Internet Appendix for
"Short Sellers and Financial Misconduct"[1]

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This appendix reports on extensions, sensitivity tests, and goodness-of-fit tests of the results reported in "Short Sellers and Financial Misconduct." Section I presents a tabular summary of the results in the paper that are new to the literature. Section II summarizes the overall pattern of abnormal short selling around the initial revelation of financial misconduct. Section III shows that the paper's results are robust to how abnormal short interest is measured. We also argue that the measures used in the paper provide greater insight into the factors that affect short selling than alternative measures that have been used. Section IV reports evidence that our measures of misconduct severity are, in fact, related to the size of the stock price drop upon the initial revelation of financial misconduct. Section V reports on alternative measures of misconduct severity. Section VI reports on tests of how the *change* in abnormal short interest is related to the severity of the misconduct. In section VII we consider, and reject, a conjecture that short selling is associated with, or causes, a stock price overreaction when news of the misconduct is first reported. Section VIII reports on sensitivity tests for the results that are reported in Table VI of the paper. Section IX reports on goodness-of-fit tests for the results that are reported in Table VII of the paper. Section X reports on alternate measures of the net external benefits of short selling for uninformed investors. And section XI reports on a conjecture that short selling by insiders accounts for some of the short selling that we observe before the public revelation of financial misconduct.

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[1] Citation format: Karpoff, Jonathan M., and Xiaoxia Lou, 2010, Internet Appendix for "Short Sellers and Financial Misconduct," *Journal of Finance* 65, 1879-1913, http://www.afajof.org/supplements.asp. Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing material) should be directed to the authors of the article.

I. A Tabular Summary of Results and Contribution

Table IA.I summarizes the tests and results reported in the main paper. The paper raises two main questions, reports on three types of tests for each question, and concludes with a simple answer to each question.

The first question we address is whether short sellers detect financial misrepresentation. In the first test (Table IV and Figure 2 of the paper), we report that abnormal short interest increases steadily in the 19 months before the misconduct is revealed to the public, and then unwinds in the subsequent 20 months. The second test (Table V) reveals that short selling is sensitive to measures of the misconduct severity. The third test (Table VI) reports that short interest concentrates in firm-months in which it subsequently is revealed that the firm was misrepresenting its financial statements. Together, these results indicate that short sellers are proficient at identifying financial misrepresentation before it is publicly revealed. Because we control for short interest driven by firm size, book-to-market, institutional ownership, share turnover, insider selling, and total accruals, we infer that short sellers are not simply basing their positions on such controls. For example, they are not simply chasing accruals. We infer that short sellers have superior private information or ability to process public information about the financial misconduct. Anecdotes from Einhorn (2008) indicate that at least some short selling before the revelation of financial misconduct is driven by short sellers' ability to process public information.

The second question addressed in the paper is whether short selling generates external costs or benefits for other investors. In our first test of this question (Table VII) we do not find support for one conjecture, which is that short selling imposes external costs because it helps trigger a cascade of selling when bad news is publicly revealed. The second test (Table VIII) reports that short interest is positively related to how quickly the misconduct is revealed to the

public. Our point estimate is that time to discovery is shortened by eight months moving from the 25th to the 75th percentile of short interest in month 12 of the violation period. Our third test (Table IX) measures the size of the transfers to and from uninformed investors through their price impact. We conclude that short selling has negligible effects on uninformed investors in the median firm. In some firms, however, short sellers generate large savings for uninformed investors, so much so that the average savings is about 1% of the firm's market capitalization.

There is not much overlap between the six main results summarized in Table IA.I and prior research. The largest overlap regards result #1: as discussed in the paper, Dechow, Sloan, and Sweeney (1996), Desai, Krishnamurthy, and Venkataraman (2006), and Efendi, Kinney, and Swanson (2006) all examine short selling before some indicator of financial misconduct, for example, an earnings restatement. In addition, Desai, Krishnamurthy, and Venkataraman (2006) examine how short selling is related to accruals, which overlaps with our result #2. To our knowledge, the other tests and results have not been considered in previous papers. As argued in Section I of the paper, the KLM database also enables tests with greater power than previous tests.

II. The Overall Pattern of Abnormal Short Selling

Figure IA.1 illustrates the overall pattern of abnormal short selling (using *ABSI(1)*) around both the initiation and discovery of financial misconduct. To construct the figure, we standardize the period between the initiation and discovery of the misconduct to be 20 pseudo-months for every firm, spreading or compressing each firm's time to revelation into 20 intervals of equal length. The resulting pattern shows a build-up of abnormal short interest that begins most noticeably two months before the violation officially begins. Abnormal short interest then grows substantially during the violation period, peaking in the second month after the

misrepresentation is publicly revealed. It then decreases until, 20 (actual) months after public discovery, it reaches approximately the same level as immediately before the violation start date.

To explain the build-up of short interest before the violation start date, we conjecture that some violations begin before the dates identified by the SEC as the official start dates. The SEC tends to limit its enforcement activities to firms and periods during which it has substantial evidence of misconduct, so it probably is conservative when it identifies the start of the violation period.

III. On the Measurement of Abnormal Short Interest

Our measures of abnormal short interest are based on prior research that shows that short interest is related to such firm characteristics as size, book-to-market, and momentum (e.g., Dechow et al. (2001), Asquith, Pathak, and Ritter (2005), and Duarte, Lou, and Sadka (2008)). Nonetheless, we conducted many tests to examine the reasonableness of our abnormal short interest measures and the robustness of the results.

For example, to calculate the three short interest benchmarks, $E(SI_{it}(j))$, $j = 1, 2, 3$, we use dummy variables to group firms into three categories for most control variables (e.g., high, medium, or low book-to-market). *Total accruals* and *insider selling* are measured as continuous variables. The results are not sensitive to the use of dummy variables or continuous measurements for any of our control variables. For example, using continuous variables for each control variable, the results are similar to those reported in the paper. Using a continuous measure for momentum or share turnover, however, yields one interesting result. In the month of a firm's public revelation date, momentum typically is very small (large negative returns) and share turnover typically is very large. Using continuous measures of momentum or share turnover causes large fluctuations in expected short interest in month +1, causing abnormal short

interest in month +1 also to be highly variable. The results for all other months are similar to those reported in the tables.

We also examined the sensitivity of the results to different measures of abnormal short interest. Table IA.II reports the results using four alternate measures. The first three differ in the way that expected short interest, $E(SI_{it})$, is defined and measured. In Model 1, $E(SI_{it})$ includes all of the controls as in *ABSI(3)* plus a control for the dispersion in analysts' forecasted earnings. Data on analysts' forecasts, which are from I/B/E/S, limit the sample size. But the results are similar to those in Table IV in the paper.

In Model 2, $E(SI_{it})$ includes all of the controls as in *ABSI(1)* plus a control for the level of short interest before the violation period. Each firm in the sample is paired with a single benchmark firm. The benchmark firm is the one firm in the same size, book-to-market, momentum, and industry portfolio that has short interest closest to that of the sample firm in the month before the start of the violation period. Abnormal short interest in any month t is the difference between the sample firm's short interest and that of its matched control firm. In Model 3, $E(SI_{it})$ is defined as the sample firm's mean level of short interest measured in the month before the beginning of its violation period. The results from Models 1 through 3 all are similar to those reported in the paper using *ABSI(j), j = 1,2,3*.

In Model 4, abnormal short interest is defined as a binary variable, *D(ABSI)*, similar to the notion used by Dyck, Morse, and Zingales (2008): *D(ABSI)* is set equal to one if it exceeds the firm's average short interest in the 12 months before its violation period by at least three standard deviations (standard deviation is measured in the same 12-month pre-violation period). The numbers reported in the table are the fraction of firms in each event month t for which *D(ABSI)* = 1. The *p*-values are from a chi-squared test with one degree of freedom of the null hypothesis that the fraction of firms for which *D(ABSI)* = 0 is equal to or less than 0.15%, which

is the probability that a variable with the normal distribution falls more than three standard deviations above the mean.

All four alternate measures yield similar inferences. In each case, abnormal short interest builds during the 19 months before public revelation of the misconduct. It is positive and statistically significant in months −1 and 0, peaks shortly after the month of public revelation, and winds down in the following months.

IV. Abnormal Returns and Misconduct Severity

Table IA.III shows that our three primary measures of misconduct severity (*Fraud, Insider trading charges, and Total accruals*) are negatively and significantly related to the one-day abnormal stock return on the day of initial public revelation. This is consistent with the premise that each is a good proxy for the severity of misconduct. If these variables are thought of as instruments for the abnormal stock return, then Table IA.III indicates that the instruments meet the relevance exclusion for a good instrumental variable.

V. Additional Measures of Misconduct Severity

Table IA.IV is similar to Table V in the paper, except that we introduce four additional measures of misconduct severity. The first, *Regulatory fines*, is the size of the regulatory fine imposed on the firm for financial misrepresentation. The second, *Private lawsuit award*, is the size of the settlement if the misrepresentation prompted a private securities class action lawsuit. The third, *Non-monetary penalties*, is Karpoff, Lee, and Martin's (2009) index of non-monetary regulatory sanctions for financial misconduct. Data for all three are from the KLM database.

The results using *Regulatory fines* or *Private lawsuit award* are similar to those reported in the paper, indicating that $ABSI(j)_{i,-1}$ is positively related to the severity of the misconduct. In

contrast, *ABSI(j)$_{i,-1}$* is not significantly related to *Non-monetary penalties*. This is consistent with findings reported by Karpoff, Lee, and Martin (2009) that non-monetary sanctions are a relatively noisy measure of misconduct severity. Notice that when these three additional measures are included, as in Model 4, our three main measures of severity all are positively and significantly related to *ABSI(j)$_{i,-1}$*.

The fourth additional measure of misconduct severity is a dummy variable that equals one if the firm subsequently declares bankruptcy during its enforcement period. Karpoff, Lee, and Martin (2008b) find that the firm's reputation loss is both large and positively related to the severity of the misconduct. This suggests that egregious violations are more likely to impose such large losses on the firm as to trigger bankruptcy, and so *Bankruptcy* is a measure of the severity of the misconduct. Consistent with this conjecture, short interest in month −1 is larger for bankruptcy firms than for non-bankruptcy firms.

A referee pointed out that Campbell, Hilscher, and Szilagy (*Journal of Finance*, December 2008) find that financially distressed stocks have abnormally low returns, and suggested that the short selling we measure might anticipate poor performance, not financial misconduct – or that it anticipates financial misconduct and not the subsequent poor performance. To examine this issue we partitioned the sample into firms that subsequently declared bankruptcy and those that did not. Abnormal short interest is higher in the bankruptcy group, but the build-up before public revelation is positive and statistically significant in both groups. This indicates that abnormal short interest is driven at least in part by financial misrepresentation. We have not investigated the firm characteristics that lead to bankruptcy, so we cannot address whether any short selling before bankruptcy is actually due to financial misconduct. A broader inquiry into this issue would need to examine the relationships between short selling, financial performance, misconduct, and bankruptcy.

VI. The Relation between Misconduct Severity and the Build-up of Short Interest

Table V in the paper reports how short interest in the month before public revelation is positively related to the severity of the misconduct. We also examined how the *change* in abnormal short interest from month -19 to month -1 is related to the severity of the misconduct. Specifically, we estimate the equation

$$\Delta ABSI(j)_{i,[-19,-1]} = \gamma_0 + \gamma_1 Severity_{i,-1} + \gamma_2 Controls_{i,-1} + e_i, \, j = 1,2,3 \quad \text{(IA-1)}$$

The results are reported in Table IA.V. All three proxies are positively related to the cumulative change in abnormal short interest. The coefficients on *Fraud* and *Total accruals* are statistically significant, both when considered separately and when all three proxies are considered together, as in Model 4.

Overall, the results in Tables V and IA.V indicate that short interest is positively related to the severity of the misrepresentation that subsequently is revealed to the public. Short sellers not only pre-identify firms that get into trouble for misrepresenting their financial statements, but they also take larger positions when the misrepresentation is particularly egregious. That is, short sellers appear to anticipate both the existence and severity of financial misrepresentation.

VII. Stock Returns after Public Revelation

We also examined the stock price behavior after the initial disclosure of misconduct. If short selling causes overreaction – either in the short term or long term – then we should see differences in the stock price paths of our sample firms that correspond to differences in short interest. The results, however, do not support an overreaction story.

Figure IA.II reports a representative test. The blue (upper) line represents the cumulative abnormal one-day abnormal stock return for the portfolio of sample firms with lower-than-average *ABSI(1)* in month −1. The gray (lower) line represents the cumulative return for firms

with higher-than-average *ABSI(1)*. The abnormal return on the day of public revelation is more negative for the high-*ABSI(1)* group. This is consistent with our findings that abnormal short interest is positively related to misconduct severity, and severity is related to the magnitude of the stock price drop on day 0. After day 0, however, the longer-term abnormal returns are not significantly different from each other, nor are they significantly different from zero. There is no price reversal after day 0 in either group.

VIII. Sensitivity Test for Table VII Results

Table IA.VI reports a variation of the test reported in Table VI of the paper. In Table VI, we define "high short interest" to consist of firm-months in which abnormal short interest is in the top 5% of the distribution of abnormal short interest. In Table IA.VI, we use a top 10% threshold to categorize firms into the "high short interest" group. The results are similar to those in Table VI. For example, in Panel A of Table IA.VI, $\chi^2 = 2877$ with a *p*-value $= 0.00$. (Using still lower thresholds, for example, the top 25%, yields similar results.) These results indicate that short interest concentrates in firm-months that subsequently are revealed to have financial misrepresentation.

IX. Short Interest and the Time to Revelation

We conducted several goodness-of-fit tests for the model used to estimate equation (8) in the paper, as described by Cleves et al. (2004). In some specifications, we find that the time to revelation is positively related to T_{it}, the number of months since the start of the violation. This indicates that the probability of uncovering misconduct in any given month *t* is negatively related to how long the misconduct has been going on. The time to revelation also is positively related to the interaction of T_{it} and abnormal short interest. This indicates that the impact of short

interest on the speed with which misconduct is discovered decreases with T_{it}. The coefficient on this interaction term, however, is small, so that the overall impact of short interest is to hasten the time to discovery. In all of the sensitivity tests we conducted, the coefficient on abnormal short interest remains negative and statistically significant.

X. Alternate Estimates of Net External Benefits

Table IX in the paper reports estimates of the external effects on uninformed investors via short sellers' impact on prices during the violation period, using *ABSI(1)* to measure abnormal short interest. Table IA.VII reports similar estimates based on *ABSI(2)* and *ABSI(3)*. The results are similar using these other two measures of abnormal short interest. Depending on the specific measure of abnormal short interest, short sellers generate external benefits for uninformed traders that average between 1.12% and 1.67% of equity value. But these benefits are concentrated in a small number of firms and they are negligible for the median firm. Short sellers make profits on their trades that average between 0.36% and 0.94% of the firm's equity value, leaving a net external benefit of between 0.19% and 1.09% of the firm's equity value. If we use a lower-bound estimate of short sellers' external costs, the measures of net benefit increase to between 0.89% and 1.53% of equity value. The overall conclusions remain the same: short sellers generate external benefits, which in the median case they internalize with their trading profits. For a small number of firms, however, the external benefits are large, indeed, large enough to affect the mean estimates. Short sellers generate net external benefits particularly when they take positions in misrepresenting firms that issue new (overpriced) shares to uninformed investors.

XI. Insider Trading and Abnormal Short Interest

A referee made the following suggestion:

"One possible interpretation of these results is that some insiders know of the misrepresentation and the likelihood of an investigation, and they short sell shares of their own firm to profit from this knowledge. This idea is supported empirically in Agrawal and Cooper (2008). Could it be the case that firms investigated for insider trading are more likely to have insider short selling, because of a disregard for insider trading rules that is associated with the culture of the firm? … One conjecture … is that short selling happens earlier for insider trading firms, perhaps before the 19 month cutoff. It might be worth displaying the pattern of short interest separately for each type of misconduct to see if insider trading firms have a different pattern of timing, especially early on."

Following the referee's suggestion, Figure IA.III partitions the sample into two groups with high and low insider selling. Abnormal short interest is relatively high for the high insider selling group in some event-months, but not before month −13. In the early months, abnormal short interest is slightly higher in the low insider selling group. This graph plots the third measure of abnormal short interest *ABSI*(3), although the results are similar using *ABSI*(1) or *ABSI*(2).

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Table IA.I
Summary of the Main Questions, Tests, and Results

Question:	Do short sellers detect financial misrepresentation?	Do they convey external benefits or costs on other investors?
Findings:	1. Abnormal short interest increases steadily before the misconduct is revealed to the public.	4. High short interest does not trigger a large price drops when the misconduct is revealed.
	2. Abnormal short interest is positively related to the severity of the misconduct.	5. Short interest is related to how quickly the misconduct is discovered by the public.
	3. Abnormal short interest in general concentrates in firm-months with misrepresentation.	6. Short sellers' price impact saves uninformed investors save roughly 1% of market cap during the violation period.
Inference:	Yes.	External benefits.

Table IA.II
Alternative Measures of Abnormal Short Interest

The table reports the abnormal short interest in the 30 months around the public revelation of financial misconduct using four alternative measures of abnormal short interest. In Model 1, normal short interest is calculated using all the controls in Model 3 of Table III plus a control for the dispersion in analysts' forecasted earnings. In Model 2, normal short interest is the short interest of the one firm in the same size, book-to-market, momentum, and industry portfolio that has the short interest level closest to that of the sample firm in the month before the start of the violation period. In Model 3, normal short interest is the sample firm's own level of short interest measured in the month before the start of the violation period. In Model 4, normal short interest is measured as the firm's mean short interest in the 12 months before its violation period plus three times the standard deviation of short interest over the same period. If a firm's short interest exceeds normal short interest, then *D(ABSI)* takes the value of one, and zero otherwise. The first column under Model 4 reports the fraction of firms for which *D(ABSI)* equals one. The *p*-value is from a chi-square test with one degree of freedom for the null hypothesis that this fraction exceeds 0.15%, which is the probability that a variable with the normal distribution falls three standard deviations above the mean.

	Model 1			Model 2			Model 3			Model 4		
Month	ABSI	N	t-stat	ABSI	N	t-stat	ABSI	N	t-stat	D(ABSI)	N	P-value
-19	0.367	118	0.98	0.455	138	1.32	0.328	196	1.57	0.302	189	<.0001
-18	0.487	125	1.31	0.476	140	1.36	-0.047	205	-0.10	0.320	197	<.0001
-17	0.599	126	1.59	0.506	139	1.38	0.128	205	0.27	0.354	198	<.0001
-16	0.788	130	2.25	0.638	149	1.94	0.208	219	0.44	0.357	210	<.0001
-15	0.669	138	2.17	0.645	154	2.21	0.196	233	0.45	0.368	223	<.0001
-14	1.086	140	3.22	0.589	158	2.23	0.192	245	0.46	0.374	235	<.0001
-13	1.143	151	3.07	0.779	165	2.84	0.384	258	0.95	0.375	248	<.0001
-12	1.439	145	3.38	0.753	161	2.52	0.465	253	1.11	0.383	243	<.0001
-11	1.685	153	3.75	0.978	170	2.97	0.789	264	1.87	0.425	254	<.0001
-10	1.622	164	3.70	0.768	181	2.42	0.842	279	2.07	0.414	268	<.0001
-9	1.623	169	3.57	0.838	180	2.59	0.964	280	2.30	0.409	269	<.0001
-8	1.572	187	3.69	0.869	186	2.69	0.954	289	2.33	0.403	278	<.0001
-7	1.607	190	3.72	0.974	192	3.02	1.022	299	2.51	0.392	288	<.0001
-6	1.791	200	4.08	1.018	191	3.05	1.019	300	2.45	0.408	289	<.0001
-5	1.981	200	4.44	0.974	195	2.87	1.096	307	2.64	0.409	296	<.0001
-4	1.771	203	4.16	0.915	194	2.69	0.910	310	2.22	0.397	300	<.0001
-3	1.844	210	4.08	0.963	194	2.71	1.052	308	2.52	0.399	298	<.0001
-2	1.722	207	3.93	0.804	188	2.27	1.175	306	2.73	0.434	295	<.0001
-1	2.073	210	4.50	0.889	189	2.43	1.218	303	2.80	0.416	293	<.0001
0	2.132	194	4.27	1.132	172	2.59	1.178	267	2.47	0.446	258	<.0001
1	2.079	171	3.80	1.183	151	3.07	1.253	241	2.58	0.440	234	<.0001
2	1.927	167	3.79	1.077	145	2.82	1.242	233	2.59	0.446	224	<.0001
3	1.913	162	3.85	0.917	142	2.21	1.114	230	2.35	0.439	221	<.0001
4	1.932	157	3.70	0.825	141	1.81	0.971	221	1.90	0.420	212	<.0001
5	1.880	156	3.50	0.782	140	1.53	1.086	217	1.94	0.438	208	<.0001
6	1.463	151	2.77	0.604	136	1.18	0.725	213	1.32	0.425	207	<.0001
7	0.979	143	2.25	0.425	139	0.91	0.535	211	0.97	0.400	205	<.0001
8	0.721	139	1.97	0.357	136	0.76	0.283	205	0.51	0.417	199	<.0001
9	0.685	136	1.89	0.35	134	0.73	0.233	202	0.42	0.408	196	<.0001
10	0.648	137	1.65	0.276	132	0.55	0.287	202	0.51	0.405	195	<.0001

Table IA.III
Abnormal Stock Returns and Misconduct Severity

The market-adjusted one-day return on the day the misconduct was publicly revealed is regressed on the three main measures of misconduct severity, *Fraud, Insider trading charges,* and *Total accruals*:

$$AR_i = a + b_1 Severity_i + b_2 Controls_i + e_i$$

All independent variables are measured at the end of the month prior to the revelation of misconduct. This table reports the estimates and corresponding *p*-value for the cross-sectional regressions.

	1	2	3	4
Severity measures:				
Fraud	-9.655			-7.862
	(0.00)			(0.00)
Insider trading charges		-11.21		-9.782
		(0.00)		(0.00)
Total accruals			-7.257	-6.340
			(0.02)	(0.16)
Control variables:				
Inst. ownership	-0.078	-0.096	-0.082	-0.074
	(0.09)	(0.03)	(0.10)	(0.10)
Size	1.384	1.603	1.321	1.172
	(0.01)	(0.00)	(0.03)	(0.03)
Book-to-market ratio	0.341	0.283	0.273	0.157
	(0.49)	(0.56)	(0.62)	(0.38)
Momentum	-0.012	-0.008	-0.012	-0.006
	(0.07)	(0.26)	(0.09)	(0.40)
Intercept	-14.75	-20.20	-20.70	-12.17
	(0.00)	(0.00)	(0.00)	(0.00)
N	355	355	287	273
Adjusted R^2	0.064	0.081	0.028	0.110

Additional Measures of Misconduct Severity

This table reports the estimates and corresponding *p*-values from cross-sectional regressions that estimate the determinants of abnormal short interest before the financial misrepresentation is publicly revealed, using four additional measures of misconduct severity:

$$ABSI(j)_{i,-1} = \gamma_0 + \gamma_1 Severity_{i,-1} + \gamma_2 Controls_{i,-1} + e_i, \, j = 1,2,3.$$

All variables are measured in the month before the misrepresentation is publicly revealed. *Regulatory fines* is the logarithm of one plus the size of the regulatory fines imposed on the firm for financial misrepresentation. *Private lawsuit award* is the logarithm of one plus the size of the settlement if the misrepresentation prompted a private securities class action lawsuit. *Non-monetary penalties* is the logarithm of one plus the Karpoff, Lee, and Martin (2009) index of non-monetary regulatory sanctions for financial misconduct. *Bankruptcy* is a dummy variable that equals one if the firm filed for bankruptcy before the end of its enforcement period.

	ABSI(1)					ABSI(2)					ABSI(3)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Severity measures:															
Regulatory fines	0.142			0.153		0.136			0.151		0.145			0.152	
	(0.01)			(0.02)		(0.01)			(0.02)		(0.01)			(0.02)	
Private lawsuit award		0.102		0.026			0.089		0.020			0.082		0.014	
		(0.01)		(0.59)			(0.02)		(0.66)			(0.06)		(0.76)	
Non-monetary penalties			0.069	-1.445				0.022	-1.464				-0.017	-1.476	
			(0.83)	(0.00)				(0.95)	(0.00)				(0.96)	(0.00)	
Bankruptcy					2.172					2.044					1.916
					(0.00)					(0.00)					(0.01)
Fraud				1.866					2.138					2.152	
				(0.06)					(0.03)					(0.03)	
Insider Trading				1.822					1.608					1.597	
				(0.04)					(0.07)					(0.07)	
Total accruals				4.635					4.263					3.856	
				(0.00)					(0.00)					(0.01)	
Control variables:															
Institutional ownership	0.087	0.084	0.090	0.092	0.090	0.072	0.069	0.074	0.078	0.074	0.079	0.078	0.082	0.077	0.082
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Size	-0.839	-0.812	-0.758	-0.825	-0.661	-0.734	-0.703	-0.656	-0.722	-0.564	-0.788	-0.757	-0.697	-0.709	-0.618
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Book-to-market ratio	0.088	0.149	0.130	0.143	0.144	0.065	0.121	0.104	0.138	0.118	0.095	0.142	0.134	0.143	0.136
	(0.53)	(0.29)	(0.36)	(0.36)	(0.30)	(0.64)	(0.38)	(0.45)	(0.37)	(0.39)	(0.55)	(0.36)	(0.40)	(0.35)	(0.38)
Momentum	0.005	0.006	0.005	0.003	0.006	0.005	0.006	0.005	0.004	0.006	0.006	0.007	0.006	0.003	0.007
	(0.38)	(0.28)	(0.37)	(0.61)	(0.26)	(0.33)	(0.25)	(0.32)	(0.49)	(0.22)	(0.31)	(0.22)	(0.29)	(0.53)	(0.23)
Intercept	1.522	1.919	2.208	1.571	1.091	1.203	1.621	1.954	1.133	0.812	1.122	1.684	2.027	1.161	0.975
	(0.07)	(0.02)	(0.04)	(0.22)	(0.22)	(0.15)	(0.04)	(0.06)	(0.37)	(0.35)	(0.23)	(0.06)	(0.08)	(0.36)	(0.31)
N	361	361	361	315	361	361	361	361	315	361	314	314	314	314	314
Adjusted R^2	0.12	0.12	0.10	0.18	0.128	0.09	0.09	0.07	0.16	0.098	0.10	0.10	0.08	0.15	0.104

Table IA.V: Determinants of the Change in Short Interest Over Months [-19,-1]

This table reports the estimates and corresponding *p*-values from cross-sectional regressions that estimate the determinants of the change in abnormal short interest before the financial misrepresentation is publicly revealed:

$$\Delta ABSI(j)_{i,[-19,-1]} = \gamma_0 + \gamma_1 Severity_{i,-1} + \gamma_2 Controls_{i,-1} + e_i, \; j = 1,2,3.$$

The change is measured from month -19 through month -1 relative to the month in which the misrepresentation is publicly revealed. The sample includes all SEC enforcement actions on NYSE/Amex/NASDAQ-listed firms for which data are available over the period 1988 to 2005. *Fraud* is a dummy variable that equals one if the enforcement action includes fraud charges under Section 17(a) of the 1933 Securities Act or Section 10 of the 1934 Securities Exchange Act. *Insider trading charges* is a dummy variable that equals one if the action includes charges of insider trading. Variable *Total accruals* is based on the measure in Richardson et al. (2005). *Institutional ownership* is from the CDA/Spectrum database; *Size* is measured as the log of market capitalization; *Book-to-market ratio* is the ratio of book assets to the sum of book liabilities and the market value of equity; and *Momentum* is calculated as the previous 12-month market-adjusted return.

| | Measure of abnormal short interest: | | | | | | | | | | | |
| | Panel A: $\Delta ABSI(1)$ | | | | Panel B: $\Delta ABSI(2)$ | | | | Panel C: $\Delta ABSI(3)$ | | | |
	1	2	3	4	1	2	3	4	1	2	3	4
Severity measures:												
Fraud	1.550			1.510	1.873			1.836	1.885			1.769
	(0.03)			(0.07)	(0.01)			(0.02)	(0.01)			(0.02)
Insider trading charges		1.156		0.596		1.067		0.404		0.875		0.160
		(0.11)		(0.47)		(0.13)		(0.61)		(0.25)		(0.84)
Total accruals			2.636	2.171			2.684	2.264			2.903	2.603
			(0.12)	(0.20)			(0.10)	(0.17)			(0.07)	(0.11)
Control variables:												
Inst. ownership	0.021	0.024	0.033	0.028	0.016	0.019	0.030	0.024	0.029	0.033	0.034	0.029
	(0.11)	(0.07)	(0.02)	(0.05)	(0.22)	(0.14)	(0.04)	(0.08)	(0.04)	(0.02)	(0.01)	(0.04)
Size	-0.238	-0.273	-0.378	-0.293	-0.194	-0.241	-0.379	-0.281	-0.250	-0.327	-0.382	-0.292
	(0.11)	(0.07)	(0.03)	(0.10)	(0.18)	(0.10)	(0.03)	(0.10)	(0.13)	(0.05)	(0.02)	(0.08)
Book-to-market ratio	-0.132	-0.149	-0.190	-0.152	-0.071	-0.095	-0.133	-0.090	-0.083	-0.118	-0.129	-0.089
	(0.39)	(0.33)	(0.24)	(0.35)	(0.64)	(0.53)	(0.40)	(0.57)	(0.59)	(0.44)	(0.40)	(0.56)
Momentum	0.003	0.002	0.003	0.003	0.006	0.005	0.005	0.006	0.006	0.005	0.005	0.006
	(0.54)	(0.68)	(0.64)	(0.57)	(0.27)	(0.39)	(0.34)	(0.27)	(0.25)	(0.40)	(0.40)	(0.31)
Intercept	0.325	1.369	1.638	0.048	-0.250	1.109	1.438	-0.411	-0.519	1.025	1.223	-0.477
	(0.75)	(0.10)	(0.07)	(0.97)	(0.80)	(0.17)	(0.10)	(0.71)	(0.64)	(0.25)	(0.16)	(0.67)
N	261	261	228	228	261	261	228	228	223	223	223	223
Adj-R^2	0.02	0.01	0.02	0.03	0.03	0.01	0.02	0.04	0.04	0.02	0.03	0.05

Table IA.VI
Short Interest and the Presence or Absence of Financial Misconduct

Each panel groups all firm-months into four cells based on a two-way classification: (i) whether the amount of abnormal short interest is low or high, and (ii) whether the firm subsequently is identified as having misrepresented its financial statements in that month. In Panel A, all firm-months from the beginning of the violation to the end of the enforcement action are included in the "Violation" column. Panel B deletes all firm-months between the public exposure of the violation to the end of the enforcement action. A firm-month is assigned to the *"High ABSI"* group if the firm's abnormal short interest in that month is above the 90th percentile of *ABSI* in the entire cross-section of firms for that month. The table reports results based on our first measure of abnormal short interest, *ABSI(1)*, although results are similar for *ABSI(2)* and *ABSI(3)*. The sample includes all NYSE/Amex/NASDAQ stocks that are in the intersection of CRSP, Compustat, and the short interest data set.

		Panel A: All firm-months "High ABSI" = 1 if $ABSI \geq 90^{th}$ percentile					**Panel B:** Excluding months after the enforcement actions begins "High ABSI" = 1 if $ABSI \geq 90^{th}$ percentile		
		No Violation	*Violation*	*Total*			*No Violation*	*Violation*	*Total*
Low	Frequency	971797	15341	987138	*Low*	Frequency	970616	7752	978368
ABSI	Percent	88.59	1.4	89.99	*ABSI*	Percent	89.28	0.71	89.99
	Row %	98.45	1.55	.		Row %	99.21	0.79	.
	Column %	90.2	78.58	.		Column %	90.09	79.3	.
High	Frequency	105615	4183	109798	*High*	Frequency	106796	2024	108820
ABSI	Percent	9.63	0.38	10.01	*ABSI*	Percent	9.82	0.19	10.01
	Row %	96.19	3.81	.		Row %	98.14	1.86	.
	Column %	9.8	21.42	.		Column %	9.91	20.7	.
Total		1077412	19524	1096936	*Total*		1077412	9776	1087188
		98.22	1.78	100			99.1	0.9	100
Chi-squared statistic:			2876.68	*p-value:*	0	*Chi-squared statistic:*		1252.56	*p-value:*	0

Table IA.VII
Short Sellers' External Effects on Uninformed Investors

This table reports estimates of short sellers' external benefits and costs for uninformed investors, similar to Table IX in the paper, using *ABSI(2)* and *ABSI(3)* to measure abnormal short interest. *%Shares sold by the firm and insiders* is the net change in shares outstanding plus net insider sales, expressed as a percentage of shares outstanding at the beginning of the month, and cumulated over all months of the violation period. *Short sellers' price impact, $P_{high} - P_{actual}$*, is the difference between the hypothetical price in the absence of abnormal short interest and the actual month-end price, expressed as a percentage of the actual share price at the beginning of the month. *External benefit* is the sum of the monthly estimates of Area B in Figure 3. Each monthly estimate equals the product of *%Shares sold by the firm and insiders* and *Short sellers' price impact*, and is expressed as a percentage of the firm's equity value. *%New shares created by short sellers* is the increase in *ABSI(j)*, j=1,2,3 from the prior month, expressed as a percentage of shares outstanding at the beginning of the month, and cumulated over all months of the violation period. *Short sellers' profit per share, $P_{actual} - P_{true}$* is the difference between the actual price and the price when news of the misconduct is first revealed to the public, expressed as a percentage of the actual share price at the beginning of the month. *External cost* is the sum of the monthly estimates of Area C in Figure 3. It equals the product of *%New shares created by short sellers* and *Short sellers' profit per share*. *Net external effect* is the difference between *External benefit* and *External cost*. Each variable is measured in each month of a firm's violation period, and summed over all violation period months. The summary measures report the mean and median of the cross-section of firm-specific measures. The *t*-statistic is computed from the cross-section of firm-specific measures.

Panel A: Using ABSI(2) to measure abnormal short interest (n = 359)			
	Mean	t-stat	Median
% Shares sold by the firm and insiders	45.65	4.61	8.34
Short sellers' price impact, $P_{high} - P_{actual}$ (% of share price)	1.93	5.84	0.11
% External benefit (sum of monthly estimates of Area B)	1.12	2.15	0.00
% New shares created by short sellers	0.75	2.51	0.07
Short sellers' profit per share, $P_{actual} - P_{true}$ (% of share price)	12.13	2.43	30.44
% External cost (sum of monthly estimates of Area C)	0.36	1.12	0.06
Net external effect (sum of monthly Area B – Area C)	0.76	0.99	0.00
Net external effect using a lower-bound estimate of external cost	1.03	1.79	0.00

| Panel B: Using ABSI(3) to measure abnormal short interest (n = 307)			
	Mean	t-stat	Median
% Shares sold by the firm and insiders	49.96	4.34	10.33
Short sellers' price impact, $P_{high} - P_{actual}$ (% of share price)	1.97	5.56	0.09
% External benefit (sum of monthly estimates of Area B)	1.12	2.07	0.00
% New shares created by short sellers	0.80	2.54	0.09
Short sellers' profit per share, $P_{actual} - P_{true}$ (% of share price)	10.95	1.91	30.77
External cost (sum of monthly estimates of Area C)	0.94	3.08	0.08
Net external effect (sum of monthly Area B – Area C)	0.19	0.38	-0.01
Net external effect using a lower-bound estimate of external cost	0.89	1.73	0.00
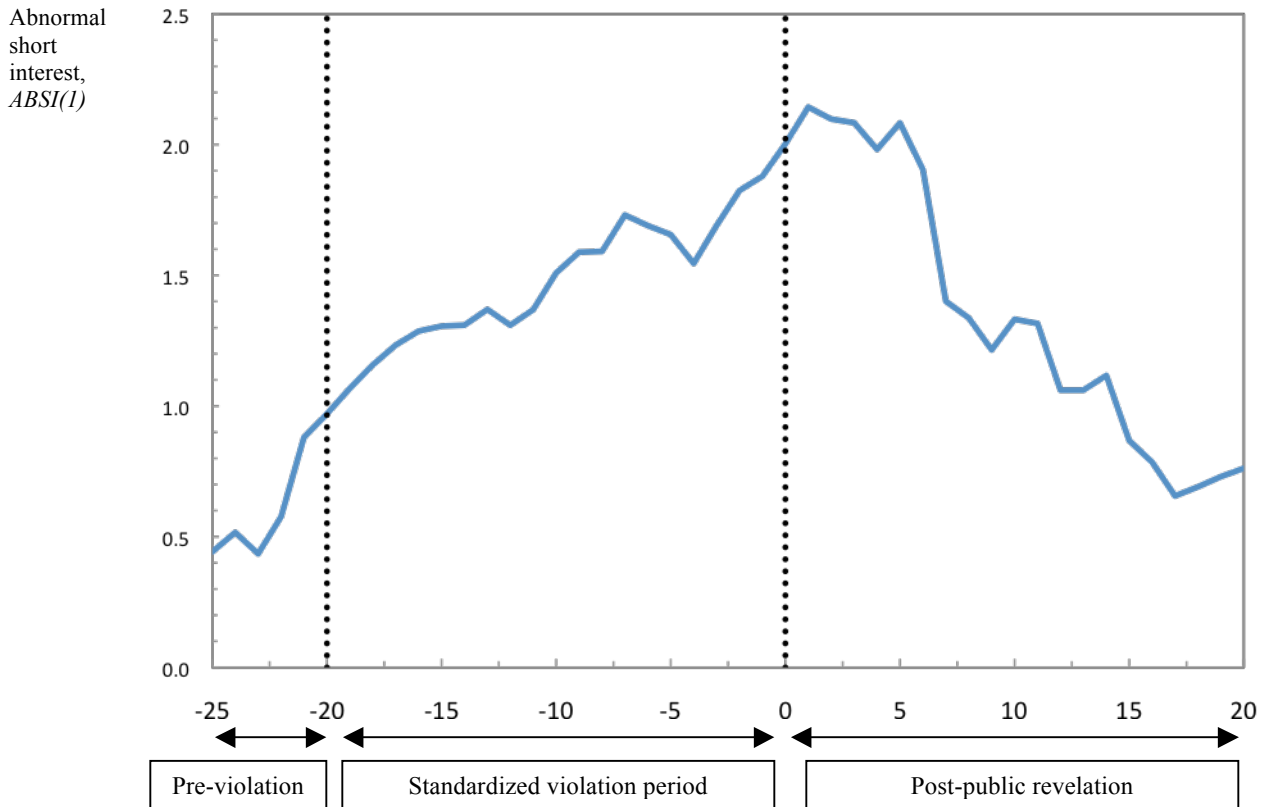
Figure IA.1. Stylized pattern of abnormal short interest. This figure reflects the pattern of abnormal short interest around the beginning of the violation period and the public revelation of financial misconduct. Because different firms' time to public discovery differ, we partition the period from the violation start to the public revelation into 21 pseudo-months (the period -20, 0) for all firms. The actual number of days in a pseudo-month differs across firms, such that all firms have exactly 20 pseudo-months. Month -20 is defined as the month in which the misrepresentation began, and month 0 is when the misrepresentation was publicly revealed. The sample includes all NYSE/Amex/NASDAQ-listed firms targeted in SEC enforcement actions for financial misrepresentation from 1988 to 2005 for which data on short interest, market capitalization, book-to-market, and momentum are available. This figure reports the results using our first measure of short interest, *ABSI(1)*, but the results are similar using *ABSI(2)* or *ABSI(3)*.
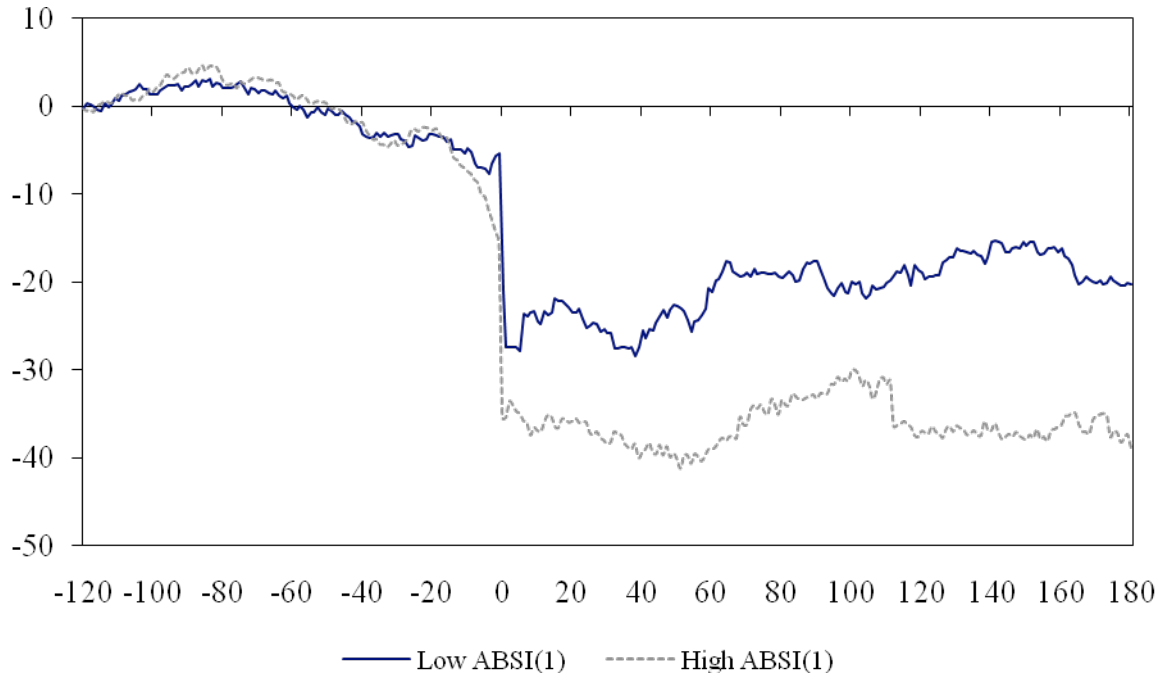
Figure IA.2. Stock price behavior after revelation. The figure plots the price paths over the 300 days around the public revelation of misconduct for the two groups of firms in our SEC enforcement action sample. The vertical axis is the cumulative excess return, and the horizontal axis is the day relative to the day when the financial misconduct is revealed to the public. Firms are partitioned into two groups based on the level of the first measure of abnormal short interest, measured at the end of the month before the public revelation of misconduct.
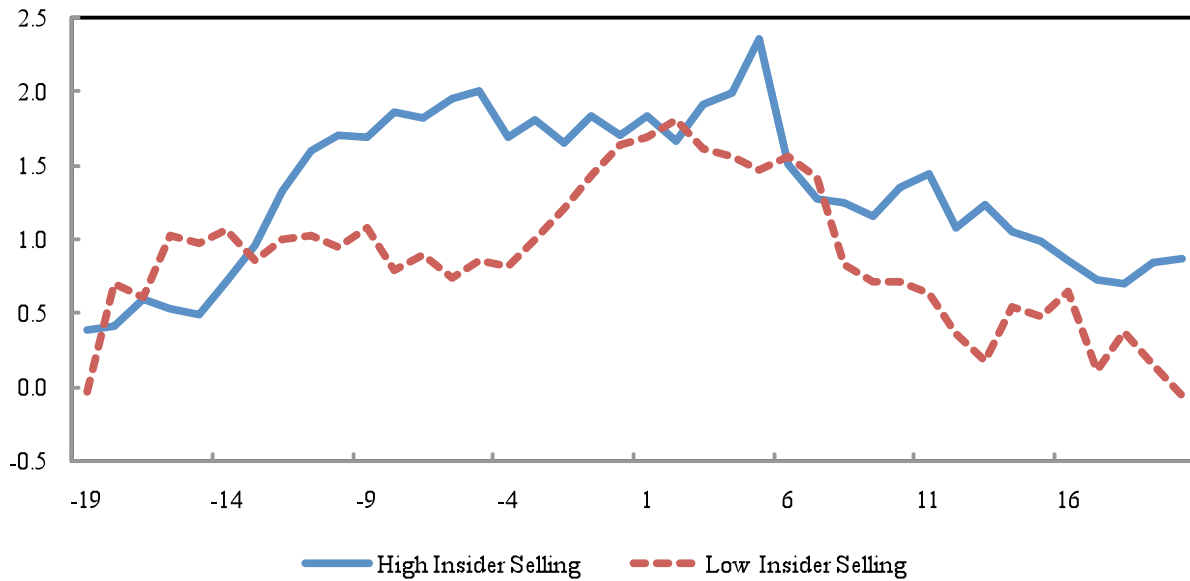
Figure IA.3. Patterns of abnormal short interest and insider selling. This figure plots the abnormal short interest in the 40 months around the revelation of misconduct for two subsamples of firms. All firms are partitioned into two groups based on the average insider selling during the violation period. The high insider selling group consists of firms with inside selling above the median level of insider selling of our SEC enforcement action sample, and the low insider selling group includes firms below the median level. Month 0 is the month when financial misconduct is revealed to the public. This graph plots the third measure of abnormal short interest *ABSI(3)*, although the results are similar using *ABSI(1)* or *ABSI(2)*.