying sample is HSR rather than non-HSR mergers. In line with the idea that the government is already fully informed about HSR mergers vis-a-vis premerger notifications, no discontinuity exists among either horizontal or non-horizontal HSR mergers.
5. Table A.2 presents results for various placebo experiments. It reports estimates of $(\hat{\alpha}_{y,\downarrow} - \hat{\alpha}_{y,\uparrow})$, where y is one of the following outcomes: the date that the merger is completed, a dummy variable indicating the deal was structured to transfer assets rather shares, 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 acquiror. See the body of the paper for an interpretation of the findings.
6. Figure A.4 plots capital expenditures over time.

[Figure A.1 about here.]

[Table A.1 about here.]

[Figure A.2 about here.]

[Figure A.3 about here.]

[Table A.2 about here.]

[Figure A.4 about here.]

B Online Appendix: Proofs

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

Proof. The claim is that $\Pr.(H|Y = 1, D \geq 1, \mu = \bar{\mu}) < \Pr.(H|Y = 1, D \geq 1, \mu = 0)$, which is equivalent to the claim that $\Pr.(H|Y = 1, D \geq 1, \mu = \bar{\mu}) - \Pr.(H|Y = 1, D \geq 1, \mu = 0) < 0$.

Let ζ equal the unconditional share of horizontal mergers opportunities. Then

$$\begin{aligned}
& \Pr.(H|Y = 1, D \geq 1, \mu = \bar{\mu}) - \Pr.(H|Y = 1, D \geq 1, \mu = 0) \\
&= \Pr.(H|Y = 1, \mu = \bar{\mu}) - \Pr.(H|d = 1, \mu = 0) \\
&= \Pr.(H|a < b^*/\bar{\mu}) - \Pr.(H|a < b^*) \\
&= \frac{\zeta F_H(b^*/\bar{\mu})}{\zeta F_{NH}(b^*/\bar{\mu}) + (1 - \zeta)F_{NH}(b^*/\bar{\mu})} - \frac{\zeta F_H(b^*)}{\zeta F_{NH}(b^*) + (1 - \zeta)F_{NH}(b^*)} \\
&\quad \propto \frac{F_H(b^*/\bar{\mu})}{F_{NH}(b^*/\bar{\mu})} - \frac{F_H(b^*)}{F_{NH}(b^*)} \\
&= \int_{b^*/\bar{\mu}}^{b^*} \frac{-f_{NH}(a)F_H(a)}{F_{NH}(a)^2} \partial a + \int_{b^*/\bar{\mu}}^{b^*} \frac{f_H(a)}{F_{NH}(a)} \partial a \\
&\quad \propto \int_{b^*/\bar{\mu}}^{b^*} \left[\frac{f_H(a)}{F_H(a)} - \frac{f_{NH}(a)}{F_{NH}(a)} \right] \partial a < 0. \quad (14)
\end{aligned}$$

Moving from the first line to the second replaces $\Pr.(H|Y = 1, D \geq 1, \mu = \bar{\mu})$ with $\Pr.(H|Y = 1, \mu = \bar{\mu})$ and $\Pr.(H|Y = 1, D \geq 1, \mu = 0)$ with $\Pr.(H|Y = 1, \mu = 0)$. The first substitution follows from the fact that when $\mu = \bar{\mu}$, D is always at least equal to one. Thus, conditional on $\bar{\mu}$, the only other relevant conditioning statement is that $Y = 1$. In other words, conditional on the SEC requiring an Item 2 report, the relevant restriction is that the merger is not deterred. The second substitution follows from the fact that when $\mu = 0$, Y is always equal to one. Thus, conditional on $\mu = 0$, the only relevant conditioning statement is that $D \geq 1$, which is equivalent in this case to $d = 1$. In other words, conditional on the SEC not requiring an Item 2 report, the relevant restriction is that management makes a basic disclosure (so that the merger actually appears in transaction level data). To arrive at the second line, we re-write the conditional probability statement in terms of draws of a . To arrive at the third line, we follow Bayes' theorem. To arrive at the fourth line, we multiply through by the product of the denominators and then factor out like terms, which are all positive. To arrive at the fifth line, we integrate by parts. That is, we let $u(a) \equiv F_H$ and $v(a) \equiv 1/F_{NH}(a)$ so that the fifth line equals $u(b^*)v(b^*) - u(b^*/\bar{\mu})v(b^*/\bar{\mu})$, and then substitute accordingly. To arrive at the sixth line, we factor out like terms, which are all positive.

The final inequality follows from reverse hazard rate dominance. ■

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

Proof. By the rules of conditional probability, $Pr.(D = 0|Y = 1) = Pr.(\mu = 0, \rho = 0) \times Pr.(D = 0|Y = 1, \mu = 0, \rho = 0)$. Thus, it suffices to show that $Pr.(\mu = 0, \rho = 0)$ and $Pr.(D = 0|Y = 1, \mu = 0, \rho = 0)$ are both positive. The first is positive by assumption. To see that the second is positive, notice that

$$Pr.(D = 0|Y = 1, \mu = 0, \rho = 0) = Pr.(D = 0|\mu = 0, \rho = 0) = Pr.(a > b^*|\mu = 0, \rho = 0) = Pr(a > b^*) > 0. \quad (15)$$

The first equality holds because management always choose $Y = 1$ when $\mu = 0$ and $\rho = 0$. The second equality holds because management choose $D = 0$ to avoid enforcement whenever a exceeds b^* . The third equality holds because because the distribution of a does not depend on μ or ρ . The inequality holds because a has positive support on $[0, \infty)$ and $b^* > 0$. Thus, $Pr.(D = 0|Y = 1) > 0$. ■

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

Proof. By Bayes' theorem,

$$Pr.(H|D = 0, Y = 1) = \frac{\xi Pr.(D = 0, Y = 1|H)}{\xi Pr.(D = 0, Y = 1|H) + (1 - \xi) Pr.(D = 0, Y = 1|NH)} \cdot \frac{\xi(1 - F_H(b^*))}{\xi(1 - F_H(b^*)) + (1 - \xi)(1 - F_{NH}(b^*))}. \quad (16)$$

For notational convenience, define $\phi_1 = Pr.(\mu = 0, \rho = 0)$, $\phi_2 = Pr.(\mu = 1, \rho = 0)$, and $\phi_3 = Pr.(\rho = 1)$. By Bayes's theorem and the rules governing conditional probabilities,

$$Pr.(H|D > 0, Y = 1) = \frac{\xi Pr.(D > 0, Y = 1|H)}{\xi Pr.(D > 0, Y = 1|H) + (1 - \xi) Pr.(D > 0, Y = 1|NH)} = \frac{\xi(\psi_1 F_H(b^*) + \psi_2 F_H(b^*/\bar{\mu}) + \psi_3 F_H(b^*/\bar{\rho}))}{\xi(\psi_1 F_H(b^*) + \psi_2 F_H(b^*/\bar{\mu}) + \psi_3 F_H(b^*/\bar{\rho})) + (1 - \xi)(\psi_1 F_{NH}(b^*) + \psi_2 F_{NH}(b^*/\bar{\mu}) + \psi_3 F_{NH}(b^*/\bar{\rho}))}. \quad (17)$$

Thus, Proposition 3 holds if and only if

$$\frac{\zeta(1 - F_H(b^*))}{\zeta(1 - F_H(b^*)) + (1 - \zeta)(1 - F_{NH}(b^*))} > \frac{\zeta(\psi_1 F_H(b^*) + \psi_2 F_H(b^*/\bar{\mu}) + \psi_3 F_H(b^*/\bar{\rho}))}{\zeta(\psi_1 F_H(b^*) + \psi_2 F_H(b^*/\bar{\mu}) + \psi_3 F_H(b^*/\bar{\rho})) + (1 - \zeta)(\psi_1 F_{NH}(b^*) + \psi_2 F_{NH}(b^*/\bar{\mu}) + \psi_3 F_{NH}(b^*/\bar{\rho}))}, \quad (18)$$

which requires

$$\frac{1}{1 + \frac{1-\zeta}{\zeta} \frac{1-F_{NH}(b^*)}{1-F_H(b^*)}} > \frac{1}{1 + \frac{1-\zeta}{\zeta} \frac{\psi_1 F_{NH}(b^*) + \psi_2 F_{NH}(b^*/\bar{\mu}) + \psi_3 F_{NH}(b^*/\bar{\rho})}{\psi_1 F_H(b^*) + \psi_2 F_H(b^*/\bar{\mu}) + \psi_3 F_H(b^*/\bar{\rho})}}, \quad (19)$$

which requires

$$[1 - F_{NH}(b^*)][\psi_1 F_H(b^*) + \psi_2 F_H\left(\frac{b^*}{\bar{\mu}}\right) + \psi_3 F_H\left(\frac{b^*}{\bar{\rho}}\right)] < [1 - F_H(b^*)][\psi_1 F_{NH}(b^*) + \psi_2 F_{NH}\left(\frac{b^*}{\bar{\mu}}\right) + \psi_3 F_{NH}\left(\frac{b^*}{\bar{\rho}}\right)], \quad (20)$$

which is true if

$$\begin{aligned} (1 - F_{NH}(b^*))F_H(b^*) &< (1 - F_H(b^*))F_{NH}(b^*), \\ (1 - F_{NH}(b^*))F_H(b^*/\bar{\mu}) &< (1 - F_H(b^*))F_{NH}(b^*/\bar{\mu}), \\ \text{and } (1 - F_{NH}(b^*))F_H(b^*/\bar{\rho}) &< (1 - F_H(b^*))F_{NH}(b^*/\bar{\rho}). \end{aligned}$$

The immediately preceding inequalities all hold if $F_H(A')/F_{NH}(A') - (1 - F_H(A))/(1 - F_{NH}(A)) < 0$ for all $A' < A$, which is true because

$$\frac{F_H(A')}{F_{NH}(A')} - \frac{F_H(A)}{F_{NH}(A)} = \int_{A'}^A \frac{-f_{NH}(a)F_H(a)}{F_{NH}(a)^2} \partial a + \int_{A'}^A \frac{f_H(a)}{F_{NH}(a)} \partial a \propto \int_{A'}^A \left[\frac{f_H(a)}{F_H(a)} - \frac{f_{NH}(a)}{F_{NH}(a)} \right] \partial a < 0. \quad (21)$$

The second expression follows from integration by parts. (See the proof of Proposition 1 for more detail.) The third expression follows from multiplying through by $\frac{F_{NH}(a)}{F_H(a)}$. The inequality follows from reverse hazard rate dominance. Thus, Proposition 3 holds. ■

C Online Appendix: Dataset construction

C.1 Thomson/SDC

We downloaded the Thomson/SDC records via Thomson One, a web-based interface. To ensure that we did not miss transactions at the collection stage, the query included (a) all transactions with an announcement or effective date between 1990 and the date of the query and (b) all transactions had either the acquiror, the target, or the acquiror's or target's intermediate or ultimate parent located in the United States. Once the records were downloaded, we eliminated transactions with missing effective dates (i.e., those that were not completed). We also remove transactions where the target and acquiror have the same name or CUSIP; these transactions mainly comprise stock buybacks that were erroneously coded as mergers. We also drop a small number of duplicates at the "deal number" level. In a few cases where the transaction value is missing but the "ranking value" (i.e., the value used to calculate rankings of investment banks and law firms) is not missing, we replace the former with the latter. We then eliminate transactions with missing transaction values. If the cash proportion of consideration is missing, we correct it whenever possible using information from the "Final Consideration" and "Synopsis" columns. To be precise, if the cash proportion is missing and if (a) the final consideration is "cash only" or (b) the synopsis indicates only cash consideration was involved, then we set the cash proportion to 100%. If the cash proportion is missing and if (a) the final consideration is "stock only" or (b) the synopsis indicates only stock consideration was involved, then we set the cash proportion to 0%. If the cash proportion is missing, the synopsis is indeterminate, and the final consideration is "hybrid," "unknown," or "choice of," we set the cash proportion to 50%.

C.2 Item 2 reports

We downloaded Form 8-K Item 2 reports from Wharton Research Data Services, accessing its "List of 8-K Items" product within the SEC Analytics Suite. Again, to ensure we did not miss any records at the collection stage, the query included (a) all Form 8-K and 8-K/A filings (b) for all dates, spanning from the mid-1990s to the present. Once downloaded, we kept records where the item number, NITEM, equals 2 or 2.01. (See the body of the main text for information about the renumbering of 8-k Items, which has no impact on our analysis.)

C.3 Company name crosswalk

We construct a crosswalk of company names over time using Wharton Research Data Services' "Historical Company Names" product within the SEC Linking Tables. Our query includes all records.

C.4 Compustat

We downloaded Compustat data from Wharton Research Data Services, accessing "S&P Capital IQ's Compustat Snapshot North America" product. We use Annual data "As First Reported." Note that this snapshot is a significant improvement over the "Current" data and appears to be a relatively recent release. In short, while S&P initially reports organization identifiers (i.e., "header" variables such as name and CUSIP) as they appear at the time companies release the results of their operations, the data provider overwrites these these objects over time, which complicates matching to other data sources (e.g., Thomson/SDC) that always report historical identifiers. Thus, the "As first reported" version of Compustat limits the need for linking tables, which in turn reduces error in the matching process when we merge records using legal names and six-digit CUSIP's.

We download variables AQC, CAPX, IVACO, and REVT, which correspond to cash flows from acquisitions, capital expenditures, other cash flow from acquisitions, and revenue. These items reflect annual flows. We also obtain the variable AT, which corresponds to total assets recorded at fiscal year end.

C.5 Standardizing names

We apply the same company name standardization procedure across all four raw data sources. To standardize names, we complete the following steps.

- Convert all text to lowercase.
- Replace all foreign language characters with closest-match English language characters (e.g, the Spanish "ñ" with an overset tilde becomes English "n").
- Remove remaining non-standard ASCII characters.
- Remove US state suffixes (e.g., "/ FL" for "Florida).
- Remove issue suffixes (i.e., "/ NEW" for "new issuances").
- Replace commas, periods, dashes, slashes, colons, asterisks, and semicolons with spaces.
- Remove duplicate interior spaces and any exterior spaces (i.e., trim the strings and interior-trim the strings).
- Replace common abbreviations that are not corporate suffixes (e.g., "ctr," "sys," "finl," "labs," "intl," "info," "natl," "tech," "hldg," "assoc") with abbreviated text.

- Remove corporate suffixes (e.g., "corp," "llc," "inc," "group").
- Again, remove duplicate interior spaces and any exterior spaces (i.e., trim the strings and interior-trim the strings).

C.6 Creating the transaction level dataset

The "core" of this dataset is the set of records from Thomson/SDC. We begin by eliminating acquisitions that Thomson/SDC involved (a) coal, (b) real oil/gas assets, (c) hotels without casinos, (d) REITs and related real estate investment vehicles, (e) banks, (f) creditors, (g) leveraged buyouts, and (h) spin-outs. Note that deals in (a)-(d) are omitted, as in Wollmann [2019], because these mergers do not require HSR mergers, indicating enforcement issues are not a first order concern here. Deals in (e) are omitted because all bank mergers are notified to the government, so HSR and Item 2 issues are irrelevant for enforcement purposes. Deals in (f)-(h) are omitted because they are intrinsically unlikely to involve competitive concerns. We then eliminate acquisitions where the acquiror's parent company is foreign or not public.¹ We also eliminate very small acquisitions (i.e., less than \$1 million in transaction value, as is customary in the literature), acquisitions where the target or acquiror name is "undisclosed" (for obvious reasons), and acquisitions where the proportion of the target being acquired is missing.

We then match the clean Thomson/SDC acquisitions to Item 2 reports if two criteria are satisfied. The first is that either (a) the standardized parent names match or (b) any historical variant of the Thomson/SDC parent name, as determined by the WRDS historical names file, matches any historical variant of the 8-K company name, as determined by the WRDS historical names file. The second criteria is that the date of the 8-K is no more than four days earlier or ten days later than the effective date of the merger.

We define *ITEM2* as a match to an Item 2 report, and we define *H* as a match between the primary four-digit SIC codes of the target and acquiror.

C.7 Creating the firm-year level dataset

Again, we start with the set of Thomson/SDC records. First, we map each acquisition's effective date to a fiscal year-end. To do so, we merge the Thomson/SDC data to the Compustat data, keeping only the fiscal year-end variable from Compustat. Second, we eliminate acquisitions where the acquiror already owns greater than or equal to 50% of the target; in these cases, from the standpoint of financial accounting, the target is already part of the acquiror, so the purchase of any part of the remaining stake

¹As per the body of the main text, the focus of this paper is "publicly traded US companies."

will now show up as cash flow from acquisitions, regardless of the type of consideration. (Substantively speaking, the target is probably not autonomous if another firm owns 50% or more of its outstanding shares, so increasing the stake should not be considered any acquisition anyway.) Third, we calculate each merger's cash and stock value by multiplying v_i by c_i and $1 - c_i$. Fourth, we collapse the data down to the parent and fiscal year level.

We then merge the panel to the Compustat data. Specifically, we merge to Compustat once at the parent's six-digit CUSIP and the fiscal year, and then we merge again at the parent's name and the fiscal year. Since each merge matches one Thomson/SDC observation to one or more Compustat records, this step creates duplicates at the parent name and fiscal year level. We eliminate them by selecting the observation with the largest C_{ft} .² As in the transaction level dataset, we then eliminate acquisitions where the acquiror's parent company is foreign or not public. Finally, we eliminate observations without revenue.

²In most cases, duplicate records are created because Compustat includes certain subsidiaries. For example, if XYZ LLC is the operating subsidiary of XYZ Inc., and we eliminate corporate suffixes, we merge our Thomson/SDC record for "XYZ" to both Compustat records. However, the subsidiary entity is correctly eliminated when we keep only the larger of the two companies in Compustat.

Figures

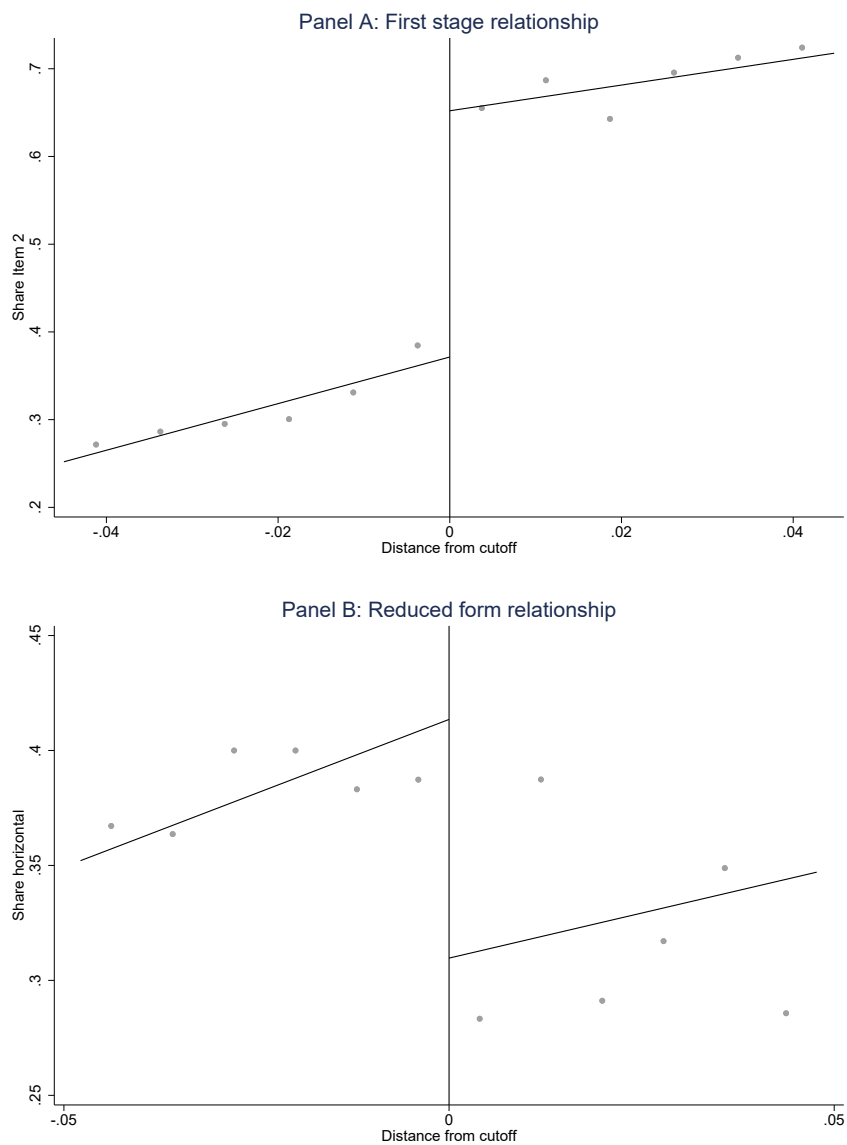


Figure A.1: First stage and reduced form when running variable is calculated in levels

This figure replicates Figure I except that we construct the running variable as the level rather than log value of the ratio of the transaction value to acquiror assets. The discontinuities at the cutoff witnessed here are similar in magnitude to the size of the jumps witnessed in the figure that appears in the body of the main text, which mirrors the comparisons of the first three and last three columns of Table III in the body of the main text.

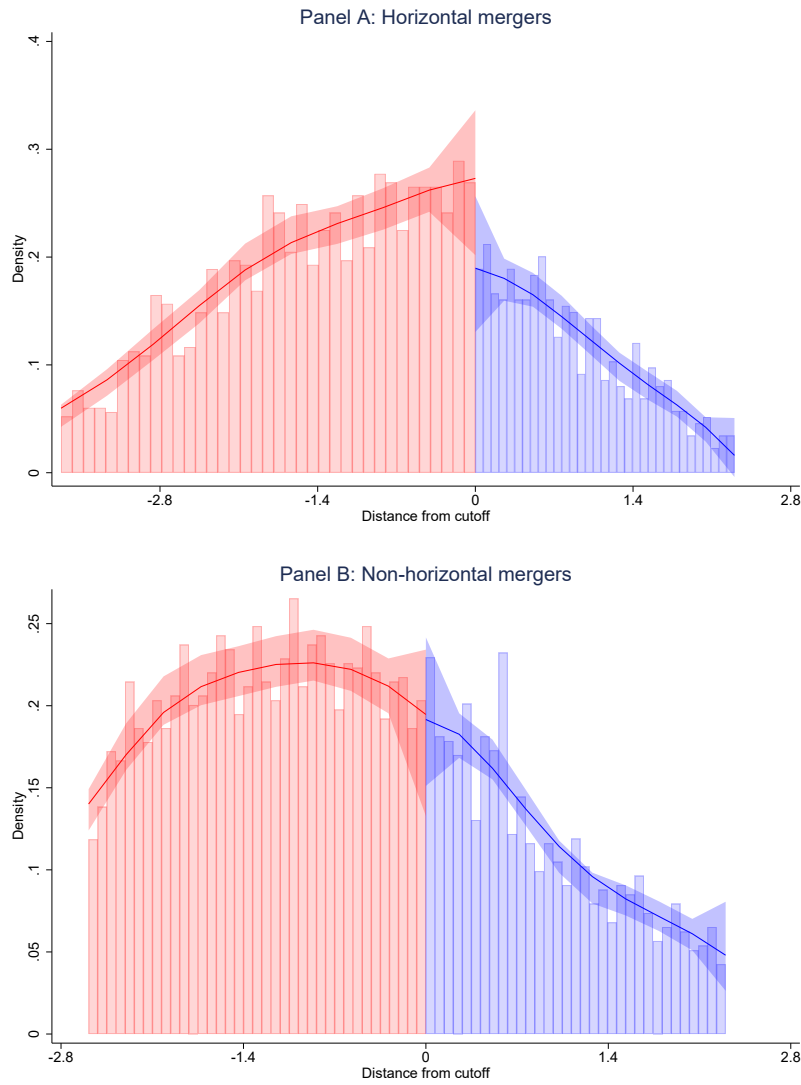


Figure A.2: Density plot of non-HSR mergers around the Item 2 cutoff

This figure plots the density of the difference between the running variable and the cutoff. The sample consists of non-HSR mergers. Bands around the curve represent valid 95% confidence intervals [Cattaneo et al., 2021]. The abrupt decline among horizontal mergers reflects deterrence, while the smooth trend among non-horizontal mergers reflects the fact that they pose little competitive threat and face very little threat of enforcement. Neither group present a pattern consistent with sorting around the threshold (i.e., a spike in density just to the left of the threshold and/or a trough just the left of it).

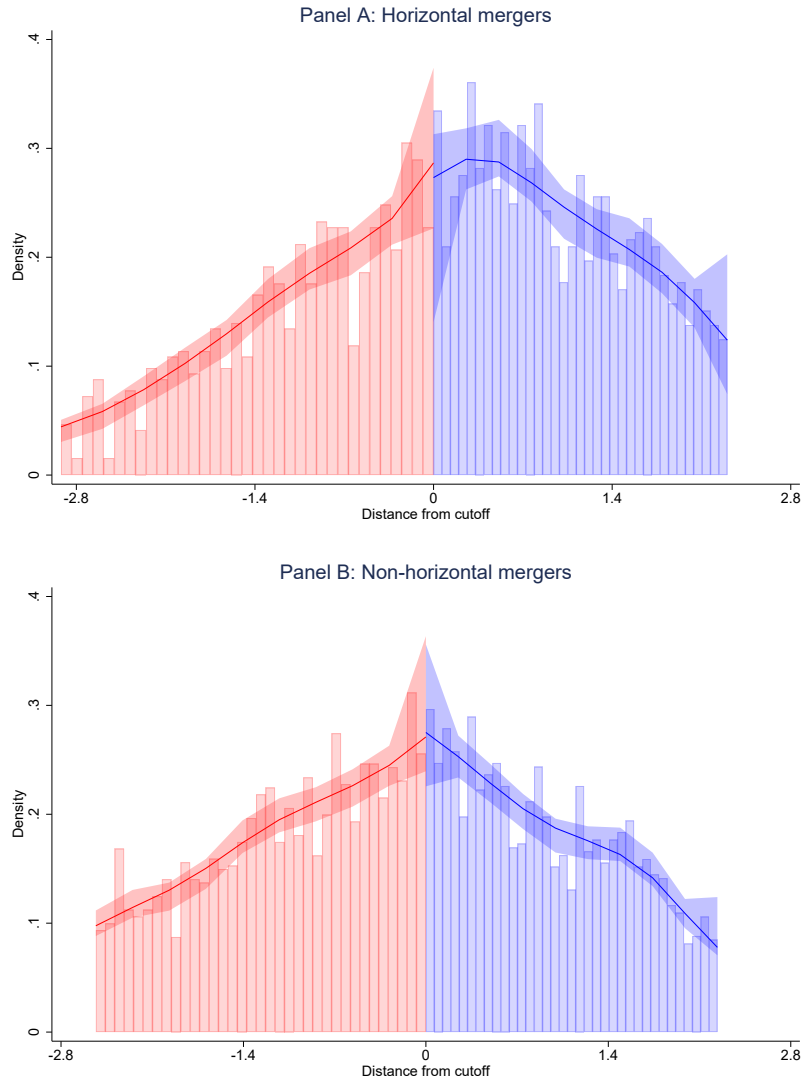


Figure A.3: Density plot of HSR mergers around the Item 2 cutoff

This figure replicates Figure A.2 except that the underlying sample consists of HSR rather than non-HSR mergers. Bands around the curve represent valid 95% confidence intervals [Cattaneo et al., 2021]. Neither plot witnesses sorting around the cutoff. Moreover, neither plot exhibits an abrupt change in density at the cutoff, consistent with the fact that the antitrust authorities are already fully informed about HSR mergers vis-a-vis premerger notifications, so Item 2 reports are uninformative for enforcement purposes.

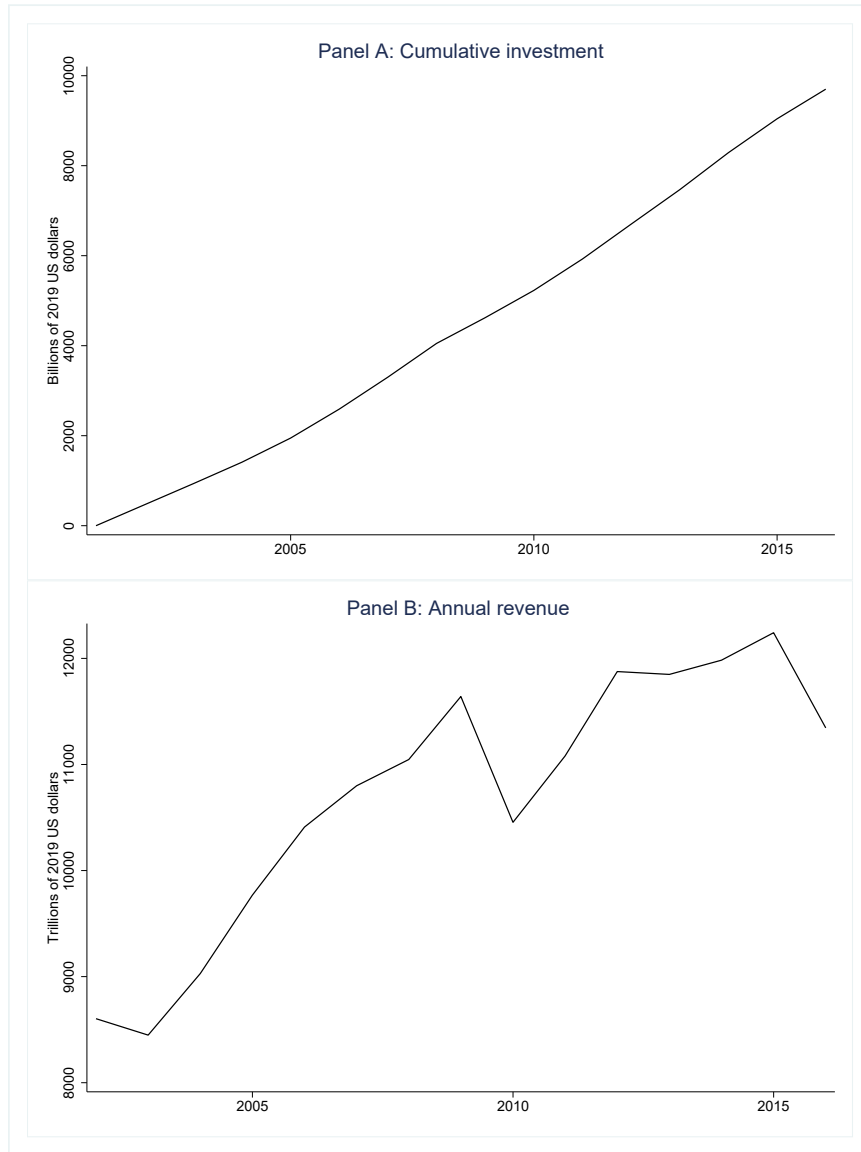


Figure A.4: Revenue and capital expenditures between 2002 and 2016

Panels A plots investment (i.e., capital expenditures) cumulatively, while Panel B plots revenue annually. (Since investment produces long-lived revenue-producing assets, it is better represented as an accumulated “stock” than a “flow.”) All figures are in constant 2019 dollars.

Tables

Table A.1: Falsification test: estimates of τ

VARIABLES	(1) Horizontal	(2) Horizontal	(3) Horizontal	(4) Horizontal	(5) Horizontal	(6) Horizontal
RD_Estimate	-0.0180 (0.133)	-0.0596 (0.132)	-0.0305 (0.130)	-0.00492 (0.120)	-0.000756 (0.114)	0.00576 (0.118)
Observations	6402	6402	6402	6402	6402	6402
Kernel Type	Triangular	Uniform	Epan.	Triangular	Uniform	Epan.
Robust p-value	0.741	0.543	0.671	0.822	0.844	0.877
BW Loc. Poly. (h)	0.909	0.748	0.883	1.353	1.105	1.288

This table replicates Table III but restricts attention away from non-HSR mergers to HSR mergers. Since antitrust authorities are already fully apprised of HSR mergers, Item 2 reports are uninformative, so they should have no effect. Consistent with that intuition and the model's predictions, we find $\hat{\tau}$ is near zero for this subset of transactions. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table A.2: Placebo experiments

Variable	MSE-optimal bandwidth	RD estimate	Robust p-value	Robust conf. int.	Eff. number of observations
Year completed	.8352	.11503	.7717	[-.71857,.968247]	2617
Asset acquisition	.4417	-.0408	.3378	[-.18863,.064738]	1409
Percent cash	.6065	-.0082	.6069	[-.10055,.058739]	1952
All cash	.9040	.02663	.6224	[-.06867,.114753]	2821
Value	.6304	1.5765	.5004	[-2.7936,5.72015]	2034
Acquiror assets	.4998	15.696	.6878	[-37.243,56.4460]	1603

The figure reports estimates of the reduced form relationship between the distance to the cutoff and various "placebo" outcomes. These outcomes include the following: the date that the merger was completed (measured in fractional shares, so that, e.g., July 1, 2005 equates to 2005.5), a dummy variable indicating the deal was structured to transfer assets rather shares, 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 acquiror. The specifications are identical to those used to estimate τ : we use MSE-optimal bandwidths, triangular kernels, and calculate the running variable in log values.