

## **Internet Appendix for “Capital Market Frictions and Human Capital Investment: Evidence from Workplace Safety around Regulation SHO”**

This Internet Appendix provides various robustness tests to the main results presented in “Capital Market Frictions and Human Capital Investment: Evidence from Workplace Safety around Regulation SHO.”

### ***A. Subsample analysis***

In Panel A of Internet Appendix Table A.1, we classify firms into above- and below-median groups based on their measure of product market competitiveness and conduct subsample analyses. For instance, in the case of *HHI*, we first find each two-digit SIC industry’s median *HHI* prior to the Reg SHO experiment. We then divide firms into *High HHI* or *Low HHI* groups based on whether the firm operates in an industry with *HHI* higher or lower than the pre-Reg SHO’s sample median. We find that the greater increase in injury rates at establishments belonging to pilot firms relative to those of nonpilot firms during the experiment period is more pronounced among firms facing stiffer competition in the product market. For instance, in the subsample of firms with relatively low *HHI*—that is, greater product market competition—injury rates at pilot firms’ establishments increase by 2.486 more than nonpilot firms. This increase is twice as large in magnitude in comparison to the increase among those facing relatively lower product market competition. Importantly, the Wald test statistics of 6.53 reject the null hypothesis that the coefficient estimates on the interaction terms are equal to each other across the two subsamples. Results using the other two measures of product market competition (*Product Market Similarity* and *Product Market Fluidity*) are also consistent with the notion that

stiff product market competition imposes an additional form of pressure on managers at pilot firms, inducing them to cut investment more in workplace safety.

In Panel B of Internet Appendix Table A.1, we divide firms into subsamples based on whether the firm operates in an industry with *Union Membership* (or *Bargain Agreement Coverage*, or *Labor Intensity*) higher or lower than the pre-Reg SHO's sample median. Overall, our results in this section suggest that managers facing short-selling pressure cut investment in workplace safety significantly more when the employees have a low bargaining power and when employees are a relatively insignificant factor in the production process.

In Panel C of Internet Appendix Table A.1, we employ the two most widely used indexes developed by Whited and Wu (2006) (WW) and Kaplan and Zingales (1997) (KZ) for financial constraints. To classify firms as financially constrained, we sort all firms into two groups based on whether a firm's measure of financing constraint lies above or below the median in the pre-Reg SHO period. Regardless of the measure of financial constraint we employ, the effect of short-selling pressure on workplace investment in financially constrained firms is at least twice as large in magnitude compared to that in nonconstrained firms.

In Panel D of Internet Appendix Table A.1, we employ four different measures of corporate governance. Our first measure is *Institutional Ownership*, which we obtain from 13F filings. It has long been documented that institutional shareholders are an effective disciplinary force exerting more monitoring effort (e.g., Burkart, Gromb and Panunzi, 1997; Chen, Harford and Li, 2007). The second measure is *% of IndBoard*, the percentage of independent directors (e.g., Core, Holthausen and Larcker, 1999). We obtain this information from Institutional Shareholder Services (ISS, formerly known as RiskMetrics).

The two final measures are the metrics of overall corporate governance—G-index developed by Gompers, Ishii and Metrick (2003) and E-index developed by Bebchuk, Cohen and Ferrell (2009). We find that the greater increase in injury rates at pilot firms relative to nonpilot firms during the experiment period is primarily concentrated among those with poor corporate governance mechanisms. None of the coefficients on the interaction term is statistically significant for firms with good corporate governance.

### ***B. Falsification tests***

While our main results suggest that firms experiencing an increase in short-selling pressure cut their investment in workplace safety, there is still a potential concern that our results could be driven by unobservable confounding effects.<sup>1</sup> We perform two types of falsification tests to address this concern. In the first type of falsification test, we keep the experiment period unchanged but randomly select firms to receive the placebo treatments. By design, some of these selected firms may indeed have been selected as the pilot firms in reality, while others may not. Our second type of placebo treatments keeps the set of pilot firms unchanged but randomly assigns them to different treatment periods—for example, 1995–1997 and 1998–2000 for falsified pre- and post-event period, respectively.<sup>2</sup> The first falsification test attempts to address the concern that our results could be attributable to other unobservable factors associated with the treated sample. The second falsification

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<sup>1</sup> We find from Panel C of Table 1 that the pilot and nonpilot firms are not different in terms of firm characteristics prior to the implementation of Reg SHO. This alleviates the concern to some extent that our difference-in-differences results could be driven by different firm characteristics between the two groups.

<sup>2</sup> OSHA's ODI program covers 1996–2011. In 2002, OSHA's recording method dramatically changed. That makes the injury data in 1996–2001 not comparable to the data in 2002–2011. In our main results, we use the post-2002 data. In the falsification test, we use the 1996–2001 data from OSHA.

test, on the other hand, deals with the possibility that our documented results are driven by time trends that cause the pilot firms to behave in a certain way.

We present the results of these analyses in Internet Appendix Table A.2. Panel A includes the results from the first falsification test. Following our main specifications, we include the same set of control variables, both at the firm and establishment levels, as well as the same combination of fixed effects. Across all specifications, we observe a small and insignificant coefficient on the interaction term  $Pseudo-Pilot_{j,t} \times During_t$ . Panel B shows a similar pattern: none of the coefficients on the interaction term  $Pilot_{j,t} \times Pseudo-During_t$  is significant. Overall, the null results of these falsification tests provide additional assurance that our main effects are indeed the results due to the policy experiment as opposed to other omitted factors.

### ***C. Alternative models and alternative injury proxies***

In this section, we reestimate the impact of the policy experiment employing alternative regression specification models as well as alternative definitions of workplace injury rates. Internet Appendix Table A.3 presents the results using Poisson regressions and negative binomial regressions. In those regressions, our dependent variable becomes *Total Case*, which is the sum of injuries and illnesses that result in days away from work or transfer and other recordable cases. Overall, the results are similar to our main finding that the pilot firms experience a significant increase in injury rates during the experiment period.

In Internet Appendix Table A.4, we follow OSHA's two alternative definitions on injury rates using alternative measures as the dependent variable, and reestimate our

main specification. Specifically, we use days away, restricted, or transferred (*DART*) and days away from work (*DAFWII*) to substitute for the total case rate and find similar effects from the Reg SHO experiment on these alternative measures of work-related injury rates.

Finally, we reestimate our main specification based on the severity of injury incidents. We classify the death cases as more severe issues than nondeath cases. We then reestimate our main regression models to test the Reg SHO effect on these two types of injury issues, and the results are reported in Internet Appendix Table A.5. It turns out that the pilot firms' increase in injury rates are driven by the nondeath cases.<sup>3</sup> This helps alleviate the concern that managers' reduction in workplace safety investments could lead to more vulnerability to the pilot firms, which are already easier to be targeted by short sellers. Our results imply that Reg SHO is only effective in less severe workplace injuries but not on severe injuries such as deaths. Managers would take efforts to avoid severe safety cases since such issues could end up with more influential public negativity.

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<sup>3</sup> In an untabulated table, we show that when the dependent variables are death cases, the coefficient estimate on the interaction term is statistically insignificant. The magnitude of the coefficient estimate is also close to zero, suggesting a very marginal impact on death cases.

## Internet Appendix Table IA.1

### **Subsample analysis**

This table presents the results of difference-in-differences (DiD) tests that use subsamples. The sample consists of establishments from Occupational Safety and Health Administration (OSHA) during 2002–2008 (excluding 2005) that belong to nonfinancial and nonutility firms. In all regressions, the dependent variable is the next year’s total case rate (*TCR*), which is the number of injuries and illnesses divided by the number of hours worked by all employees in a given establishment-year, then multiplied by 200,000. *Pilot* is a dummy variable that equals one for treatment group if a stock is designated as a pilot stock during the Regulation SHO program, and zero otherwise. *During* is a dummy variable that equals one for the period during Regulation SHO, and zero for the period before Regulation SHO. In Panel A, the subsamples are defined based on product market metrics. One firm is defined as in “Low” *Product Market HHI* group if in the pre–Reg SHO period, the firm is in an industry with lower than pre–Reg SHO period’s sample median of *Product Market HHI*, where industry is based on two-digit SIC codes; otherwise, a firm is defined as in “High” *Product Market HHI* group. Same token applies to *Product Market Similarity* and *Product Market Fluidity*. In Panel B, one firm is defined as in “Low” *Union Membership* group if in the pre–Reg SHO period, the firm is in an industry with lower than pre–Reg SHO period’s sample median of *Union Membership*, where industry is based on two-digit SIC codes; otherwise, a firm is defined as in “High” *Union Membership* group. Same token applies to *Bargain Agreement Coverage* and *Labor Intensity*. In Panel C, one firm is defined as in “Low” *KZ Index* group if in the pre–Reg SHO period, the firm’s *KZ Index* is lower than pre–Reg SHO period’s sample median of *KZ Index*; otherwise, a firm is defined as in “High” *KZ Index* group. Same token applies to *WW Index*. In Panel D, one firm is defined as in “Low” *Inst. Ownership* group if in the pre–Reg SHO period, the firm’s institutional ownership is lower than its pre–Reg SHO period’s sample median; otherwise, a firm is defined as in “High” *Inst. Ownership* group. Same token applies to the percentage of independent directors (*% of IndBoard*) and two corporate governance indexes (*G-Index* and *E-Index*). We include all the firm- and establishment-specific variables as in Table 2 but do not report for brevity. Definitions of other variables are in Appendix A. *P*-values based on robust standard errors clustered at firm level are reported in parentheses under the corresponding estimated coefficients. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

*Panel A. Effect of product market competition*

Dependent Variable	Product Market HHI		Product Market Similarity		Product Market Fluidity	
	Low	High	High	Low	High	Low
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>
<i>Pilot</i> × <i>During</i>	2.486** (0.027)	1.208** (0.012)	2.451** (0.012)	1.003** (0.012)	3.181*** (0.002)	0.385 (0.407)
<i>During</i>	-2.549** (0.044)	-2.386*** (0.000)	-2.507** (0.014)	-2.302*** (0.000)	-2.747*** (0.003)	-1.532*** (0.000)
Wald Test	$\chi^2 = 6.53^{***}$ ( <i>P</i> -value = 0.001)		$\chi^2 = 13.23^{***}$ ( <i>P</i> -value = 0.000)		$\chi^2 = 40.61^{***}$ ( <i>P</i> -value = 0.000)	
Control Variables	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Num. of Observations	7,819	8,421	8,389	7,866	9,066	7,189
Adjusted R <sup>2</sup>	0.454	0.418	0.424	0.452	0.428	0.343

*Panel B. Effect of labor market condition*

Dependent Variable	Union Membership		Bargain Agreement Coverage		Labor Intensity	
	Low	High	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>	<i>TCR</i> <sub><i>t</i>+1</sub>
<i>Pilot</i> × <i>During</i>	2.453** (0.018)	0.950 (0.104)	2.444** (0.018)	0.997* (0.087)	2.384** (0.030)	0.812 (0.143)
<i>During</i>	-3.624*** (0.000)	-2.297*** (0.000)	-3.624*** (0.000)	-2.313*** (0.000)	-3.116*** (0.001)	-2.357*** (0.000)
Wald Test	$\chi^2 = 14.47^{***}$ ( <i>P</i> -value = 0.000)		$\chi^2 = 13.40^{***}$ ( <i>P</i> -value = 0.000)		$\chi^2 = 14.66^{***}$ ( <i>P</i> -value = 0.000)	
Control Variables	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES
Num. of Observations	7,582	9,182	7,576	9,189	6,498	10,323
Adjusted R <sup>2</sup>	0.457	0.420	0.456	0.419	0.363	0.457

Panel C. Effect of labor financial constraints

Dependent Variable	KZ Index		WW Index	
	High (1)	Low (2)	High (3)	Low (4)
<i>Pilot</i> × <i>During</i>	2.088** (0.037)	0.986 (0.189)	1.952*** (0.001)	0.675 (0.386)
<i>During</i>	-3.280*** (0.002)	-1.794*** (0.000)	-2.840*** (0.000)	-2.178*** (0.009)
Wald Test	$\chi^2 = 7.69^{***}$ (P-value = 0.006)		$\chi^2 = 9.49^{***}$ (P-value = 0.002)	
Control Variables	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES
Num. of Observations	7,557	8,816	7,621	8,545
Adjusted R <sup>2</sup>	0.388	0.431	0.445	0.388

Panel D. Effect of corporate governance

Dependent Variable	Inst. Ownership		% of IndBoard		G-Index		E-Index	
	Low (1)	High (2)	Low (3)	High (4)	High (5)	Low (6)	High (7)	Low (8)
<i>Pilot</i> × <i>During</i>	2.254*** (0.000)	0.771 (0.375)	2.165*** (0.002)	1.365 (0.116)	2.348*** (0.000)	0.157 (0.855)	2.022*** (0.001)	0.417 (0.646)
<i>During</i>	-2.734*** (0.000)	-2.657*** (0.002)	-2.878*** (0.000)	-3.021*** (0.000)	-2.784*** (0.000)	-2.673** (0.013)	-2.598*** (0.000)	-3.145*** (0.003)
Wald Test	$\chi^2 = 11.10^{**}$ (P-value = 0.001)		$\chi^2 = 2.60^*$ (P-value = 0.010)		$\chi^2 = 22.41^*$ (P-value = 0.000)		$\chi^2 = 11.36^{***}$ (P-value = 0.001)	
Control Variables	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Num. of Observations	8,582	8,273	7,906	6,973	8,402	6,345	8,384	5,863
Adjusted R <sup>2</sup>	0.433	0.423	0.381	0.490	0.418	0.458	0.419	0.489



Internet Appendix Table IA.2

**Placebo tests**

This table presents the two placebo tests following the baseline regression models. The dependent variable is the next year's total case rate (*TCR*), which is the number of injuries and illnesses divided by the number of hours worked by all employees in a given establishment-year, then multiplied by 200,000. *During* is a dummy variable that equals one for the period during Regulation SHO (i.e., 2005–2007) and zero for the period before Regulation SHO (i.e., 2001–2003). *Pseudo-Pilot* is a dummy variable that equals one if a firm is randomly assigned as the treatment group, and zero otherwise. *Pilot* is a dummy variable that equals one for treatment group if a stock is designated as a pilot stock during the Regulation SHO program, and zero otherwise. *Pseudo-During* is a dummy variable that equals one for observations in the arbitrarily defined pre-event fiscal year 1995–1997 and equals zero for observations in the arbitrarily defined post-event fiscal year 1998–2000. Other variables are defined in Appendix A. *P*-values based on robust standard errors clustered at firm level are reported in parentheses under the corresponding estimated coefficients. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

*Panel A. Pseudo-pilot firms*

	(1)	(2)	(3)	(4)	(5)
<i>Pseudo-Pilot</i> × <i>During</i>	-1.321 (0.168)	-1.362 (0.147)	-1.296 (0.187)	-1.424 (0.200)	-1.215 (0.271)
<i>During</i>	-1.467*** (0.003)		-1.405*** (0.005)		-1.795*** (0.001)
Control Variables	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	NO	NO
Establishment FE	NO	NO	NO	YES	YES
Industry FE	NO	NO	YES	NO	YES
Year FE	NO	YES	NO	YES	NO
Num. of Observations	17,071	17,071	17,071	17,071	17,071
Adjusted R <sup>2</sup>	0.417	0.419	0.425	0.629	0.624

*Panel B. Pseudo-event years*

	(1)	(2)	(3)	(4)	(5)
<i>Pilot</i> × <i>Pseudo-During</i>	0.458 (0.508)	0.594 (0.339)	0.534 (0.427)	0.139 (0.821)	0.430 (0.572)
<i>Pseudo-During</i>	-2.796*** (0.000)		-2.904*** (0.000)		-3.333*** (0.000)
Control Variables	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	NO	NO
Establishment FE	NO	NO	NO	YES	YES
Industry FE	NO	NO	YES	NO	YES
Year FE	NO	YES	NO	YES	NO
Num. of Observations	15,545	15,545	15,545	15,545	15,545
Adjusted R <sup>2</sup>	0.372	0.397	0.379	0.652	0.614

Internet Appendix Table IA.3

**Alternative regression models**

This table presents the results of Poisson regressions and negative binomial regression that estimate the effect of Regulation SHO on workplace safety. The sample consists of establishments from Occupational Safety and Health Administration (OSHA) during 2002–2008 (excluding 2005) that belong to nonfinancial and nonutility firms. For all specifications, the dependent variable is the next year’s *Total Case*, which is the sum of injuries and illnesses that result in days away from work or transfer and other recordable cases. In Columns (1)–(3), we run Poisson regressions, and in Columns (4)–(6), we run negative binomial regressions. *Pilot* is a dummy variable that equals one for treatment group if a stock is designated as a pilot stock during the Regulation SHO program, and zero otherwise. *During* is a dummy variable that equals one for the period during Regulation SHO (i.e., 2005–2007), and zero for the period before Regulation SHO (i.e., 2001–2003). We include all the firm- and establishment-specific variables as those in Table 2 but do not report for brevity. Definitions of other variables are in Appendix A. *P*-values based on robust standard errors clustered at firm level are reported in parentheses under the corresponding estimated coefficients. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	<i>Total Case</i> $t+1$					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pilot</i> × <i>During</i>	0.033*** (0.000)	0.034*** (0.000)	0.003 (0.730)	0.086*** (0.000)	0.112*** (0.000)	0.061*** (0.000)
<i>During</i>	−0.047*** (0.000)	−0.043*** (0.000)	−0.036*** (0.000)	−0.119*** (0.000)	−0.134*** (0.000)	−0.119*** (0.000)
Control Variables	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	NO	YES	YES	NO
Establishment FE	NO	NO	YES	NO	NO	YES
Industry FE	NO	YES	YES	NO	YES	YES
Regression Model	Poisson	Poisson	Poisson	Negative binomial	Negative binomial	Negative binomial
Num. of Obs.	17,071	17,071	17,071	17,071	17,071	17,071

Internet Appendix Table IA.4

**Alternative injury rates**

This table presents the results of difference-in-differences (DiD) tests on the effect of Regulation SHO on workplace safety. The sample consists of establishments from the Occupational Safety and Health Administration (OSHA) during 2002–2008 (excluding 2005) that belong to nonfinancial and nonutility firms. In Columns (1)–(3), the dependent variable is the next year’s injury rate with days away, restricted, or transferred (*DART*), which is the number of injuries and illnesses with days away from work and with job restriction or transfer divided by the number of hours worked by all employees in a given establishment-year, then multiplied by 200,000. In Columns (4)–(6), the dependent variable is the next year’s injury rate with days away from work (*DAFWII*), which is the number of injuries and illnesses with days away from work divided by the number of hours worked by all employees in a given establishment-year, then multiplied by 200,000. We include all the firm- and establishment-specific variables as those in Table 2 but do not report for brevity. Definitions of other variables are in Appendix A. *P*-values based on robust standard errors clustered at firm level are reported in parentheses under the corresponding estimated coefficients. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

Dependent Variable	<i>DART</i> <sub><i>t</i>+1</sub>			<i>DAFWII</i> <sub><i>t</i>+1</sub>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pilot</i> × <i>During</i>	1.157** (0.019)	1.096** (0.031)	0.895* (0.083)	0.863** (0.020)	0.868** (0.021)	0.872** (0.039)
<i>During</i>	-1.588*** (0.000)	-1.536*** (0.000)	-1.749*** (0.000)	-0.903*** (0.001)	-0.883*** (0.001)	-1.023*** (0.001)
Control Variables	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	NO	YES	YES	NO
Establishment FE	NO	NO	YES	NO	NO	YES
Industry FE	NO	YES	YES	NO	YES	YES
Num. of Observations	17,071	17,071	17,071	17,071	17,071	17,071

Internet Appendix Table IA.5

**Nondeath injuries**

This table presents the results of difference-in-differences (DID) tests that estimate Equation (1). The dependent variable is the next year's nondeath injury rates, which are the number of nondeath injuries and illnesses scaled by the number of hours worked by all employees in a given establishment-year, then multiplied by 200,000. *Pilot* is a dummy variable that equals one for treatment group if a stock is designated as a pilot stock during the Regulation SHO program, and zero otherwise. *During* is a dummy variable that equals one for the period during Regulation SHO and zero for the period before Regulation SHO. We include all the firm- and establishment-specific variables as those in Table 2 but do not report for brevity. Definitions of other variables are in Appendix A. *P*-values based on robust standard errors clustered at firm level are reported in parentheses under the corresponding estimated coefficients. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)
<i>Pilot</i> × <i>During</i>	1.677** (0.026)	1.650** (0.032)	1.478* (0.057)
<i>During</i>	-2.582*** (0.000)	-2.493*** (0.000)	-2.737*** (0.000)
Control Variables	YES	YES	YES
Firm FE	YES	YES	NO
Establishment FE	NO	NO	YES
Industry FE	NO	YES	YES
Num. of Observations	17,071	17,071	17,071
Adjusted R <sup>2</sup>	0.418	0.426	0.626