The Real Effects of Mandated Information on Social Responsibility in Financial Reports: Evidence from Mine-Safety Records

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Keywords: Information dissemination, real effects, financial reporting, Dodd-Frank Act, mine safety, corporate social responsibility.

JEL Classification: D03, G14, G18, G38, I18, J28, K22, K32, L71, L72, M41, M48

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1. Introduction

In the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (the "Dodd-Frank Act"), policymakers made an unprecedented move towards using securities regulation to address issues unrelated to the Securities and Exchange Commission's (SEC) core mission of protecting investors and maintaining the fair and efficient functioning of financial markets (Lynn 2011). Sections 1502 and 1503 of the Dodd-Frank Act require SEC-registered firms to include information regarding purchases of conflict minerals from the Democratic Republic of Congo (DRC) and mine health and safety performance in their financial reports. In this paper, we examine the real effects of the mandatory inclusion of mine-safety records ("MSD") in the financial reports of the 151 SEC-registered firms whose ownership of a U.S. mine make them subject to Section 1503 of the Dodd-Frank legislation.[1] A key feature of our setting is that the information provided through MSD is already publicly available on the Mine Safety and Health Administration's (MSHA) website; this allows us to isolate and estimate the magnitude of the incremental real effects of including information in financial reports.

Section 1503 of the Dodd-Frank Act requires reporting citations for violations of mine-safety regulations both periodically in mine owners' financial reports (i.e., Forms 10K and 10Q) and immediately upon the receipt of an imminent danger order (IDO) through a Form 8K filing. The implicit argument advocates of MSD make is that including information in financial reports has implications that it does not have when disclosed only on the MSHA's website. However, it is unclear whether the information included in MSD is news to investors or to other interested parties. One reason that including safety information in financial reports could have an incremental effect is because financial reports broadcast the information to a wide range of

[1] We define "real effects" as situations in which the disclosing person or reporting entity changes its allocation of resources as a result of the disclosure mandate.

interested parties, which increases awareness of firms' safety records. A broader awareness of safety performance makes it easier to attribute responsibility to firms' managers and owners and more difficult for owners to plausibly deny their knowledge of unsafe work conditions. Even if some relatively sophisticated investors, such as institutions, are already aware of the MSHA disclosures, as less sophisticated parties become aware of safety issues, the costs of investing in or operating a firm with a poor safety record could increase.

If MSD increases awareness of safety records, one potential mechanism through which it could provide an incentive for managers to improve mine safety is feedback effects from equity markets.[2] MSD could affect equity valuations by bringing attention to information that helps investors assess future cash flows or allocate assets according to their non-cash-flow-based preferences. Cash flow effects could occur, for example, through fines or mine closures. Non-cash-flow-based preferences could lead investors to require higher returns for financing the operations of firms that engage in activities that conflict with those preferences, such as maintaining relatively unsafe working conditions (e.g., Fama and French 2007; Friedman and Heinle 2016). If MSD affects investor demand for a firm's securities, then MSD will give managers an incentive to alter resource allocation decisions to improve safety. MSD could also affect safety through mechanisms other than firm value, such as increasing the reputational costs or career consequences of operating a firm with poor safety conditions.

Using data obtained from the MSHA, we first assess the effect of MSD on the incidence rate of citations for violations of mine-safety regulations. For these analyses, we employ a

[2] We use the term "feedback effects" to describe scenarios where the firm's reporting of information affects (or is anticipated to affect) security prices, which in turn leads a manager to alter her behavior. Such effects could occur either because managers learn from changes in security prices (e.g., about investors' preferences over safety) or because of the mitigation of agency costs, where managers do not learn from prices per se, but rather are forced to internalize the long-term cash flow effects of poor safety (see Section 3). Our definition of feedback effects is, similar to, but broader than the definitions used in most prior work (e.g., Kanodia and Sapra 2016).

difference-in-differences design that compares changes in citations issued to mines owned by SEC registrants ("MSD mines") and mines owned by non-SEC registrants ("non-MSD mines") around the effective date of Dodd-Frank. We control for flexible time trends and static, mine-level differences by including both year and mine fixed effects. Using both ordinary least squares (OLS) and Poisson regressions, and measuring incidence rates over one- and two-year periods, we document a decrease in citations per inspection hour of approximately 11% for MSD mines relative to non-MSD mines. Our evidence suggests this reduction in citations is attributable to an increase in compliance with mine safety regulations rather than a change in inspector behavior.

Next, we analyze the effect of MSD on injury rates. An implicit assumption of MSD, which focuses almost exclusively on the reporting of citations for safety violations, is that a decrease in citations will translate into a reduction in injuries. However, the link between compliance with mine safety regulations and actual safety improvements is debatable (e.g., Ruffennach 2002; Gowrisankaran et al. 2015). Using the same methodology as in the citation analysis, and consistent with a meaningful improvement in safety, we document a 13% decrease in injuries for MSD mines relative to non-MSD mines. This 13% reduction translates into 0.21 fewer injuries annually per 100 full-time employees (200,000 mine-hours worked).

While the above results suggest that MSD has substantial benefits, it is unlikely that the observed safety improvements are costless. Gowrisankaran et al. (2015) posit that mines produce a joint output of safety and mineral production, which suggests that an increase in safety could lead to lower mineral production per hour worked. We examine this tradeoff by testing whether productivity in coal mines, where we have reliable measures of production and labor quantities, changes around the adoption of MSD. Using a difference-in-differences research design, we find evidence of a significant reduction in labor productivity for MSD mines relative to non-MSD

mines following the implementation of MSD. The observed decline translates into increased labor costs of approximately 0.9% of total revenue.

Although all of the information reported under MSD is available on the MSHA's website, the MSHA website discloses information at the mine-level and does not connect this information perfectly to the mine's legal owner, which may be a subsidiary of its SEC-registered parent company. To ensure that the effects we document are not attributable to MSD providing a previously unknown link between a mine's legal owner and the corresponding SEC registrant, we show that the economic magnitude of the real effects is very similar to those documented above for the subsample of MSD mines where the SEC registrant's and legal owner's names are virtually identical.

A critical assumption of our identification strategy is that the trends in mine safety and productivity for MSD and non-MSD mines would have been the same in the absence of MSD (i.e., the parallel-trends assumption). We assess the validity of this assumption by mapping out the counterfactual treatment effect of MSD in the pre-MSD period (from 2002 to 2009) and showing that the trends for MSD and non-MSD mines are similar and that the differences are statistically insignificant for all of our outcome variables in the pre-MSD period.

Even with similar pre-treatment trends, unobservable events leading to the MSD regulation that differentially affect MSD and non-MSD mines could potentially confound our inferences. To address this possibility, we first demonstrate that there is no difference in the reactions of MSD and non-MSD mines to another major regulatory event (the 2006 MINER Act) that pertains to all mines and was triggered by events similar to those that led to MSD. Additionally, we match MSD and non-MSD mines on observable characteristics and show that the impact on the estimated treatment effect is small, which indicates that any potential selection

on unobservables would have to be large to affect our inferences (Altonji et al. 2005). Finally, to assess the influence of macroeconomic shocks, we demonstrate that the timing of the 2008 financial crisis and the subsequent recovery do not line up with the pattern of our estimated treatment effects around MSD and that treatment does not vary with owners' financial constraints. Taken together, the results of our analyses indicate that MSD has real effects on mine safety and productivity.

We next explore feedback effects from the equity market as a potential mechanism through which MSD could create an incentive for managers to improve safety by examining short-window stock returns following MSD-8K filings. We find a 155 (140) basis point more negative average (median) market reaction when a safety citation is reported in an 8K filing *and* disclosed on the MSHA's website, compared to the period when such citations are disclosed only on the website. These market reactions are most negative for firms operating primarily in the mining industry, where safety violations likely have the greatest implications for firm value.

Finally, we examine the holdings of mutual funds, which, given the public disclosure of their ownership positions, are likely particularly sensitive to workplace safety issues. In the pre-MSD period, we find a significant reduction in ownership in the quarter following an IDO announcement, indicating that some sophisticated investors were aware of, and responded to, IDO website disclosures prior to MSD. In the post-MSD period, the reduction in ownership when the safety information is also disseminated through an 8K is significantly larger, which suggests that mutual funds' care more about safety issues when other parties' awareness of these issues increases. These effects are particularly pronounced for mutual funds with explicitly stated preferences for socially responsible investment.

Our paper contributes to the existing literature by documenting the magnitude of the real

effects of including information on social responsibility in financial reports. Prior research shows accounting disclosures can have real effects because: (i) disclosure reduces information asymmetry and agency costs,[3] (ii) accounting numbers are used in contracts and regulation,[4] and (iii) managers learn new information from their own disclosures and the disclosures of peers.[5] The novelty of our study is to show that the disclosure of previously public information in financial reports also affects real decisions, which, to our knowledge, is not predicted by any of the mechanisms examined in prior research. In addition, our paper examines managerial decisions related to social responsibility, which is not the focus of prior research on the real effects of accounting disclosures.

Another related literature examines the real effects of disclosure in settings where the disclosed information is not publicly available elsewhere (e.g., Jin and Leslie 2003; Bennear and Olmstead 2008; Chuk 2013). Our paper differs from this prior work primarily because mine-safety records are already publicly available outside of the firm's financial reports, which allows us to isolate the incremental effect of including information in financial reports as opposed to the effects of disclosing information not previously publicly released elsewhere.

Finally, we contribute to the literature examining corporate social responsibility reporting (CSR). The takeaway from this literature is that (at least some) investors have non-cash-flow-

[3] For example, Biddle and Hilary (2006) document a relation between accounting quality and investment efficiency. Biddle et al. (2009) and McNichols and Stubben (2008) document similar results. Shroff et al. (2014) document that the external information environments in which foreign subsidiaries operate affect the investment decisions and productivity of multinational corporations.

[4] For example, an extensive literature examines the effects of recognizing versus disclosing information in the financial reports. This prior work dates back to Horwitz and Kalodny (1980) and Dukes et al. (1980) who examine how the required expensing of R&D affects R&D expenditures. Since then, numerous other studies investigate the real effects of recognition, including: Beatty (1995), Graham et al. (2005), Bens and Monahan (2008), Choudhary et al. (2009), Zhang (2009), Hayes et al. (2012), and Cohen et al. (2016).

[5] For example, Shroff (2016) finds that the process of complying with GAAP changes alters managers' information sets and consequently changes their investment decisions. Beatty et al. (2013) investigate how fraudulent accounting affects peer firms' investments. Chen et al. (2013) document spillover effects from IFRS adoption on peer firms' investment policies.

based preferences and that these preferences can affect asset prices.[6] We add to this literature by providing evidence on the real effects of including information in financial reports that potentially has implications for firms' perceived social responsibility.

Our setting also allows us to provide several other novel insights. First, we study the effects of financial reporting on outcomes such as safety and productivity that are infrequently examined in the prior literature (Leuz and Wysocki 2016). Second, our paper highlights the role of capital market responses to the inclusion of information in financial reports as a mechanism that can alter managerial incentives and precipitate real changes. Prior literature shows that because investors have limited attention, disseminating already publicly available information can affect security prices.[7] However, prior papers do not provide evidence on whether these factors lead the reporting entity to change its resource allocation (i.e., have real effects).

Understanding the real effects of regulations requiring the inclusion of information on social responsibility in financial reports is increasingly important given the recent trend towards employing such policies. For example, U.S. policymakers are currently debating the appropriateness of similar reporting requirements regarding political contributions and conflict minerals from DRC. The European Union (EU) also recently mandated significant disclosures related to firms' environmental, social, and governance performance (Grewal et al. 2015). However, as with any applied study, our results are specific to the regulation we examine and might not be generalizable to other settings.

Despite the improvements in safety we document, there are still reasons to question the

[6] See for example: Fama and French (2007), Hong and Kacperczyk (2009), Dhaliwal et al. (2011), El Ghoul et al. (2011), Hong and Kostovetsky (2012), Cheng et al. (2014), Matsumura et al. (2014), Lys et al. (2015), and Friedman and Heinle (2016).

[7] For examples of evidence on limited attention, see: Merton (1987), Barber et al. (2005), Barber and Odean (2008). For dissemination, see: Huberman and Ragev (2001), Cohen and Frazzini (2008), Bushee et al. (2010), Cohen and Lou (2012), Blankespoor et al. (2014), and Rogers, et al. (2016).

appropriateness of using securities regulation to address social issues unrelated to protecting investors. First, we find a decline in productivity following MSD, suggesting that the improvements in safety are not costless. Second, there are likely other costs of MSD that we cannot measure. For instance, increasing the length of financial reports by including information that is irrelevant to protecting investors could reduce the usefulness of these reports to investors.

2. Institutional Background

The mining industry is both an economically important and historically unsafe sector of the U.S. economy. In 2014, the mining industry contributed $225.1 billion to GDP and nearly two million jobs to the U.S. economy (NMA 2014). Since 1900, more than 100,000 workers have died and many more have been injured in U.S. mines (MSHA 2014). Although mining is no longer among the ten most dangerous jobs in the U.S. (based on fatalities), it remains one of the most heavily regulated sectors in terms of employee health and safety.

As is often the case with policy interventions, catastrophic events frequently trigger mine-safety regulation (Ruffennach 2002). The Upper Big Branch disaster, which killed twenty-nine miners in West Virginia on April 5, 2010, was no exception. However, in an unprecedented move, policy-makers turned to securities regulation for a solution. Following the congressional practice of tacking off-topic provisions onto laws, West Virginia Senator Jay Rockefeller IV introduced MSD into the Dodd-Frank Act, which primarily focuses on regulations intended to reform the financial services sector. Public comments suggest that MSD was explicitly motivated by the intention of improving safety rather than aiding investors in assessing financial performance (Lynn 2011).[8] Senator Rockefeller himself indicated publicly that the goal of the

[8] An alternative possibility is that MSD was motivated by environmental activists and politicians with the objective of imposing costs on the coal industry. However, our reading of the background of the MSD regulation does not support this explanation. First, an important part of Senator Rockefeller's constituency includes miners and mining trade unions, who are unlikely to have an interest in imposing costs on the coal mining industry (see e.g., *The New*

regulation was to "make mine safety a top priority" (Senator John D. Rockefeller IV, Press Release May 07, 2010), and, not surprisingly, the strongest supporters of MSD in comment letters on the regulation written to the SEC were organizations representing mine workers (e.g., the United Mine Workers of America).

Dodd-Frank Section 1503(a) requires SEC-registered mine owners to include their safety records for U.S. mines in their periodic reports (i.e., 10Qs and 10Ks for domestic issuers and 20Fs and 40Fs for foreign issuers). Under the Federal Mine Safety and Health Act of 1977 (the Mine Act), the MSHA is required to inspect surface mines at least twice a year and underground mines at least four times a year. Inspections are also conducted in response to hazardous condition complaints. If inspectors identify violations of safety and health standards, they issue citations or orders, which may carry monetary penalties or, in some cases, result in mine closures. Under MSD, from these inspections, issuers must report: severe citations for violations of the Mine Act, proposed penalties, legal actions, and fatalities. Section 1503(b) of the Act also requires issuers to file a current report on Form 8K within four business days of receiving an IDO.[9] Unlike most SEC reporting requirements, issuers must report safety records even if their omission is unlikely to influence the decisions of financial report users (i.e., there is no materiality threshold for MSD filings). In Appendix A, we provide an example of a typical MSD 8K and 10K filing, a screenshot from the MSHA website, and a more detailed description of the MSD reporting requirements.

The use of transparency as a policy instrument in the context of mine safety follows a

York Times, January 18, 2011). Second, we examined the comment letters on MSD written to the SEC and found that although several commenters (8 of 20) could be classified as activists, their concerns were related to mine safety rather than environmental issues.

[9] Issuers must also file an 8K when a firm receives a notice for a Pattern of Violations (POV). However, because POVs are infrequent in practice (there is only one in our sample), we refer to those events that trigger the filing of an 8K as IDOs. Because the SEC does not require foreign issuers to file 8Ks, they are not subject to this requirement.

recent trend in regulation where lawmakers take an informational approach to solve complex regulatory challenges and rely on market forces to impose penalties for socially undesirable behavior (Fung et al. 2007). Yet, whereas earlier transparency initiatives mandated the disclosure of information not publicly available elsewhere—such as charge prices in healthcare (Christensen et al. 2016) or hygiene scores in restaurants (Jin and Leslie 2003)—since 2000, the MSHA has disclosed all of the information included in the MSD filings on its website, typically within twenty-four hours, making it a timelier source than the financial reports.[10] The prior disclosure of the safety records allows us to estimate the incremental effect of including this information in financial reports independent from the effects of disclosing the information for the first time.

3. Conceptual Framework

In this section, we discuss how the inclusion of safety information in financial reports can create an incentive for managers to improve mine safety. One possibility is that financial reports disseminate mine-safety records more broadly than the MSHA website and that dissemination affects security prices. Changes in securities prices could create a feedback effect that leads managers of mines to alter their resource allocation decisions. Mine safety information could affect securities prices through (at least) two channels: 1) through its direct implications for cash flows, and/or 2) because some investors require higher returns for financing activities that conflict with their non-cash-flow-based preferences.

Information on safety could be useful for investors in estimating firm value because safety violations can directly decrease cash flows through fines and shutdowns. Although the dollar value of fines is small compared to the total revenues of the mining industry (for example,

[10] In fact, the SEC estimates that MSD compliance costs are low because the required information is available on the MSHA website by the time firms need to file the reports (Release Nos. 33-9286; 34-66019; File No. S7-41-10).

in 2011, the MSHA levied only $152 million in fines (MSHA 2012)), current information on mine safety is likely to be useful in assessing future safety performance. Thus, MSD could lead investors to revise their expectations of future cash flows. Even though before MSD investors would eventually observe the cash flow implications of firm safety (i.e., when cash flows are disclosed in the financial reports), if the horizon over which managers seek to optimize firm value is shorter than that of investors (e.g., because investors do not actively seek out forward looking safety information from the MSHA), and MSD accelerates investors' discovery of safety issues, then MSD could affect managers' incentives by causing them to internalize the long-run cash flow implications of safety issues.[11]

Information on safety could also affect firm value if a significant proportion of investors prefer owning firms with strong safety records for reasons independent of the cash flow implications of those safety records. If a firm conducts an activity in opposition to some investors' non-cash-flow-based preferences, revelation of this activity will likely decrease the demand of those investors, which in turn could affect the firm's stock price (Fama and French 2007). Friedman and Heinle (2016) build on Fama and French (2007) to model the asset pricing implications of CSR, which, given the subject of MSD, is directly relevant in our setting. Their model predicts that, given a sufficient number of investors with non-cash-flow-based preferences, the market will price CSR disclosures.

MSD could also affect safety through mechanisms other than firm value, such as increasing the reputational costs managers face from the public revelation that they operate a firm with poor safety conditions. Such reputational costs could manifest on a personal (e.g., shame) or professional level (e.g., labor market and career concerns). Dewatripont et al. (1999)

[11] Consistent with firms' reported cash flows and earnings not fully reflecting the implications of operating a firm with poor safety, CEO compensation contracts frequently include safety performance in addition to financial performance metrics (see Appendix B for details).

show how managerial incentives can be shaped not only by explicit incentive contracts but also by implicit reputational and career concerns. In the mining industry, because of the potential political consequences, the importance of safety goes beyond its direct implications for firm value. If managers of firms with poor safety records are less attractive labor market candidates, they have a strong incentive to improve safety performance.

Safety issues also have the potential to damage the reputation of the firm. For example, Dyck et al. (2008) examine the role of western media coverage in reforming corporate governance in Russia and find that increased coverage in the Anglo-American press increases the probability of reform and argue that this result suggests that shaming and the revelation of misbehavior to an audience likely to condemn the action is a likely mechanism. Graham et al. (2013) provide evidence that firms are willing to pay additional taxes to avoid negative reputational consequences. In the mining in industry, the majority of managerial compensation contracts include safety performance provisions (see Appendix B for details), which provide a direct channel through which a firm's directors could quickly increase managerial incentives to improve safety.

Regardless of the mechanism through which safety information affects safety, what creates tension, and allows us to separate the effect of including information in financial reports from the first-time disclosure of that information, is that all of the mine-safety records in the financial reports are already publicly available through the MSHA's website. Thus, for MSD to affect managers' incentives to invest in safety, it must increase awareness of firms' safety records or lead some interested parties to assign greater importance to safety issues.

One reason MSD could increase awareness is that the information in financial reports is more broadly disseminated than the information on the MSHA website. SEC-required

disclosures on Forms 8K, 10Q, and 10K are effectively the billboards of the financial community. Because financial reports are so widely disseminated and have such low incremental acquisition costs, after MSD, investors, financial analysts, and the news media that follow SEC filings are more likely to become aware of violations of the Mine Act—even if they are not explicitly looking for them (e.g., via news wires).[12]

Even if sophisticated investors were already familiar with mines' safety records prior to MSD, as less sophisticated parties also become aware of safety violations, the cost of investing in a firm that owns an unsafe mine could increase after MSD. For example, increased awareness that an institutional investor owns a company with a poor safety record could lead to heightened public disapproval—particularly if third parties, such as the news media, scrutinize the investor's portfolio holdings (as may be the case, for example, with university endowments, public pensions, or mutual funds). This opposition could manifest through shareholder divestment or even protests against investing in companies that own unsafe mines. An increased awareness of safety issues could also reduce the ability of institutional investors to plausibly deny their awareness of these issues, heightening the reputational risks to the institution's manager.

Increased awareness of mine safety records is likely not the only implication of including information in financial reports. For instance, investors or other constituent groups might perceive policymakers' decision to include safety information in financial reports as an implicit signal of that information's importance. After all, an explicit objective of financial reporting is to provide investors with information material to their economic decisions.[13]

[12] Consistent with this notion, we find evidence of a substantial increase in media coverage of safety citations (IDOs) around the time of MSD—with the number of articles increasing from virtually zero to more than 50 per year. News wires of 8K announcements account for a large proportion of this increase in coverage.

[13] A further possibility is that MSD increases firms' securities litigation risk. In order to prove fault in a securities litigation suit, the plaintiff must identify a specific misleading statement and show that reliance on this statement caused a loss (SEC Rule 10b-5). Given that MSD is effectively a direct transcription of information from the MSHA website, and that this transcript is subsequently audited, it is unlikely that managers would attempt to mislead

In the end, whether the mandatory inclusion of information on social responsibility in financial reports has economically significant real effects is an empirical question. Our goal in this paper is to estimate the magnitude of any such effects. Although we do assess the role of dissemination and increased attention in the equity market, other mechanisms could lead to real effects in our setting and, ultimately, we cannot quantify the relative importance of each.

4. Empirical Evidence

We organize our empirical analyses as follows: first, we document the real effects of MSD by examining changes in safety citations, mining-related injuries, and labor productivity around the enactment of MSD. We then explore the impact of MSD on equity markets as a potential mechanism for the observed real effects.

4.1 Implications of MSD for mine safety

In this section, we assess the effect of MSD on the incidence rate of citations for violations of the Mine Act and mining-related injuries. Our empirical strategy relies on the fact that only SEC-registered firms are subject to Dodd-Frank and, hence, only mines owned by SEC-registrants have their safety records included in financial reports. We use a standard difference-in-differences framework, where mines owned by non-SEC registrants are the control group.[14] Our baseline model, suppressing year and mine subscripts, is:

$$Citations\ or\ Injuries = \beta_0 + \beta_1 MSD + \sum \beta_i Fixed\ Effects + \varepsilon \quad (1)$$

The dependent variable is either the incidence rate of citations per inspection hour (*Citations*) or

investors by misstating MSD information. Consistent with this argument, we have found no examples of misstatements of MSD information in firms' 10K reports and there have been no securities litigation cases brought against issuers for non-compliance with MSD reporting requirements. Thus, it is unlikely that MSD substantially increases litigation risk.

[14] An alternative (or additional) approach would be to use non-U.S. mines as the control group. However, we are unaware of another country that maintains a comparable mine-level database that is available to researchers.

injuries per 200,000 hours worked (*Injuries*).[15] *MSD*, the variable of interest, is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We include year fixed effects to control for changes over time in safety technology and regulations other than Dodd-Frank, which likely affect both MSD and non-MSD mines equally. We include mine fixed effects to control for differences in production technologies and other time-invariant factors among mines.[16] In this specification, we identify the effect of MSD from changes in incidence rates around the entry-into-force date of Dodd-Frank for MSD relative to non-MSD mines. We estimate block-bootstrapped standard errors at the mine-owner level (e.g., Bertrand et al. 2004).[17]

We estimate Eq. (1) using a standard OLS regression, where we measure incidence rates over both one- and two-year periods. Although one-year incidence rates are consistent with the length of the 10K reporting period, one year is a relatively short interval over which to measure infrequent outcomes such as citations and injuries. To mitigate this concern, we also estimate Eq. (1) using incidence rates measured over two years. Yet, even when measured over two-years, the infrequency of citations and injuries still results in a high density of observations at zero. An OLS regression does not effectively account for this concentration of observations, which could lead to biased estimates of the treatment effect (Wooldridge 2002). We therefore also estimate Eq. (1) using a Poisson regression.

[15] To mitigate the concern that our inferences could be affected by a change in inspection hours we: 1) alternatively include the log of inspection hours as a control variable (with an unconstrained coefficient) rather than scaling by inspection hours (or including inspection hours as the exposure variable) and 2) scale by (or include as an exposure variable) mine hours worked, rather than inspection hours. In both cases, we find similar results (untabulated).

[16] Inferences for our primary analyses are similar if we include state×year fixed effects in the OLS specification (the Poisson regression often fails to converge with the large number of additional fixed effects). Further, in Appendix D, we match mines based on their MSHA districts, which serves an alternative approach to mitigating any potential location-specific omitted variables such as, for example, regional differences in output prices.

[17] The block bootstrap approach adjusts standard errors to account for the lack of independence within mine owner by resampling observations (over 100 iterations) at the mine-owner level (i.e., keeping mine-level observations within the owner together). As an alternative approach, we cluster observations at the mine-owner level using the OLS specification. Results for this specification (untabulated) are similar to those reported in the paper, consistent with the block bootstrapping approach being very similar to the clustering approach.

The Poisson probability distribution captures the infrequent and discrete nature of citations and injuries and is widely used to model similar events (e.g., Rose 1990; Li et al. 2012). In the Poisson specification, the dependent variable is the count of citations or injuries. In the case of citations (injuries), we use inspection hours (hours worked) as the exposure variable—meaning the interpretation of the estimated coefficient on *MSD* is comparable to the OLS specification. We report average treatment effects for both the OLS and Poisson regressions where incidence rates are measured over one- and two-year periods, but because it conceptually best addresses low incidence rates, our preferred specification is the Poisson regression with incidence rates measured over two-years.[18]

We obtain mine-level data from the *U.S. Department of Labor MSHA Open Government Data* website, which compiles an array of datasets on health and safety for mining operations located in the U.S. We use the *Inspection*, *Violation*, *Accident/Injuries*, and *CDC Address/Employment (AE)* databases. We include all observations from 2002 to 2013 that meet our sample criteria. We restrict the analyses of injuries to mine-years with at least five full-time equivalent employees (i.e., more than 10,000 hours worked) to reduce the influence of very small mines. In the OLS regressions, we truncate the top 1% of incident rates. We do not truncate the incidence rates in the Poisson specification because it is essentially a log-linear model, which can effectively deal with outliers without truncation. We include a relatively long pre-period (six

[18] Poisson regression also has some limitations, including: 1) it assumes that a distribution's conditional mean equals its conditional variance (violations of this assumption are known as over-dispersion), 2) it assumes the independence of incidents over time, and 3) it is estimated using maximum likelihood, which requires a relatively large number of observations to achieve consistent estimates (i.e., the incidental parameters problem). Regarding the first concern, we follow Rose (1990) and Hausman et al. (1984) to test for over-dispersion using a regression of the log of the estimated variance of the residuals on the log of the conditional mean for each mine. We find that the magnitude of the coefficient on the log of the conditional mean is close to one, indicating that overdispersion is not a serious problem. Regarding the second concern, we augment the baseline Poisson model by including the lagged dependent variable in the regression and find that it has no effect on the *MSD* coefficient in any of our primary analyses. Regarding the third concern, the primary issue is that our regression model includes mine fixed effects but, in the annual analysis, uses only twelve years of data to estimate these effects (six periods for the two-year analysis). We assess the magnitude of the bias this issue creates using a jackknife procedure (dropping each period in turn) and find that the bias is less than 5% of the treatment effects reported in the paper.

years) so that we can better assess the parallel-trends assumption (see Section 4.3.2).[19]

We determine which mines in the MSHA database are disclosed in financial reports (and therefore are in our treatment sample) through a comprehensive search of all relevant filings in the SEC's *Edgar* database. We provide a detailed description of this data collection procedure in Appendix C. Our control sample consists of all non-MSD mines available in the MSHA database (i.e., those not identified as MSD mines through the *Edgar* search).

Table 1 provides descriptive statistics for the 151 issuers subject to MSD. The average MSD issuer owns about 24 mines. Relative to the average issuer in *Compustat*, MSD firms are larger, with an average book value of total assets of $15B (the *Compustat* average is $12B). Coal-mining companies represent 11% of our sample and non-coal mining companies 18%, making mining the most frequent primary industry sector of MSD issuers. However, mining is not the main business activity of many SEC registrants that own mines. For example, 75% of the firms that own coal mines have a primary industry that is not coal mining.

4.1.1 Compliance with the Mine Act

In this section, we present results for our analysis of the effect of MSD on citations. Table 2 provides descriptive statistics for the variables used in the citation analysis. After excluding inactive mines and truncating the top 1% of citations per inspection hour, the dataset contains 2,726 MSD mines and 23,533 non-MSD mines. For MSD (non-MSD) mines, on average, one inspection hour results in 0.08 (0.10) citations. Minimum, median, and maximum values are also similar. Overall, the descriptive statistics indicate that MSD and non-MSD mines are similar in terms of the citations they receive before conditioning on MSD.[20]

We present results for the estimated average effect of MSD on the incidence of citations

[19] Results are similar if we instead use a balanced pre- and post-period sample (i.e., from 2006 to 2013).
[20] We provide further evidence on covariate balance between MSD and non-MSD mines in connection with the matching analysis in Appendix D.

in Table 3. In Columns (1) and (3), we estimate Eq. (1) using OLS and measuring *Citations* over one- and two-year periods, respectively. In both specifications, the coefficient on *MSD* is negative and significant (-0.011 and -0.009, respectively). The estimated coefficients imply a reduction in *Citations* of between 11% and 13%.[21] In Table 3 Columns (2) and (4), we estimate Eq. (1) using Poisson regressions over one- and two-year periods, respectively.[22] For both specifications, the coefficient on *MSD* is negative and significant (-0.112 and -0.113, respectively) and the estimated magnitudes imply a reduction in *Citations* of 11%. Overall, the estimates for the average effect of MSD in Table 3 are consistent across specifications and indicate a significant reduction in the incidence of citations for MSD mines relative to non-MSD mines subsequent to Dodd-Frank.[23]

An important caveat makes it difficult to interpret the results from the citation analysis in Table 3 unambiguously—it is not clear whether the observed reduction in citations is attributable to increased compliance with the Mine Act or changes in MSHA enforcement. Given that our objective is to assess whether MSD improves compliance, ideally, we would examine actual violations of the Mine Act, rather than citations for violations. However, violations do not result in citations when they go undetected or when inspectors use the discretion available to them in the Mine Act to exercise forbearance. Inspectors might consider the consequences of citing a mine for a violation before they write the citation and, because they know that the consequences

[21] To calculate economic magnitudes, we compare the coefficient on *MSD* to the mean incidence rate of citations for MSD mines prior to MSD.

[22] The number of observations differs in the Poisson specifications because mines with no citations throughout the entire sample period are excluded.

[23] In an additional (untabulated) analysis, we use an alternative measure of compliance based on assessed fines. One advantage of using fines is that they, at least to some extent, capture the significance of violations. A disadvantage is that the assessment of fines is fairly opaque and includes subjective judgment unrelated to compliance. Using our standard OLS difference-in-differences specification, consistent with compliance improving after mine safety records are included in financial reports, fines are reduced for MSD mines relative to non-MSD mines by approximately 6%. However, the estimate is measured imprecisely and is only marginally significant, which is most likely due to fines being a noisy measure of compliance.

are greater subsequent to MSD (i.e., a severe citation must be included in the firm's financial reports), might reduce the severity of citations to MSD mines (but not to non-MSD mines)—Jin and Leslie (2003) document a similar effect for restaurant hygiene inspectors. Managers may also recognize the consequences of including citations in financial reports and, subsequent to MSD, spend more resources persuading inspectors to downgrade citations before they issue them (e.g., through arguments or bribes).

To address this possibility, we separately examine *Severe Citations*, which for MSD-mines are included in financial reports, and *Not-Severe Citations*, which are not included in any financial reports. We define *Severe Citations*, for both MSD and non-MSD mines, as those citations classified by the MSHA as "S&S" (severe and significant) violations. We define all other citations as *Not-Severe Citations*. As shown in Table 2, *Severe Citations* comprise about one fourth of all citations. Table 4 Columns (1) and (2) report regression results separately for *Severe Citations* and *Not-Severe Citations*. If inspectors downgrade S&S citations in response to the MSD regime, we would expect a positive coefficient on *MSD* for *Not-Severe Citations*.[24] However, consistent with MSD increasing compliance with the Mine Act, we find a negative and statistically significant coefficient on *MSD* for both *Severe* and *Not-Severe Citations*. It is difficult to explain the reduction in *Not-Severe Citations* if the overall reduction in citations is attributable to inspectors downgrading severe violations to not-severe violations (i.e., it is not clear why inspectors would have an incentive to change their behavior around MSD for citations that are not included in financial reports).[25]

Overall, the evidence in this section indicates that compliance with the Mine Act

[24] Alternatively, the inspector may disregard all types of violations—our analysis assumes that inspectors face costs if they ignore violations and hence will prefer to downgrade severe citations rather than ignoring them completely.
[25] We do find a stronger effect for *Severe Citations* (although it is statistically insignificantly different from the coefficient on *Not-Severe Citations*), which could suggest that inspectors change their citation behavior to some extent, yet the magnitude of the shift is not sufficient to account completely for the observed change in citations.

increased in response to MSD. However, because it is not obvious that compliance with the Mine Act will have an impact on safety (e.g., Ruffennach 2002), it is difficult to interpret reductions in citations as providing sufficient evidence to conclude that safety has improved.

4.1.2 Injuries

In this section, we present results for injury rates. MSD focuses on the reporting of Mine Act compliance records. Yet, a reduction in injury rates is clearly the ultimate policy objective (e.g., Rockefeller 2010). Following mine-industry standards, we define the injury rate as the number of injuries per 200,000 employee hours worked. To mitigate any effects of injury reporting bias, we include only injuries that lead to an absence of at least one week, permanent disability, or a fatality.[26] Table 2 provides descriptive statistics. After excluding mine-year observations with less than 10,000 hours worked and truncating the top 1% of injury rates, the dataset contains 2,168 MSD mines and 8,321 non-MSD mines. Injury rates are similar across MSD and non-MSD mines—there are on average 1.45 and 1.34 injuries per 200,000 hours worked, respectively. Reflecting these low incidence rates, the median injury rate is zero for both MSD and non-MSD mines.

Table 5 reports results for the baseline specification, where we estimate the average effect of MSD on injury rates. In Columns (1) and (3), we estimate OLS regressions measuring injury rates over one- and two-year periods, respectively. The coefficient on MSD is negative and significant in both specifications (-0.196 and -0.231, respectively). The estimated coefficients imply a reduction in injury rates for MSD mines of between 12% and 16% subsequent to MSD.

In Table 5 Columns (2) and (4), we estimate Poisson regressions measuring injury rates

[26] Reporting bias in injuries can occur if workers are compensated for their safety performance and for that reason choose not to report minor injuries (National Research Council 1982). Injuries that lead to at least a one week absence, permanent disability, or a fatality are unlikely to go unreported (Morantz 2013). Moreover, the penalties for misreporting or failing to report an injury are severe (including up to five years in prison), which further suggests that reporting bias is unlikely a concern for serious accidents (see http://www.msha.gov/forms/70001).

over one- and two-year periods, respectively. The coefficients on *MSD* are also negative and significant in both specifications. The coefficients of -0.130 (in both specifications) imply a 13% reduction in the incidence rate of injuries for MSD mines subsequent to MSD, which translates into 0.21 fewer injuries annually per 100 full time employees (200,000 mine-hours worked).[27]

Overall, the estimates for the average effect of MSD are consistent across specifications and indicate that the regulation reduced injury rates by between 12% and 16%. The estimated reduction in injury rates are close to the 11% reduction we estimate for citations in Section 4.1.1, and are consistent with substantial safety improvements.

4.2 Labor productivity in coal mines

In this section, we investigate whether the improvements in safety around MSD impose a measurable cost on coal mines in terms of lower labor productivity (productivity is unobservable for non-coal mines). We focus on labor productivity rather than investments because most citations are issued for the failure to take some time-consuming safety precaution (e.g., failure to set up a fence before working in an elevated area), and not equipment malfunctions.[28]

To assess empirically whether MSD affects labor productivity, we estimate an OLS difference-in-differences specification similar to Eq. (1) using the natural log of tons of coal mined per mine hour worked (*Labor Productivity*) as the dependent variable. Again, we include year and mine fixed effects. We obtain data on coal-mine production from the CDC's *AE* database. One important difference in this analysis is that, because of data availability constraints, we are only able to observe productivity for coal mines since 2006.

[27] Prior research suggests that large improvements in safety can occur over relatively short horizons. For example, Gowrisankaran et al. (2015) find that two years following a mining disaster, for mines in the state of the disaster, serious accidents decrease by 68%.

[28] There are other ways firms could improve safety that would not necessarily affect productivity. For example, firms could elect to close their most dangerous mines in response to MSD. In an untabulated analysis, we find that the likelihood of closing a mine that is in the top decile of the injury distribution increases in the post-MSD period by 4% for MSD relative to non-MSD mines.

Table 2 presents descriptive statistics for *Labor Productivity*. Average productivity for MSD and non-MSD mines is at 4.1 and 3.2 tons of coal per hour, respectively. Table 6 presents results for our analysis of the effect of MSD on labor productivity. The results suggest that, following the adoption of MSD, labor productivity decreased by 7.4% for MSD mines relative to non-MSD mines, which translates into an increase in labor costs of approximately 0.9% of revenues.[29] The observed reduction in labor productivity is consistent with an increased focus on safety and highlights one potential cost of MSD. For comparison, in Columns (2) and (3) of Table 6, we present results for citations and injuries for the subsample of coal mines. The estimated treatment effects for coal mines are similar in magnitude, albeit statistically weaker (as expected given the smaller sample size), to those reported in Tables 3 and 5.

4.3 Assessing identification assumptions

In this section, we assess the validity of two critical assumptions underlying our identification strategy: 1) that the MSD information included in financial reports is publicly available elsewhere, and 2) the parallel-trends assumption.

4.3.1 Availability of MSD information on the MSHA website

The ideal setting to isolate and estimate the magnitude of the incremental real effects of including information in financial reports would be one where the exact same safety reports included in financial reports were already publicly available elsewhere. Our setting falls short of this experimental ideal because the structure of the data on the MSHA website differs from the exhibit included in the 10K. The MSHA website reports data at the mine-level and only aggregates this data based on the mine's legal owner, which for approximately 25% of mines is a

[29] This estimate is based on the assumption of an hourly wage of $25 and an average coal price of $50 per ton, which implies an average labor cost as a proportion of revenue of 12.5% [$25 per labor hour ÷ (4 tons per hour×$50 per ton)]. To approximate the increase in labor cost relative to revenue, we multiply the reduction in productivity (7.4%) by the average labor costs as a proportion of revenue (12.5%).

subsidiary whose name differs substantially from that of its SEC-registered parent company. A potential concern is that MSD provides a previously unknown link between a mine's legal owner and SEC-registered parent company, making it difficult to isolate the incremental effect of including information in financial reports. However, given that a firm's subsidiaries are disclosed in Exhibit 21 of the 10K, the task of compiling the same information included in MSD from the MSHA's website is unlikely insurmountable, at least for sophisticated users.

Nonetheless, we address this concern by estimating Eq. (1) excluding MSD-mines with legal owners that do not have virtually the same name as their SEC-registered parent company. Our assumption is that, if the names of the mine' legal owner and SEC-registered parent firm are the same, the mapping between the MSHA website and the financial reports is straightforward. The estimated treatment effects for this subsample, reported in Table 7, are very similar to those for the full sample of mines, which suggests that the effects in the main analyses are not driven by MSD providing previously non-public information.

4.3.2 The parallel-trends assumption

A key assumption underlying our identification strategy is that MSD and non-MSD mines would have had parallel trends in citations, injuries, and productivity absent MSD. The inclusion of mine-level fixed effects in our analyses preclude any time invariant differences across mines from affecting our results, but several potential concerns remain, including: 1) the outcome variables for MSD and non-MSD mines could have different trends for reasons unrelated to MSD; 2) MSD regulation is a response to the Upper Big Branch disaster that also raised public scrutiny of mine safety, which could affect MSD and non-MSD firms differentially; 3) MSD and non-MSD firms could respond differently to changes in macroeconomic conditions. We conduct several additional analyses to address these concerns.

First, we examine differences in pre-Dodd-Frank trends in our outcome variables' across MSD and non-MSD mines by mapping out counterfactual treatment effects over our sample period. Using two-year Poisson regressions, we map out these effects by replacing the single *MSD* variable with separate interactions between the MSD-mine indicator and indicators for each of the two-year sample periods. We exclude the two-year period immediately before MSD takes effect, making 2008-2009 the benchmark period. We graphically depict these results in Figure 1 Panels A-C. In all three panels, the counter-factual treatment effects in the pre-regulation periods are small and statistically indistinguishable from the benchmark period, which provides support for the parallel-trends assumption.[30]

Second, we explore the possibility that other outcomes of the Upper Big Branch disaster represent alternative explanations for our results by looking at responses to the MINER Act, another regulatory act focused on improving mine safety that shares many similarities with MSD. The MINER Act, which was adopted in July 2006 shortly after the Sago Mine disaster, applies equally to all U.S. mines regardless of whether they are owned by a public or private firm (i.e., it pertains to both our treatment and control mines). In Figure 2, we plot two proxies for public attention to mine safety, the total number of U.S. newspaper articles and Google searches referencing mine safety (both indexed at 100 at the time of the Sago Mine disaster on January 2, 2006). For both proxies, sharp spikes in attention are evident around the mining disasters preceding the MINER Act and MSD. To the extent the two proxies capture the unobservables that led to regulation, the graph suggests that the unobservables around MSD and the MINER Act change in the same direction. Hence, we can use the MINER Act to assess whether MSD

[30] As an additional (closely related) way to assess the validity of the parallel trends assumption, we plot univariate trends separately for the treatment and control groups in the pre-MSD period (untabulated). A visual inspection of these trends provides no indication of differential responses between the groups for any of our three primary outcome variables, which provides further comfort that the parallel trends assumption is valid in our analyses.

and non-MSD mines react similarly to unobservables that are similar to those that preceded MSD. In Figure 1, Panels A-C, we indicate the timing of the adoption of the MINER Act. In none of the three figures is there evidence of a differential response between MSD and non-MSD mines to the MINER Act, which suggests that publicly and privately owned mines respond similarly to unobservables that precede regulation.

Third, we perform two additional (untabulated) analyses to further assess whether unobservables associated with the Upper Big Branch disaster affect our estimates. Disaster-related unobservables likely have a greater impact on mines that are geographically closer to the mine where the disaster occurred or are of the same mine type (Gowrisankaran et al., 2015). The Upper Big Branch mine is located in West Virginia and produces coal. When we exclude mines located in West Virginia or coal mines (regardless of their location), we find little attenuation in the estimated treatment effect, which suggests that MSD and non-MSD mines respond similarly to unobservables associated with the proximity to disaster mines.

Fourth, we address the concern that MSD and non-MSD firms respond differently to changes in macroeconomic conditions around the time of the adoption of Dodd-Frank. Given their access to the public capital markets, public firms might respond differently to shocks in the debt and equity markets. Figure 3 presents trends in equity and credit market conditions over our sample period. The graphs show that, while there are multiple shocks to both equity and credit markets over this period, the patterns of these shocks look nothing like the estimated counterfactual treatment effects for citations, injuries, or productivity (see Figure 1). Figure 3 does reveal a deterioration in credit conditions in 2008-2009. Financing constraints could lead privately owned mines to differentially reduce their investment in safety because they are less able to access equity financing. To address this concern, we first note that the observed decline in

citations and injuries for MSD relative to non-MSD mines is not driven solely by a decrease in safety by non-MSD mines (i.e., the majority of the effect comes from an increase in safety for MSD mines) (untabulated). In addition, we examine whether, within MSD-mines, the estimated treatment effect varies based on whether a mine's SEC-registered owner is financially constrained—defined as a firm that is above the 75th percentile of the Rajan and Zingales (1998) measure of financial constraints.[31] We find no significant cross-sectional variation in the effect of MSD based on the extent of financing constraints (untabulated).

Fifth, in Appendix D, we present our main analyses based on a sample of matched MSD and non-MSD mines. This approach directly addresses selection on observables, and, to the extent observable and unobservable mine characteristics are related, provides a way to gauge the magnitude of any potential selection effect (Altonji et al. 2005). A disadvantage of matching is that it alters the sample composition and hence prevents the estimation of treatment effects for the population of mines. Descriptive statistics, presented in Appendix D, indicate that MSD and non-MSD mines differ significantly along two dimensions, mine size (based on hours worked) and mine type (coal versus non-coal and surface versus underground). We match on these characteristics, in addition to mine location, and find that matching has little effect on the estimated treatment effects (see Appendix D).

A final possible concern is that our results could be attributable to MSD firms selling their most citation- and accident-prone mines to non-MSD firms. In an untabulated analysis, we find no evidence that public firms sell their most dangerous mines (defined as mines in the top decile of the citation distribution) to private firms at a higher frequency in the post-MSD period.

4.4 Feedback effects from the equity markets

In this section, we explore one mechanism through which MSD could affect mine

[31] Results are similar if we instead use the Hadlock and Pierce (2010) measure of financing constraints.

safety—equity-market feedback effects.[32] If an increased awareness of poor safety performance reduces investor demand for a firm's securities (and correspondingly firm value), then the dissemination of safety information will give managers an incentive to undertake real actions to improve their safety records. We assess the equity-market effects of MSD by comparing short-window stock returns following the public announcement of an imminent danger order (IDO) in the pre- and post-MSD periods. In the pre-MSD period, IDOs are disclosed only on the MSHA's website. In the post-MSD period, the MSHA posts IDOs on their website and firms disseminate them through an 8K filing. If MSD-8Ks increase investor awareness of mine-safety issues, we expect to observe a larger market response to IDOs issued in the post-MSD period.

For our sample of 151 firms subject to MSD, we compile a comprehensive list of IDO filings between 2000 (the year the MSHA launched its website) and 2014 from the MSHA's website. Our pre-MSD sample, from January 1, 2000 to August 20, 2010 (the effective date of MSD), includes 754 unique IDOs. Our post-MSD sample, from the MSD effective date through 2014, includes 245 unique IDOs. While on average a firm receives about six IDOs over the sample period, 57% of issuers do not receive any IDOs (86 out of 151) and a small number of firms receive IDOs frequently (e.g., ten firms in our sample receive 31 or more IDOs).

We conduct our market reaction tests using a standard event study methodology and compute average and median cumulative abnormal returns (*CAR*) beginning on the IDO issue date (*day 0*) and ending five trading days afterward (*day 5*). In the pre-MSD period, our event window captures the disclosure of the IDO on the MSHA's website, which occurs the morning after an IDO is issued. In the post-MSD period, the event window captures both the MSHA website disclosure and the release of the MSD-8K, which must be filed within four business days

[32] While we empirically examine only equity-market feedback effects, we recognize that other mechanisms, such as managers' reputation and career concerns, which are difficult to empirically test, likely contribute to the observed effects of MSD.

of the IDO date. This design allows for an assessment of the incremental market reaction when the IDO is also disseminated through an 8K filing.[33] We obtain stock price data from the *Center for Research in Security Prices* (*CRSP*) and calculate both market- and industry-adjusted returns. We market-adjust (industry-adjust) returns by subtracting the corresponding event-window return on the *CRSP* (one-digit SIC code) equal-weighted index.

Table 8 reports the results. In the first row, we report the results based on market-adjusted returns. In the pre-MSD period, when an IDO is disclosed only on the MSHA's website, the mean and median CARs are close to, and not statistically different from, zero. In the post-MSD period, when the IDO is also disseminated through an 8K filing, the average (median) CARs are -1.54% (-1.10%). Consistent with an increase in investor awareness in the post-MSD period, the difference in the mean (median) pre-period CAR and post-period CAR of -1.55% (-1.40%) is statistically significant at the 1% level. As reported in the second row of Table 8, results are similar when we industry-adjust returns.[34]

Next, we examine the event-window CARs based on whether the SEC-registered parent company that owns the mine receiving the IDO is in the coal mining, general mining (including coal, metal, and other types of mining), or a non-mining industry (based on the parent company's two-digit SIC code). Ex-ante, it is difficult to predict which group is likely to have the largest market response to the announcement of poor mine safety. On the one hand, an MSD-related 8K filing could have a larger impact on investor awareness for a firm whose core business is not mining, where investors are potentially less aware of mine safety issues. On the other hand, even

[33] In practice, most 8Ks are filed within two days of the IDO posting on the MSHA website, which precludes us from examining market reactions separately for website postings and 8K filings in the post-MSD period.

[34] We conduct several untabulated sensitivity analyses including: 1) dropping any IDO filings where the return window overlaps with a firm's *Compustat* earnings announcement date; 2) trimming CARs at the 1% level; 3) market-adjusting using the *CRSP* value-weighted-return index; 4) excluding the firm Alpha Natural Resources, which has a relatively large number of IDOs compared to the other firms in our sample (approximately ten per year). Results for each of these additional analyses are similar to our primary results (e.g., the post- minus pre-MSD period average return difference for the tests are as follows: 1) -1.13%, 2) -1.41%, 3) -1.96%, 4) -0.63%).

if MSD significantly increases investor awareness of safety issues for non-mining firms, the cash flow implications of poor safety as a proportion of total firm value are likely much smaller for these firms than for mining-industry firms.

Focusing on the post- minus pre-MSD average incremental returns in Column (5) of Table 8, we find that the average event-window *CAR* is -3.06%, -2.21%, and 0.12% for firms in the coal-, general-, and non-mining industries, respectively. For coal- and general-mining-industry firms, the average return differences are statistically significant at the 1% level. For non-mining firms, the return difference is statistically insignificant.

Overall, these results are consistent with the dissemination of IDOs through an 8K filing leading to larger market reactions for firms where poor safety is expected to have the greatest firm value implications. However, in this analysis, we cannot use private firms as a control group, which limits our ability to control for trends over time.[35] The results in this section should be interpreted with this caveat in mind.

4.5 Socially responsible investor demand

In this section, we examine whether one group of investors that are likely sensitive to workplace safety issues becomes more sensitive when safety records are more widely disseminated through financial reports. We focus on mutual funds because, although mutual fund managers are relatively sophisticated, and thus likely aware of firms' safety issues prior to MSD, their holdings are publicly observable, and thus subject to greater scrutiny than the holdings of other types of investors such as individuals or hedge funds (Hong and Kacperczyk, 2009).

[35] For example, one time-variant factor that could affect our results is a general increase in attention to safety following the Upper Big Branch disaster in the post-MSD period. We address this particular concern by examining changes in market reactions to IDOs following the Sago Mine disaster in 2005 and the subsequent MINER Act (but prior to MSD). If it is the case that the larger responses to IDOs we observe in the post-MSD period are attributable to greater safety concerns, rather than MSD, we would expect to observe similar increases in this period. However, these market reactions (untabulated) provide no evidence of a significant response to IDOs in this period.

Furthermore, among mutual funds, there is potentially significant heterogeneity in the sensitivity to safety issues. For instance, in recent years, there has been an increase in the number of funds dedicated to "socially responsible investing" (SRI) (Hong and Kostovetsky 2012). Many of these funds avoid (or underweight relative to the market portfolio) investments in firms that engage in socially sensitive activities such as alcohol, gaming, and defense, or that offer poor working conditions.

Even if mutual-fund managers are already aware of safety issues, as other, less sophisticated, parties become aware of firms' safety records, their costs of holding unsafe mines could increase. To see this, assume that mutual-fund managers attempt to accomplish two objectives: maximizing returns and conveying that they behave in accordance with the social values of their investors (e.g., the perceived safety of the firms in which they invest). The joint maximization of these objectives imposes a trade-off on the fund manager such that the mutual fund's investment portfolio will likely not satisfy both objectives perfectly. Then assume that MSD increases the correlation between less sophisticated individuals' (e.g., journalists, individual investors) perceptions of how safe firms are and the actual safety levels of these firms. Under these two assumptions, if fund managers care about the perceived safety of their investments and the correlations between perceptions of safety and actual safety increase after MSD, mutual-fund managers' investment decisions will become more sensitive to safety, even if managers were always fully informed about the safety levels of firms.

Using the *Thomson Reuters Mutual Funds* database, we identify mutual fund holdings for 111 of the 151 firms subject to MSD for the period from 2003, when quarterly holdings reports were mandated in the U.S, to 2014.[36] The average firm has mutual fund ownership of

[36] Forty firms are not included in this analysis either because: 1) the firm is missing a matching identifier, 2) the *Thomson Reuters Mutual Funds* database does not cover the firm, or 3) the firm has no mutual fund ownership.

approximately 31% of shares outstanding. Following Hong and Kostovetsky (2012), we classify mutual funds' SRI status based on their inclusion in an index maintained by *The Forum for Sustainable and Responsible Investment* (*USSIF*).[37] From this list, we are able to identify 46 SRI funds that own shares in at least one of the firms subject to MSD. The average firm has total SRI ownership (across all SRI funds) of approximately 0.31% of shares outstanding. While the small number of funds that identify as SRI leads to a relatively small average total SRI ownership, the average individual SRI fund's position is comparable to that of other types of mutual funds (0.045% versus 0.041% of shares outstanding, respectively).

We assess mutual fund sensitivity to mine safety by examining each fund's percentage change in holdings from the end of the quarter prior to the announcement of an IDO to the end of the subsequent quarter by estimating the following OLS regression at the fund-firm-quarter level (suppressing fund, firm and year-quarter subscripts):

$$\begin{aligned} \%\Delta Holdings \; &= \beta_0 + \beta_1 IDO \; + \beta_2 MSD \times IDO + \beta_3 SRI \times IDO + \beta_4 MSD \times SRI \times IDO \\ &\quad + \sum \beta_i Fixed \;\; Effects + \varepsilon \end{aligned} \tag{2}$$

%ΔHoldings is the percentage change in holdings for fund *i* in firm *j* from quarter_{t-1} to quarter_{t+1}. *IDO* is an indicator coded as one if a firm receives an IDO in a given quarter_t. *MSD* is an indicator coded as one if an IDO is disclosed on both the MSHA's website and disseminated through an 8K (i.e., in the post-MSD period). *SRI* is an indicator coded as one if a fund identifies as socially responsible. We include year-quarter fixed effects to control for any potential trends in ownership and allow these coefficients to vary across SRI and non-SRI investors. We include mutual fund fixed effects to control for time-invariant differences in trading behavior and investment preferences across funds. We trim the top and bottom 1% of *%ΔHoldings* to control for outliers and cluster standard errors at the fund level. In this specification, we identify the

[37] This index is available online at http://charts.ussif.org/mfpc/. We accessed this data in August 2015.

effect of MSD from changes in mutual funds' trading behavior around the entry-into-force date of MSD for IDO quarters relative to non-IDO quarters and for SRI relative to non-SRI funds.

We present the results of estimating Eq. (2) in Table 9. Consistent with a decline in mutual-fund demand following poor-firm-safety performance, the coefficient of -0.009 on *IDO* indicates that, on average, mutual funds decrease their ownership stakes by 0.9% more in quarters when the MSHA discloses an IDO on its website relative to those quarters when it does not. This result suggests that some relatively sophisticated investors were aware of firm safety issues prior to MSD. The coefficient of -0.011 on *MSD*×*IDO* indicates that the sensitivity to safety issues more than doubles (i.e., the total post-MSD IDO effect is -2.0%) when the IDO is also disseminated through an 8K.

Looking at the incremental sensitivity of SRI funds to IDO releases, the coefficient on *SRI*×*IDO* of -0.029 suggests that SRI funds respond more to safety issues than other types of mutual funds. In the post-MSD period, the coefficient on *MSD*×*SRI*×*IDO* of -0.097 indicates that the incremental sensitivity of SRI funds to safety further increases when the IDO is also disseminated through an 8K. Despite the relatively large economic magnitude of these effects, neither of these coefficients is statistically different from zero, which likely reflects the small number of SRI fund-firm observations. However, the total incremental sensitivity of SRI funds in the post period (*SRI*×*IDO* + *MSD*×*SRI*×*IDO*) of -0.126 is statistically significant (p-value 0.059), and suggests that SRI mutual funds decrease their ownership allocations by 12.6 percentage points more than non-SRI funds in quarters when an MSD-8K is filed.

Overall, these findings indicate that investors that are likely sensitive to workplace safety issues become more sensitive when safety records are more widely disseminated through financial reports, suggesting that mutual funds' care more about safety issues when other parties'

awareness of these issues increases.[38]

5. Conclusion

Increasingly, policy makers are using securities regulation to address issues beyond the SEC's core mission of protecting investors and maintaining the fair and efficient functioning of financial markets. We examine the effectiveness of these policies in the context of mandatory inclusion of mine-safety records in SEC-registered firms' financial reports. The safety information included in financial reports is publicly available on the MSHA's website—this feature of the setting allows us to isolate the effect of including information in financial reports independent from the effect of disclosing information for the first time.

Comparing mines owned by SEC-registrants to those mines that are not, we document that including safety records in financial reports is associated with an approximately 11% decrease in mining-related citations and a 13% decrease in injuries. We also find that this increase in safety is associated with a decline in labor productivity, suggesting a tradeoff between safety and productivity. Our evidence suggests feedback effects from the capital markets are one, among several, potential mechanisms through which safety information included in financial reports can alter managers' decisions and have real effects. Overall, our results indicate that there are real effects of including information on social responsibility in financial reports—even if this information is publicly available elsewhere.

It is important to note that our results are subject to several limitations. First, the main threat to identification in our analyses is a violation of the parallel trends assumption. In assessing this assumption, we rely heavily on the lack of differential responses for MSD and non-MSD mines to the MINER Act. While, this approach alleviates concerns about

[38] Relatively few mutual funds invest in coal-mining companies, which prevents us from estimating reliable treatment effects separately for coal mining firms.

unobservables associated with mine-safety regulation, it does not rule out contemporaneous changes that are unique to the Dodd-Frank implementation period. To address this issue, we perform sensitivity tests that assess the concurrent changes we think are most likely to affect our analyses (e.g., financial constraints and state-specific shocks). However, it is possible that there are other concurrent changes that we have not identified or cannot completely rule out (e.g., changes in safety performance provisions in compensation contracts). If such changes differentially affect MSD and non-MSD mines, they could confound our inferences. Ultimately, there is no unequivocal approach to validating the parallel trends assumption.

Second, we cannot establish whether MSD is a socially efficient policy because we have no objective way to tradeoff its benefits (increased safety) and costs (lower productivity). Moreover, productivity reductions are unlikely to be the only cost of MSD. For instance, it is also possible that including potentially irrelevant information in financial reports reduces the usefulness of these reports to investors. Consistent with this view, the SEC Chairman, Mary Jo White, has expressed skepticism about using securities regulation to exert societal pressure on companies to change behavior (White 2013).

Third, our results speak only to the incremental effects of including information on social responsibility in financial reports—we cannot say what the effects of disseminating such information through other channels might be (e.g., billboards or public service announcements). Fourth, although we are able to provide some evidence that feedback effects from the capital markets are a plausible mechanism for the observed real effects, we are unable to assess the importance of other mechanisms (e.g., managerial career concerns). Finally, because the real effects we document are likely to be (at least in part) driven by feedback effects from equity markets, our findings may not generalize to other settings (e.g., private firms).

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Appendix A: Dodd-Frank Sections 1503(a) and (b) Disclosure Requirements

Section 1503(a) of the Dodd-Frank Act describes the information that must be disclosed in periodic reports (on Forms 10Q and 10K), including the following: (i) violations of the Mine Act that are significant and substantial (S&S);[39] (ii) the total dollar value of proposed-penalty assessments from the MSHA under the Mine Act; (iii) the number of mining-related fatalities; (iv) pending as well as resolved legal actions before the Federal Mine Safety and Health Review Commission (FMSHRC), an independent adjudicative agency for disputes under the Mine Act; and, (v) the number of certain orders and citations that require (or may in the future require) the mine operator immediately to withdraw all personnel from an affected area of a mine such as an imminent danger order (IDO) or a written notice of a pattern of violations (POV).[40] Issuers are free to present the required information as they believe is appropriate but after 2010 most follow the tabular presentation that the SEC suggests (see SEC File No. S7-41-10).

Below, we provide an example of a typical MSD 8K and 10K filing and a screenshot from the MSHA website. We also give an example of how the information presented in Exhibit 95 in the 10K can be reconciled with the data on the MSHA's website for one particular mine (Lone Mountain 6C).

Form 8K Example: Arch Coal, Inc.

Item 1.04 Mine Safety — Reporting of Shutdowns and Patterns of Violations.

On June 22, 2015, Thunder Basin Coal Company, L.L.C., a subsidiary of Arch Coal, Inc., received an imminent danger order under section 107(a) of the Federal Mine Safety and Health Act of 1977 at the Black Thunder mine located in Campbell County, Wyoming. The order states that an overburden blast was initiated when two miners were within the blast area.

[39] MSHA inspectors, when writing a citation or order, determine whether a violation is significant and substantial (S&S). A violation is S&S if it "significantly and substantially contributes to the cause and effect of a coal or other mine safety or health hazard..." (MSHA Program Policy Manual Vol. 1, p. 23).

[40] An imminent danger is defined in the Mine Act as "the existence of any condition or practice in a coal or other mine, which could reasonably be expected to cause death or serious physical harm before such condition or practice can be abated." An imminent danger order requires operations to cease and miners to leave the affected area until the violations have been deemed to be abated. A written notice of a pattern of violations (POV) is issued when the MSHA determines that a history of violations exist that could indicate future danger. A POV can be particularly concerning because if any violation is found within 90 days of the issuance of a POV, an order to cease operation is subsequently delivered.

Appendix A (cont.): Form 10K Example- Arch Coal, Inc.

Mine Safety and Health Administration Safety Data

We believe that Arch Coal, Inc. ("Arch Coal") is one of the safest coal mining companies in the world. Safety is a core value at Arch Coal and at our subsidiary operations. We have in place a comprehensive safety program that includes extensive health & safety training for all employees, site inspections, emergency response preparedness, crisis communications training, incident investigation, regulatory compliance training and process auditing, as well as an open dialogue between all levels of employees. The goals of our processes are to eliminate exposure to hazards in the workplace, ensure that we comply with all mine safety regulations, and support regulatory and industry efforts to improve the health and safety of our employees along with the industry as a whole.

The operation of our mines is subject to regulation by the Federal Mine Safety and Health Administration (MSHA) under the Federal Mine Safety and Health Act of 1977 (Mine Act). MSHA inspects our mines on a regular basis and issues various citations, orders and violations when it believes a violation has occurred under the Mine Act. We present information below regarding certain mining safety and health violations, orders and citations, issued by MSHA and related assessments and legal actions and mine-related fatalities with respect to our coal mining operations. In evaluating the above information regarding mine safety and health, investors should take into account factors such as: (i) the number of citations and orders will vary depending on the size of a coal mine, (ii) the number of citations issued will vary from inspector to inspector and mine to mine, and (iii) citations and orders can be contested and appealed, and in that process are often reduced in severity and amount, and are sometimes dismissed or vacated.

The table below sets forth for the twelve months ended December 31, 2012 for each active MSHA identification number of Arch Coal and its subsidiaries, the total number of: (i) violations of mandatory health or safety standards that could significantly and substantially contribute to the cause and effect of a coal or other mine safety or health hazard under section 104 of the Mine Act for which the operator received a citation from MSHA; (ii) orders issued under section 104(b) of the Mine Act; (iii) citations and orders for unwarrantable failure of the mine operator to comply with mandatory health or safety standards under section 104(d) of the Mine Act; (iv) flagrant violations under section 110(b)(2) of the Mine Act; (v) imminent danger orders issued under section 107(a) of the Mine Act; (vi) proposed assessments from MHSA (regardless of whether Arch Coal has challenged or appealed the assessment); (vii) mining-related fatalities; (viii) notices from MSHA of a pattern of violations of mandatory health or safety standards that are of such nature as could have significantly and substantially contributed to the cause and effect of coal or other mine health or safety hazards under section 104(e) of the Mine Act; (ix) notices from MSHA regarding the potential to have a pattern of violations as referenced in (viii) above; and (x) pending legal actions before the Federal Mine Safety and Health Review Commission (as of December 31, 2012) involving such coal or other mine, as well as the aggregate number of legal actions instituted and the aggregate number of legal actions resolved during the reporting period.

1

Mine or Operating Name / MSHA Identification Number	Section 104 S&S Citations (#)	Section 104(b) Orders (#)	Section 104(d) Citations and Orders (#)	Section 110(b)(2) Violations (#)	Section 107(a) Orders (#)	Total Dollar Value of MSHA Assessments Proposed (in thousands) ($)	Total Number of Mining Related Fatalities (#)	Received Notice of Pattern of Violations Under Section 104(e) (yes/no)	Received Notice of Potential to Have Pattern of Violations Under Section 104(e) (yes/no)	Legal Actions Initiated During Period (#)	Legal Actions Resolved During Period (#)	Legal Actions Pending as of Last Day of Period(1) (#)
Active Operations												
Arch Coal Terminal / 15-10358	—	—	—	—	—	0.8	—	No	No	—	—	—
ADDCAR 20 HWM / 12-02416	—	—	—	—	—	—	—	No	No	—	1	—
ADDCAR 11 HWM / 46-08799	—	—	—	—	—	—	—	No	No	—	—	1
ADDCAR 18 HWM / 48-01645	—	—	—	—	—	—	—	No	No	—	—	—
Lone Mountain Darby Fork / 15-02263	13	—	—	—	—	40.3	—	No	No	—	—	—
Lone Mountain Clover Fork / 15-18647	39	—	1	—	—	133.3	—	No	No	—	—	5
Lone Mountain Huff Creek / 15-17234	14	—	—	—	—	43.1	—	No	No	—	—	—
Lone Mountain 6C Mine / 44-06782	3	—	—	—	—	1.9	—	No	No	—	—	—
Lone Mountain Processing / 44-05898	7	—	—	—	1	5.5	—	No	No	—	—	—
Flint Ridge Prep Plant / 15-11991	2	—	—	—	—	0.6	—	No	No	—	—	—
Flint Ridge Mine #2 / 15-18991	39	—	—	—	—	90.1	—	No	No	14	13	24
Hazard South Fork Mine / 15-19391	—	—	—	—	—	—	—	No	No	—	—	—
Hazard Kentucky River Loading / 15-13495	—	—	—	—	—	0.6	—	No	No	—	—	1
Hazard Rowdy Gap Mine / 15-18048	4	—	—	—	—	6.5	—	No	No	2	4	2
Hazard Tip Top Mine / 15-18613	—	—	—	—	—	—	—	No	No	—	—	—
Hazard East Mac & Nellie / 15-18966	16	—	—	—	—	16.3	—	No	No	1	—	1

Appendix A (cont.): MSHA Website Citation Disclosure Example- Arch Coal, Inc.

Current Mine Information

Mine ID:	**4406782**
Operator:	**Lone Mountain Processing Inc**
Opr. Begin Date:	**10/1/1994**
Mine Name:	**6C Mine No 1**
Current Controller:	**Arch Coal Inc**
Controller Start Date:	**9/20/2005**
Mine Status:	NonProducing
Status Date:	3/1/2006
Mined Material:	Coal (Bituminous)
Type of Mine:	Underground
Location:	Lee County, VA
State:	VA

Operator History for Mine ID: 4406782

Operator Name	Begin Date	End Date
Lone Mountain Processing Inc	10/1/1994	

How do I use this information? *Click Here*

Violator	Contractor ID	Citation/Order No.	Case No.	Date Issued	Final Order Date	Section of Act	Date Terminated	Citation/Order	S & S	Standard	Proposed Penalty ($)	Citation/Order Status	Current Penalty ($)	Amount Paid To Date ($)
Lone Mountain Processing Inc		8200913	000311633	11/19/2012	2/21/2013	104(a)	11/19/2012	C	N	75.1100-2(f)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8200914	000311633	11/19/2012	2/21/2013	104(a)	11/19/2012	C	Y	75.1731(a)	207.00	Closed	207.00	207.00
Lone Mountain Processing Inc		8200849	000306560	10/1/2012	12/20/2012	104(a)	10/1/2012	C	N	75.1910(i)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8200850	000306560	10/1/2012	12/20/2012	104(a)	10/1/2012	C	N	75.1909(a)(10)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8200851	000306560	10/1/2012	12/20/2012	104(a)	10/1/2012	C	N	75.1911(a)(3)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8200852	000306560	10/1/2012	12/20/2012	104(a)	10/1/2012	C	N	75.1909(a)(3)(vii)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8181870	000300531	7/23/2012	10/17/2012	104(a)	7/23/2012	C	Y	77.400	263.00	Closed	263.00	263.00
Lone Mountain Processing Inc		8181871	000300531	7/23/2012	10/17/2012	104(a)	7/23/2012	C	N	77.1104	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8181872	000300531	7/23/2012	10/17/2012	104(a)	7/31/2012	C	N	77.705	117.00	Closed	117.00	117.00
Lone Mountain Processing Inc		8181869	000303661	7/23/2012	11/22/2012	104(a)	7/23/2012	C	Y	75.202(a)	263.00	Closed	263.00	263.00
Lone Mountain Processing Inc		8181868	000297874	7/11/2012	9/19/2012	104(a)	7/23/2012	C	N	75.400	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8172798	000295072	5/15/2012	8/23/2012	104(a)	5/15/2012	C	N	75.333(h)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8159317	000289416	3/22/2012	6/21/2012	104(a)	3/23/2012	C	N	75.364(b)(1)	100.00	Closed	100.00	100.00
Lone Mountain Processing Inc		8193061	000280709	1/5/2012	3/22/2012	104(a)	1/5/2012	C	N	77.1107	100.00	Closed	100.00	100.00

Appendix B: Evidence on the use of Safety Performance Metrics in Executive Compensation Contracts

In this Appendix, we present descriptive statistics on the inclusion of safety performance provisions in executive compensation contracts based on data from *Incentive Labs*. In compensation contracts, safety performance is frequently measured using days lost and/or incidence rates. Days-lost rates capture the extent to which occupational injuries result in time away from an employee's scheduled work. Incidence rates capture the frequency of injuries relative to the size of a firm's employee base. Table B1 shows the prevalence of safety contracts across different 2-digit SIC codes. The inclusion of safety information in executive compensation contracts indicates that safety information is not fully captured by financial performance metrics. The prevalence of safety performance metrics, especially in the mining industry, suggests a channel through which a firm's directors could quickly increase managerial incentives to improve safety. A potential concern is that compensation contracts could have changed around Dodd-Frank for reasons unrelated to MSD. The small fraction of firms in our sample covered by the *Incentive Labs* database limits our ability to address this concern empirically (50 out of 151). However, we are unaware of any such changes that are likely to affect our inferences. Figure B1 provides an illustrative example of the executive compensation contract for CONSOL Energy Inc.

Table B1: Descriptive Statistics of Compensation Contracts

	All firms in database			*Firms that own mines*		
2 Digit SIC Industry Code	# Firms	Safety	% Safety	# Firms	Safety	% Safety
SIC 10: Metal Mining	4	4	100.00%	4	4	100.00%
SIC 12: Coal Mining	6	6	100.00%	6	6	100.00%
SIC 13: Oil and Gas Extraction	55	27	49.09%	5	3	60.00%
SIC 14: Mining and Quarrying of Nonmetallic Minerals	3	2	66.67%	3	2	66.67%
SIC 16: Heavy Construction	4	2	50.00%	1	0	0.00%
SIC 26: Paper and Allied Products	13	5	38.46%	1	0	0.00%
SIC 28: Chemicals and Allied Products	102	17	16.67%	7	3	42.86%
SIC 29: Petroleum Refining	17	13	76.47%	2	2	100.00%
SIC 32: Stone, Clay, Glass, and Concrete	4	0	0.00%	2	0	0.00%
SIC 33: Primary Metal Industries	11	5	45.45%	4	3	75.00%
SIC 35: Industrial and Commercial Machinery and Computer Equipment	72	7	9.72%	3	0	0.00%
SIC 37: Transportation Equipment	36	5	13.89%	1	0	0.00%
SIC 49: Electric, Gas, and Sanitary Services	78	61	78.21%	10	7	70.00%
SIC 87: Engineering, Accounting, Research, Management, and Related Services	18	2	11.11%	1	0	0.00%
Total	**423**	**156**	**36.88%**	**50**	**30**	**60.00%**

Table B1 continued

Notes: This table reports the total number of firms that include safety performance provisions in their executive compensation contracts. The data is from *Incentive Labs*. *All firms in database* is the full sample of U.S.-listed firms in the *Incentive Labs* database. *Safety* is the number of firms that include a safety provision in their incentive contracts. Whether a firm includes a safety provision is determined by a key-word search for "safety" or other safety-themed words (e.g. safety, accident, injury, etc.) in the performance-metric descriptions. *Firms that own mines* is the sample of firms that own mines subject to MSD.

Appendix C: Description of Data Collection Methodology

This appendix provides a detailed description of the methodology used to identify firms that own mines and therefore must disclose safety records according to Dodd-Frank Section 1503 and compile a list of the mines that they operate.

We identify mine-safety filings using *directEDGAR,* an extraction engine that facilitates text-based searches of all SEC Edgar filings. We also use *SeekEdgar*, a similar extraction engine to verify and complement the *directEDGAR* search. To capture the full sample of relevant firms, we search Form 10K (and 20F) filings using the terms "mine safety" and "section 104" (the most common type of citation). These terms allow us to identify disclosures in both the exhibits to the 10K (Exhibits 95 and 99 are commonly used) as well as in the body of the filing. We then compile a comprehensive list of the MSD mines from these filings, which we hand match to the MSHA databases based on mine names and numbers. For MSD mines that are still not matched to a mine number after this process, we use an internet search to aid in identifying mine numbers. We exclude firms that work only as contractors. Contractors are not involved in operating the mine and therefore have less influence on the safety of the mine.

There were two complications in this process that affected our ability to identify a small number of mines. First, companies occasionally group mines together into a common classification such as "other mines" that makes it difficult to infer the exact identities of the mines. Second, for seven firms, we were unable to match all of the MSD mines to the MSHA databases because of ambiguities in the disclosed names. In these cases, we search the company name using an MSHA database that reports the ownership history at each mine and included all mines under that company currently listed as "active." Due to the complex organizational structures of firms in our sample, this process is likely to be less accurate than directly identifying mine ID numbers within the 10K (for this subset of mines, mine numbers were not included in the financial reports). For example, if a firm discloses mines that are operated by a subsidiary in its 10K, we run the risk of misclassifying the mine using this process (because the MSHA database would list the subsidiary as the owner). However, this subset represents a small subset of our sample mines and is unlikely to materially affect our analysis. In Section 4.3.1, we discuss an analysis where we restrict the sample of mines to those that can be easily matched to their owners by name.

Appendix D: Matching Analysis

In this Appendix, we present the results of an analysis using coarsened exact matching (CEM). Matching on mine characteristics is an alternative way to address non-random assignment to the treatment group in our sample. Matching directly addresses selection on observables, and, to the extent observable and unobservable mine characteristics are related, provides a way to gauge the magnitude of any potential selection on unobservable mine characteristics (Altonji et al. 2005). However, matching comes at the cost of altering the sample composition, which prevents us from estimating treatment effects for the population of MSD mines—which is ultimately what we are interested in. In our view, our assessment of the parallel-trends assumption around unobservable shocks correlated with regulation in the pre-MSD period (see Section 4.3 and Figures 1-3) is preferred to matching in our setting. For this reason, we do not use a matched sample in our main analyses.

Nevertheless, in this Appendix, as an alternative way of assessing the influence of unobservables, we present results using CEM matching. CEM is a monotonic imbalance matching approach that allows the covariate balance between the treatment and control groups to be specified ex ante (see Blackwell et al. 2009). Effectively, the CEM method groups observations into distinct bins based on the selected matching variables, the size of which are determined by the researcher. Then, weights are assigned to the control observations such that the representation of the control group in each bin matches that of the treatment group. Observations in bins without both a treatment and control observation are eliminated to ensure common support.

For our analysis, we select four mine characteristics as matching variables: the average hours worked in a mine in the pre-MSD period (*Size*), whether the mine is a coal mine (*Coal*), whether the mine is an underground mine (*Underground*), and the MSHA district location.[41] We coarsen our sample into 200 CEM bins, which reflects a tradeoff between preserving observations and the ex-post similarity of the distributions of the matching variables across the treatment and control groups. We then use the weights from this coarsening in estimations of our primary specifications of Eq. (1).

Table D1 shows the descriptive statistics for the treatment and control samples both before and after applying CEM weights. We present descriptive statistics for citation rates, injury rates, and labor productivity samples, respectively. However, because the results of the matching procedure are similar across the samples, we discuss detailed results only for the citation sample.

[41] Coal (metal) districts, as classified by the MSHA, are available at: http://arlweb.msha.gov/district/coalhome.htm (http://arlweb.msha.gov/district/mnm/mnmhome.htm).

In the citation sample, prior to matching, the average *Size* of MSD mines (the treatment group) is 59,731 work hours per year compared to 18,851 for non-MSD mines. After applying the CEM weights to the non-MSD-mine sample, average *Size* increases to 57,242. Prior to applying the CEM weights, 14.4% (5.5%) of the non-MSD mines are coal (underground) mines compared to 28.7% (12.9%) for the MSD mines. After applying CEM weights to non-MSD mines, these mines have virtually the same proportion of coal (underground) mines as MSD mines—28.7% (14.6%). Overall, the descriptive statistics indicate that the distribution of observable mine characteristics is more balanced after performing CEM.

Table D2 presents the regression results using CEM for the citation rate, injury rate, and labor productivity analyses. We present results for the common support sample both with and without CEM weights. By presenting both sets of results, we are able to assess the effect of applying the CEM weights. For all three analyses, results based on the common support sample are similar to our main analyses in the paper, which indicates that the observations lost because of a lack of common support have little effect on our inferences. More importantly, when we apply the CEM weights, we observe little attenuation (increase) in the magnitude of the estimated coefficient on *MSD* in any of the three specifications. Specifically, the attenuation (increase) from applying the CEM weights is 2.5% for citations, 12.8% for injuries, and (9.6%) for productivity.

Since the attenuation in the treatment effect after matching is modest, any potential selection on unobservable mine characteristics would have to have little correlation with mine size, mine type, and mine location (which seems unlikely) or be quite large to explain all of the estimated treatment effect.

References in Appendix D:

Altonji, J.G., Elder, T.E., Taber, C.R., 2005. Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools. Journal of Political Economy 113, 151-184.

Blackwell, M., Iacus, S., King, G., Porro, G., 2009. cem: Coarsened Exact Matching in Stata. The Stata Journal 9, 524-546.

Table D1: Matching Analysis Descriptive Statistics

	MSD-Mines		*Non-MSD-Mines*			
			No CEM Weights		*CEM Weights*	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Citation Sample:						
Size	59,731	92,225	18,851	42,150	57,242	92,893
Coal	0.2865	0.4521	0.1443	0.3514	0.2865	0.4521
Underground	0.1287	0.3349	0.0552	0.2284	0.1456	0.3527
Injury Sample:						
Size	74,303	103,705	40,620	60,592	73,402	103,565
Coal	0.2994	0.4580	0.1734	0.3786	0.2994	0.4580
Underground	0.1373	0.3442	0.0792	0.2701	0.1601	0.3667
Labor Productivity Sample:						
Size	100,750	92,605	56,557	64,843	100,024	91,708
Coal	1.0000	0.0000	1.0000	0.0000	1.0000	0.0000
Underground	0.5632	0.4961	0.4072	0.4914	0.4785	0.4996

Notes: This table reports descriptive statistics on observables for MSD and non-MSD mines before and after coarsened exact matching (CEM). The sample period is from 2002 to 2013. We define *Size* as the average hours worked. *Coal* and *Underground* are binary indicators that take on the value of one if the mine is identified as a coal or underground mine, respectively. We describe our data collection procedures in Appendix C.

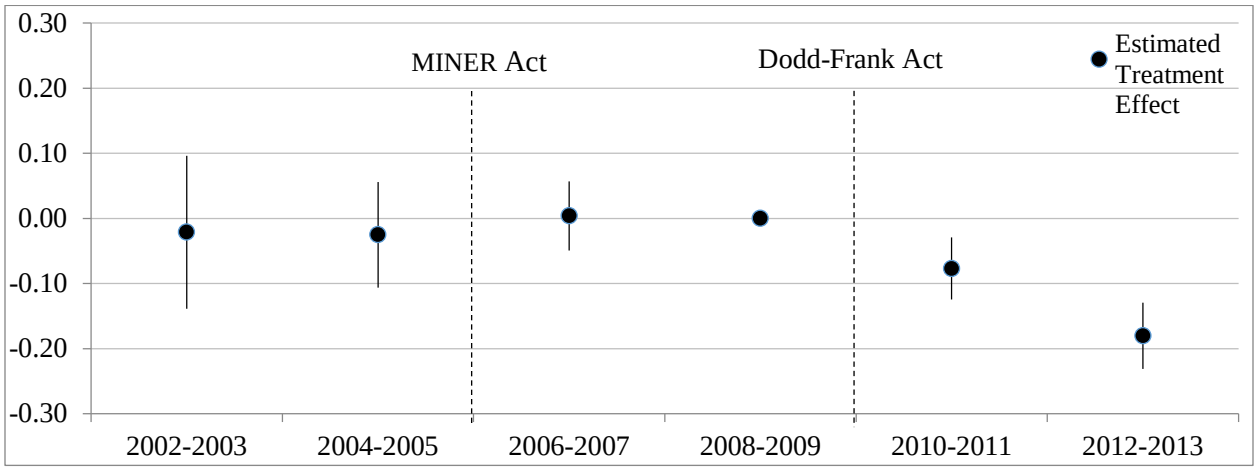
Table D2: Effect of Matching on Estimated Treatment Effect

	Citation Rates		*Injury Rates*		*Labor Productivity*	
	No CEM Weights	*CEM Weights*	*No CEM Weights*	*CEM Weights*	*No CEM Weights*	*CEM Weights*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
MSD	-0.080***	-0.078***	-0.180***	-0.157***	-0.094**	-0.103*
	(-3.52)	(-3.68)	(-4.13)	(-4.34)	(-2.47)	(-1.94)
Fixed Effects:						
Mine	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
R-squared / Psuedo R-Squared	0.538	0.547	0.578	0.602	0.723	0.709
N (mine-periods)	85,321	85,321	20,541	20,541	4,975	4,975
Number of Unique Mines	18,781	18,781	4,539	4,539	1,295	1,295

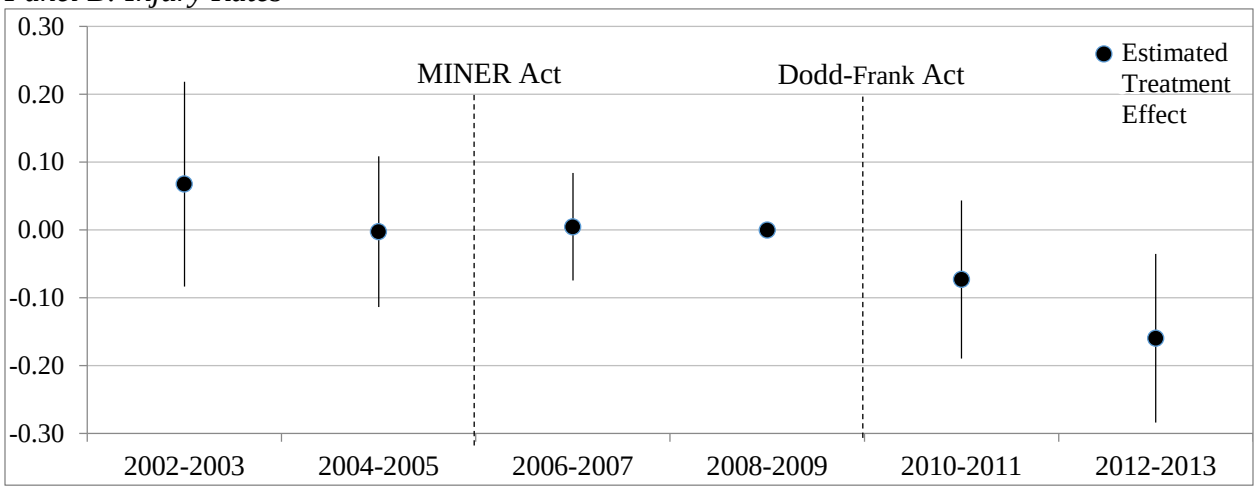
Notes: This table reports results from our analysis of the real effects of MSD before and after coarsened exact matching (CEM). The sample period is from 2002 to 2013. In Columns (1)-(4), we estimate citation and injury rate effects using Poisson regressions measured over two-year periods. In Columns (5)-(6), we estimate labor productivity effects using OLS regressions measured over one-year periods. We calculate the coefficients reported in the columns titled *CEM Weights* using CEM and the results reported in the columns titled *No CEM Weights* using the same common support sample as the *CEM Weights* columns, but without applying the CEM weights. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. All regressions include mine and year fixed effects. T-statistics, reported in parentheses, are based on standard errors clustered by mine. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Figure 1: Pattern of the Counter-Factual Treatment Effects

Panel A: Citation Rates



Panel B: Injury Rates



Panel C: Labor Productivity

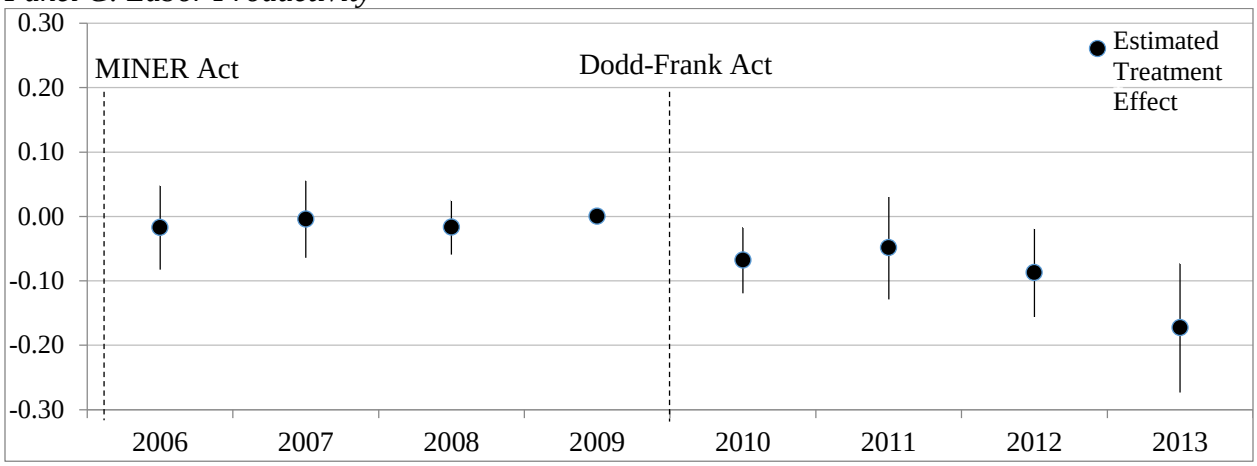
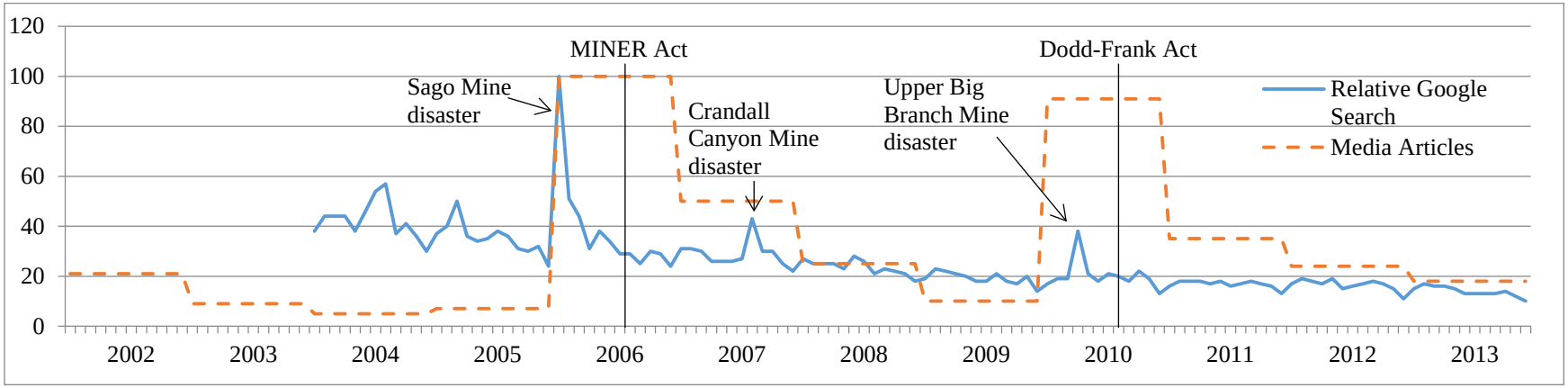


Figure 1 continued

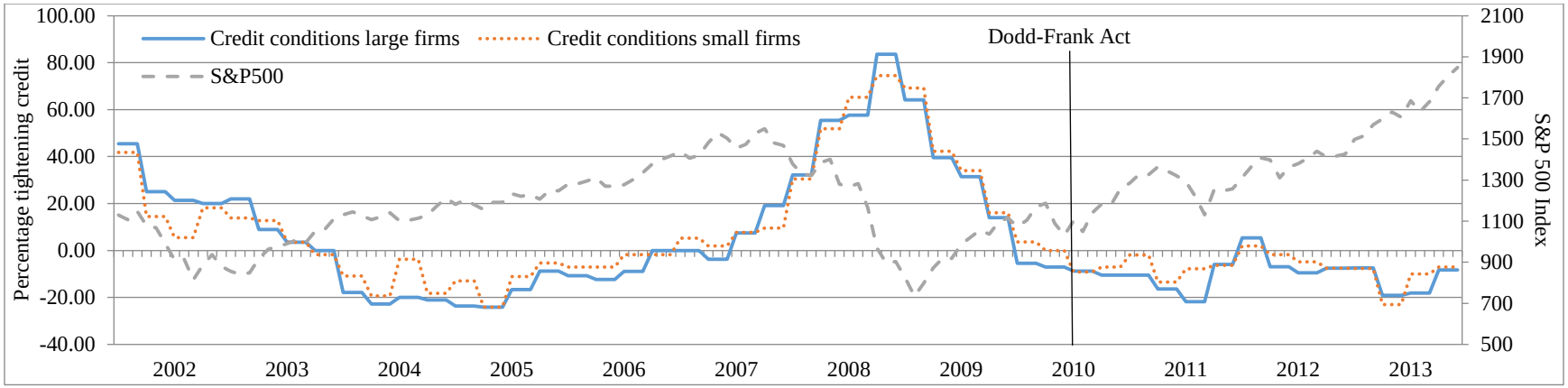
Notes: This figure displays Poisson (OLS) regression coefficient estimates and two-tailed 90% confidence intervals based on standard errors block-bootstrapped at the mine-owner level in Panels A and B (Panel C). We report results for citations (Panel A) and injury rates (Panel B) measured over two-year periods from 2002 to 2013 and for labor productivity (Panel C) measured annually from 2006 to 2013. To map out the pattern in the counter-factual treatment effects in Panels A and B (C), we include, in one regression, indicators for every two- (one-) year period in the sample except 2008-2009 (2009), which serves as the benchmark period (i.e., the coefficient is constrained to equal zero). In these specifications, we measure the pattern in the counter-factual treatment effects relative to the period immediately prior to the effective date of MSD. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C.

Figure 2: Media Coverage of Mine Safety



Notes: This figure presents media articles from 2002 to 2013 and Google search activity related to mine safety from 2004 to 2013. *Relative Google Search* is an index that captures the frequency of Google searches that include the term "mine safety" measured relative to all other Google searches over the same period. *Media Articles* is an index for the annual number of newspaper articles that include the terms "mine safety" and/or "mine disaster." We plot both indices relative to a value of 100 set in the benchmark year of 2006. We obtain data on Google searches from Google Trends and data on newspaper articles from FACTIVA.

Figure 3: Credit and Equity Market Conditions



Notes: This figure presents summary statistics for two time-series proxies for the condition of the U.S. credit and equity markets. We measure *Credit conditions* as the net percentage of respondents who indicate a tightening of credit standards for commercial and industrial loans as reported in the October 2015 Senior Loan Officer Opinion Survey on Bank Lending Practices published by the Federal Reserve Board (available at http://www.federalreserve.gov/econresdata/statisticsdata.htm). We report credit conditions separately for large and small borrowers. We measure equity market conditions using the S&P 500 Index.

Table 1: Descriptive Statistics for Issuers Subject to Section 1503 of the Dodd-Frank Act

Panel A: Descriptive Statistics

N (Issuers)=151	*Mean*	*Std. Dev.*	*Min.*	*Median*	*Max.*
Number of Mines	23.62	70.38	1.00	3.00	539.00
Total Assets (2010-2013)	15,391	43,403	2.38	3,334	419,315

Panel B: Industry Distribution

Industry	*Number of Issuers*	*Percentage of Issuers*
Mining:		
Coal	17	11%
Non-coal	27	18%
Oil & Gas Extraction	6	4%
Construction	5	3%
Manufacture	42	28%
Transport and Utilities	29	19%
Wholesale Trade	2	2%
Services	3	2%
Non-classifiable	20	13%
Number of issuers subject to MSD	*151*	*100%*

Notes: This table presents descriptive statistics for issuers subject to Section 1503 of the Dodd-Frank Act. Panel A provides descriptive statistics for the 151 issuers that disclose mine-safety records as mandated by the Act. We describe the data collection procedures in Appendix C. We obtain *Average Total Assets*, in millions of $USD, from *Compustat* and calculate the average over fiscal years from 2010-2013. Panel B provides the SIC industry sector distribution.

Table 2: Descriptive Statistics on Citation Rates, Injury Rates, and Labor Productivity

Variable	*Unique mines*	*Observations (N)*	*Mean*	*Std. Dev.*	*Min.*	*Median*	*Max.*
Mines Owned by Firms Subject to Dodd-Frank:							
Citation Rate	2,726	24,434	0.08	0.08	0.00	0.06	0.56
Severe Citation Rate (Reported in financial reports)	2,726	24,434	0.02	0.03	0.00	0.00	0.50
Not-Severe Citation Rate	2,726	24,434	0.06	0.06	0.00	0.05	0.52
Injury Rate	2,168	14,882	1.45	2.76	0.00	0.00	17.96
Labor Productivity	547	2,816	4.08	4.01	0.26	3.06	32.59
Mines Owned by Firms Not Subject to Dodd-Frank:							
Citation Rate	23,533	141,576	0.10	0.11	0.00	0.08	0.56
Severe Citation Rate	23,533	141,576	0.03	0.05	0.00	0.00	0.56
Not-Severe Citation Rate	23,533	141,576	0.08	0.09	0.00	0.06	0.56
Injury Rate	8,321	43,006	1.34	3.20	0.00	0.00	17.99
Labor Productivity	1,179	4,145	3.20	2.42	0.26	2.60	32.43

Notes: This table reports descriptive statistics for citation rates, injury rates, and labor productivity for mine-year observations included in the analyses in Tables 3-7. The sample period is from 2002 to 2013. We define the *Citation Rate* as the number of citations scaled by inspection hours and trim the top 1% of firm-year observations. We define *Severe Citations* as citations that must be included in financial reports for mines owned by firms subject to the Dodd-Frank Act. We define all other citations as *Not-Severe Citations*. We define the *Injury Rate* as the number of injuries scaled by mine worker hours multiplied by 200,000 and trim the top 1% of firm-year observations. We define *Labor Productivity* as tons of coal produced divided by mine-worker hours and trim the top 1% of firm-year observations. We describe the data collection procedures in Appendix C.

Table 3: Effect of MSD on Citation Rates

Dependent Variable: Citation Rates Measured over One- or Two-year Periods	*One-year Periods*		*Two-year Periods*	
	OLS	*Poisson*	*OLS*	*Poisson*
	(1)	*(2)*	*(3)*	*(4)*
MSD	-0.011***	-0.112***	-0.009***	-0.113***
	(-5.22)	(-3.38)	(-3.99)	(-3.28)
Fixed Effects:				
Mine	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
R-squared / Psuedo R-Squared	0.249	0.433	0.331	0.559
N (mine-periods)	166,010	159,811	95,383	88,563
Number of Unique Mines	26,259	21,461	26,203	20,014

Notes: This table reports results from our analysis of the effect of MSD on citation rates using both OLS and Poisson regressions. The sample period is from 2002 to 2013. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. All regressions include mine and year fixed effects. Z-statistics, reported in parentheses, are based on standard errors estimated by block-bootstrap at the mine-owner level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 4: Effect of MSD on Severe and Not-Severe Citation Rates

Dependent Variable: Citations Measured over Two-year Periods	*Severe Citations* *(1)*	*Not-Severe Citations* *(2)*
MSD	-0.232***	-0.063**
	(-3.51)	(-2.49)
Fixed Effects:		
Mine	Yes	Yes
Year	Yes	Yes
R-squared / Psuedo R-Squared	0.552	0.538
N (mine-two-year-periods)	79,366	88,188
Number of Unique Mines	17,333	19,873

Notes: This table reports results from our analysis of the effect of MSD on *Severe* and *Not-Severe* citation rates using Poisson regressions. The sample period is from 2002 to 2013. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. All regressions include mine and year fixed effects. Z-statistics, reported in parentheses, are based on standard errors estimated by block-bootstrap at the mine-owner level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 5: Effect of MSD on Injury Rates

Dependent Variable: Injury Rates Measured over One- or Two-year Periods	*One-year Periods*		*Two-year Periods*	
	OLS	*Poisson*	*OLS*	*Poisson*
	(1)	*(2)*	*(3)*	*(4)*
MSD	-0.196**	-0.130**	-0.231***	-0.130**
	(-2.43)	(-2.35)	(-2.91)	(-2.28)
Fixed Effects:				
Mine	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
R-squared / Pseudo R-Squared	0.191	0.488	0.257	0.598
N (mine-periods)	57,888	36,584	35,798	21,769
Number of Unique Mines	10,489	5,010	10,459	4,801

Notes: This table reports results from our analysis of the effect of MSD on injury rates using both OLS and Poisson regressions. The sample period is from 2002 to 2013. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. All regressions include mine and year fixed effects. Z-statistics, reported in parentheses, are based on standard errors estimated by block-bootstrap at the mine-owner level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 6: Effect of MSD on Labor Productivity, Citations, and Injuries in Coal Mines

	Labor Productivity	*Citation Rates*	*Injury Rates*
	(1)	*(2)*	*(3)*
MSD	-0.074**	-0.090**	-0.120
	(-2.50)	(-2.32)	(-1.31)
Fixed Effects:			
Mine	Yes	Yes	Yes
Year	Yes	Yes	Yes
R-squared	0.778	0.649	0.605
N (mine-periods)	6,961	14,098	6,018
Number of Unique Mines	1,726	3,557	1,530

Notes: This table reports results from our analysis of the effect of MSD on labor productivity using an OLS regression and replicates the analyses for citations and injuries from Tables 3 and 5, restricting the sample to coal mines using Poisson regression over two-year periods. The labor productivity sample includes annual coal mine observations over the period from 2006 to 2013. The citation and injury sample is identical to Tables 3 and 5 except we restrict the sample to coal mines. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. The regressions include mine and year fixed effects. Z-statistics, reported in parentheses, are based on standard errors estimated by block-bootstrap at the mine-owner level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 7: Main Results for the Subsample where MSHA Website and MSD Information is Similar

	Citation Rates	*Injury Rates*	*Labor Productivity*
	(1)	*(2)*	*(3)*
MSD	-0.139***	-0.146***	-0.059*
	(-4.36)	(-2.62)	(-1.75)
Fixed Effects:			
Mine	Yes	Yes	Yes
Year	Yes	Yes	Yes
Pseudo R-squared	0.564	0.608	0.788
N (mine-periods)	85,046	19,419	6,182
Number of Unique Mines	19,578	4,409	1,633

Notes: This table reports results from our main analysis of the real effects of MSD excluding the subset of MSD mines where the SEC filer's and legal owner's names are not virtually identical. We report results for citations and injury rates measured over two-year periods from 2002 to 2013 and for labor productivity measured annually from 2006 to 2013. In Columns (1) and (2), we estimate citation and injury rate effects using Poisson regressions measured over two-year periods. In Column (3), we estimate labor productivity effects using OLS regressions measured over one-year periods. *MSD* is an indicator coded as one after Dodd-Frank for mines disclosed in financial reports. We provide a detailed description of the variables in the notes to Table 2 and describe our data collection procedures in Appendix C. All regressions include mine and year fixed effects. Z-statistics, reported in parentheses, are based on standard errors estimated by block-bootstrap at the mine-owner level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.

Table 8: Market Reactions to Imminent Danger Orders

	Website Only (Pre Dodd-Frank)		*Website & Form-8K (Post Dodd-Frank)*		*Effect of Form-8K (Post minus Pre)*	
	Mean	*Median*	*Mean*	*Median*	*Mean*	*Median*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
All Firms Subject to Dodd-Frank:						
CAR - Market Adjusted	0.01%	0.30%	-1.54%***	-1.10%***	-1.55%***	-1.40%***
	(0.04)	(0.67)	(-3.21)	(-3.60)	(-2.74)	(-3.25)
CAR - Industry Adjusted	-0.07%	-0.01%	-1.18%***	-0.81%***	-1.11%**	-0.80%**
	(-0.28)	(-0.34)	(-2.63)	(-2.74)	(-2.15)	(-2.41)
N (IDO disclosures)	754		245		999	
Coal Firms Subject to Dodd-Frank:						
CAR - Market Adjusted	0.19%	0.74%	-2.87%***	-2.67%***	-3.06%***	-3.41%***
	(0.41)	(0.89)	(-3.34)	(-3.86)	(-3.26)	(-3.60)
N (IDO disclosures)	340		112		452	
Mining Firms Subject to Dodd-Frank:						
CAR - Market Adjusted	0.16%	0.46%	-2.06%***	-1.94%***	-2.21%***	-2.40%***
	(0.43)	(1.10)	(-3.24)	(-3.81)	(-3.06)	(-3.64)
N (IDO disclosures)	500		178		678	
Non-Mining Firms Subject to Dodd-Frank:						
CAR - Market Adjusted	-0.28%	-0.02%	-0.16%	-0.01%	0.12%	0.01%
	(-0.65)	(-0.45)	(-0.36)	(-0.28)	(0.13)	(0.03)
N (IDO disclosures)	254		67		321	

Notes: This table reports average and median cumulative abnormal returns (CARs) around the disclosure of imminent danger orders (IDOs) on the MSHA website and the concurrent release of a Form 8K filing in the post Dodd-Frank period. The sample period is 2000-2014. Results are reported for all firms in our sample as well as separately for coal firms, mining firms, and non-mining firms (see the industry distribution in Table 1). We describe data collection procedures in Appendix C. *CAR - Market Adjusted* (*CAR - Industry Adjusted*) are computed using the CRSP (industry) equal-weighted return index as a benchmark over an estimation window of [t, t+5], where t denotes the IDO date. We report t-statistics (z-statistics) in parentheses for means (medians). ***, **, * denote significance at the 1%, 5% and 10% level, respectively.

Table 9: Mutual Fund Ownership Sensitivity to Imminent Danger Orders

Dependent Variable: %ΔHoldings	
Mutual Fund Sensitivity to IDOs Pre- and Post-MSD:	
IDO	-0.009***
	(-3.14)
MSD×IDO	-0.011**
	(2.52)
Incremental SRI-Fund Sensitivity to IDOs Pre- and Post-MSD:	
SRI×IDO	-0.029
	(-0.46)
MSD×SRI×IDO	-0.097
	(-0.96)
Incremental SRI Sensitivity Post-MSD:	
SRI×IDO + MSD×SRI×IDO=0	-0.126*
F(1, 16510)	[2.44]
Fixed Effects:	
Fund	Yes
Year-Quarter	Yes
Year-Quarter*SRI	Yes
Observations (Fund-Firm, Year-Quarter)	1,495,420
R-squared	0.051

Notes: This table presents the percentage change in mutual fund ownership following quarters with imminent danger orders (IDOs) disclosed on the MSHA website and the concurrent release of a Form 8K filing in the Post-Dodd-Frank period. The sample period is from 2002-2014. IDO is a binary indicator variable that takes the value of one if a firm receives an imminent danger order (IDO) in a given quarter. MSD is a binary indicator that takes the value of one if the IDO is disclosed on the MSHA website and disseminated through an 8K filing (i.e., after the Dodd-Frank Act). SRI is a binary indicator that takes the value of one if a mutual fund identifies as socially responsible. We describe the data collection procedures in Appendix C. The mutual fund data are from *Thomson Reuters' Mutual Funds* database. SRI mutual fund data is from *The Forum for Sustainable and Responsible Investment* (USSIF) (we accessed this dataset in August 2015). The regression includes mutual fund, year-quarter, and year-quarter×SRI fixed effects. T-statistics, reported in parentheses, are based on standard errors clustered at the mutual fund level. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels (two-tailed), respectively.