

Do short sellers target firms with poor earnings quality? evidence from earnings restatements

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Abstract We study the behavior of short sellers around earnings restatements. We find that short sellers accumulate positions in restating firms several months in advance of the restatement and subsequently unwind these positions after the drop in share price induced by the restatement. The increase in short interest is larger for firms with high levels of accruals prior to restatement. We document that heavily shorted firms experience poor subsequent performance and a higher rate of delisting. Overall, these results suggest that the motive for short selling is, at least in part, related to suspect financial reporting and that short sellers pay attention to information being conveyed by accruals.

Keywords Short sellers · Accruals · Earnings quality · Earnings restatements

JEL Classification G14 · M41 · D82

1. Introduction

This study contributes to a better understanding of the decision process of short sellers. Prior research has shown that firms with high levels of short interest subsequently underperform (Asquith & Muelbrock, 1995; Desai, Ramesh, Thiagarajan, & Balachandran, 2002). However, the empirical evidence is relatively sparse as to how short sellers identify

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their targets and whether accounting information plays a useful role in their analysis. This paper addresses this gap in the literature.

In this paper, we examine the behavior of short sellers around the time when firms publicly acknowledge material errors in their previously reported financials. The objective is to assess whether the motive for short selling is, at least in part, related to questionable financial reporting. We study whether short sellers take positions in restating firms in advance of the restatement announcement. Along these lines, we examine whether short sellers are particularly sensitive to information conveyed by the magnitude of accruals, as managers are more likely to use accruals to manage or manipulate earnings. Finally, we examine whether the level of short interest prior to earnings restatement helps predict subsequent performance of restating firms. The goal is to test whether short interest is incrementally informative in distinguishing more egregious restatements from those that might be relatively benign.

There are several advantages to the event study framework implemented by this study. By focusing on the behavior of short sellers in a restricted sample of firms that are known ex-post to have poor earnings quality, we investigate whether ex-ante, short sellers are able to identify and take positions in firms whose financial reporting might be suspect. A finding that short sellers accumulate positions before the restatement would strongly suggest that the motive for short selling is related to the quality of earnings. On the other hand, under the null hypothesis that the information set of short sellers is uncorrelated with earnings quality, we expect to see no abnormal short interest around the restatement event. For these reasons, examining short seller behavior in the period around earnings restatements provides a sharp test of whether information related to earnings quality plays an important role in the shorting decision.

The event study framework is also potentially powerful because it permits an examination of the time-series behavior of short sellers while holding each firm as its own control. Thus, the framework avoids concerns associated with controlling for other cross-sectional determinants of the expected level of short interest. Nonetheless, we control for market-wide effects by benchmarking the short interest of sample firms against that of control firms, where control firms are selected based on industry, size and book-to-market (BM) ratio. In cross-sectional regressions, we also control for firm characteristics such as prior momentum, trading volume, turnover, residual standard deviation and dividend yield that might affect the shorting decision.

The results indicate that short sellers initiate their positions several months in advance of the restatement announcement. The mean short interest for sample firms (as a percentage of the number of shares outstanding) is 2.18% in month -18 and increases to 2.74% in the month immediately preceding the restatement announcement. Following the restatement, the mean level of short interest declines to 2.07% by month $+12$, suggesting that short sellers unwind their positions as the stock price declines. Over the same period, there is no concurrent change in the short interest for control firms. Observing large increases in short selling for the sample of restatement firms but not for otherwise similar control firms suggests that the motive for short selling is, at least in part, related to questionable accounting practices and that short sellers are able to identify these practices in advance of the public disclosure. The latter result is quite striking because it is in sharp contrast to prior empirical evidence that other market participants, such as analysts and auditors, fail to detect such practices (Bradshaw, Richardson, & Sloan, 2001).

We also document a strong association between short interest and the magnitude of accruals. Specifically, we partition the sample firms into terciles based on total accruals measured 18 months prior to the restatement. For the high accruals tercile, short interest

increases significantly in the months leading up to the restatement. The mean reported short interest immediately preceding the restatement announcement is 3.52% and the change in short interest from month -18 to month -1 is 1.14%. In contrast, the change in short interest over the same period for firms in medium and low accruals group is less pronounced. The relation between the change in short interest (and the level of short interest in month -1) and accruals is robust to controlling for known determinants of short interest in a regression framework. In addition, we decompose total accruals into its various components and show that short sellers appear to predominantly target firms with less reliable and less persistent accruals. Overall, these findings suggest that short sellers pay attention to the same type of information that is being conveyed by accruals.

Finally, in a regression setting, we show that the firms with high levels of short interest prior to the restatement experience lower subsequent returns and a higher likelihood of performance-related delisting. These results suggest that short sellers are able to identify the more egregious restatements and that the information set of short sellers is not subsumed by common proxies such as size, book-to-market ratio and accruals.

The rest of the paper proceeds as follows. Section 2 briefly describes related literature, and Section 3 describes the sample and provides variable definitions and summary statistics. Section 4 presents the results on short seller behavior around restatements and stock return analysis. The conclusions and implications are presented in Section 5.

2. Relation to existing studies

The decision process of short sellers has been the subject of a handful of studies. Dechow, Hutton, Muelbroek, and Sloan (2001) show that short sellers particularly target firms that are priced high relative to fundamentals such as book value, earnings and cash flow, suggesting that short sellers use valuation related cues. Interestingly, they show that even among stocks that are priced high relative to fundamentals, short sellers assume large positions in some stocks, but not others, and the stocks targeted heavily by short sellers have significant deterioration in their fundamentals relative to stocks that they did not target. However, their study did not specifically address how short sellers discriminate between the two sets of stocks.

A related paper by Richardson (2003) examines whether short selling activities are related to the magnitude of accruals for the universe of firms on US stock exchanges. The motivation for studying the association between accruals and short interest is derived from the results in Sloan (1996), who shows that firms with a higher level of accruals have poor subsequent earnings and stock market performance.¹ Given that short sellers target overpriced firms, it seems reasonable that the information in accruals might be a useful input in the shorting decision. However, Richardson (2003) fails to detect a significant relation between short interest and accruals, raising the possibility that the information set of short sellers does not include information conveyed by accounting accruals.

A distinction between our paper and Richardson (2003) is that we study the behavior of short sellers in a restricted sample of firms that are known, ex-post, to have poor earnings quality, while Richardson (2003) examines the relation between short interest and accruals

¹ Results in several recent studies are generally consistent with Sloan (1996). A partial list of papers includes Xie (2001), Collins and Hribar (2000), Thomas and Zhang (2002) and Fairfield, Whisenant, and Yohn (2003). In an out of sample test of accruals anomaly, Bhojraj and Swaminathan (2004) show that bond returns of firms in extreme accruals portfolios are also significantly related to the magnitude of accruals, suggesting that mis-pricing of accruals is also observed in the bond market.

for the universe of firms on US stock exchanges. This distinction is important because in a broader sample, other non-earnings quality related motivations for short selling might dominate or at least influence the observed association between short interest and accruals. For example, a firm can have high short interest as a result of arbitrageurs engaging in either convertibles arbitrage or merger arbitrage. In addition, a firm can have high short interest due to implementation of certain tax or hedging strategies.² Thus, a plausible explanation for the contrasting findings in our paper and Richardson (2003) is that the use of a broader sample of firms in Richardson (2003) reduces the power to detect an association between shorting activities and accruals. In contrast, our research design focuses on the behavior of short sellers in firms that are known ex-post to have adopted questionable accounting practices and thus provides a powerful test to detect an association between short selling and earnings quality, if one exists.

Two recent papers examine whether short sellers accumulate positions prior to earnings restatements (Efendi, Kinney, & Swanson, 2004) or corrective disclosures by firms that lead to investor allegations of securities fraud (Griffin, 2004). Consistent with the results in our paper, these studies find that short interest increases in the months just prior to an earnings restatement or corrective disclosures. However, neither paper specifically addresses how short sellers discriminate among firms with otherwise similar characteristics. In contrast, we show that, even within the sample of restatement firms, short sellers disproportionately target high accruals firms suggesting that the information set of short sellers is related to the information conveyed by accruals. Moreover, we document that short interest helps predict future returns in a regression setting for the sample of restating firms.

3. Data

3.1. Sample and control firm selection

Our initial sample comprises 919 restatements compiled by the General Accounting Office (GAO) of the United States government. This database includes restatements, primarily due to erroneous or fraudulent accounting, announced during the period between January 1, 1997 and June 30, 2002. Examples include aggressive revenue recognition, improper or inappropriate application of GAAP, and outright fraud. Restatements due to mergers, stock splits, discontinued operations, and changes in accounting policy are not included in the GAO database. The database provides the name of the restating firm, the ticker symbol, the date of the restatement, the entity that prompted the restatement (the auditor, the company or the SEC) and the reasons for the restatement (e.g., revenue recognition, improper capitalization of cost or expense, restructuring or securities related, besides others).

From this initial sample (see Table 1), we eliminate 49 firms that are not available on the CRSP files and 86 observations where the firm announced multiple restatements, retaining only the first restatement announcement. We focus on non-regulated U.S firms and exclude observations if the restating firm is either based outside the U.S (CRSP share code is not 10 or 11), or in a regulated industry such as utilities and financial institutions

² In a convertibles arbitrage, the arbitrageur typically goes long in the convertible bonds and shorts the stock of the issuing firm. In a merger arbitrage, the arbitrageur goes long in the shares of the target and shorts the shares of the acquirer following the announcement of a stock-for-stock merger. Short selling can also be motivated by a hedging strategy in which the investor hedges his/her long position by shorting a stock whose returns are highly correlated with the stock in which the investor is long (for example, long GM and short Ford).

Table 1 Sample selection

Original sample in the GAO report	919
Less firms not in CRSP	49
Less multiple announcements	86
	784
Exclude if	
CRSP share code is not 10 or 11	67
Regulated industries – Financials and Utilities	94
	623
Firm has missing data (Size/BM data in month –18)	111
Firm missing returns during restatement announcement period	35
	477

The table details the sample selection procedure. The initial sample of 919 firms comes from the database compiled by the United States General Accounting Office and published as report GAO-03-395R. The database covers all restatements due to accounting irregularities made during the period January 1, 1997 to June 30, 2002

(SIC codes 4900–4939 and 6000–6999). This leaves us with a sample of 623 firms. Since we select control firms based on size and book-to-market ratio in month –18, we exclude 111 observations where this data is not available in month –18. Finally, we exclude 35 firms that did not have announcement period returns, leaving us with a final sample of 477 firms of which 455 have data on accruals in month –18. We impose similar restrictions in selecting control firms, as explained below.³

For each sample firm, we select a control firm matched on industry, size and book-to-market ratio (BM) ratio 18 months prior to restatement month.⁴ The matching criteria are motivated by the evidence in Dechow et al. (2001) that the ratio of fundamentals to price is an important determinant of short interest. Size (MVE) is the number of shares outstanding times the month end share price from CRSP. BM is the ratio of equity book value (annual data #60 from Compustat) to market value of equity (from CRSP). In order to avoid the look-ahead bias, we use the book value of equity from the previous fiscal year if month –18 is within 4 months of the firm’s annual earnings announcement date. We assign sample firms to size and BM deciles in month –18, with monthly breakpoints computed using the universe of NYSE firms.⁵ If we are unable to assign size or BM decile rank in month –18, we assign the rank in the preceding month, progressively going upto month –21, if necessary. The initial pool of potential matches includes all non-regulated, US domiciled firms on CRSP, excluding restating firms. For all potential control firms in the same size and BM decile portfolio as the sample firm in month –18, we calculate a deviation score, following the approach in Huang and Stoll (1996), as follows:

$$\text{Deviation Score} = \left[\frac{MVE^s - MVE^m}{(MVE^s + MVE^m)/2} \right]^2 + \left[\frac{BE^s - BE^m}{(BE^s + BE^m)/2} \right]^2 \tag{1}$$

³ The requirement that the sample firm has data on size and book-to-market in month –18 is imposed because our criteria for selecting control firms is based on industry, size and book-to-market ratio. We have replicated our analysis without imposing this requirement. This increases the sample size to 538 firms in month –18 and the results are similar.

⁴ Our conversations with short sellers suggest that they often assume positions several months prior to the restatement announcement. To address this possibility, we select control firms in month –18.

⁵ We require the firm to have positive book value to assign BM decile rank.

where ‘*s*’ and ‘*m*’ represent sample and matching firm values. For each sample firm, we sort potential match firms by industry and ascending deviation score, and retain the best match.

3.2. Variable definitions and summary statistics

The stock market related data are obtained from the CRSP files. Trading volume (TRVOL) is the share price times the number of shares traded and turnover (TURNOVER) is the ratio of shares traded to shares outstanding. The monthly short interest data are obtained from NYSE and NASDAQ. Short interest (SHINT) is normalized by the number of shares outstanding.⁶

The financial data used in the study are from the Standard and Poor’s Compustat files. Note that, when a company issues an amended financial statement (10 K/A or Form 8) due to error or fraud, Compustat replaces the data originally reported by the firm. However, if the restatement is reported in a subsequent 10 K, Compustat preserves the originally reported numbers but reports the restated data in Compustat’s restated series. Thus, the reporting convention introduces a look-ahead bias and, in many cases, purges the earnings management or manipulation from Compustat’s original data series.

We measure accruals 18 months prior to the restatement date and the data for computing accruals are taken from the Compustat files. Since the period over which we measure accruals might include the period for which the financials have been restated, we elected to investigate the impact of Compustat’s reporting convention in detail for a sub-sample of our firms. Specifically, we sorted our final sample of 477 firms by the restatement date and picked every 25th firm, thus yielding a random sample of 19 firms. For each of these 19 firms, we collected data on Sales, Net Income, Total Assets, Cash Flow from Operations and Cash Flow from Investing activities from their originally issued 10-Ks (from EDGAR) for fiscal year corresponding to month –18 relative to the restatement. We then compared these originally reported numbers to those obtained from the original series in Compustat files. For the random sample of 19 firms, almost all the numbers reported in Compustat’s original series in month –18 correspond to numbers reported in original 10-Ks. Thus, at least for the analysis reported in our study, the extent of look-ahead bias due to Compustat’s reporting convention appears to be small.⁷

Following Healy (1985) and Sloan (1996), the vast majority of prior research has focused on current operating accruals. However, this measure does not include accruals resulting from investing and financing activities, such as capital investments in physical assets or in intangible assets (e.g., software development costs). In a recent paper, Richardson, Sloan, Soliman, and Tuna (2005) show that investing accruals, such as non-current operating asset accruals, are associated with lower earnings persistence and are significantly mis-priced. Therefore, our primary measure, which is total accruals, incorporates both operating and investing accruals, although we also use operating accruals as an alternative measure. To ensure comparability of results, our definitions of total accruals and operating accruals follow Richardson (2003), as follows:

⁶ The short interest dataset provides monthly data for those securities with non-zero short interest both in the current and the previous month. Missing observations for consecutive months thus imply zero or insignificant short interest during the period. Accordingly, we set the short interest for all missing consecutive firm-months to zero.

⁷ The tabulated results of the analysis are not reported in the paper, but are available from the authors on request. Also, note that Compustat’s reporting convention will add noise to the relation between accruals and short interest and thereby reduce the power to detect the conjectured relation.

$$\text{TOTACC} = (\text{Earnings} - \text{CFO} - \text{CFI}) / (\text{AverageAssets}) \quad (2)$$

$$\text{OPACC} = (\text{Earnings} - \text{CFO}) / (\text{AverageAssets}) \quad (3)$$

where Earnings is the earnings before extraordinary items (annual data item # A18), and CFO and CFI are the cash flow from operations and cash flow from investing activities, both from the statement of cash flows (# A308 and # A311, respectively). Average assets is the average of the book value of total assets (# A6) during the year.

Panel A of Table 2 provides summary statistics for the sample and control firms in month –18. The mean equity market value for sample firms (\$2,669 million) is not significantly different from that for control firms (\$2,365 million). While the mean BM ratio for sample firms (0.47) is significantly lower than the mean BM ratio for control firms (0.49), the median difference is not statistically significant. Thus, the matching algorithm does a reasonable job of identifying control firms that have similar size and BM ratio as sample firms. The mean (median) monthly trading volume for sample firms is \$438.9 million (\$27.4 million) and for control firms is \$365.44 million (\$24.74 million), and neither the difference in the mean nor the median is statistically significant. Similarly, we find no significant difference in monthly turnover across the two groups. Prior return momentum (measured over months –30 to –19) for sample firms and control firms is quite similar. The mean (median) total accruals for sample firms is 0.09 (0.07) and for control firms is 0.07 (0.05); the difference is not significant. Similarly, there is no significant difference in the magnitude of operating accruals, income before extraordinary items and operating cash flow between sample and control firms. Overall, the above statistics show that sample and control firms have similar characteristics.

In Panel B, we group the sample firms into terciles based on total accruals (TOTACC) and present the summary statistics for sample and control firms in each tercile. Consistent with the overall characteristics, there is little difference in size, BM ratio, trading volume, share turnover and prior momentum across sample and control firms for the three groups (the exception being mean trading volume in the medium accruals group and mean BM ratio in the low accruals group). Thus, there does not appear that sample firms are more shortable than control firms. However, an examination of accounting variables shows systematic differences between the sample and control firms. The sample firms in the low accruals tercile have significantly lower accruals in month –18 relative to control firms, while sample firms in the high accruals tercile have significantly higher accruals and lower operating cash flows relative to the control firms. To the extent that these variables provide information about the quality and persistence of earnings, we expect to see variations in short seller behavior across the three terciles.

4. Empirical results

4.1. Short selling activities around earnings restatements

We begin our empirical analysis by documenting the pattern of short interest at various intervals around the restatement announcement (Table 3). The mean level of short interest for sample and control firms is presented in Panel A and the change in short interest relative to the month immediately preceding the restatement announcement (month –1) is presented in

Table 2 Summary statistics

	Sample		Control		Paired difference	
	Mean	Median	Mean	Median	Mean	Median
<i>Panel A. All Firms</i>						
Size	2,669	254	2,365	242	303	0
Book-to-Market	0.47	0.31	0.49	0.32	-0.02**	0.00
Price	21.11	14.50	23.66	14.94	-2.55*	-0.44**
Return(-30, -19)	37.71	8.34	36.43	11.11	1.28	-0.99
Monthly trading volume	438.94	27.38	365.44	24.74	73.51	0.42
Monthly turnover	17.87	9.28	17.34	9.86	0.53	0.55
TOTACC	0.09	0.07	0.07	0.06	0.01	0.02
OPACC	-0.05	-0.04	-0.07	-0.04	0.02	0.00
INCOME	-0.04	0.03	-0.07	0.04	0.04	0.01
CASH FLOW	0.01	0.05	-0.01	0.07	0.03	-0.01
<i>Panel B. Total accruals groups</i>						
B. 1. Low Accruals						
Size	1,809	163	2,083	152	-274	395
Book-to-Market	0.40	0.31	0.46	0.31	-0.06**	0.00
Price	16.83	8.31	20.33	11.62	-3.50***	-1.34***
Return(-30, -19)	39.21	11.27	44.37	10.05	-5.16	-3.24
Monthly trading volume	284.28	12.36	296.58	14.02	-12.29	0.48
Monthly turnover	18.06	8.86	15.31	8.75	2.75	0.97
TOTACC	-0.16	-0.07	0.05	0.04	-0.20***	-0.17***
OPACC	-0.17	-0.11	-0.09	-0.05	-0.07***	-0.08***
INCOME	-0.17	-0.01	-0.17	0.03	0.02	-0.05***
CASH FLOW	0.00	0.07	-0.08	0.06	0.09	0.02
B. 2. Medium Accruals						
Size	5,382	518	3,876	463	1,506	845
Book-to-Market	0.51	0.32	0.51	0.32	0.00	0.00
Price	25.77	18.50	25.87	19.44	-0.10	-0.50
Return (-30, -19)	38.71	10.17	33.47	9.61	5.24	-3.21
Monthly trading volume	795.88	52.09	506.04	48.90	289.84 **	0.16
Monthly turnover	15.41	8.26	15.44	9.86	-0.03	-0.82
TOTACC	0.08	0.07	0.06	0.05	0.02	0.03
OPACC	-0.02	-0.02	-0.07	-0.04	0.05**	0.02***
INCOME	0.04	0.04	-0.05	0.05	0.09***	0.02***
CASH FLOW	0.07	0.08	0.02	0.08	0.04**	0.02
B. 3. High accruals						
Size	948	176	1,281	176	-334	295
Book-to-market	0.53	0.34	0.54	0.35	-0.01	0.00
Price	19.79	13.94	22.28	13.31	-2.48	0.94
Return (-30, -19)	33.29	4.35	26.82	12.26	6.47	4.65
Monthly trading volume	211.32	17.40	314.54	17.61	-103.22	0.40
Monthly turnover	17.94	11.43	21.39	10.93	-3.45	0.67
TOTACC	0.34	0.28	0.12	0.06	0.23***	0.21***
OPACC	0.04	0.03	-0.03	-0.04	0.08***	0.08***
INCOME	0.01	0.04	-0.01	0.05	0.02	0.00
CASH FLOW	-0.03	0.00	0.02	0.08	-0.05**	-0.08

The table reports summary statistics for the sample of 477 firms that restated their earnings during 1997–2002. Size is the market capitalization from CRSP (in \$ million) in month -18. The book-to-market ratio is computed as book value of equity divided by equity market value in month -18. Share price, monthly trading volume (in \$ million), and monthly turnover are computed from CRSP in month -18. Return(-30, -19) is the raw stock return during the period TOTACC and OPACC are total accruals and operating accruals, respectively, calculated in month -18 from Compustat, INCOME is earnings before extraordinary items, and CASHFLOW is the cash flow from operating activities, all deflated by average total assets. The table reports the mean and median values for sample and control firms, and tests of whether mean and median paired difference (sample minus control) is different from zero *

Table 3 Short interest surrounding earnings restatements

	Month -18	Month -12	Month -6	Month -1	Month +6	Month +12	Month +18
<i>Panel A. Short interest (%)</i>							
Sample	2.18	2.51	2.88	2.74	2.91	2.07	2.00
Control	1.68	1.72	1.55	1.64	1.71	1.59	1.58
Paired diff.	0.50**	0.79***	1.34***	1.10***	0.48**	0.48**	0.41*
# Obs.	477	477	477	477	477	477	477
<i>Panel B. Change in short interest relative to Month -1(%)</i>							
Sample	0.56***	0.23	-0.15	0.00	-0.55***	-0.67***	-0.74***
Control	-0.04	-0.08	0.09	0.00	0.07	-0.05	-0.05
Paired diff.	0.59**	0.31	-0.24	0.00	-0.62***	-0.61***	-0.68***
# Obs.	477	477	477	477	477	477	477

The table reports the level of short interest (Panel A) and change in short interest relative to month -1 (Panel B) for the sample of firms that announce earnings restatements during 1997–2002, with available data. The short interest is reported as a percentage of the number of shares outstanding. Each panel in the table reports the average value for the sample firms, the control firms and the paired difference (sample minus match) at six-monthly intervals during months -18 to +18. The significance levels test whether the reported values are difference from zero, using a *t*-test

*,** and *** denote significance at the 10-,5- and 1-percent level respectively

Panel B.⁸ We also report the results of statistical tests of paired difference between sample and control firms for each interval.

The results in Panel A indicate that in month -18, the mean short interest for sample firms is 2.18% and the corresponding mean for control firms is 1.68%. The difference of 0.50% is significant at the 5% level. In subsequent months, the level of short interest increases steadily leading up to the restatement announcement such that the short interest of sample firms is 2.88% 6 months before restatement and 2.74% in the month immediately prior to restatement. In contrast, over the same period, the short interest for control firms remains essentially unchanged. In month -6 and month -1, the short interest for control firms is 1.55% and 1.64%, respectively. The mean difference in short interest between sample and control firms in month -6 and month -1 is 1.34% and 1.10%, respectively (both significant at the 1 percent level). Observing increased shorting activity for restatement firms but not for otherwise similar control firms strongly supports the view that the motive for short selling is, at least in part, related to questionable accounting practiced by restating firms and that short sellers can identify such practices well in advance of the actual public disclosure.⁹

⁸ The reported short interest represents all transactions that are settled as of the 15th of each month. Since the settlement period during our sample period is 3-days, the actual transactions would have been executed at least 3 business days earlier. Thus, for a firm which restated say on April 2nd, the level of short interest in month -1 will be the reported short interest in March, while for a firm that restated on April 27th, the short interest in month -1 is the reported short interest on April 15th.

⁹ Using short interest data for 28 firms subject to SEC enforcement actions over the period 1982 to 1992, and 33 control firms, Dechow, Sloan, and Sweeney (1996) document that short sellers increase their positions in firms that were later subject to an SEC investigation, suggesting that short sellers were able to anticipate that the prices of these firms were not sustainable. However, they found that short interest of sample firms and control firms begin to differ significantly only 2 months prior to the announcement of an investigation. On the other hand, in our sample, short sellers appear to be targeting the firms several months prior to the restatement announcement. There could be two potential explanations for this difference. First, short sellers have become more active in recent times (consistent with a steady increase in mean level of short interest over the decade of 1990s, documented in various studies cited earlier). Second, the stock market bubble of the mid to late 1990s accompanied by increasingly aggressive accounting practiced by the firms (as evidenced by the dramatic increase in earnings restatements in the late 1990s and early 2000s) provided short sellers with many more opportunities during more recent periods.

Panel B of Table 3 reports the change in short interest over various intervals relative to month -1 and provides additional evidence to support the assertion that short selling is related to questionable financial reporting. For sample firms, the point estimates indicate that short interest increased by 0.56% from month -18 to month -1 (significant at the 1% level). The corresponding change for control firms is -0.04% . The difference between sample and control firms of 0.59% is significant at the 5% level. However, the increase from month -12 to month -1 for sample firms (0.23%) is not significant. This suggests that short sellers accumulate positions well in advance of the restatement announcement and hold their short positions for several months. Observing significant increase in short interest for sample firms and not for control firms suggests that the results are not driven by market wide effects during this period.

As might be expected, we find that short sellers unwind their large positions after the restatement announcement. Results reported in Panel A of Table 3 indicate that the mean level of short interest drops from 2.74% in month -1 to 2.19% in month $+6$, and further drops to 2.07% in month $+12$. Similarly, the mean change in short interest (Panel B) from month -1 to month $+6$ and month $+12$ is -0.55% and -0.67% , respectively (both significant at the 1% level). Thus, short sellers cover their positions when the stock price declines following the restatement announcement (detailed results are reported in Table 7).

4.2. Are short selling activities related to accruals?

The empirical results reported in the preceding section show increased shorting activity in sample firms in the months leading up to the restatement. Given that managers use accruals to opportunistically manage reported earnings [see Dechow et al. (1996) and Palmrose, Richardson, and Scholz (2004)], we examine whether short sellers pay attention to information being conveyed by the magnitude of accruals. The null hypothesis is that the information set of short sellers is uncorrelated with accruals, in which case we expect no relation between short selling activities and accruals. In contrast, a positive relationship between short interest and accruals would suggest that the information set of short sellers contains accruals.

To test the relation between short interest and accruals, we divide sample firms into terciles based on the magnitude of total accruals measured 18 months prior to the earnings restatement (i.e., month -18). Panels A, B and C of Table 4 report the level and change in short interest for sample and control firms by accrual groups over various intervals. The statistics reported in Panel A suggest that short sellers are not particularly active in restating firms with low accruals. Specifically, the mean short interest in month -18 for sample firms is 2.04%. It decreases marginally to 1.82% in month -1 and then increases to 2.14% in month $+12$. The short interest of sample firms is not different from that of control firms over all the seven periods examined. Moreover, neither sample firms nor control firms experience any significant change in short interest during this period, the exception being the change from month -6 to month -1 . The difference between sample and control firms from month -12 to month -1 (month -6 to month -1) is -0.68% (-0.69%) and is significant at the 10% (5%) level. Overall, the results suggest that short selling activity in the low accruals sample is not much different from their control firms.

For the firms in the medium accruals group (Panel B), the mean short interest increases from 2.22% in month -18 to 2.76% in month -6 and then declines to 2.47% in month -1 . The corresponding means for control firms are 1.54%, 1.67% and 1.76%, respectively. The mean short interest of sample firms is significantly higher than that of control firms in month -6 and month -1 suggesting that short sellers are more active in the medium

Table 4 Change in short interest relative to earnings restatement month by total accruals groups

	Month -18	Month -12	Month -6	Month -1	Month +6	Month +12	Month +18
<i>Panel A. Low total accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	2.04	2.18	2.18	1.82	2.02	2.14	2.03
Control	1.85	1.71	1.71	2.03	1.85	1.85	1.90
Paired diff.	0.19	0.47	0.48	-0.21	0.17	0.29	0.13
<i>Change in short interest relative to month -1 (%)</i>							
Sample	-0.21	-0.36	-0.36*	0.00	0.19	0.32	0.21
Control	0.18	0.32	0.33*	0.00	-0.19	-0.18	-0.13
Paired diff.	-0.40	-0.68*	-0.69**	0.00	0.38	0.50	0.34
<i>Panel B. Medium total accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	2.22	2.30	2.76	2.47	1.93	1.80	1.96
Control	1.54	2.00	1.67	1.76	1.93	1.60	1.38
Paired diff.	0.68	0.30	1.09**	0.71*	0.00	0.21	0.58
<i>Change in short interest relative to month -1 (%)</i>							
Sample	0.24	0.16	-0.29	0.00	-0.54***	-0.66**	-0.51
Control	0.21	-0.25	0.08	0.00	0.17	-0.16	-0.38
Paired diff.	0.03	0.41	-0.38	0.00	-0.71***	-0.50	-0.13
<i>Panel C. High total accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	2.38	2.96	3.42	3.52	2.40	2.04	1.78
Control	1.74	1.52	1.33	1.25	1.40	1.37	1.55
Paired diff.	0.64	1.44***	2.09***	2.27***	0.99***	0.67*	0.23
<i>Change in short interest relative to month -1 (%)</i>							
Sample	1.14***	0.55	0.09	0.00	-1.12***	-1.48***	-1.74***
Control	-0.49*	-0.28	-0.09	0.00	0.16	0.12	0.30
Paired diff.	1.64***	0.83*	0.18	0.00	-1.28***	-1.60***	-2.04***

The table report the level of short interest and changes in short interest relative to month -1 for the sample of firms that announce earnings restatements during 1997–2002, with available data. The short interest is reported as a percentage of the number of shares outstanding. The firms are assigned to terciles based on total accruals in month -18. Panel A, B and C reports the results for firms in the low-accruals, medium-accruals and high-accruals tercile, respectively. Each panel in the table reports the average level of short interested and changes in short interest for the sample firms, the control firms and the paired difference (sample minus match) at six-monthly intervals during months -18 to +18. The significance levels test whether the reported values are different from zero, using a *t*-test

*,** and *** denote significance at the 10-,5- and 1- percent level, respectively

accruals firms. However, none of the changes in short interest (relative to month -1) are significant prior to the restatement, although there is some evidence of short covering after the announcement. The mean short interest of sample firms declines from 2.47% in month -1 to 1.93% by month +6 and to 1.80% by month +12. The change in short interest from month -1 to month +6 is -0.54% and from month -1 to month +12 is -0.66%; both are significant at the 5% level. Overall, the results suggest that short sellers are relatively more active in medium accruals firms as compared to low accruals firms and that short sellers cover their positions in the months subsequent to the restatement.

In contrast, the results in Panel C of Table 4 suggest that short sellers display a remarkable degree of interest in high accruals firms. Specifically, the mean short interest for this group is 2.38% in month -18, and increases to 3.42% in month -6, and to 3.52% in month -1. The corresponding short interest for control firms is 1.74%, 1.33%

and 1.25%, respectively. Thus, a large increase in short interest is observed for high-accrual sample firms prior to restatement but not for their control firms. Not surprisingly, the paired difference (sample–control) in short interest increases steadily from month –18 to month –1. The mean paired difference in month –1 is 2.27% (significant at the one-percent level) and is almost four times higher than the mean paired difference in month –18 of 0.64%.

The analysis of change in short interest yields similar results. The mean change in short interest for sample firms from month –18 to month –1 is 1.14% (significant at the 1% percent level), while the corresponding change in short interest for control firms is –0.49% (significant at the 10% level). The change in short interest for sample firms is significantly higher than that for control firms over this period. From month –12 (and month –6) to month –1, the change in short interest is not statistically significant, suggesting that short sellers accumulate significant positions in high accrual firms well in advance of the public disclosure.

Also, consistent with Table 3, the results suggest that short sellers cover their positions in the months following the restatement. The mean short interest declines significantly from 3.52% in month –1 to 2.40% in month +6 and to 2.04% in month +12. While the level of short interest of the sample firms still remains higher than that of control firms, the mean difference (sample–control) declines from 2.27% in month –1 to 0.99% in month +6 and to 0.67% in month +12. The mean change in short interest from month –1 to month +6 is –1.12% (significant the 1% level) and from month –1 to month +12 is –1.48% (significant at the 1% level). In contrast, no significant change in short interest is observed for control firms over this period. The pattern of short interest for total accrual groups over months –18 to +18 is depicted graphically in Fig. 1. Overall, the evidence in Table 4 is consistent with short sellers paying attention to the same kind of information that is contained in the magnitude of total accruals.

Our measure of total accruals includes both operating and investing accruals. As a result, the relation between total accruals and short interest documented above does not

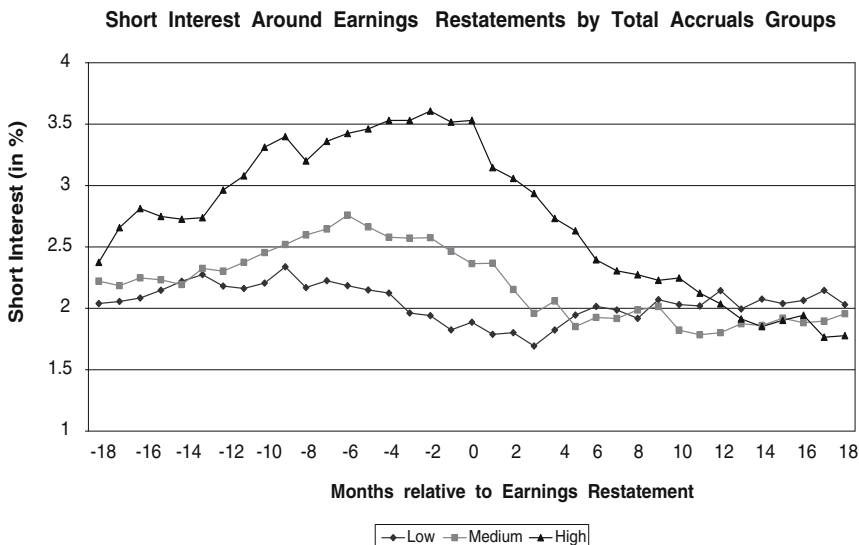


Fig. 1 Short interest surrounding earnings restatements, by total accrual groups. The figure presents the level of short interest, reported as a percentage of the number of shares outstanding, for the sample of firms that announce earnings restatements during 1997–2002. The firms are assigned to terciles based on total accruals in month –18 relative to the restatement date

distinguish whether short sellers target firms that are managing their earnings or firms that are overextended in terms of their investments. Prior research on earnings management suggests that a large fraction of firms that manage or manipulate their earnings do so by overstating their revenue (Dechow et al., 1996; Palmrose et al., 2004). Furthermore, Thomas and Zhang (2002) show that changes in inventory are strongly associated with future returns. The overstatement of revenue as well as changes in inventory will impact the magnitude of operating accruals. Table 5 reports the results of the analysis relating short interest and operating accruals. The approach parallels the one used in Table 4 for total accruals. We find that short sellers are particularly active in firms with high operating accruals. Notably, in month -1, the level of short interest is the highest for firms with high operating accruals and these firms show a large and significant increase in short interest from month -18 to -1. Both the raw and control firm adjusted change in short interest are highly significant for firms with high operating accruals. Moreover, consistent with results

Table 5 Change in short interest relative to earnings restatement month by operating accruals groups

	Month -18	Month -12	Month -6	Month -1	Month +6	Month +12	Month +18
<i>Panel A. Low operating accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	2.29	2.71	2.66	2.27	2.04	1.81	1.76
Control	1.68	1.60	1.58	2.02	1.93	1.64	1.70
Paired diff.	0.61	1.12 ***	1.08 ***	0.25	0.12	0.17	0.06
<i>Change in short interest relative to month -1 (%)</i>							
Sample	-0.03	-0.44*	-0.39**	0.00	-0.22	-0.45	-0.51
Control	0.34	0.42	0.44**	0.00	-0.09	-0.37	*-0.32
Paired diff.	-0.36	-0.87**	-0.83***	0.00	-0.13	-0.08	-0.19
<i>Panel B. Medium operating accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	2.39	2.41	2.69	2.61	2.28	2.22	2.18
Control	1.88	1.91	1.69	1.46	1.60	1.62	1.55
Paired diff.	0.51	0.50	1.00**	1.16***	0.68*	0.59	0.63*
<i>Change in short interest relative to month -1 (%)</i>							
Sample	0.22	0.21	-0.07	0.00	-0.33	-0.40	-0.44
Control	-0.42*	-0.45*	-0.23*	0.00	0.14	0.17	0.09
Paired Diff.	0.65*	0.66*	0.16	0.00	-0.48*	-0.56	-0.53
<i>Panel C. High operating accruals tercile</i>							
<i>Short interest (%)</i>							
Sample	1.93	2.31	3.01	2.91	1.99	1.93	1.81
Control	1.55	1.72	1.43	1.55	1.65	1.53	1.56
Paired diff.	0.38	0.58	1.58***	1.36***	0.34	0.39	0.25
<i>Change in short interest relative to month -1 (%)</i>							
Sample	0.98***	0.60	-0.10	0.00	-0.92***	-0.98***	-1.10***
Control	0.01	-0.17	0.12	0.00	0.10	-0.02	0.01
Paired diff.	0.97**	0.77*	-0.22	0.00	-1.02***	-0.97**	-1.11**

The table reports the level of short interest and changes in short interest relative to month -1 for the sample of firms that announce earnings restatements during 1997–2002, with available data. The short interest is reported as a percentage of the number of shares outstanding. The firms are assigned to terciles based on operating accruals in month -18. Panels A, B and C reports the results for firms in the low-accruals, medium-accruals and high-accruals tercile, respectively. Each panel in the table reports the average level of short interest and changes in short interest for the sample firms, the control firms and the paired difference (sample minus match) at six-monthly intervals during months -18 to +18. The significance levels test whether the reported values are different from zero, using a *t*-test

*, ** and *** denote significance at the 10-, 5- and 1-percent level respectively

reported in Table 4, we find that short sellers cover their positions in high operating accruals firms in the months following the restatement announcement.

To further investigate whether short sellers pay attention to the accrual or the cash flow components of earnings, we independently sort sample firms into terciles based on earnings as well as cash flows from operating activities, and assign each firm to one of nine cells. Sloan (1996) reports that earnings of firms with high accruals are not sustainable and mean revert quickly. In contrast, earnings of firms with high cash flows are more persistent and mean revert over longer periods. Thus, we examine whether short sellers discriminate between firms with high earnings generated by accruals rather than cash flows. Our conjecture is that short sellers will target high earnings firms with high accruals, given prior evidence that such earnings might not be sustainable. Consistent with this conjecture, we find (not reported in tables) that short sellers are active in firms with high earnings and low cash flows. For example, in the month -1 , the mean control firm adjusted level of short interest for firms in the high earnings-low cash flow group is 4.16% (significant at the 5% level) and the change in control firm adjusted short interest from month -18 to month -1 is 3.52% (significant at the 5% level). The level and the increase for this group is much larger than that for the other eight groups examined. This result further establishes that short sellers pay attention to the information conveyed by accruals and, in particular, whether high earnings are supported by high accruals or high cash flows.

To summarize our findings, short sellers increase their positions in sample firms prior to the restatement and unwind their positions subsequently. Further, the relation between short interest and accruals suggests that, at a minimum, short sellers pay attention to information being conveyed by accounting accruals. However, the following caveat must be noted. While the restatement sample provides a powerful design for examining the relation between short selling and earnings quality, the fact that the sample has been identified ex-post potentially introduces a selection bias. Thus, the extent to which our results can be generalized is not clear and suggests an avenue for future research.

4.3. Explaining the change in short interest in a multivariate regression framework

The findings presented thus far show that short selling activities and accruals are related in the sample of restatement firms. Furthermore, this relation is robust to controlling for market wide effects as the relation holds on a control firm adjusted basis as well. However, an alternate explanation could be that the results documented here are attributable to other firm characteristics that are related to accruals and have been shown to affect the shorting decision. For example, Dechow et al. (2001) find that the motivation for short selling is related to valuation-related cues, such as the book-to-market (BM) ratio. Thus, we test for the incremental relation between short interest and accruals after controlling for firm characteristics such as BM ratio, size, liquidity and residual standard deviation in a regression framework.

The regression approach also allows us to decompose total accruals into its various components to test whether short sellers pay particular attention to certain types of accruals. The motivation for using accruals decomposition is based in part on the evidence in a recent paper by Richardson et al. (2005). In this paper, the authors decompose total accruals into its various balance sheet components and assign a reliability rating of low, medium, or high to each accruals component. They argue that less reliable accruals are likely to result in lower earnings persistence. If the market fails to fully appreciate this effect, then one should observe greater mis-pricing associated with less reliable accruals. Specifically, they categorize accruals resulting from changes in current operating assets

(COA) as less reliable because the primary drivers of COA are accounts receivables and inventory, and these accounts can be significantly influenced by managerial discretion. On the other hand, balances in accounts such as current liabilities involve relatively little discretion on the part of management. Richardson et al. (2005) show that accruals categorized by them as less reliable exhibit lower earnings persistence and greater mis-pricing.

The results of Richardson et al. (2005) lead us to test whether short sellers are particularly sensitive to the magnitude of less reliable accruals. We adopt their methodology and classify the different accruals according to their perceived reliability. We decompose total accruals into those related to current operating activities (non-cash working capital), non-current operating activities and financing activities, all deflated by average total assets. Working capital accruals are calculated as the change in current operating assets minus the change in current operating liabilities. Non-current operating accruals are calculated as the change in non-current operating assets minus the change in non-current operating liabilities and Financing accruals are calculated as change in financial assets minus change in financial liabilities. Accruals related to current operating assets and non-current operating assets are expected to be less reliable as compared to other accruals.

Table 6 reports the results of regressions where the dependent variable is the change in short interest from month -18 to month -1 . The main explanatory variables of interest are accruals. We include firm size (natural logarithm of market value of equity), book to market ratio, prior momentum, and residual standard deviation as control variables.¹⁰ Prior momentum (raw return from month -30 to month -19) is included to control for the effect of prior firm performance on short selling activity while residual standard deviation is included to serve as a proxy for costs or limits to arbitrage (Shleifer & Vishny, 1997).

In model 1, we find that the coefficient on total accruals (TOTACC) is positive (1.47) and significant at the 5% level, suggesting that the magnitude of accruals is related to short selling activities after controlling for other firm characteristics. In model 2, we interact accruals with firm size (a proxy for liquidity) to test whether the relation between accruals and shorting activity is stronger for larger (more liquid) firms. The positive and significant coefficient on the interaction term suggests that, *ceteris paribus*, the sensitivity of short sellers to accruals is greater in larger (more liquid) firms. This result is consistent with the well documented preference of short sellers for liquid firms because liquidity reduces the likelihood of a short squeeze.¹¹

In models 3 and 4, we replicate the analysis using operating accruals instead of total accruals. We find a positive and statistically significant coefficient here as well, suggesting that the results are not sensitive to the measure of accruals. In model 5, we include the components of total accruals—working capital accruals (WC), net non-current operating assets accruals (NCO) and financing accruals (FIN)—as explanatory variables. Richardson et al. (2005) rate the WC accruals as low reliability, non-current operating assets accruals as low/medium reliability and financing accruals as high reliability. Consistent with this classification, we find a positive coefficient on working capital accruals (significant at the

¹⁰ The correlation of trading volume with firm size in month -18 is 0.84. We have replicated our analysis after including trading volume, dividend yield and prior momentum in the regressions, and the inference remains unchanged. Also, we find similar results using the level of short interest in month -1 as the dependent variable.

¹¹ Typically shorted shares are borrowed from an institutional investor, a brokerage house, or a dealer. However, these borrowed shares (loan) must be repaid on demand. A short squeeze, thus, occurs when the lender of the borrowed shares wants to sell the stock. If the short seller is unable to find another lender, he/she has to repurchase the shares in the open market to fulfill the obligation to repay the loan (shares). Thus, short sellers prefer liquid stocks since it is easier to find alternative lenders in case of a short squeeze.

Table 6 Regression analysis of change in short interest on firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: Change in short interest (%) Month –18 to Month –1						
Intercept	1.6871	2.2825	1.5500	0.2440	1.0237	0.1666
Log(MVE)	-0.0394	-0.0987	-0.0145	0.1049	-0.0147	-0.0321
Equity B/M(x1000)	-0.4248	-0.3579	-0.4428	-0.3851	-0.4984	-0.4927
Return[-30, -19]	-0.0129	-0.0194	-0.0063	0.0097	-0.0188	-0.0114
Stock Volatility	-14.8506**	-14.9116**	-13.0823*	-13.9813	-13.9720**	-14.2251**
TOTACC	1.4694**	-9.5451**				
TOTACC* Firm Size		0.9649***				
OPACC			2.5163**	-22.1915***		
OPACC* Firm Size				2.1987***		
WC ACC					1.7628*	
NCOACC					0.5470	
FIN ACC					0.3566	
COA						2.4562*
NCOA						1.1608
COL						0.0454
NCOL						0.5013
STIA						1.3504
LTIA						-0.3334
FINL						-0.5321
Adj R ² (%)	1.62	3.16	1.76	4.64	0.77	0.75

The table reports the coefficients of OLS regressions for a sample of 477 restating firms with available data. The dependent variable is the change in short interest between months [-18, -1]. Total accruals (TOTACC) is defined as earnings before extraordinary items minus cash flow from operations minus cash flow from investments, deflated by average total assets. Operating accruals (OPACC) is earnings before extraordinary item minus cash flow from operations, divided by average total assets. In model 5, we include non-cash working caption accruals (WC), non-current operating accruals (NCO) or financing accruals (FIN). In model 6, WC is further decomposed into current operating asset (liabilities) accruals COA (COL), NCO is decomposed into non-current operating asset (liabilities) accruals NCOA (NCOL), and FINL is decomposed into short and long term investment accruals STIA and LTIA and financial liabilities accruals FINL. The control variables include firm size (natural log of equity market value), book to market (BM) ratio, prior return in month [-30, -19], and stock volatility (standard deviation of market model residuals, estimated over the one year ending one week before the restatement announcement)

, * and * denote significance at the 10-, 5- and 1-percent level, respectively

10% level). The coefficients on non-current operating accruals (NCO) and financing accruals (FIN) are not statistically significant. Finally, in model 6, we use the extended decomposition of accruals as explanatory variables, and find that the firms with high current operating asset accruals experience large increases in short interest. The coefficients on the other accrual variables are not significantly different from zero. Given that current operating accruals involve greater subjectivity as they relate to trade accounts receivables and inventory, the results suggest that short sellers pay particular attention to less reliable and less persistent accruals.

Overall, the regression analysis confirms the finding documented earlier that, at a minimum, the information set used by short sellers is correlated with the magnitude of accruals.¹² These results provide a plausible explanation for an unresolved question from

¹² Note that although we find a significant relation between accruals and change in short interest, the R^2 of the various models is low. One plausible reason for the low R^2 could be that the information set used by the short sellers is broader than the information conveyed by commonly used proxies. Our conversations with professional short sellers suggest that this is indeed the case. Another reason could be that the relation between short interest and the explanatory variables is non-linear, while we have imposed a linear structure in our regressions.

the Dechow et al. (2001) study—in deciding which firms to short, how do short sellers discriminate between stocks that have similar relative valuation? The finding that short interest is related to less reliable and less persistent accruals suggests that short sellers rely on accruals-related information to identify potential targets.

4.4. Analysis of stock returns

We now examine whether the level of short interest is associated with subsequent returns for the restating firms. Our objective is to test whether short interest is incrementally informative in distinguishing the more egregious restatements from those that might be relatively more benign. Of course, we do not draw any inference about the overall profitability of a short sales strategy from this analysis because we have focused on a sample of restatement firms that are known ex-post to have poor subsequent performance.

As a preliminary analysis, we sort the restatement sample into terciles based on the level of short interest in month -1 . For each group, Panel A of Table 7 reports announcement period returns, raw returns and (control firm adjusted) abnormal returns during [month $-1,+6$], and summary statistics on firm size, daily trading volume, and annual turnover.¹³ The results show that firms in each of the three groups experiences large negative announcement period as well as subsequent returns.¹⁴ However, the average returns experienced by the high short interest firms are not statistically different from those experienced by the low short interest firms. An intriguing question is why don't short sellers target firms in the low short interest group?¹⁵ An examination of firm size, trading volume, and turnover statistics for the three groups suggests that the likely explanation is liquidity. The mean firm size for the low short interest tercile in month -1 is \$157 million, as compared to \$3,151 million for firms in the high short interest tercile. Similarly, the annual turnover for low short interest tercile is 121% as compared to 402% for the high short interest tercile. Thus, it appears that even though restating firms in the low short interest tercile experience poor subsequent returns, short sellers avoid trading in these firms due to their poor liquidity.

Panel B of Table 7 presents the coefficients from regressions of returns on the level of short interest after controlling for other known determinants of returns (size, book-to-market ratio, and total accruals).¹⁶ To formally capture the marginal impact of liquidity, we interact short interest with firm size, a proxy for liquidity. In models 1 and 2, where the dependent variable is announcement period abnormal returns, we find that only the coefficient on total accruals is statistically significant. However, in models 3 and 4, where the dependent variable is firm return from month -1 to month $+6$, the coefficient on short interest is negative and statistically significant at the 5% level. Thus, the level of short interest is reliably associated with future returns for restating firms. In models 5 and 6,

¹³ The reason for cumulating the returns starting month -1 is that we sort the firms into short interest terciles in month -1 . We have replicated the analysis by cumulating returns from month 0 (announcement month) and the results are qualitatively similar to those reported above.

¹⁴ For the full sample, the announcement period market reaction (relative to CRSP Value-weighted index) is -8.60% . This is consistent with the large negative market reaction to restatement announcements reported in several recent studies. For example, Palmrose et al. (2004) report a mean two-day announcement period abnormal return of -9.2% for a sample of 403 restatements announcements from 1995 to 1999. Similar results are reported by Anderson and Yohn (2002), Richardson, Tuna, and Wu (2003), Wu (2002) and Hribar and Jenkins (2004).

¹⁵ The mean short interest in month -1 for firms in the low, medium and high short interest tercile is 0.06%, 1.13% and 7.02%, respectively.

¹⁶ The results are similar after including prior momentum (measured over month -13 to month -2) as well.

Table 7 Analysis of stock return around earnings restatements

	BHAR (-2, 2)					
	Raw ret. (Month -1, 6)	Abn. ret. (Month -1, 6)	Firm size (\$ mill.)	Avg. turnover (%)	Avg. trad. vol. (\$ mill.)	
<i>Panel A. Return, size and trading characteristics by short interest terciles in Month -1</i>						
Low short interest	-8.13***	-13.97**	156.92****a	121.92****a	1.51***a	
Medium short interest	-7.21***	-9.43 ^b	3899.80***	182.52****a	23.29*** ^b	
High short interest	-10.45***	-26.42***	3151.19***	402.42***	60.74***	
	BHAR (-2, +2)			Abnormal Return (-1, 6)		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel B. Regression results</i>						
Intercept	0.097*	-0.066	-0.546***	-0.303	-0.397	-0.049
Log(MVE)(×1000)	2.160	-0.437	37.060**	16.490	0.016	-13.950
Book-to-market ratio (×1000)	-0.247	-0.028	-15.962	-14.224	18.288	20.783
Total Accruals	-0.079**	-0.081***	-0.046	-0.064	-0.252	-0.277*
Short interest (Month-1, (%))	-0.002	-0.020	-0.019**	-0.168**	-0.006	-0.220**
Short interest* Log(MVE)		0.001		0.012**		0.017**
Adj. R ² (%)	0.85	0.83	1.62	2.32	-0.13	0.58

In Panel A, we group firms into terciles based on the level of short interest in month -1. BHAR(-2, +2) is the buy and hold market adjusted abnormal return, using the return on the CRSP value-weighted index (with dividends) as the market return. The raw return (-1, 6s) is the buy and hold raw return over months -1 to +6. The abnormal return over the same period is calculated as the control-firm adjusted buy-and-hold return. The control firms are matched on industry, size and book-to-market ratio. Also reported are the summary statistics-size, annualized turnover and daily trading volume—for the three groups. Panel B reports the coefficients of OLS regressions where the dependent variable is the stock return—BHAR (-2, 2) in models (1) and (2), raw return (-1, 6) in models (3) and (4), and abnormal return (-1, 6) in models (5) and (6). Short interest in month -1 is the number of shares shorted, divided by the number of shares outstanding. Firm size is the natural logarithm of equity market value, book to market (BM) ratio is the ratio of book value to market value of equity, and total accruals is earnings before extraordinary items minus cash flow from operations minus cash flow from investments, deflated by average assets

*, ** and *** denote significance at the 10-, 5- and 1-percent level, respectively

a, b & c denote significance at the 10, 5 and 1 percent level, respectively for the test of difference between low & medium short interest tercile versus high short interest tercile

where the dependent variable is (control-firm adjusted) abnormal returns, the inference is similar to that obtained using raw returns. Overall, the evidence in Table 7 suggests that short sellers avoid small firms, perhaps due to high liquidity risk and the difficulty in borrowing stocks. Moreover, the firms targeted heavily by short sellers exhibit poor subsequent performance, *ceteris paribus*, suggesting that short sellers identify and target the more egregious restatements in the sample.

Analyzing performance-related delisting offers an alternate approach to studying the relation between shorting activity and subsequent performance (Desai et al. 2002). Importantly, it helps avoid problems associated with measurement of stock returns over long horizons (Kothari & Warner, 1997 and Barber & Lyon, 1997). Thus, we test for an association between performance related delisting and short interest after controlling for firm size, BM ratio, and accruals in a logistic regression model. The dependent variable is an indicator variable that equals one when the firm delists due to poor performance within 12 months of restatement, and equals zero otherwise. In untabulated results, we find that the level of short interest is positively and significantly associated with the likelihood of subsequent delistings. This finding provides further empirical evidence in support of the conjecture that the firms targeted heavily by short sellers exhibit poor subsequent performance and that the information set of short sellers is not subsumed by firm size, book-to-market ratio and total accruals.

5. Conclusions

This study offers new insights on the decision process of the short sellers. While prior research finds that short sellers can identify overpriced securities, there is relatively little empirical evidence on how short sellers identify their targets. Using a sample of firms that restated their previously reported earnings, we show that short selling is related to questionable financial reporting and that short sellers can identify such practices well in advance of their public disclosure. Specifically, the results show that short sellers accumulate positions in the restating firms in the months leading up to the restatement announcement. Furthermore, even among restating firms, short sellers are particularly more active in firms with less reliable and less persistent accruals. We also document that short interest predicts future returns after controlling for characteristics such as size, BM ratio, and accruals.

Several important implications emerge from the study. First, the results suggest that short sellers can identify suspect financial reporting in advance of public disclosure. In contrast, prior literature has shown that the market, on average, and other informed participants such as analysts and auditors are unable (or unwilling) to detect such reporting. Second, the finding that short selling is related to the level of accruals suggests that, at least for the sub-sample of firms with suspect financial reporting, the information set of short sellers is related to the information conveyed by accruals. Finally, the association between short interest and subsequent returns suggests that the information in short interest is incremental to that conveyed by size, BM ratio and accruals, suggesting that these variables do not fully capture the information set used by short sellers. Future research can broaden the information set beyond size, book-to-market, and accruals to better understand the decision process of short sellers.

Acknowledgements We thank an anonymous referee, Amber Anand, Hank Bessembinder, Neil Bhattacharya, Ted Brynn, Naveen Daniel, Bruce Duncan, Xavier Garza-Gomez, Chris Hogan, Prem Jain, Gerry Lobo, David Mauer, Scott Richardson, Eddie Riedl, Muku Santhanakrishnan, K. Sivaramakrishnan, Scott Whisenant and seminar participants at Barclays Global Investors, Harvard University (IMO Conference),

the University of Houston and the Indian School of Business for helpful comments and discussions. We also thank Vijay Singhal and Honghui Chen for some of the data used in this study and Machiko Hollifield for research assistance. Particular thanks are due to Charles Lee (the editor) for his comments that have led to significant improvements in the paper. Venkataraman thanks the Frank and Susan Dunleavy Faculty Research Fellowship for financial support.

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