Does Accounting Conservatism Deter Short Sellers?

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ABSTRACT: We examine the impact of the corporate information environment on short selling by testing the relationship between short interest and accounting conservatism. Short interest, the total number of shares shorted and not yet covered, is a widely used measure of short selling activity. Accounting conservatism, on the other hand, represents the timelier recognition of bad versus good news in earnings, and is widely acknowledged as a vital accounting property and a contributor to transparency and efficient contracting in firms. We reason that conservatism lowers information asymmetry and decreases expected returns to short sellers and hypothesize a negative relation between short interest and measures of conservatism. Our results are consistent with this hypothesis and we verify findings using a variety of conservatism measures including those indicated in the recent literature (e.g., Dutta and Patatoukas 2017).

Key words: Short selling, Conservatism, Investor behavior

JEL Classifications: G1, M41

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Introduction

Conservatism refers to the asymmetrically timely reflection of economic losses in earnings. Ever since Basu (1997) operationalized the concept using a segmented regression of earnings on returns, a considerable literature has evolved to show the varied role of conservatism in corporate governance, operations, and financing. In fact, conservatism is considered among the most important of accounting properties. But, as noted recently in García Lara, García Osma, and Penalva (2014), there are only a few studies of direct consequences of conservatism for security holders. We aim to fill this gap by examining a potential effect of conservatism on an important class of equity investors: we study whether conservatism affects activity of short sellers. We hypothesize a negative relation between short selling and conservatism and present evidence consistent with the expectation.

There are two plausible explanations for a negative relation between conservatism and short selling. *First*, Kim and Zhang (2016) maintain that bad-news hoarding that leads to stock price crashes is mitigated under conservatism. These authors follow LaFond and Watts (2008) in arguing that conservativism is a governance mechanism that curbs a natural managerial tendency to delay reporting bad news in hopes of a reversal of fortune. Thus, under conservatism, Kim and Zhang (2016) maintain that there is a reduced likelihood of a firm hoarding a reservoir of bad news that can then reach a tipping point and cause a stock price crash. Our argument about conservatism and short selling follows a similar train of thought. Since short sellers take positions in anticipation of future bad news, especially when such news is expected to lead to significant stock price decreases, their interest in firms reporting conservatively is lower. Just as

conservatism has been argued to mitigate stock price crashes, we argue that conservatism mitigates short selling.

Second, the literature provides multiple arguments consistent with conservatism improving the information environment and mitigating information asymmetry. For a comprehensive review of these arguments, please see García Lara et al. (2014). With lower information asymmetry, the probability that a stock becomes severely overvalued is lower, and, correspondingly, the expected return to short sellers is lower. More generally, short sellers are informed investors (Boehmer, Jones, and Zhang (2008)) and thrive in an opaque environment. Conservatism, to the extent it captures 'more complete disclosure' (Armstrong, Guay, and Weber (2010)), mitigates information asymmetry between the firm and external investors and this, in turn, decreases potential returns from short selling. For these two reasons, we argue that, ceteris paribus, conservatism decreases short selling.

A plausible, alternative perspective is that conservatism encourages short selling because it provides tangible and verifiable bad news to market participants. Since such news is 'authenticated' by the use of audited accounting statements, there is less ambiguity concerning the bad news. Therefore, conservatism validates and supports a stock price decrease at the time of bad-news disclosure. In this conservative reporting environment, short sellers may take advantage of their knowledge (or forecast) of future bad news with the confidence that conservatism would dictate rapid dissemination to produce the desired stock price drop. Short sellers also get their trading advantages by analyzing public information faster (Engelberg, Reed, & Ringgenberg (2012)), so they can gain from the bad news dissemination under conservatism. Thus, it is possible that the relation between conservatism and short selling is positive. Since a

positive as well as a negative relation is possible, it is of interest to empirically determine the relation between conservatism and short selling.

Our study is motivated by the continuing interest in conservatism. Early studies such as the pioneering Basu (1997) study or others such as Ball, Kothari, and Robin (2000) and Ball, Robin, and Wu (2003) relied on a sample-level construct and were mostly interested in verifying whether there was indeed conservatism in certain samples. Later, the literature focused on identifying the characteristics of firms displaying conservatism (e.g., Ball, Robin, and Sadka 2008) and documenting the consequences to firms and investors (e.g., García Lara, García Osma, and Penalva 2011). An interesting strand of this research concerns the effect of conservatism on investors. While most studies in this strand focus on debt (e.g., Ball, Robin, and Sadka, 2008; Zhang, 2008; Li, 2013, Haw, Lee, and Lee 2014), it does appear that conservatism reduces risks to both debt and equity investors. Concerning equity investors, García Lara et al. (2011) report that conservatism is associated with a lower cost of equity; Zhang (2008) offers an analogous result concerning debt. Ours is also a study of investor consequences. We focus on a particularly tangible aspect of investor behavior, the decision to short a stock. Our study is also related to Ramalingegowda and Yu (2012) who associate demand for conservatism with one type of sophisticated investors, monitoring institutions. Instead, we focus on the activity of another type of sophisticated investor, short sellers, and how the activity of these investors is affected by conservatism. Finally, in the conservatism literature, our study addresses the issue of how transient investors (Bushee and Christopher 2000) affect conservatism: just as transient institutional investors are associated with lower conservatism (Lin 2016), we find that another type of transient investor (that is, short sellers) is also associated with lower conservatism.

Our study is also motivated by the strong interest of researchers in examining short selling in various corporate contexts. This interest is perhaps recognition of the complexity inherent in the subject. Needless to say, short selling is a controversial activity. On the one hand, there is a continuing fear that short sellers manipulate the market and therefore decrease liquidity. This fear is evident in the following restrictions: the uptick rule (allowing shorting only when the price is at least a tick higher than the preceding price) that was revoked in 2007; the short selling ban of 797 financial stocks during the financial crisis of 2008; Rule 201 of Regulation SHO (allowing only limit orders to short sell after a 10 percent intraday decline in a stock's price); SEC Rule 105 of Regulation M (prohibiting purchase of securities in follow-on and secondary offerings when the purchaser has effected short sales in the securities within a specified amount of time prior to the pricing of an offering).[1] On the other hand, and related to our current study, there appears to be an increasing support for the view that short sellers support the price discovery process by predicting future bad-news events such as financial misrepresentation (Karpoff and Lou 2010), negative earnings announcements (Christophe, Ferri, and Angel 2004), analyst downgrades (Christophe, Ferri, and Hsieh 2010), and earnings restatement (Desai Krishnamurthy, and Venkatraman (2006) and Drake, Myers, Scholz, and Sharp (2015)). Since conservatism also implies bad-news disclosure, it is plausible that conservatism and short selling are substitutes: high levels of conservatism may plausibly be associated with low levels of short selling.

We obtain a large sample for the period 1995-2014 (excluding the financial crisis period in year 2008) to test whether short selling is associated with conservatism. Our short selling measure is scaled short interest calculated as short interest divided by shares outstanding, where

[1] See Diether, Lee, and Werner (2009a) for a study of the uptick rule. See Jain, Jain, McInish (2012) for a discussion of Rule 201, and Henry and Koski (2010) for a discussion of the SEC Rule 105 of Regulation M.

short interest is the total number of shares shorted and not yet covered. We calculate firm-year values by averaging scaled short interest over the fiscal year. For conservatism, we use two firm-year measures. The first measure is based on Collins, Hribar, and Tian (2014) who suggest modifying the Khan and Watts (2009) C Score measure by using accruals instead of earnings in the estimation procedure – fundamentally, this type of measure is a firm-year transformation of the Basu (1997) earnings-returns measure. For the second measure, we implement a similar firm-year transformation on the Ball and Shivakumar (2005) accruals-cash flow measure. In tests using these two measures, we examine contemporaneous and delta values. For details of these measures, please see the section on sample and variables. After controlling for known determinants of short interest, we find a significant, negative relation between conservatism and short sales in most specifications. Our results are consistent with short sellers estimating a lower payoff to shorting firms with conservative accounting. Also, this result is maintained when we control for potential endogeneity using the Heckman (1979) two-step procedure.

In addition to the above mentioned measures, we also use an alternative measure of conservatism based on Dutta and Patatoukas (2017) who report a greater variance of accruals conditional on bad news (that is, the difference between the variance for bad news and the variance for good news is positive). Based on this notion, we create quintiles of short interest and then divide each quintile into two groups of positive and negative returns. We examine the difference between the standard deviation of accruals for the two return groups and find that for the lowest quintile of short interest this difference is positive (i.e., higher conservatism). Consistently, for the highest quintile of short interest the difference is negative (i.e., lower conservatism).

Our study contributes to the conservatism literature in accounting. Early and influential papers such as Ball et al. (2000) focus on the role of conservatism in debt contracting. The effect of conservatism on equity investors has not been explored to the same extent. Nevertheless, an emerging literature connects conservatism with equity investors. For example, Ramalingegowda and Yu (2012) show a positive association between conservatism and the presence of institutional investors, arguing that these investors are sophisticated enough to demand conservatism for its governance benefits. García Lara, García Osma, and Penalva (2009) find that conservatism complements strong corporate governance. Also, García Lara et al. (2011) find that conservatism decreases the cost of equity. But there is little if any evidence of conservatism's effect on direct trading actions of equity investors. Our study contributes in this regard and associates a tangible action of equity investors, short selling, with conservatism. Along with the numerous benefits attributed to conservatism (such as lower cost of capital, better investment efficiency, and lower agency costs), our results suggest another potential benefit: conservatism reduces short interest and therefore potentially mitigates the costs that short sellers sometimes are accused of imposing on other investors.

We also contribute to the short selling literature by identifying yet another determinant of short interest. We show that short interest is related to the corporate disclosure environment. Regardless of whether one views short selling as informative or manipulative, it remains an interesting form of trading and continues to attract the attention of market regulators. Therefore, the finding that conservatism influences short interest is potentially of importance.

The remainder of this paper is structured as follows. In the following section, we review the relevant literature and develop our hypothesis concerning conservatism and short interest. In

section three, we describe the sample and variables. In section four, we describe our results. We summarize and conclude our paper in the final section.

Background and Hypothesis

Below, we review the relevant literature in the areas of short selling and conservatism respectively, and explain the hypothesis relating short selling to conservatism.

Short Selling

Short selling allows a trader (the short seller) to borrow a stock and sell it without actually owning it. After a short position is opened in this manner, at a later date, the short seller closes the position by purchasing the shares. Short sellers make a profit or loss based on the difference between their selling and buying prices. Because the sale of the stock precedes its purchase, unlike long buyers, short sellers expect the price to go down in the future. Short selling accounts for a significant fraction of trading volume on major stock exchanges. Using data for the year 2005, Diether, Lee, and Werner (2009b) find that short sales represented 31 percent of share volume for NASDAQ-listed stocks and 24 percent of share volume for NYSE-listed stocks.

The literature shows that short sellers are sophisticated investors and perform an important function by incorporating negative information into prices. Miller (1977) hypothesizes that in a market without short selling, the demand for a security comes from the most optimistic investors; consequently, stocks are overvalued if there are short-sale constraints and subsequent negative abnormal returns represent a correction of this overvaluation. Diamond and Verrecchia (1987) argue that short sellers are traders motivated by information rather than liquidity needs

because they cannot use the proceeds of the sale. Bris, Goetzmann, and Zhu (2007) find that in countries where short sales are more prevalent, prices incorporate negative information at a faster rate.

Some papers have expressed concern over the activities of short sellers. Specifically, there is concern that short selling may be manipulative or even speculative. Brunnermeier and Pedersen (2005) raise the concern that short sellers follow manipulative and predatory trading strategies, leading to less informative prices. Blau and Wade (2012) find that short-selling patterns surrounding both analyst downgrades and upgrades are symmetric suggesting that short selling is speculative; informative short selling would have led to higher short selling before the downgrades and lower short selling before the upgrades. Henry and Koski (2010) find that short selling around the issue date of seasoned equity offerings is manipulative and not informative.

Regulators banned short selling during the financial crisis of 2008 and implemented a new regulation restricting short selling (Rule 201) in 2011; this shows that the role of short sellers is controversial in recent years. In fact, short selling regulations have been at the center of debates since 2008. Soon after removing the uptick rule in 2007, in 2008, the SEC took an about turn and implemented a short selling ban on 797 financial stocks. Thereafter, in 2011, the SEC approved Rule 201, which restricts short selling in stocks that have a 10 percent intraday decline. Interestingly, Jain, Jain, and McInish (2012) find that this rule does not serve its intended purpose as short sellers largely withdraw from the market before such a decline occurs. But this has not stopped regulators from further attempts at curbing short selling. At the present time, the SEC is discussing several other regulations such as more frequent disclosure of short interest with the objective of restricting short selling. Thus, in the current regulatory environment, short selling is viewed as potentially disruptive.

Several papers have linked short selling activity to corporate events such as analyst downgrades (Christophe et al. (2010)), seasoned equity offerings (Henry and Koski (2010)), dividend announcements (Blau, Fuller, and Van Ness (2011)), and merger announcements (Ben-David, Drake, and Roulstone (2015)). Of particular relevance are studies linking short-selling to financial reporting. Most of these studies link short selling activity to events and not necessarily to earnings properties. Christophe et al. (2004) show that short selling prior to unfavorable earnings announcements relates negatively to post announcement returns, suggesting that short sellers have an ability to acquire private information before it is publicly observed. In a similar vein, Engelberg et al. (2012) study other accounting events such as 8-K filings. Blau, Brough, Smith, and Stephens (2013) find that short sellers systematically increase activity following certain auditor changes such as auditor resignations. Mashruwala and Mashruwala (2014) find that short-selling constraints combined with investor disagreement cause prices to respond more strongly to bad earnings news than to good earnings news. Desai et al. (2006) 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. On the other hand, Drake et al. (2015) suggest that short sellers do not appear to anticipate restatement announcement dates, but find that abnormal short selling is significantly higher than is typical when restatements are announced, especially for restatements announced transparently.

Conservatism

Conservatism is the asymmetric verification requirement in accounting for gains versus losses which leads to losses being recognized more readily than gains (Basu 1997). Since Basu's pioneering work, a large literature has developed on this topic. In early studies, focus was on

determining whether or not conservatism is evident in US or in non-US samples and in determining jurisdictions and time-periods with greater levels of conservatism. These studies, with Ball et al. (2000) and Ball et al. (2003) as examples, simultaneously verified the existence of conservatism and provided understanding of factor such as country-level institutions explaining the phenomenon. In the second phase of the conservatism literature, researchers attempted to identify firm specific factors such as leverage (e.g., Zhang 2008) affecting conservatism. In the current phase, attention shifted to consequences of conservatism, in terms of corporate governance, agency, operations, and financing; our study fits in this literature.

Conservatism assists in mitigating problems of agency and information asymmetry and improves corporate governance. Ahmed and Duellman (2007) show that conservatism is negatively related to the proportion of inside directors and positively related to the proportion of outside directors and conclude that conservatism assists outside directors in their monitoring efforts. In a similar vein, Ramalingegowda and Yu (2012) find a positive association between the presence of monitoring institutional investors and conservatism especially when the firm has growth options. Thus, external monitors (outside directors or monitoring institutional investors) and conservatism are complementary. In contrast, LaFond and Roychowdhury (2008) find that managerial ownership and conservatism are substitutes: lower managerial ownership, indicative of higher agency costs, is associated with higher conservatism. Thus, conservatism is demanded in situations with high levels of agency costs and helps improve corporate governance. A similar governance benefit is mooted by LaFond and Watts (2008) who contend that conservatism mitigates the information asymmetry between insiders and outsiders.

Conservatism also assists firms in contracting with creditors who depend on the timely reflection of bad news in accounting statements to monitor the value of their claims (Basu 1997;

Ball et al. 2000). Zhang (2008) reports the inter-related ex ante and ex post effects of conservatism: conservatism lowers the cost of debt ex ante and increases covenant violation probability ex post. Similarly, Ball, Bushman, and Vasvari (2008) show that conservatism helps with contracting in the syndicated loan market; for example, it alleviates agency problems between the lead arranger and other participants and allows the lead arranger to hold a smaller stake. Nikolaev (2010) reports that, in the context of public debt contracts, extensive use of financial covenants is positively associated with conservatism. Internationally, Ball, Robin, and Sadka (2008) report that conservatism is associated with the size of national debt markets. Overall, considerable evidence indicates that conservatism is useful in various aspects of debt contracting.

We study conservatism in the context of equity investors. While many studies directly link conservatism to actions of creditors, few studies link conservatism to actions of equity investors. Some exceptions are LaFond and Watts (2008) and García Lara et al. (2014) examining the association between conservatism and the bid-ask spread, García Lara et al. (2011) examining the association between conservatism and the cost of capital, and Ramalingegowda and Yu (2012) examining the link between conservatism and the presence of monitoring institutional investors. We examine the relation between conservatism and short selling, a tangible and important type of trading, and contribute to this literature.

Hypothesis

We hypothesize that conservatism decreases short selling. Conservatism involves the timely disclosure of bad news, which, by definition, reduced bad-news hoarding by firms. In this general environment, short sellers have a reduced probability of success. In this sense, our

hypothesis is similar to the one about conservatism and stock price crash risk in Kim and Zhang (2016). As in Kim and Zhang, we follow LaFond and Watts (2008) to view conservatism as a governance mechanism which discourages managers from delaying the report of bad news.

The general argument is that conservatism improves the information environment and reduces information asymmetry, and this in turn decreases expected returns to short sellers. A firm that commits to conservative reporting reduces opportunistic reporting by managers. For example, Watts (2003) argues that because accounting reports have information about managerial performance and have consequences in terms of managerial welfare, there are moral hazard problems in reporting. These problems lead to biases in reporting. Watts (2003) argues that conservative reporting mitigates these biases. Thus earnings management is decreased and the information environment is improved. These arguments are supported in analytical models in Chen, Hemmer, and Zhang (2007) and Gao (2013). For example, Chen et al. (2007) show that earnings management (in the absence of conservatism) diminishes the stewardship role of accounting and leads to suboptimal contracting; in this setting, conservatism reduces earnings management and enhances risk-sharing and contracting efficiency.

García Lara et al. (2014) provide a test of informational consequences of conservatism. They show, for example, that prior-period conservatism leads to lower bid-ask spreads in the current period. Since bid-ask spreads are a reflection of information asymmetry (Copeland and Galai (1983) and Glosten and Milgrom (1985)), this indicates that conservatism reduces information asymmetry in the context of equity investing. In fact, this study is one of the few studies to document a direct effect of conservatism on equity investors. Our study is another such study, focusing on short selling as opposed to trading costs.

Our prediction of a negative relation between conservatism and short selling is also supported by the analytical model in Suijs (2008) which models the effect of asymmetric reporting of good and bad news. In this model, since the horizon of the firm exceeds the horizon of investors, shares are transferred from one generation of investors to another. This in turn creates a role for financial reporting in influencing investment risk. Suijs (2008) shows that the asymmetric reporting of bad news with greater precision is associated with lower volatility in future prices. Such a result might also help explain, from an informational angle, why conservatism may negatively influence short selling.

Methodology

We test our hypothesis by estimating the following equation (firm and year subscripts avoided for convenience) which relates (firm-year) measures of conservatism to short interest while allowing for a variety of controls (other variables that affect short interest):

$$Short\ Interest = \alpha + \beta Conservatism + \lambda Controls + \varepsilon \qquad (1)$$

All variables are measured on a firm-year basis; all values are contemporaneous except for one control variable, stock return, which is lagged.

We also use the delta values of conservatism measures i.e. $conservatism_{i,y}$ – $conservatism_{i,y-1}$ (i is index for firm and y is index for year) as follows:

$$Short\ Interest = \alpha + \beta \Delta Conservatism + \lambda Controls + \varepsilon \qquad (2)$$

The coefficient of interest is β which indicates the association between conservatism and short interest in equation 1, and between the change in conservatism and short interest in equation 2.

In this section, we first explain how we construct the sample for performing this test. We then describe our measure of short interest, measures of conservatism, and control variables.

Sample selection

We obtain short interest (total number of shares shorted that have not yet been covered) for the period January 1995 to December 2014 (excluding 2008). We extract these data from Compustat which makes available monthly observations until 2006 and fortnightly observations after 2006. Short interest data from Compustat (or other sources) have been used widely in the literature (for example, D'Avolio 2002; Asquith, Pathak, and Ritter 2005; Karpoff and Lou 2010; Ben-David et al. 2015; Jain, Jain, McInish, and McKenzie 2013; and Jain, Jain, and Rezaee 2016).

We assign a fiscal year to each of these observations using the fiscal year end date from Compustat. We keep the firm-years for which short interest is available for at least 2 periods (fortnights or months) during a fiscal year. If a stock has no short interest for a given fortnight or month, then the stock will not appear in the Compustat database for that fortnight or month. Therefore, we manually assign a value of zero as short interest to those missing stock-fortnights or stock-months. We only insert these 'zero' records between the first and the last appearance of a stock in the sample period, to avoid the error of using periods before a new listing or after a de-listing. We then calculate the average value of total short interest during each fiscal year. This results in an intermediate sample of 3,846 unique firms and 38,443 firm-years.

We obtain all required accounting variables from Compustat for all firms in the database for the fiscal years 1995 to 2014. We obtain 9,828 unique firms and 113,623 firm-years in this extraction. We use these accounting variables obtained to calculate our measures of conservatism

and also some of the control variables. We delete firms belonging to the financial or utilities industries. This deletion results in a sample of 5,975 unique firms and 72,483 firm-years. We obtain a few variables from other sources as follows: institutional ownership from the 13F filings, monthly prices from CRSP, risk-free returns from the Federal Reserve website; and SIC codes from Kenneth R. French's website. We merge these data with Compustat data and short interest data and end with a sample of 3,840 unique firms and 38,234 firm-years. Then we exclude the year 2008 from our sample period as this is the year of the recent financial crisis and ban on short selling. We trim all variables in this merged data set at the 1st and 99th percentiles. Thus, we obtain a final sample of 3,837 unique firms and 35,302 firm-years. These are potential observations; actual tests use fewer observations because of missing data for one or more variables.

Measure of short selling activity

We use scaled short interest as our measure of short selling activity. Following Asquith et al. (2005), Boehme, Danielsen, and Sorescu (2006), and Jain et al. (2013), scaled short interest is defined as short interest divided by shares outstanding, where short interest is the outstanding position of shares sold short at the end of each month (1995-2006) or fortnight (2007-2014) as reported in Compustat. We compute the average of scaled short interest across all fortnights or months during the fiscal year to create a firm-year observation. We recognize that short selling is a short-term activity; many positions are closed out in days rather than months or years (e.g., Reed 2007). However, our research question concerns the association between a reporting environment and the associated short selling environment. We therefore argue that the

appropriate measure of short selling should capture the typical or overall environment for short selling. Accordingly, we use an annualized measure of short interest.

Measures of conservatism

The conservatism literature stems from Basu (1997). Many empirical studies use the Basu measure which is based on the incremental sensitivity between bad news (represented by negative returns) and earnings typically estimated using a pooled time-series and cross-sectional regression. Later, Khan and Watts (2009) developed the firm-level C-Score which essentially models the incremental sensitivity in the Basu model as a function of firm size, market-to-book, and leverage, variables identified in the literature as influencing conservatism.

Although the Basu and the closely-allied C-Score measures predominate in the conservatism literature, there has been a lively debate about whether these measures are subject to measurement errors and biases (e.g., Givoly, Hayn, and Natarajan 2007; Ryan, 2006; Patatoukas and Thomas, 2011; Ball, Kothari, and Nikolaev 2013). Therefore, in our paper, in addition to using the C-Score (modified based on Collins, Hribar, and Tian (2014)), we develop and use an alternate measure of conditional conservatism, the Ball and Shivakumar (2005, 2006) measure. We discuss these two measures below.

Our first measure of conservatism, *C_Score*, is based on Collins et al. (2014). Their measure is a modified version of *C_Score* measure from Khan and Watts (2009).[2] They recommend the use of accruals rather than earnings in the first step of the two-step procedure for

[2] Our results of a negative relation between short selling and conservatism also hold for the original Khan and Watts (2009) *C_Score* measure.

calculating *C Score*. Therefore, in the first step, we run the following annual cross-sectional regression:

$$\begin{aligned} Acc_i &= \beta_1 + \beta_2 DR_i + R_i\left(\mu_1 + \mu_2 Size_i + \mu_3 MB_i + \mu_4 Lev_i\right) \\ &+ DR_i R_i\left(\lambda_1 + \lambda_2 Size_i + \lambda_3 MB_i + \lambda_4 Lev_i\right) \\ &+ \left(\delta_1 Size_i + \delta_2 MB_i + \delta_3 Lev_i + \delta_4 DR_i Size_i + \delta_5 DR_i MB_i + \delta_6 DR_i Lev_i\right) + \varepsilon_i \end{aligned} \qquad (3a)$$

where β, μ, λ, and δ are parameters to be estimated and ε is the random error term. Subscript i stands for firm i. Acc_i is (change in inventory + change in receivables + change in other current assets – change in accounts payable – change in other current liabilities – depreciation and amortization)/ lag of total assets. DR_i is a dummy variable which is set equal to one if R_i is negative, and zero otherwise. R_i is the annual return calculated by compounding monthly returns beginning from the fourth month after the fiscal year end. $Size_i$ is the natural log of market value of equity. MB_i is the ratio of market value of equity to book value of equity. Lev_i is long-term debt plus short-term debt divided by the market value of equity.

After estimating the above regression equation (3a), in the second step, we calculate the *C_Score* as follows:

$$C\_Score_{i,y} = \lambda_1 + \lambda_2 Size_{i,y} + \lambda_3 MB_{i,y} + \lambda_4 Lev_{i,y} \qquad (3b)$$

where subscripts i and y denote firm and fiscal year, respectively.

Our second measure of conservatism is based on the sensitivity of accruals to negative cash flows (Ball and Shivakumar, 2005) but constructed in the same manner as *C_Score*. Specifically, we run the following annual cross-sectional regression:

$$\begin{aligned} Acc_i &= \beta_1 + \beta_2 DCFO_i + CFO_i\left(\mu_1 + \mu_2 Size_i + \mu_3 MB_i + \mu_4 Lev_i\right) \\ &+ DCFO_i CFO_i\left(\lambda_1 + \lambda_2 Size_i + \lambda_3 MB_i + \lambda_4 Lev_i\right) \\ &+ \left(\delta_1 Size_i + \delta_2 MB_i + \delta_3 Lev_i + \delta_4 DCFO_i Size_i + \delta_5 DCFO_i MB_i + \delta_6 DCFO_i Lev_i\right) + \varepsilon_i \end{aligned} \qquad (4a)$$

where β, μ, λ, and δ are parameters to be estimated and ε is the random error term. Subscript i stands for firm i. Acc_i is defined earlier. $DCFO_i$ is a dummy variable set equal to 1 when *CFO* is negative, and zero otherwise. CFO_i is (Income before extraordinary items – *Acc*) / lag of total assets. $Size_i$, MB_i, and Lev_i are as defined earlier.

After estimating the above regression equation (4a), we calculate the conservatism measure *C_AccCFO* as follows:

$$C\_AccCFO_{i,y} = \lambda_1 + \lambda_2 Size_{i,y} + \lambda_3 MB_{i,y} + \lambda_4 Lev_{i,y} \qquad (4b)$$

We also implement an alternate, non-firm-year measure of conservatism. Dutta and Patatoukas (2017), argue that a positive difference between the standard deviation of accruals for negative returns and the standard deviation of accruals for positive returns is consistent with conservatism. To implement this measure of conservatism, we create quintiles of short interest and then divide each quintile into two groups of positive and negative returns. This allows us to calculate the difference in standard deviation for each quintile as the conservatism measure to see whether the measure varies across short interest quintiles.

Control variables

We use several control variables in our regression analysis to account for other determinants of short selling activity identified in previous studies. Diether et al. (2009b), as well as Jain et al. (2012), find that past positive stock returns increase short selling. So we control for past stock returns. Jain et al. (2013) find that short selling is higher for firms with higher trading volume and lower for larger firms. So we control for average daily volume and market capitalization. Jain et al. (2013) also find that traders are not deterred by the length of time that it could take to cover the aggregate outstanding short positions. Instead, they find that traders apply

momentum strategies and short previously shorted stocks even more. So we control for days to cover. D'Avolio (2002) and Asquith et al. (2005) argue that higher institutional ownership positively affects short selling by increasing the supply of loanable shares. So we control for institutional ownership. Jain et al. (2013) find that short sellers do not maintain high open interest in high dividend paying firms. So we control for dividend yield. Diether et al. (2009b) also show that return volatility affects short selling. So we control for return volatility. Asquith et al. (2005) find that the level of short interest is known to be higher for firms with convertible bonds. So we control for convertible debt. We also control for industry fixed effects in all our regression models.

The control variables mentioned above are defined as follows. *Return* is calculated as log (price) – log (lag (price)) for each firm-year; we lag this value in tests. *Log Market Capitalization* is the log of shares outstanding multiplied by price at the end of fiscal year. *Log Average Daily Volume* is the log of average of fortnightly daily volume during the fiscal year. *Days to Cover* is the average short interest divided by the average daily trading volume. *% Institutional Ownership* is the average of fortnightly percentage institutional ownership during the fiscal year. *Dividend Yield* is calculated as dividend per share divided by price per share. *Return Volatility* is the standard deviation of monthly returns for each firm during the fiscal year. *Convertible Debt Dummy* is a dummy variable indicating a value of 1 for firm-years with convertible debt greater than zero, and 0 otherwise.

Descriptive statistics

We report descriptive statistics in Table 1. Our measure of short selling activity, *Scaled Short Interest*, has a mean value of 3.01 percent with a median of 1.58 percent. Our four

measures of conservatisms are *C_Score*, *C_AccCFO*, Δ*C_Score*, and Δ*C_AccCFO*. These measures have mean values of -0.02, -0.81, -0.03, and -0.79 respectively. The corresponding median values are 0.02, 0.24, 0.00, and -0.30. Turning to some of the control variables, mean *Market Capitalization* is $4,113 million, mean *Return* is 1.93 percent, mean *Average Daily Volume* is approximately 800,000 shares, and mean *% Institutional ownership* is about 50%. The sample appears skewed toward large capitalization firms.

[Insert Table 1 here]

We report correlations in Table 2. In Panel A, we report the correlation between *Scaled Short Interest* and measures of conservatism. Consistent with our hypothesis, we find a negative relationship between *Scaled Short Interest* and all four measures of conservatism. We also note that a modestly positive correlation of 0.39 between *C_Score* and *C_AccCFO* suggesting that the measures reflect different aspects of conservatism and perhaps also contain measurement errors as discussed in the literature.

Table 2 Panel B reports correlations for control variables. The correlation between *Scaled Short Interest* and control variables are mostly consistent with the prior literature. Lagged *return* is positively correlated with *Scaled Short Interest* consistent with Diether et al. (2009b) and Jain et al. (2012). *Market Capitalization* is negatively correlated with *Scaled Short Interest* consistent with Jain et al. (2013). *Average Daily Volume* and *Days to Cover* are positively correlated with *Scaled Short Interest* consistent with Jain et al. (2013). *% Institutional Ownership* is positively associated with *Scaled Short Interest* consistent with D'Avolio (2002) and Asquith et al. (2005). *Dividend Yield* is negatively correlated with *Scaled Short Interest* consistent with Jain et al. (2013). *Convertible Debt Dummy* is positively correlated with *Scaled Short Interest* consistent with Asquith et al. (2005). With respect to correlation among control variables, we do not note

many large correlations: the largest value is 0.47 (between *Market Capitalization* and *Average Daily Volume*) and the next highest is -0.35 (between *% Institutional Ownership* and *Return Volatility*); this suggests that multicollinearity is not a concern.

[Insert Table 2 here]

Empirical results

In this section, we present evidence concerning the relationship between short interest and measures of conservatism. Table 3 presents estimates of equation (1). We use *C_Score* as the explanatory variable in Models 1 and 3. We use *C_AccCFO* as the explanatory variable in Models 2 and 4. The t-statistics in Models 1 and 2 are based on White's heteroscedasticity consistent standard errors while those in Model 3 and 4 are based on standard errors clustered by fiscal year as well as by firm following Petersen (2009). The coefficient of *C_Score* is negative and significant both in Model 1 and in Model 3 indicating that *Scaled Short Interest* is lower for firms with higher levels of conservatism. The coefficient of *C_AccCFO* is also negative and significant in Models 2 and 4 consistent with our hypothesis. Thus, Table 3 shows support for the hypothesized negative relation between conservatism and short interest.

[Insert Table 3 here]

We now turn to the coefficients of some of the control variables. The coefficient of *Return* is positive and significant indicating that short interest is higher for firms with positive past returns consistent with Diether et al. (2009b) and Jain et al. (2012). The coefficient of *Log Market Capitalization* is negative and significant indicating that short interest is lower for bigger firms, consistent with Jain et al. (2013). The coefficient of *Log Average Daily Volume* is positive and significant indicating that short interest is higher for firms with higher trading volume, consistent with Jain et al. (2013). The coefficient of *Days to Cover* is positive and significant

indicating that traders are not deterred by the length of time to cover outstanding short positions; instead, traders apply momentum strategies and short previously-shorted stocks even more. This result is consistent with Jain et al. (2013). The coefficient of *Institutional Ownership* is positive and significant indicating that higher institutional ownership positively affects short interest by increasing the supply of loanable shares consistent with D'Avolio (2002) and Asquith et al. (2005). The coefficient of *Return Volatility* is positive and significant indicating that short interest is higher for firms with higher return volatility consistent with Diether et al. (2009b). The coefficient of *Convertible Debt Dummy* is positive and significant indicating that short interest is higher for firms with convertible bonds consistent with Asquith et al. (2005). The coefficient of *Dividend Yield* appears to be inconsistent with the prior literature. Overall, our controls behave as expected. Importantly, we find a negative relation between short interest in conservatism in all four specifications after controlling for known determinants of short interest.

Next, we report the estimates of equation (2) in Table 4. We use delta values of conservatism as independent variables and find that our results hold. The coefficient of delta conservatism is negative and significant in all four models indicating that *Scaled Short Interest* is lower for firms with an increase in conservatism. Thus, Table 4 shows evidence of a negative relation between conservatism and short interest and corroborates results in Table 3.

[Insert Table 4 here]

To control for potential endogeneity, we use the Heckman (1979) two-step procedure to test the relationship between conservatism and short interest. Endogeneity may result from omitted factors explaining short interest that are correlated with conservatism measures or from measurement errors in conservatism measures, both of which would induce endogeneity in the sense that residuals in the short interest regression (the test model) would be correlated with

conservatism. The Heckman procedure allows control for this type of a problem (e.g., Chung and Wynn, 2008) and involves the estimation of a selection model for conservatism as a first step followed by the insertion of the *Inverse Mills Ratio* from the first step in the estimation of the test model in the second step. In the selection model, the dependent variable is a dichotomous variable indicating conservatism; for each conservatism measure, we set this variable equal to one if the value is higher than the median value (entire sample) and zero otherwise. This dichotomous conservatism variable is then related to percentage institutional ownership, sales growth, leverage, research and development and advertisement expenses, cash flow from operations/total assets, and firm size.[3] We control for these variables following Ahmed and Duellman (2007). Note that following the literature (Lennox, Francis, and Wang 2012), we include certain instruments in the first step that are excluded in the test equation. For example, leverage has been identified in the literature as influencing conservatism but has not been related to short interest; hence it is included in the first step and not in the second step and performs the role of an exclusionary variable.

Table 5 Panel A reports results from the first-step selection model. We find that our conservatism measures are positively related to growth, leverage, and cash flow from operations/total assets and negatively related to % institutional ownership, research and development and advertisement, and firm size. We include the *Inverse Mills Ratio* from the selection model in the test model, the second step in the two-step procedure, which is reported in Table 5 Panel B. Similar to our earlier results (Table 3), we find a negative relation between conservatism and short interest in all four specifications. Thus, as in Table 3, we find evidence

[3] For the selection model, we define firm size as total assets following Ahmed and Duellman (2007). For the test model, we define firm size as *Market Capitalization* following Jain et al. (2013) and this is also consistent with rest of the tables.

that conservatism affects short interest. Finally, we note that the coefficients of the *Inverse Mills Ratio* are statistically significant, justifying controls for endogeneity.

[Insert Table 5 here]

Next, in Table 6, we report a similar two-step procedure to test the relationship between delta conservatism and short interest. As in Table 5, Panel A presents the selection model while Panel B presents the test model. In the selection model, we find evidence that the change in conservatism is negatively related to the change in institutional ownership, the change in cash flow from operations/total assets, and the change in firm size, and positively related to the change in growth. In the test model, we find that coefficients of Δ *C_Score* and Δ *C_AccCFO* remain negative and significant in three out of four models. Thus, as in Table 4, we find evidence that conservatism affects short interest. Overall, and across various specifications, Tables 3-6 show fairly consistent evidence that conservatism and short interest are negatively related.

[Insert Table 6 here]

In an acknowledgment of recent developments in the conservatism literature and as a robustness check, we measure conservatism following Dutta and Patatoukas (2017). They argue that a key implication of conditional conservatism is asymmetry in the distribution of accruals. Specifically, these authors expect and find a higher variance of accruals for bad news relative to good news. We offer a test of our hypothesis using this notion of conservatism (that is, asymmetry in the conditional variance of accruals) and report results in Table 7. Specifically, we create quintiles of firm-years using short interest and then divide each quintile into positive and negative return subgroups. In column 3, we report the standard deviation of accruals scaled by lagged value of total assets for these groups. In column 4, for each short interest quintile, we report the difference in the standard deviation of accruals for the two groups based on returns;

this measure is positively related to conservatism. We find that, for the lowest quintile, this difference is positive (i.e., higher conservatism). Similarly, for the highest quintile of short interest this difference is negative (i.e., lower conservatism). These results are consistent with our hypothesis of a negative relation between conservatism and short selling.

[Insert Table 7 here]

Conclusion

We focus on short selling as the investor-action metric and conservatism as the relevant characteristic of accounting information and use a large sample for the period 1995-2014 (excluding 2008) to test whether conservatism is related to short interest. After controlling for known determinants of short selling, we find evidence of a negative relationship. The relation is robust to various methodologies. In particular, we use various alternative measures of conservatism including those suggested in the most recent literature (e.g., Dutta and Patatoukas 2017). We also use other methodological checks including the use of levels versus changes of conservatism and controls for endogeneity using the Heckman two-step procedure.

In one of the key accounting papers examining short selling, Dechow, Hutton, Meulbroek, and Sloan (2001) show how accounting information as reflected in fundamentals-to-price ratios (e.g., earnings-to-price ratio, cash flows-to-price ratio) is related to short interest. We complement this study by showing how a reporting strategy (that is, conservatism) is related to short interest. Thus, sophisticated investors such as short sellers respond to information content as well as information strategy. This is potentially an important consideration for firms as they devise their information strategies. As claimed in influential papers such as Watts (2003), conservatism is a governance mechanism and a policy; thus, corporate boards may wish to

consider market effects such as the one we identify as they structure the information processes for the firm.

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APPENDIX A

Variable Definitions

Scaled Short Interest$_{i,y}$ = total short interest$_{i,y}$ divided by shares outstanding times 100, where total short interest$_{i,y}$ is the average number of outstanding shorted shares for each security during the fiscal year;

C_Score = Following Collin et al. (2014) we estimate annual cross-sectional Basu (1997) regressions, specifying the asymmetric accrual timeliness coefficient as a linear function of firm-specific characteristics namely size, market-to-book, and leverage. C_score, is calculated by substituting the firm's size, market-to-book and leverage into the estimation regression for that year;

C_AccCFO = measure of the sensitivity of accruals to negative cash flows using the approach in Ball and Shivakumar (2005). Similar to how Khan and Watts (2009) transform the Basu (1997) measure into a firm-year measure, we transform the Ball and Shivakumar measure into a firm-year measure by specifying the asymmetric accruals timeliness coefficient as a linear function of firm-specific characteristics namely size, market-to-book, and leverage. C_AccCFO, is calculated by substituting the firm's size, market-to-book and leverage into the estimation regression for that year;

Return$_{i,y-1}$ = log(lag(price) - log(lag2(price));

Market Capitalization$_{i,y}$ = market capitalization for firm i during fiscal year y;

Average Daily Volume$_{i,y}$ = average daily volume for firm i during fiscal year y;

Days to Cover$_{i,y}$ = average short interest divided by average daily trading volume;

% Institutional ownership$_{i,y}$ = average of fortnightly % institutional ownership during the fiscal year;

Dividend Yield$_{i,y}$ = dividend per share divided by price per share;

Return Volatility$_{i,y}$ = standard deviation of monthly stock returns for each firm during the fiscal year y;

Convertible Debt Dummy$_{i,y}$ = dummy variable indicating a value of 1 for firm-years with convertible debt greater than zero, and 0 otherwise; and

Table 1

Descriptive Statistics

Variable	N	Mean	Median	STD
Measure of short selling				
Scaled short interest $(\%)_{i,y}$	35,302	3.01%	1.58%	3.89%
Measures of conservatism				
$C\_Score_{i,y}$	34,510	(0.02)	0.02	0.20
$C\_AccCFO_{i,y}$	34,604	(0.81)	0.24	3.13
Δ $C\_Score_{i,y}$	32,397	(0.03)	0.00	0.23
Δ $C\_AccCFO_{i,y}$	32,344	(0.79)	(0.30)	4.16
Control variables				
$Return_{i,y-1}$	32,328	1.93%	5.52%	57.77%
Market Capitalization (in millions)$_{i,y}$	34,804	4,113.18	617.76	10,554.52
Average Daily $Volume_{i,y}$	32,202	787,549.96	216,174.24	1,602,916.17
Days to $Cover_{i,y}$	32,460	4.31	3.15	4.11
% Institutional $Ownership_{i,y}$	28,206	49.84	52.62	31.50
Dividend $Yield_{i,y}$	34,924	0.01	0.00	0.02
Return $Volatility_{i,y}$	32,058	0.03	0.03	0.02
Convertible Debt $Dummy_{i,y}$	35,104	0.12	0.00	0.33

See variable definitions in Appendix A

TABLE 2

Correlations

This table reports Pearson correlations. In Panel A, we report the correlation between scaled short interest and measures of conservatism. In Panel B, we report the correlation between scaled short interest and control variables used in the regression analysis.

Panel A: Short selling and measures of conservatism

	Variable	Scaled short interest $(\%)_{i,y}$	1	2	3
1	$C\_Score_{i,y}$	-0.1092***			
2	$C\_AccCFO_{i,y}$	-0.1151***	0.3939***		
3	Δ $C\_Score_{i,y}$	-0.0883***	0.8741***	0.3680***	
4	Δ $C\_AccCFO_{i,y}$	-0.0800***	0.2226***	0.8077***	0.2784***

Panel B: Short selling and other control variables

	Variable	Scaled short interest $(\%)_{i,y}$	1	2	3	4	5	6	7
1	$Return_{i,y-1}$	0.0367***							
2	Market Capitalization (in millions)$_{i,y}$	-0.0975***	0.0250***						
3	Average Daily $Volume_{i,y}$	0.1384***	-0.0097*	0.4678***					
4	Days to $cover_{i,y}$	0.5899***	-0.0045	-0.0759***	-0.0879***				
5	% Institutional $Ownership_{i,y}$	0.4638***	0.0586***	0.0426***	0.2370***	0.2646***			
6	Dividend $Yield_{i,y}$	-0.1239***	-0.0125**	0.1615***	0.0476***	-0.0343***	-0.0811***		
7	Return $Volatility_{i,y}$	-0.0295***	-0.1993***	-0.2095***	-0.0876***	-0.1554***	-0.3541***	-0.2651***	
8	Convertible Debt $Dummy_{i,y}$	0.1619***	-0.0261***	0.0654***	0.1631***	0.0753***	0.1022***	-0.0745***	0.0234***

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively. See variable definitions in Appendix A

Table 3

Regression Analysis: Conservatism and Short Interest

Dependent Variable = Scaled Short Interest$_{i,y}$

Variables	Coefficient (t-statistic)			
	(1)	**(2)**	**(3)**	**(4)**
Intercept	-8.3254***	-8.1973***	-8.3254***	-8.1973***
	(-31.11)	(-31.03)	(-10.46)	(-10.76)
C_Score$_{i,y}$	-0.5693***		-0.5693***	
	(-6.19)		(-3.02)	
C_AccCFO$_{i,y}$		-0.0761***		-0.0761***
		(-13.37)		(-5.40)
Return$_{i,y-1}$	0.4072***	0.4599***	0.4072***	0.4599***
	(12.42)	(13.92)	(6.04)	(8.23)
Log Market Capitalization $_{i,y}$	-0.6482***	-0.6763***	-0.6482***	-0.6763***
	(-41.62)	(-43.11)	(-17.35)	(-16.11)
Log Average Daily Volume$_{i,y}$	0.9765***	0.9842***	0.9765***	0.9842***
	(53.50)	(53.86)	(17.99)	(17.87)
Days to Cover$_{i,y}$	0.4707***	0.4722***	0.4707***	0.4722***
	(77.89)	(78.06)	(21.37)	(20.96)
Institutional Ownership$_{i,y}$	0.0298***	0.0292***	0.0298***	0.0292***
	(41.54)	(40.77)	(13.60)	(13.83)
Dividend Yield$_{i,y}$	2.1124**	2.1506**	2.1124	2.1506
	(2.40)	(2.45)	(1.24)	(1.29)
Return Volatility$_{i,y}$	11.6454***	10.0979***	11.6454***	10.0979**
	(8.41)	(7.41)	(3.06)	(2.54)
Convertible Debt Dummy$_{i,y}$	0.7281***	0.7549***	0.7281***	0.7549***
	(11.75)	(12.20)	(4.77)	(4.95)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Double clustered standard errors by firms and year	No	No	Yes	Yes
Adjusted R Squared	0.5959	0.5990	0.5959	0.5990
Number of Observations	23,554	23,499	23554	23499

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively. t-statistics in Models 1 and 2 are based on White's heteroscedasticity consistent standard errors and t-statistics in Model 3 and 4 are based on standard errors clustered by fiscal year and firm following Petersen (2009). See variable definitions in Appendix A.

Table 4

Regression Analysis: Delta conservatism and Short Interest

Dependent Variable = Scaled Short Interest$_{i,y}$

Variables	Coefficient (t-statistic)			
	(1)	**(2)**	**(3)**	**(4)**
Intercept	-8.4247***	-8.2410***	-8.4247***	-8.2410***
	(-31.28)	(-31.07)	(-10.67)	(-10.98)
Δ C_Score$_{i,y}$	-0.3500***		-0.3500*	
	(-4.44)		(-1.67)	
Δ C_AccCFO$_{i,y}$		-0.0407***		-0.0407**
		(-9.60)		(-2.50)
Return$_{i,y-1}$	0.4175***	0.4695***	0.4175***	0.4695***
	(12.64)	(13.97)	(5.84)	(9.64)
Log Market Capitalization $_{i,y}$	-0.6460***	-0.6577***	-0.6460***	-0.6577***
	(-40.94)	(-41.85)	(-16.79)	(-17.28)
Log Average Daily Volume$_{i,y}$	0.9837***	0.9764***	0.9837***	0.9764***
	(53.22)	(53.06)	(18.16)	(19.03)
Days to Cover$_{i,y}$	0.4741***	0.4747***	0.4741***	0.4747***
	(77.53)	(77.37)	(21.88)	(21.71)
Institutional Ownership$_{i,y}$	0.0299***	0.0295***	0.0299***	0.0295***
	(41.21)	(40.95)	(13.59)	(13.87)
Dividend Yield$_{i,y}$	2.2488**	2.3263***	2.2488	2.3263
	(2.52)	(2.61)	(1.32)	(1.38)
Return Volatility$_{i,y}$	11.1856***	10.1427***	11.1856***	10.1427**
	(8.04)	(7.37)	(2.79)	(2.53)
Convertible Debt Dummy$_{i,y}$	0.7380***	0.7637***	0.7380***	0.7637***
	(11.74)	(12.18)	(4.78)	(4.82)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Double clustered standard errors by firms and year	No	No	Yes	Yes
Adjusted R Squared	0.5955	0.5982	0.5955	0.5982
Number of Observations	22,929	22,881	22,929	22,881

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively. t-statistics in Models 1 and 2 are based on White's heteroscedasticity consistent standard errors and t-statistics in Model 3 and 4 are based on standard errors clustered by fiscal year and firm following Petersen (2009). See variable definitions in Appendix A.

Table 5

Control for Endogeneity: Regressions of short interest on conservatism using the Heckman selection model

We use the two-step Heckman approach In the first step, we estimate the selection model: the probability of conservatism being high is modelled (Panel A). In the second step, the Inverse Mills ratio from the first-step along with conservatism and other variables are used to explain short interest (Panel B).

Panel A: Selection Model

	Coefficient (t-statistic)	
Variables	**$C\_Score_{i,y}$**	**$C\_AccCFO_{i,y}$**
Intercept	0.3685***	0.1755***
	(17.14)	(8.21)
% Institutional $Ownership_{i,y}$	-1.4567***	-1.0279***
	(-6.27)	(-4.45)
$Growth_{i,y}$	0.0396***	0.0033
	(2.99)	(0.24)
$Leverage_{i,y}$	0.1405***	0.2145***
	(5.90)	(8.78)
Research and Development and $Advertisement_{i,y}$	-0.1822***	-0.1161**
	(-3.32)	(-2.13)
$CFO/TA_{i,y}$	0.1302***	0.0059
	(6.72)	(0.31)
Firm Size (log of total $assets)_{i,y}$	-0.0655***	-0.0364***
	(-18.34)	(-10.32)
Likelihood ratio	592.17	299.22
Number of observations	34470	34653

Table 5 continued…

Table 5 continued…

Panel B: Test Model

	Dependent Variable = Scaled Short Interest$_{i,y}$ Coefficient (t-statistic)			
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	-5.5535***	-20.6297***	-5.5535***	-20.6297***
	(-12.68)	(-17.24)	(-5.63)	(-10.23)
C_Score$_{i,y}$	-0.5698***		-0.5698***	
	(-6.17)		(-3.09)	
C_AccCFO$_{i,y}$		-0.0761***		-0.0761***
		(-13.28)		(-5.90)
Return$_{i,y-1}$	0.3730***	0.4013***	0.3730***	0.4013***
	(10.99)	(11.70)	(5.71)	(6.84)
Log Market Capitalization $_{i,y}$	-0.5916***	-0.6826***	-0.5916***	-0.6826***
	(-32.67)	(-42.08)	(-14.04)	(-15.61)
Log Average Daily Volume$_{i,y}$	0.9950***	0.9906***	0.9950***	0.9906***
	(52.23)	(52.77)	(18.02)	(17.67)
Days to Cover$_{i,y}$	0.4717***	0.4745***	0.4717***	0.4745***
	(77.02)	(77.40)	(22.28)	(21.74)
% Institutional Ownership$_{i,y}$	22.2652***	61.5222***	22.2652***	61.5222***
	(19.67)	(19.25)	(9.87)	(10.28)
Dividend Yield$_{i,y}$	1.5930*	2.9366***	1.5930	2.9366*
	(1.79)	(3.29)	(0.99)	(1.89)
Return Volatility$_{i,y}$	11.9429***	10.8191***	11.9429***	10.8191***
	(8.56)	(7.84)	(3.25)	(2.98)
Convertible Debt Dummy$_{i,y}$	0.7899***	0.8567***	0.7899***	0.8567***
	(12.45)	(13.55)	(5.14)	(5.80)
Inverse Mills Ratio	-2.8829***	10.1390***	-2.8829***	10.1390***
	(-8.08)	(10.60)	(-4.77)	(5.72)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Double clustered standard errors by firms and year	No	No	Yes	Yes
Adjusted R Squared	0.5986	0.6031	0.5986	0.6031
Number of Observations	22491	22586	22629	22491

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively. t-statistics in Models 1 and 2 are based on White's heteroscedasticity consistent standard errors and t-statistics in Model 3 and 4 are based on standard errors clustered by fiscal year and firm following Petersen (2009). See variable definitions in Appendix A.

Table 6

Control for Endogeneity: Regressions of short interest on delta conservatism using the Heckman selection model

We use the two-step Heckman approach In the first step, we estimate the selection model: the probability of conservatism being high is modelled (Panel A). In the second step, the Inverse Mills ratio from the first-step along with conservatism and other variables are used to explain short interest (Panel B).

Panel A: Selection Model

	Coefficient (t-statistic)	
Variables	**Δ C_Score$_{i,y}$**	**Δ C_AccCFO$_{i,y}$**
Intercept	-0.0403***	-0.0004
	(-5.45)	(-0.06)
Δ % Institutional Ownership$_{i,y}$	-0.4914	-1.8728***
	(-0.74)	(-2.78)
Δ Growth$_{i,y}$	-0.0005	0.1585***
	(-0.04)	(12.19)
Δ Leverage$_{i,y}$	0.0046	0.0597
	(0.11)	(1.35)
Δ Research and Development and Advertisement$_{i,y}$	-0.0278	-0.0029
	(-0.38)	(-0.04)
Δ CFO/TA$_{i,y}$	0.0241	-0.0493*
	(0.99)	(-1.82)
Δ Firm Size (log of total assets)$_{i,y}$	0.0059	-0.1942***
	(0.38)	(-11.53)
Likelihood ratio	1.9069	350.54
Number of observations	29783	29900

Table 6 continued…

Table 6 continued…

Panel B: Test Model

	Dependent Variable = Scaled Short Interest$_{i,y}$ Coefficient (t-statistic)			
Variables	**(1)**	**(2)**	**(3)**	**(4)**
Intercept	-2.4313***	-13.7941***	-2.4313	-13.7941***
	(-3.49)	(-12.40)	(-0.62)	(-2.85)
Δ C_Score$_{i,y}$	-0.3493***		-0.3493	
	(-4.29)		(-1.57)	
Δ C_AccCFO$_{i,y}$		-0.0392***		-0.0392**
		(-8.73)		(-2.37)
Return$_{i,y-1}$	0.3375***	0.4657***	0.3375***	0.4657***
	(9.43)	(12.84)	(4.07)	(9.80)
Log Market Capitalization$_{i,y}$	-0.6596***	-0.6681***	-0.6596***	-0.6681***
	(-39.08)	(-39.69)	(-16.47)	(-16.80)
Log Average Daily Volume$_{i,y}$	0.9712***	0.9712***	0.9712***	0.9712***
	(49.81)	(49.76)	(18.60)	(19.32)
Days to Cover$_{i,y}$	0.4716***	0.4741***	0.4716***	0.4741***
	(74.42)	(74.37)	(22.03)	(21.19)
% Institutional Ownership$_{i,y}$	28.9604***	28.7082***	28.9604***	28.7082***
	(38.31)	(38.03)	(12.97)	(13.03)
Dividend Yield$_{i,y}$	2.6363***	2.0423**	2.6363	2.0423
	(2.85)	(2.21)	(1.42)	(1.20)
Return Volatility$_{i,y}$	12.8241***	11.1937***	12.8241***	11.1937**
	(8.31)	(7.31)	(2.92)	(2.56)
Convertible Debt Dummy$_{i,y}$	0.7112***	0.7352***	0.7112***	0.7352***
	(10.89)	(11.28)	(4.75)	(4.83)
Inverse Mills Ratio	-6.1419***	5.4549***	-6.1419	5.4549
	(-9.28)	(4.99)	(-1.53)	(1.16)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Double clustered standard errors by firms and year	No	No	Yes	Yes
Adjusted R Squared	0.5968	0.5978	0.5968	0.5978
Number of Observations	20,989	21,008	20,989	21,008

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively. t-statistics in Models 1 and 2 are based on White's heteroscedasticity consistent standard errors and t-statistics in Model 3 and 4 are based on standard errors clustered by fiscal year and firm following Petersen (2009). See variable definitions in Appendix A.

Table 7

Alternative measures of conditional conservatism for short selling quintiles

We create quintiles of short selling and then divide each quintile into two groups based on return less than 0 and return more than 0. We report the standard deviation of accruals scaled by lagged value of total assets for these groups in column 3. In column 4, we report the difference in the standard deviation of accruals for the two groups based on returns.

		Standard deviation of accruals	**Difference (Returni,y < 0 - Returni,y > 0)**
Scaled short interest$_{i,y}$ (Low)	Return$_{i,y}$ < 0	0.13119	
	Return$_{i,y}$ > 0	0.1236	0.0076***
2	Return$_{i,y}$ < 0	0.12463	
	Return$_{i,y}$ > 0	0.12398	0.0006
3	Return$_{i,y}$ < 0	0.10416	
	Return$_{i,y}$ > 0	0.10457	-0.0004
4	Return$_{i,y}$ < 0	0.10097	
	Return$_{i,y}$ > 0	0.10558	-0.0046**
Scaled short interest$_{i,y}$ (High)	Return$_{i,y}$ < 0	0.104	
	Return$_{i,y}$ > 0	0.11295	-0.0090***

*, **, *** Significant at 0.10, 0.05, and 0.01 levels, respectively.

See variable definitions in Appendix A