5-2011

Accounting quality, stock price delay and future stock returns

Hai LU
Singapore Management University, hailu@smu.edu.sg

Jeffrey CALLEN

Mozaffar KHAN

Citation

LU, Hai; CALLEN, Jeffrey; and KHAN, Mozaffar. Accounting quality, stock price delay and future stock returns. (2011). *Contemporary Accounting Research*. 30, (1), 269-295.
Available at: https://ink.library.smu.edu.sg/soa_research/1575

Published in Contemporary Accounting Research, 2011 May, Volume 30, Issue 1, Pages 269-295
http://doi.org/10.1111/j.1911-3846.2011.01154.x

Accounting Quality, Stock Price Delay, and Future Stock Returns*

JEFFREY L. CALLEN, *University of Toronto*

MOZAFFAR KHAN, *University of Minnesota*

HAI LU, *University of Toronto*

1. Introduction

In frictionless capital markets with complete information and rational investors, stock prices adjust to new information instantaneously and completely. However, a substantial body of research studies information imperfections such as asymmetric information and incomplete information (e.g., Barry and Brown 1984; Merton 1987; Easley, Hvidkjaer, and O'Hara 2002; Hou and Moskowitz 2005; Lambert, Leuz, and Verrecchia 2007; Akins, Ng, and Verdi 2012). Information imperfections potentially hinder timely price discovery and are associated with delayed stock price adjustment to information (e.g., Verrecchia 1980; Callen, Govindaraj, and Xu 2000). Hence, our first research question is whether the quality of accounting information (or "accounting quality") is one such information imperfection that is associated with cross-sectional variation in stock price delay.

We define accounting quality as the precision with which financial reports convey information to equity investors about the firm's expected cash flows (e.g., Dechow, Ge, and Schrand 2010). Poor accounting quality is likely associated with uncertainty about stock valuation parameters and incomplete information. In the models of Barry and Brown 1984 and Merton 1987, stocks with parameter estimation risk and incomplete information have higher expected returns. Our second research question therefore is whether the accounting quality component of price delay is associated with higher future stock returns. The emphasis of this question is on poor accounting quality. Because delay likely is associated with both nonaccounting and accounting firm characteristics, any return premium for delay is also likely associated with both nonaccounting and accounting firm characteristics. Our research design allows us to parse out the delay premium associated with accounting versus nonaccounting sources, and thereby to provide evidence on the relation between accounting quality and future returns.

To facilitate the following discussion we distinguish between investors' *preexisting* information set and *newly arriving* information. At any point between two financial reporting dates, the most recent set of financial statements is the preexisting accounting

* Accepted by Christine Botosan. Helpful comments were received from participants at the BANDS Boston Area Research Conference (Boston College, Boston University, Harvard University, and MIT), the 2010 Global Finance and Business Conference, the 2011 CAAA conference, and the 2011 Maui International Business Conference, as well as from seminar participants at City University of Hong Kong, Columbia, Fudan, ICTSE Portugal, Interdisciplinary Center Hertzliya, Iowa, Louisiana State, Notre Dame, MIT, Penn State, Texas A&M, University of Minnesota, and the University of Southern California. We further thank the anonymous referees of this journal, Christine Botosan (Editor), Brian Akins, Randy Beatty, Rei-Ning Chen, Zhaoyang Gu, Michelle Hanlon, Chandra Kanodia, Stephannie Larocque, Maria Ogneva, Sugata Roychowdhury, Devin Shanthikumar, K. R. Subramanyam, Rodrigo Verdi, Ross Watts, Joe Weber, and Franco Wong for their useful input. We especially thank Feng Li both for helpful comments and for providing us with access to his data set. Yiwei Dou, Yanju Liu, and Yuri Loktionov are to be commended for excellent research assistance.

information set. Investors use their preexisting or baseline information set to forecast cash flows and arrive at a price estimate. In this paper, we hypothesize that poor accounting quality is associated with a lower quality baseline cash flow forecast. When new value-relevant information, whether market-wide or firm-specific, arrives, revising cash flow forecasts derived from a poor-quality accounting information set likely leads to a more uncertain price estimate than revising cash flow forecasts derived from a high-quality accounting information set. When there is uncertainty in the price estimate, investors are likely over time to revise their initial price assessment based on improved understanding and also learning from the assessments of other investors, until prices converge to their fundamental values. This is what we refer to as delayed price adjustment (Verrecchia 1980; Callen et al. 2000). Empirically, therefore, we examine the delay in price adjustment across stocks with differences in the quality of their preexisting accounting information set.

Our tests require empirical measures of the two main theoretical constructs: price delay and accounting quality. We measure price delay based on correlations of firm-specific returns with lagged market or firm-specific returns, as in Hou and Moskowitz 2005. We measure accounting quality using the quantitative information in financial statements, such as accrual quality (AQ), special items, and earnings surprise. The price delay and accounting quality measures are described in detail in section 3. Consistent with our prediction, we find that firm-years with poor accrual quality and large negative special items are associated with significantly greater stock price delay. In particular, a one-standard-deviation deterioration in accrual quality is associated with a 9 percent increase in stock price delay. The regressions control for firm distress, as well as a number of different proxies for both stock liquidity and investor attention. Results are robust to using AQ as the sole measure of accounting quality, controlling for innate determinants of AQ (Francis, LaFond, Olsson, and Schipper 2005), and controlling for a number of different proxies for the firm's growth options.

As an additional test we measure accounting quality using the FOG index of Li 2008, which is a measure of the readability of qualitative information in annual reports. Qualitative information is forward looking (e.g., Management Discussion and Analysis, [MD&A]), helps in interpreting financial statement numbers, and therefore aids in predicting cash flows. Poor or fuzzy qualitative information is likely associated with lower-quality cash flow forecasts. Hence, we expect the FOG index to be associated with more delayed (less timely) incorporation of value-relevant information into stock prices (e.g., Grossman and Stiglitz 1980; Bloomfield 2002; Li 2008). Results indicate that firms with annual reports that are difficult to read, that is, firms with a high FOG index, have significantly higher price delay.

We subsequently examine whether firms with high accounting-associated delay have higher future stock returns (e.g., Barry and Brown 1984; Merton 1987). We estimate accounting-associated delay, $Delay_{Acct}$, as the fitted portion of stock price delay explained by accounting quality. In Fama-MacBeth 1973 regressions of one-year-ahead monthly excess stock returns on a number of firm characteristics known to predict returns, including size, book-to-market ratio, accruals, and return momentum, we find that both total delay and $Delay_{Acct}$ have significantly positive predictive ability. This suggests firms with high stock price delay in general, and firms with high accounting-associated delay in particular, have higher future stock returns.

In addition to the cross-sectional return regressions above, we also conduct time-series asset pricing tests of return predictability following Fama and French 1993. We expect significantly positive alphas for high $Delay_{Acct}$ minus low $Delay_{Acct}$ portfolios if there is an accounting-associated delay premium in stock returns. We find that accounting-associated delay has a significant annual return premium of 7.7 percent when both accounting and nonaccounting delay are severe. This suggests that poor accounting quality is associated with higher average returns when nonaccounting frictions such as stock illiquidity and lack of investor attention are also severe. Finally, following the suggestion in Botosan, Plumlee, and Wen 2011 to use the RPEG implied cost of capital measure as a proxy for expected returns, we find that $Delay_{Acct}$ is associated with significantly higher RPEG.

This paper contributes to the literature in a number of ways. First, this is the first paper to empirically study how the speed of price adjustment is related to accounting quality. Our results shed light on the role of accounting quality in the price formation process. Second, we show the negative association between accounting quality and future stock returns is conditional on the presence of nonaccounting delay. The prior literature has examined the unconditional relation between accounting quality and future stock returns. Our results suggest the accounting quality component of delay is associated with a return premium when it coexists with other nonaccounting determinants of delay. One interpretation of this result is that the effects of poor accounting quality on its own can be offset by other nonaccounting information sources that act as substitutes in enabling the firm to maintain a transparent information environment. However, when these substitutes are themselves deficient, that is, when accounting-associated and nonaccounting-associated delay coexist, investors expect a return premium for the overall poor information quality.

The rest of this paper proceeds as follows. Section 2 develops our hypotheses. Section 3 motivates the accounting quality proxies and describes the measurement of price delay. Section 4 examines the cross-sectional relation between price delay and accounting quality. Section 5 examines the relation between future returns and the accounting quality component of price delay. Section 6 describes a battery of robustness tests. Section 7 concludes. The appendix presents variable definitions.

2. Hypothesis development

In this section we motivate our two testable hypotheses. First we motivate the link between accounting quality and stock price delay, and then we motivate the link between stock price delay and future stock returns.

The relation between accounting quality and stock price delay

Extensive prior research has documented that financial statements are part of the information set investors use to forecast a firm's future cash flows, in order to arrive at equity price estimates (i.e., that financial statements are value relevant). However, financial statements are issued periodically, and other value-relevant information, both market-wide and firm-specific, arrives between the issuance of successive financial statements. When such value-relevant news arrives, investors update their previous cash flow forecasts to arrive at a new stock price estimate. The updating process relies on two sets of information: the newly arriving information, or news; and the preexisting (relative to the news) or baseline information which includes the most recent financial statements. The preexisting information (and its quality) is relevant because it is the basis for the previous or baseline cash flow forecast that has to be updated. In the traditional perfect capital markets paradigm, updating baseline cash flow forecasts and the stock price adjustment occur quickly and completely because there are no market frictions such as poor quality information, either newly arriving or preexisting. Our paper relaxes the perfect capital markets assumption of frictionless markets, and we examine the speed of stock price adjustment as the quality of the baseline or preexisting accounting information set varies. The quality of the baseline or preexisting information set is proxied by accounting quality, which is defined as the precision with which financial statements convey information to investors about future cash flows.

Our paper is related to the theoretical work of Verrecchia 1980 who analyzed the speed of price adjustment as the quality of *newly arriving* information varies across firms, holding constant across firms the quality of investors' *preexisting* information set. He showed that, as the quality of newly arriving value-relevant information increases, the speed of price adjustment increases. In contrast, we examine the speed of price adjustment to new information when the quality of the *preexisting* accounting information set, that is, accounting quality, varies across firms. In order to do this, we hold constant across firms the quality of the *newly arriving* information, by using the same or identical news for all firms — market-wide news. Another related theoretical paper is Callen et al. 2000, which analyzed the convergence of noisy prices to fundamental values. Noisy prices could result when, for example, investors' existing information set is poor. Callen et al. showed that convergence to fundamental value occurs as the noise in stock returns declines, suggesting that price adjustment occurs as investors learn from each other and reduce heterogeneity of opinion. They also showed that the speed of convergence is slower the noisier are stock returns, suggesting a cross-sectional relation between adjustment speed and the quality of investors' existing information set.

When financial statements convey information about future cash flows with relatively lower precision, that is, when accounting quality is poor, we expect investors' resulting baseline cash flow forecasts to be poor or imprecise, and there is also likely heterogeneity in investor opinion about the amounts, timing, and uncertainty of future cash flows. As new value-relevant information arrives, investors likely have an initial assessment of its price implications, and this is impounded in price. In the subsequent days and weeks investors' understanding of the news likely improves, and they also learn from each other, giving rise to continued price adjustment.[1] Updating baseline cash flow forecasts previously derived from poor quality financial statements likely takes longer because of the underlying opacity and uncertainty, and hence a poor (high) accounting quality firm's stock is more (less) delayed in our terminology. This suggests a negative relation between accounting quality and stock price delay. Consider as an example the Dubai debt crisis of 2009. News arrives that Dubai's debt defaulted, but it is not readily apparent which firms are exposed and by how much. There is an extensive nexus of financial connections between firms, which makes any one firm's exposure difficult to readily ascertain; it is especially problematic for firms with more opaque accounting and financial reporting. Prices likely react initially for all suspected firms, and as time progresses and the extent and magnitude of exposure are determined more accurately, prices adjust. We expect the price adjustment is slower (or more delayed) for firms with poor accounting quality.

On the other hand, if investors are subject to the behavioral bias of conservatism (Barberis, Shleifer, and Vishny 1998) or overconfidence (Daniel, Hirshleifer, and Subrahmanyam 1998), they might overanchor on more precise preexisting information and therefore underreact to new information for firms with high accounting quality relative to firms with low accounting quality. This is consistent with the model of Barberis et al. 1998, wherein the investor is Bayesian but his model of the earnings process is inaccurate. An inaccurate model of the earnings process is more likely when accounting quality is poor. In this setting conservatism is associated with underreaction to new information, and greater subsequent stock price drift or higher stock price delay (see Barberis et al. 1998, and papers cited therein). Therefore, the conservatism bias suggests high-accounting-quality firms' stock is more delayed, implying a positive relation between accounting quality and stock price delay.

1. Jiang, Lee, and Zhang (2005) and Zhang (2006) examine the relation between information uncertainty proxies, return momentum, and future returns. Their information uncertainty proxies are nonaccounting firm characteristics such as turnover, analyst coverage, size and cash flow volatility. In contrast to them, our focus is on the relation between accounting information quality, price delay, and future returns, and we provide evidence on the role of accounting quality after controlling for their nonaccounting information uncertainty proxies.

The relation between accounting quality and stock price delay is therefore an empirical question, and we test the following null hypothesis:

Hypothesis 1. *Poor accounting quality is not associated with stock price delay.*

The alternative to Hypothesis 1 posits that a firm's accounting quality affects stock price delay through a lower quality *preexisting* information set. Hence, testing Hypothesis 1 requires that we hold constant in the cross-section the quality of arriving information (or "news"). We do so by examining cross-sectional variation in the speed of price adjustment to newly arriving market-wide or systematic (as opposed to firm-specific) news.

The relation between stock price delay and future stock returns

We also examine whether the accounting quality component of price delay, $Delay_{Acct}$, is associated with higher future stock returns. This is motivated by the parameter uncertainty and estimation risk models of Bawa, Brown, and Klein 1979 and Barry and Brown 1984. In these differential information models, investors have better quality information about some securities than about other securities. Their perceived risk of the low-information-quality securities is higher than their perceived risk of high-information-quality securities that have the same market beta. In equilibrium, investors require higher returns to compensate them for holding high-estimation risk stocks. In other words, investors appropriately price estimation risk, and so higher future returns are not anomalous in the sense that they are not due to misvaluation. Parameter uncertainty and estimation risk are directly related to our notion of accounting quality in that opaque or poor quality financial statements are associated with greater uncertainty in estimating future cash flows.

Another motivation comes from the incomplete information model of Merton 1987. In this model, each investor has information, or knows, about a subset of securities, in the sense that she knows the parameters of the return process for one subset of securities. All investors who know about this subset have homogeneous beliefs about these parameters and there is no estimation uncertainty. The behavioral assumption in this model is that investors only hold securities they know about, consistent with the fact that investors typically only hold a fraction of the publicly available stocks. In addition, there is no information asymmetry between traders because only investors who know about a security trade in that security. In this setting, Merton (1987) shows that expected returns are decreasing in the degree of investor recognition, in that less widely held (or known) stocks have higher expected returns. Hou and Moskowitz (2005) further show empirically that investor recognition is one determinant of stock price delay, consistent with slower information diffusion for less well recognized or followed stocks being associated with higher stock price delay. Therefore, if poor-accounting-quality firms are relatively neglected or less well recognized by investors, we expect the accounting component of price delay to be associated with higher expected returns.

In our main empirical tests we follow the prior literature in using future realized returns as a proxy for expected returns. Botosan et al. (2011) suggest using the RPEG implied cost of capital measure (Easton 2004; Botosan and Plumlee 2005) rather than future realized returns as a proxy for expected returns. There is a large literature on proxies for expected returns, and while determining the best proxy for expected returns is beyond the scope of our paper, we confirm in robustness tests reported in section 6 that our expected return tests are robust to using the RPEG measure.

We therefore test the alternative hypothesis that $Delay_{Acct}$ is associated with higher future stock returns against the following null hypothesis:

Hypothesis 2. *The accounting quality component of stock price delay does not predict future stock returns.*

There is a large prior literature on the relation between information quality and expected returns. Besides the literature described above (differential information and incomplete information), there are also other proposed links between information quality and expected returns. For example, information asymmetry between traders leads to an information risk premium in the theoretical model of Easley and O'Hara 2004 and the empirical work of Botosan 1997, Easley et al. 2002, Botosan and Plumlee 2002, Francis et al. 2005, Aboody, Hughes, and Liu 2005, Chen, Shevlin, and Tong 2007, and Ogneva 2008.[2] Our hypothesis, while motivated by differential information and incomplete information, is also consistent with asymmetric information arguments. For example, information asymmetry may be associated with differences in investor opinion or interpretation of financial statements that are opaque and of low quality, and this may delay price adjustment to new information and require a return premium.

There is also a literature that explores the relation between information quality and expected returns through illiquidity and liquidity risk. For example, the theoretical models of Diamond and Verrecchia 1991 and Amihud and Mendelson 1986, and the empirical results in Amihud and Mendelson 1986 and Amihud 2002 suggest illiquidity is associated with low information quality and higher stock returns. Ng (2011) studies the relation between information quality and future stock returns through liquidity risk, that is, liquidity shocks or unexpected liquidity. Therefore, in both our main tests and in further robustness tests we control for liquidity, and examine whether the accounting quality component of stock price delay that is orthogonal to liquidity predicts stocks returns. Finally, Lambert et al. (2007) suggest information affects expected returns through market risk or beta, and these information effects can be captured by a forward-looking capital asset pricing model (CAPM) beta if a forward-looking beta can be appropriately specified empirically. However, they suggest a separate information effect, if the historical beta is used in empirical studies. In our tests, we control for the firm's historical beta, and examine whether the accounting quality component of price delay incrementally predicts returns.

3. Measuring accounting quality and price delay

In this section we first describe our accounting quality proxies. We then describe the measurement of accrual quality and of price delay. The final subsection describes our data and sample.

Accounting quality proxies

Consistent with our definition of accounting quality, we use proxies that capture uncertainty in the mapping between current financial statement numbers and future cash flows. We use three financial statement-based proxies for accounting quality — AQ, special items, and earnings surprise — but all results are robust to use of only one proxy, AQ, as reported in section 6. In further robustness tests described in section 6, we also use a measure of the qualitative characteristics of nonfinancial statement information in annual reports to proxy for accounting quality.

AQ

Accruals are estimates of noncash earnings resulting from timing differences between the provision or consumption of goods and services and the receipt or disbursement of cash

2. Hughes, Liu, and Liu (2007), Core, Guay, and Verdi (2008) and Mohanram and Rajgopal (2009) suggest no risk premium for information asymmetry.

for those goods or services. Accruals reverse once the associated cash is received or disbursed. Therefore, AQ is defined as the uncertainty associated with the accrual-to-cash flow mapping. We use the AQ measure of Francis et al. 2005, which is the variability of accruals unexplained by the Dechow and Dichev 2002 model, as one proxy for accounting quality. Firms with high AQ have poor accounting quality, because AQ increases with large unexplained changes, both positive and negative, in accruals. We expect a positive relation between AQ and stock price delay.

Doyle, Ge, and McVay (2007a) and Ashbaugh-Skaife, Collins, Kinney, and LaFond (2008) provide evidence that firms with poor internal controls have high AQ, while Hutton, Marcus, and Tehranian (2009) and Dechow, Ge, Larson, and Sloan (2011) provide evidence that versions of AQ are associated with a higher likelihood of restatements and material misstatements in financial reports. This suggests AQ is associated with accounting quality.

Special items

Special items include restructuring charges and write-offs. Corporate restructurings in turn are associated with low-quality accrual estimates and adjustments and internal control deficiencies (Doyle, Ge, and McVay 2007b). Further, special items incorporate managerial discretion and can be used to shift expenses out of core earnings (e.g., Kinney and Trezevant 1997; Cain, Kolev, and McVay 2011). Therefore, special items are likely associated with lower precision in predicting cash flows from current financial statement numbers, and hence with lower accounting quality. We therefore expect firms with large (negative) special items (SI) to have higher price delay, implying a negative relation between the two variables.

Earnings surprise

Earnings surprises (both negative and positive) could reflect imprecise prior expectations, and less precise prior expectations are likely associated with poor quality financial statements. An earnings surprise can also be associated with increased uncertainty and therefore with lower precision in predicting cash flows from current financial statement numbers. We therefore expect a positive relation between the absolute value of earnings surprise (ES) and price delay. If higher business uncertainty is associated with earnings surprises, this could introduce measurement error into earnings surprise as a measure of information quality. Therefore, for this and other reasons, our tests control for a variety of firm characteristics associated with business uncertainty, such as firm size, sales and cash flow volatility, growth options, and the length of the operating cycle.

Measuring AQ

Following Francis et al. 2005, AQ is the variability of unexplained accruals from the Dechow and Dichev 2002 and McNichols 2002 models. Specifically, the following cross-sectional model is estimated annually:

$$CAcc_t = \gamma_{1,t} + \gamma_{2,t}CFO_{t-1} + \gamma_{3,t}CFO_t + \gamma_{4t}CFO_{t+1} + \gamma_{5,t}\Delta rev_t + \gamma_{6,t}PPE_t + \varepsilon_t \qquad (1),$$

where *CAcc* is current accruals or the change in working capital, *CFO* is operating cash flows, *Δrev* is the change in revenues, *PPE* is property, plant and equipment, and all variables are scaled by total assets. Firm subscripts are suppressed for convenience. Model 1 is estimated separately for each of the 48 industry groups defined in Fama and French 1997, if the industry has at least 20 firms in year *t*. The AQ metric in year *t* for firm *j* is the standard deviation, over the last five years, of firm *j*'s unexplained current accruals (the residuals from (1)). A high AQ implies high uncertainty in the accrual to cash flow mapping, so high AQ represents poor accrual quality. Note that AQ pertains to the variability, rather than the level, of unexplained accruals. To avoid look-ahead bias due to the use of CFO_{t+1} in (1), we use one-year-lagged AQ in all our tests.

Measuring price delay

Following Hou and Moskowitz 2005, we calculate the average delay with which information is impounded into stock prices by first regressing stock returns for each firm on contemporaneous and four lagged market returns as follows:

$$r_{i,t} = \alpha_i + \beta_i R_{m,t} + \Sigma_{n=1\text{to}4}\delta_{i,n}R_{m,t-n} + \varepsilon_{i,t} \quad (2),$$

where $r_{i,t}$ is the return on stock i and $R_{m,t}$ is the market return in week t. If the stock price response to information is delayed, some of the $\delta_{i,n}$ will differ from zero and lagged returns will add explanatory power to the regression. (2) is estimated as above (unrestricted regression), as well as with the restriction that all $\delta_{i,n}$ are zero (restricted regression). Price delay, *Delay*, is then calculated as one minus the ratio of the restricted to the unrestricted R^2:

$$Delay = 1 - (R^2_{\text{restricted}}/R^2_{\text{unrestricted}}) \quad (3).$$

Delay is similar to an *F*-test of the joint significance of the lagged terms in (2). Delay is larger when the proportion of return variation explained by the lagged terms in (2) is higher, so price delay is increasing in *Delay*.

(2) is estimated using weekly returns from July_{t-1} to June_t, to calculate $Delay_t$. Lower return frequencies (such as monthly) are not used since most stocks complete their response to information within a month, while higher return frequencies (such as daily) introduce market microstructure problems such as nonsynchronous trading and bid-ask bounce (Hou and Moskowitz 2005).

(2) uses market returns, or systematic news, as the stimulus to which stock i responds. This allows us to hold constant in the cross-section the quality of newly arriving information, as discussed earlier in section 2. In further tests reported in section 6, we also estimate a second delay measure, *Delay_fs*, in which firm-specific news is the stimulus to which investors respond.

To reduce estimation error, the delay measure is estimated at the portfolio level. We first calculate firm-level delay measures, and sort firms into deciles of size in June of year t and then into deciles of firm-level delay in June of year t within each size decile. This yields 100 portfolios in June of year t. We use postformation portfolio returns to estimate the portfolio delay, and assign the portfolio delay to each firm in the portfolio. Because firms switch portfolios from year to year, each firm's level of delay varies over time. This procedure follows Hou and Moskowitz 2005 and is analogous to the method commonly used to calculate portfolio betas (e.g., Fama and French 1992).

Data and sample

We obtain returns and liquidity measures from the Center for Research in Security Prices, accounting data from COMPUSTAT, analyst coverage and earnings surprise data from I/B/E/S and institutional ownership and mutual fund data from Thomson Financial. I/B/E/S annual data is available from 1976 and institutional ownership data is available from 1981, so our primary sample covers 1981 to 2006 and has 29,345 observations. All variable definitions are presented in the appendix.

Table 1 shows descriptive statistics for our sample. The mean delay, *Delay*, is 0.093, implying a 9.3 percent decline in R^2 when (2) is restricted by not including lagged terms, relative to the unrestricted model. The median *Delay* is 0.042. Therefore, a subset of firms

TABLE 1
Descriptive statistics

	Mean	Q1	Median	Q3	Std.Dev.
Delay	0.093	0.016	0.042	0.119	0.124
ES	1.942	0.201	0.645	1.697	8.426
AQ	0.039	0.020	0.033	0.050	0.026
SI	−0.013	−0.009	0	0	0.066
Loss	0.199	0	0	0.333	0.323
Analyst	1.826	1.099	1.792	2.485	0.831
InstOwn	0.379	0.251	0.399	0.518	0.172
Empl	1.589	0.588	1.324	2.303	1.228
Adv	1.027	0	0	1.645	1.722
NASDAQ	0.430	0	0	1	0.495
Turn	0.130	0.045	0.086	0.162	0.145
Traday	248	251	252	252	17
BSM	0.036	0	0	0.007	0.113
CBreadth	0.080	−0.203	−0.004	0.216	0.585

Notes:

The table reports descriptive statistics for 29,345 firm-years from 1981 to 2006. *Delay* is the average delay with which information is impounded into stock price, and its estimation is described in section 3 in the text. *ES* is the absolute value of annual earnings surprise scaled by the standard deviation of annual earnings surprises over the last five years. *AQ* is accrual quality, measured as the standard deviation of the residuals from the Dechow-Dichev model over the last five years. *SI* is special items. *Loss* is the relative frequency of annual losses in past three years (number of loss years divided by three). *Analyst* is log of 1 + the number of analysts. *InstOwn* is log of 1 + annual institutional ownership, where ownership is number of shares held scaled by shares outstanding. *Empl* is log of 1 + the number of employees. *Adv* is log of 1 + advertising expense. *NASDAQ* = 1 if the firm trades on NASDAQ, and 0 otherwise. *Turn* is log of share turnover, where turnover is average monthly shares traded scaled by shares outstanding. *Traday* is the number of days the stock is traded in a given year. *BSM* is the probability of default from the Merton 1974 option pricing model. *CBreadth* is the change of breadth from year $t-1$ to year t scaled by breadth in year $t-1$. *Breadth* is the annual average of quarterly breadth which is the ratio of the number of mutual funds that hold a long position in the stock to the total number of mutual funds in the quarter.

in the cross-section appears to be substantially delayed, but the majority of firms are fairly informationally efficient. This result, and the distribution of *Delay*, is consistent with Hou and Moskowitz 2005. Also in Table 1, the mean accrual quality, *AQ*, is 0.039 and its distribution is similar to that reported in Francis et al. 2005. The mean of special items, *SI*, is −0.013, or −1.3 percent of total assets. The mean absolute earnings surprise normalized by the five-year standard deviation of surprises, *ES*, is 1.942. Table 2 reports means of annual cross-sectional correlations between the various variables used in this paper. The low correlations between our accounting quality proxies suggest that they capture non-overlapping information.

4. Empirical evidence on the relation between accounting quality and price delay

We rank firm-years into quintiles of stock price delay annually and examine the univariate relation between the delay ranking, our accounting quality variables, and various control

TABLE 2
Correlations

	Delay	*ES*	*AQ*	*SI*	*Loss*	*Analyst*	*InstOwn*	*Empl*	*Adv*	*NASDAQ*	*Turn*	*Traday*	*BSM*	*CBreadth*
Delay		**–0.06**	**0.16**	**–0.04**	**0.25**	**–0.53**	**–0.43**	**–0.41**	**–0.22**	**0.28**	**–0.10**	**–0.36**	**0.14**	**–0.08**
ES	**–0.12**		**–0.06**	**0.14**	**–0.09**	**0.05**	**0.05**	**0.04**	**0.03**	**–0.04**	–0.01	**0.04**	**–0.08**	**0.04**
AQ	**0.19**	**–0.05**		**–0.11**	**0.25**	**–0.16**	**–0.07**	**–0.24**	**–0.09**	**0.20**	**0.15**	–0.01	**0.08**	**0.04**
SI	–0.02	**0.12**	**–0.08**		**–0.21**	**–0.01**	–0.01	**0.02**	0.00	**–0.05**	**–0.08**	**–0.02**	**–0.08**	**0.04**
Loss	**0.27**	**–0.16**	**0.24**	**–0.20**		**–0.20**	**–0.20**	**–0.23**	**–0.11**	**0.19**	**0.10**	–0.01	**0.30**	**–0.06**
Analyst	**–0.64**	**0.12**	**–0.17**	**–0.03**	**–0.20**		**0.51**	**0.54**	**0.33**	**–0.25**	**0.18**	**0.29**	**–0.08**	**–0.05**
InstOwn	**–0.46**	**0.10**	**–0.04**	**–0.03**	**–0.19**	**0.52**		**0.30**	**0.19**	**–0.18**	**0.17**	**0.23**	**–0.11**	0.03
Empl	**–0.55**	**0.09**	**–0.23**	–0.01	**–0.25**	**0.55**	**0.37**		**0.50**	**–0.42**	–0.03	**0.17**	**–0.05**	**–0.06**
Adv	**–0.21**	**0.04**	–0.03	**–0.02**	**–0.06**	**0.24**	**0.16**	**0.35**		**–0.18**	**0.07**	**0.10**	**–0.04**	**–0.03**
NASDAQ	**0.33**	**–0.04**	**0.21**	**–0.03**	**0.18**	**–0.26**	**–0.19**	**–0.45**	**–0.09**		**0.23**	**–0.16**	**0.02**	0.03
Turn	**–0.14**	**0.04**	**0.20**	**–0.08**	**0.15**	**0.29**	**0.31**	0.01	**0.11**	**0.23**		**0.15**	**0.08**	**0.15**
Traday	**–0.48**	**0.07**	**–0.06**	**–0.02**	**–0.05**	**0.48**	**0.33**	**0.33**	**0.14**	**–0.21**	**0.376**		0.00	**0.04**
BSM	**0.20**	**–0.14**	**0.08**	**–0.12**	**0.33**	**–0.11**	**–0.12**	**–0.02**	**–0.04**	0.02	**0.119**	**–0.03**		**–0.11**
CBreadth	**–0.14**	**0.10**	–0.02	**0.09**	**–0.15**	0.02	**0.11**	0.02	0.00	**–0.03**	**0.097**	**0.08**	**–0.22**	

Notes:

The table reports means of annual cross-sectional Pearson (upper diagonal) and Spearman (lower diagonal) correlations for the sample of 29,345 firm-years from 1981 to 2006. *Delay* is the average delay with which information is impounded into stock price, and its estimation is described in section 3 in the text. *ES* is the absolute value of annual earnings surprise scaled by the standard deviation of annual earnings surprises over the last five years. *AQ* is accrual quality, measured as the standard deviation of the residuals from the Dechow-Dichev model over the last five years. *SI* is special items. *Loss* is the relative frequency of annual losses in past three years (number of loss years divided by three). *Analyst* is log of 1 + the number of analysts. *InstOwn* is log of 1 + annual institutional ownership, where ownership is number of shares held scaled by shares outstanding. *Empl* is log of 1 + the number of employees. *Adv* is log of 1 + advertising expense. *NASDAQ* = 1 if the firm trades on NASDAQ, and 0 otherwise. *Turn* is log of share turnover, where turnover is average monthly shares traded scaled by shares outstanding. *Traday* is the number of days the stock is traded in a given year. *BSM* is the probability of default from the Merton 1974 option pricing model. *CBreadth* is the change of breadth from year $t-1$ to year t scaled by breadth in year $t-1$. *Breadth* is the annual average of quarterly breadth which is the ratio of the number of mutual funds that hold a long position in the stock to the total number of mutual funds in the quarter. Numbers in bold are statistically significant at 1 percent, where significance is calculated using the time series of annual correlations in order to control for cross-sectional correlation.

variables suggested as cross-sectional determinants of delay in Hou and Moskowitz 2005. The objective is to examine the univariate relation between delay and our accounting quality variables before imposing the linearity assumption implicit in linear regressions.

Table 3 shows that the mean AQ (*AQ*) is monotonically increasing in delay, suggesting more delayed firms have worse accrual quality. Earnings surprise (*ES*) is monotonically increasing in delay, while special items (*SI*) are weakly monotonically decreasing, suggesting that firms with large earnings surprises and large negative special items are associated with higher delay. In summary, Table 3 documents that the relations between our accounting quality variables and stock price delay are monotonic and in the predicted directions.

TABLE 3
Univariate analysis of information delay

	Low	2	3	4	High	High-Low
Delay	0.009	0.026	0.056	0.108	0.265	0.256***
ES	1.592	1.705	1.735	2.294	2.383	0.791***
AQ	0.032	0.036	0.038	0.041	0.047	0.015***
SI	−0.011	−0.011	−0.013	−0.013	−0.017	−0.006***
Loss	0.094	0.143	0.180	0.231	0.347	0.252***
Analyst	2.564	2.111	1.827	1.507	1.126	−1.437***
InstOwn	0.456	0.430	0.399	0.353	0.257	−0.199***
Empl	2.643	1.837	1.493	1.148	0.828	−1.814***
Adv	1.827	1.168	0.869	0.738	0.539	−1.288***
NASDAQ	0.208	0.324	0.399	0.539	0.679	0.470***
Turn	0.144	0.145	0.139	0.129	0.094	−0.050***
Traday	252	251	251	248	240	−12***
BSM	0.018	0.028	0.034	0.042	0.059	0.041***
CBreadth	0.083	0.111	0.114	0.094	−0.005	−0.088*

Notes:

The table reports means by quintiles of price delay, *Delay*, for the sample of 29,345 firm-years from 1981 to 2006. *Delay* is the average delay with which information is impounded into stock price, and its estimation is described in section 3 in the text. *ES* is the absolute value of annual earnings surprise scaled by the standard deviation of annual earnings surprises over the last five years. *AQ* is accrual quality, measured as the standard deviation of the residuals from the Dechow-Dichev model over the last five years. *SI* is special items. *Loss* is the relative frequency of annual losses in past three years (number of loss years divided by three). *Analyst* is log of 1 + the number of analysts. *InstOwn* is log of 1 + annual institutional ownership, where ownership is number of shares held scaled by shares outstanding. *Empl* is log of 1 + the number of employees. *Adv* is log of 1 + advertising expense. *NASDAQ* = 1 if the firm trades on NASDAQ, and 0 otherwise. *Turn* is log of share turnover, where turnover is average monthly shares traded scaled by shares outstanding. *Traday* is the number of days the stock is traded in a given year. *BSM* is the probability of default from the Merton 1974 option pricing model. *CBreadth* is the change of breadth from year $t-1$ to year t scaled by breadth in year $t-1$. *Breadth* is the annual average of quarterly breadth which is the ratio of the number of mutual funds that hold a long position in the stock to the total number of mutual funds in the quarter. * and *** denote one-tailed statistical significance at the 10 percent and 1 percent levels, respectively, where significance is calculated using the time series of annual high-low differences in order to control for cross-sectional correlation.

Turning to the nonaccounting-quality variables in Table 3, a number of variables that proxy for investor attention vary monotonically in the predicted direction with stock price delay. More delayed firms are covered by fewer analysts (*Analyst*), have lower levels of institutional ownership (*InstOwn*), fewer employees (*Empl*) and lower levels of advertising (*Adv*). Further, the most delayed quintile of firms is associated with a reduction in the breadth of mutual fund ownership (*CBreadth*), suggesting an increase in short sales constraints (Chen, Hong, and Stein 2002). A number of variables that proxy for stock liquidity also vary monotonically (or nearly so) with stock price delay. More delayed firms are more likely to be traded on the NASDAQ (*NASDAQ*), have lower stock turnover (*Turn*) and fewer trading days or more nontrading days (*Traday*).[3]

As a proxy for economic distress in Table 3 we use *BSM*, the probability of default, measured as the probability of the firm's assets falling below the value of its liabilities, based on the Black-Scholes-Merton option pricing model (Black and Scholes 1973; Merton 1974). *BSM* is a market-based distress measure that has been shown by Hillegeist, Keating, Cram, and Lundstedt 2004 to have higher information content than accounting-based distress measures. In addition, using accounting-based distress measures in studying the effect of accounting variables on price delay may confound inferences about the relative roles of distress versus accounting. Table 3 shows *BSM* is monotonically increasing in delay, suggesting that distressed firms are associated with higher delay. Overall, Table 3 suggests the relation between delay and its various determinants that we examine is generally monotonic.

To test multivariate relations, we estimate pooled (cross-sectional and time-series) regressions of stock price delay on accounting quality, including controls for firm distress, liquidity and investor attention variables:

$$Delay_{i,t} = a_t + b_{1,t}AQ_{i,t} + b_{2,t}SI_{i,t} + b_{3,t}ES_{i,t} + \Sigma_{j>3}b_{j,t}Controls_{j,i,t} + \varepsilon_{i,t} \quad (4).$$

Table 4 shows the coefficients from estimation of (4), along with *t*-statistics based on standard errors clustered by firm and year to control for cross-sectional and serial correlation (Petersen 2009).[4] The table shows results for two specifications: one with only accounting quality variables, and the other with a full set of controls.

We discuss results from the fully-specified model only. *AQ* is significantly positive at less than 1 percent, suggesting firms with poor accrual quality have higher stock price delay. In particular, a one-standard-deviation deterioration in *AQ* is associated with an increase in delay of $0.026 \times 0.309 = 0.008$. Dividing this by the mean of delay from Table 1 implies an increase in delay of $0.008/0.093 = 9$ percent. *SI* is significantly negative at less than 1 percent, suggesting firms with large negative special items have higher stock price delay. *ES* is insignificant. To ensure our accounting quality variables are not simply capturing firm distress, we control for the distress measure, *BSM*. Table 4 shows that *BSM* loads significantly positively, suggesting more distressed firms have higher price delay. In particular, distress does not subsume the effect of our accounting quality measures on price delay. *Loss* is significantly positive at less than 5 percent, indicating loss firm-years have higher delay.

3. We note that, in comparing Table 3 to Hou and Moskowitz 2005 (Table 1, p. 686), the results are qualitatively similar but the magnitudes differ because of sample differences. In particular, our calculation of *AQ* requires that our sample firms survive five years, and hence our sample firms are larger on average than those in Hou and Moskowitz 2005. As a result, the most delayed quintile of firms in our sample has higher institutional ownership and analyst coverage, for example, than the most delayed quintile of firms in Hou and Moskowitz 2005. However, the existence of larger, surviving firms in our sample likely biases against our finding a relation among accounting quality, price delay, and future returns.
4. Following Petersen 2009 we compare White-adjusted standard errors (White 1980) with each of firm-clustered and time-clustered standard errors, and find that the firm-clustered standard errors are more than twice the White-adjusted standard errors. This indicates the presence of a firm effect that cannot be corrected using Fama and MacBeth regressions, but can be addressed through double clustering.

TABLE 4
Determinants of information delay

	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	0.056	8.89***	0.460	3.07***
AQ	0.826	8.71***	0.309	6.10***
SI	−0.037	−1.99**	−0.037	−2.44***
ES	0.386	2.22**	0.0001	0.72
Loss			0.017	1.77**
Analyst			−0.032	−6.66***
InstOwn			−0.142	−8.87***
Empl			−0.011	−7.06***
Adv			−0.0004	−0.55
NASDAQ			0.045	5.22***
Turn-NYAM			−0.010	−0.41
Turn-NASD			−0.157	−5.27***
Traday			−0.001	−1.77**
BSM			0.119	7.38***
CBreadth			−0.010	−1.98**
R^2	3.29%		35.42%	

Notes:

The table presents coefficients from pooled (cross-sectional and time-series) regressions of price delay, *Delay*, on the variables shown. The sample consists of 29,345 firm-years from 1981 to 2006. *Delay* is the average delay with which information is impounded into stock price, and its estimation is described in section 3 in the text. *AQ* is accrual quality, measured as the standard deviation of the residuals from the Dechow-Dichev model over the last five years. *SI* is special items. *ES* is the absolute value of annual earnings surprise scaled by the standard deviation of annual earnings surprises over the last five years. *Loss* is the relative frequency of annual losses in past three years (number of loss years divided by three). *Analyst* is log of 1 + the number of analysts. *InstOwn* is log of 1 + annual institutional ownership, where ownership is number of shares held scaled by shares outstanding. *Empl* is log of 1 + the number of employees. *Adv* is log of 1 + advertising expense. *NASDAQ* = 1 if the firm trades on NASDAQ, and 0 otherwise. *Turn* is log of share turnover, where turnover is average monthly shares traded scaled by shares outstanding. *Traday* is the number of days the stock is traded in a given year. *BSM* is the probability of default from the Merton 1974 option pricing model. *CBreadth* is the change of breadth from year $t-1$ to year t scaled by breadth in year $t-1$. *Breadth* is the annual average of quarterly breadth which is the ratio of the number of mutual funds that hold a long position in the stock to the total number of mutual funds in the quarter. The *t*-statistics are based on standard errors clustered by firm and time (double clustering). ** and *** denote one-tailed statistical significance at 5 percent and 1 percent, respectively.

Turning to the investor attention variables suggested in Hou and Moskowitz 2005, firms with higher institutional ownership, higher analyst following, more employees, and higher advertising levels are likely to be followed more broadly and to have a richer information environment, thereby having less stock price delay. Consistent with this, *InstOwn*, *Analyst*, and *Empl* are all significantly negative at less than 1 percent in Table 4. *Adv* is insignificant. *CBreadth*, or change in the breadth of mutual fund ownership, captures the extent of short sale constraints (Chen et al. 2002). Short sale constraints impede the timely flow of (adverse) information into stock prices (e.g., Diamond and Verrecchia 1987). Table 4 shows that *CBreadth* is significantly negative at less than 5 percent, suggesting a reduction in the breadth of mutual fund ownership is associated with higher stock price delay.

We also control for stock liquidity as in Hou and Moskowitz 2005 using turnover, the exchange on which the stock is traded and the number of days the stock is actively traded (*Traday*). Stocks with lower turnover, less frequent trading or more nontrading days, and NASDAQ stocks are less liquid. Turnover is indicated separately for NYSE/AMEX (*Turn-NYAM*) and NASDAQ (*Turn-NASD*) stocks. The exchange is controlled for by including an intercept dummy that equals one for NASDAQ stocks and zero otherwise. We expect less liquid stocks to have higher price delay. Table 4 shows that *Turn-NASD* is significantly negative at less than 1 percent, but *Turn-NYAM* is insignificant, suggesting stock turnover is an important determinant of price delay for NASDAQ firms but not for NYSE/AMEX firms. Because NYSE/AMEX firms are larger and older than NASDAQ firms on average, this is consistent with the marginal importance of liquidity for price delay being higher for smaller firms with poor information environments. The exchange dummy NASDAQ is significantly positive at less than 1 percent, consistent with NASDAQ firms having higher average price delay. *Traday* is significantly negative at less than 5 percent, suggesting less frequently traded stocks have higher price delay.

We control for firm size (indirectly) by the number of firm employees following Hou and Moskowitz 2005. Size is also correlated with (and therefore controlled for by) other independent variables such as analyst following and institutional ownership. Nevertheless, as panel A of Table 8 shows, after controlling for firm size measured as log market value of equity, *AQ* and *SI* continue to be significantly associated with price delay, with *p*-values less than 1 percent and 5 percent, respectively.

Overall Table 4 shows that poor accounting quality is associated with significantly higher stock price delay. This result suggests that financial reporting quality plays an important role in price discovery in equity markets.

5. Empirical evidence on the relation between stock price delay and future returns

In this section we isolate the accounting quality component of stock price delay, and examine its predictive ability for future stock returns. We calculate the accounting quality component of delay for each firm-year, $Delay_{Acct}$, as the fitted value of delay from the fully-specified model in Table 4. From (4), using the empirical estimates of b_1 to b_3 (denoted by hats):

$$Delay_{Acct\,i,t} = \hat{b}_{1,t}AQ_{i,t} + \hat{b}_{2,t}SI_{i,t} + \hat{b}_{3,t}ES_{i,t} \quad (5).$$

Because our interest is in the accounting component of delay, we do not further distinguish between the components of delay due to investor attention, stock liquidity and firm distress.

To examine the relation between accounting-associated delay and future stock returns, we estimate cross-sectional (Fama and MacBeth 1973) regressions of one-year-ahead monthly stock returns in excess of the risk-free rate on $Delay_{Acct}$, including controls for other return determinants suggested in the prior literature, that is, CAPM beta, size, and book-to-market (Fama and French 1992), prior returns (Jegadeesh and Titman 1993), and accruals (Sloan 1996). Because the monthly stock return is the dependent variable, serial correlation is not expected to be an issue and Fama-MacBeth regressions are well specified in this case (Petersen 2009).[5] Table 5 shows mean coefficients for two regression

5. In untabulated tests we estimate panel regressions with double-clustered (time and firm) standard errors to control for both cross-sectional and time-series correlation, and verify that results are robust.

TABLE 5
Return prediction regressions

	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	−0.046	−8.12***	−0.058	−9.95***
Beta	0.004	1.92**	0.003	1.72**
B/M	0.007	7.73***	0.007	8.28***
Size	0.008	12.48***	0.010	14.25***
$Ret_{[-1]}$	−0.053	−9.89***	−0.054	−10.18***
$Ret_{[-12,-2]}$	−0.001	−0.44	−0.002	−1.04
$Ret_{[-36,-13]}$	−0.001	−2.01**	−0.001	−2.08**
Accruals	−0.009	−2.18**	−0.009	−2.21**
Delay	0.081	9.64***		
$Delay_{NonAcct}$			0.111	11.90***
$Delay_{Acct}$			0.393	5.80***
R^2	21.79%		22.64%	

Notes:

The table presents mean coefficients from Fama and MacBeth 1973 cross-sectional regressions of one-year-ahead monthly excess stock returns on the variables shown. The sample consists of 28,199 firm-years from 1981 to 2006. *Delay* is the average delay with which market information is impounded into stock price, and its estimation is described in section 3 in the text. The accounting component of delay, $Delay_{Acct}$, is the fitted portion of *Delay* associated with accounting quality and is described in section 5 in the text. The nonaccounting component of *Delay*, $Delay_{NonAcct}$, is defined as the difference between *Delay* and $Delay_{Acct}$. *Beta* is the CAPM beta at the end of June each year, estimated using rolling 60-month time series firm-specific regressions. *B/M* is the log book-to-market ratio. *Size* is the log market value of equity. $Ret_{[-1]}$ is the return in month $t-1$. $Ret_{[-12,-2]}$ is the total return from months t − 12 to $t-2$. $Ret_{[-36,-13]}$ is the total return from months $t-36$ to $t-13$. *Accruals* is the change in working capital, minus depreciation, scaled by average total assets. The *t*-statistics are calculated from Fama-MacBeth standard errors. *, **, and *** denote one-tailed statistical significance at 10 percent, 5 percent, and 1 percent, respectively.

specifications, with *t*-statistics based on Fama-MacBeth standard errors. In the first specification we include total delay, *Delay*. In the second specification we decompose *Delay* into its accounting component, $Delay_{Acct}$, and the remaining component, $Delay_{NonAcct}$. Total delay, *Delay*, loads significantly positively (p-value < 0.01) in Table 5, indicating that delayed firms have higher average future returns. When delay is decomposed into its accounting and nonaccounting components, both $Delay_{Acct}$ and $Delay_{NonAcct}$ load significantly positively (p-value < 0.01), indicating that firms with high accounting-associated delay have higher average future returns. Comparing the marginal effect of a one-standard-deviation change in $Delay_{Acct}$ to a one-standard-deviation change in $Delay_{NonAcct}$, we find that the return premium for $Delay_{Acct}$ is 20 percent of the sum of the return premiums for $Delay_{Acct}$ and $Delay_{NonAcct}$, suggesting that 20 percent of the return premium for price delay is associated with poor accounting quality.

Also in Table 5, the CAPM beta, the log book-to-market ratio (*B/M*), and log size (*Size*) load significantly positively (p-values < 0.05). The prior one month return, $Ret_{[-1]}$, intended to control for the one-month return reversal effect of Jegadeesh 1990, is significantly negatively associated with future returns (p-values < 0.01). The prior three-year return excluding the most recent year, $Ret_{[-36,-13]}$, intended to control for longer horizon return reversal, is significantly negative. The prior one-year return excluding the most recent month, $Ret_{[-12,-2]}$, intended to control for the momentum effect of Jegadeesh and Titman 1993, is insignificant. Finally, accruals load significantly negatively, consistent with Sloan 1996.

Overall, Table 5 indicates that firms with higher accounting-associated delay have higher future stock returns.

6. Robustness tests

Calendar-time Fama-French regressions

The cross-sectional Fama-MacBeth return regressions of section 5 control for firm characteristics that predict future returns. As an alternative, we estimate the delay premium as the alpha from a calendar-time Fama and French 1993 time-series regression. By a delay premium we mean the difference in future stock returns for high versus low delay firms. The Fama-French tests control for risk factor betas under the theory that returns depend on covariances (betas). The alpha of a test portfolio is the portion of returns unexplained by the portfolio's exposure to Fama-French risk factors, so that the difference in alphas between high and low delay portfolios represent a premium for delay.

We sort firms into quintiles of total delay, *Delay*, in June of year *t*, and then estimate the equal-weighted monthly portfolio returns for the next twelve months. Repeating this each year yields a time series of monthly portfolio returns for quintiles of total delay. We then estimate time series regressions of the quintile portfolio monthly returns on the monthly returns to the three Fama-French factors and an intercept or alpha. Results, not tabulated, suggest that the most delayed firms have significantly positive alphas, and the high-low delay portfolio has a significant alpha of 0.42 percent monthly (p-value $<$ 0.01, one-tailed). This translates into an annual return premium to high delay firms, relative to low delay firms, of about 5 percent, consistent with Hou and Moskowitz 2005.

Next we examine whether there is a return premium for accounting-associated delay. We sort firms into quintiles of $Delay_{Acct}$ and quintiles of $Delay_{NonAcct}$. The intersection of these sorts yields $5 \times 5 = 25$ portfolios each year, and allows us to capture return variation due to accounting-associated delay while controlling for the level of nonaccounting delay. As above, we estimate time series regressions of monthly portfolio returns on the monthly returns to the three Fama-French factors, and examine alphas and t-statistics for the 25 portfolios. Results, not tabulated, show the high-low $Delay_{Acct}$ ($Delay_{NonAcct}$) portfolio has a significantly positive alpha when $Delay_{NonAcct}$ ($Delay_{Acct}$) is high. In particular, when $Delay_{NonAcct}$ is also high, the accounting quality component of delay is associated with a monthly return premium of 0.64 percent (7.7 percent annualized, p-value $<$ 0.01). This suggests poor accounting quality is associated with higher future stock returns when non-accounting frictions such as stock illiquidity and lack of investor attention are also severe.

In comparison with the prior literature on the pricing of AQ, note that we show the relation between accounting quality and future stock returns is (i) indirect and (ii) conditional. The relation is indirect because accounting quality is associated with higher future stocks returns through stock price delay (i.e., the projection of price delay on accounting quality has a return premium). The relation is conditional because accounting quality predicts stock returns only when nonaccounting frictions are high. In contrast, prior papers examine direct and unconditional relations between accounting quality and future stock returns.

Alternative accounting quality measures

AQ as the sole measure of accounting quality

In Table 6, we examine whether the relation between accounting quality and stock price delay is robust to using *AQ* as the sole measure of accounting quality. We reestimate the

TABLE 6
Alternative measures of accounting quality

Panel A: Delay regression

	AQ only		Lexical properties	
	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	0.458	3.06***	0.791	10.33***
Analyst	−0.033	−6.60***	−0.033	−10.24***
InstOwn	−0.145	−9.06***	−0.182	−8.45***
Empl	−0.012	−7.18***	−0.014	−5.52***
Adv	−0.0004	−0.61	0.002	2.16**
NASDAQ	0.047	5.02***	0.051	5.40***
Turn-NYAM	−0.002	−0.06	0.041	2.05**
Turn-NASD	−0.151	−5.26***	−0.138	−4.18***
Traday	−0.001	−1.74**	−0.002	−8.07***
BSM	0.131	7.60***	0.121	6.24***
CBreadth	−0.011	−2.11**	−0.019	−2.72***
AQ	0.347	6.32***		
Fog			0.001	1.94**
NWords			−0.0001	−2.60***
R^2	35.20%		44.27%	

Panel B: Return prediction regression

	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	−0.059	−10.03 ***	−0.099	−6.92***
Beta	0.003	1.68**	0.005	1.89**
B/M	0.008	8.38***	0.008	5.45***
Size	0.010	14.34***	0.012	9.46***
$Ret_{[-1]}$	−0.054	−10.18***	−0.045	−4.61***
$Ret_{[-12,-2]}$	−0.002	−1.05	−0.008	−2.66***
$Ret_{[-36,-13]}$	−0.001	−2.17**	−0.003	−3.00***
Accruals	−0.009	−2.25***	−0.012	−2.07**
$Delay_{NonAQ}$	0.111	11.89***		
$Delay_{AQ}$	0.403	6.34***		
$Delay_{NonLex}$			0.132	8.46***
$Delay_{Lex}$			1.095	5.33***
R^2	22.58%		15.22%	

Notes:

The table reports coefficients and *t*-statistics from a delay regression (panel A) and a return prediction regression (panel B) when accounting quality is measured by either *AQ* only or annual reports' lexical properties — the readability (*FOG*) and the length (*NWords*) of annual reports. The FOG index and *NWords* are obtained from Feng Li for the period 1994–2004. Panel A (panel B) follows Table 4 (Table 5). See Tables 4 and 5 for the relevant regression description and variable definitions. In panel B, $Delay_{AQ}$ is the fitted portion of *Delay* associated with *AQ*, while $Delay_{NonAQ}$ is the difference between *Delay* and $Delay_{AQ}$. $Delay_{Lex}$ is the fitted portion of *Delay* associated with *FOG* and *NWords*, while $Delay_{NonLex}$ is the difference between *Delay* and $Delay_{Lex}$. *Delay* is the average delay with which information is impounded into stock price, and its estimation is described in section 3 in the text. ** and *** denote one-tailed statistical significance at 5 percent and 1 percent, respectively.

delay regression of Table 4 using *AQ* only, and omitting *SI* and *ES*. As panel A of Table 6 shows, *AQ* loads significantly positively at less than 1 percent, indicating that firms with poor accrual quality are associated with higher stock price delay as expected. We then reestimate the return prediction regression of Table 6 using *AQ* as the sole measure of accounting quality. As panel B of Table 6 shows, the fitted component of delay associated with *AQ* loads significantly positively at less than 1 percent, indicating that firms with higher accounting-associated delay have higher future returns. Thus, results are robust to using *AQ* as the sole measure of accounting quality.

Annual reports' lexical properties as a measure of accounting quality

We examine whether the relation between accounting quality and stock price delay is robust to using the FOG index of Li 2008, which is a measure of the readability of qualitative information in annual reports. The qualitative information is forward looking (e.g., MD&A), which helps in interpreting financial statement numbers and is useful in forecasting cash flows. Annual reports that are more difficult to read are likely associated with lower-quality cash flow forecasts and more delayed (less timely) incorporation of value-relevant information into stock prices (e.g., Grossman and Stiglitz 1980; Bloomfield 2002; Li 2008).

The U.S. Securities and Exchange Commission has long encouraged and provided guidelines for the use of plain English in disclosures and annual reports, suggesting the lexical properties of disclosures affect investors' information processing costs. Li (2008) uses innovations from the computational linguistics literature to measure text complexity based on the number of words per sentence and the number of syllables per word. He computes a FOG index of readability, and provides evidence that managers appear to strategically use annual report readability to obfuscate poor performance and low earnings persistence. This suggests firms with poor earnings quality have a higher FOG score.

We reestimate the delay regression in Table 4 using *FOG* as an accounting quality proxy. We also control for the length of the annual report using the number of words (*NWords*). Li (2008) suggests longer reports may be less readable or may have more information, so the effect of *NWords* on delay is an empirical question. Results shown in panel A of Table 6 indicate that firms with a high FOG score have significantly higher stock price delay (t-statistic = 1.94, one-tailed p-value < 0.05), while *NWords* loads significantly negatively, consistent with longer reports having more information.[6] This result is consistent with Table 4, and suggests the relation between accounting quality and price delay is robust. Panel B of Table 6 shows that, using *FOG* and *NWords* to proxy for accounting quality, firms with high accounting-associated delay ($Delay_{Lex}$) have higher future stock returns, suggesting the results in Table 6 are robust to using qualitative measures of accounting quality.

Alternative expected return measure

In a recent paper, Botosan et al. (2011) suggest using the RPEG implied cost of equity capital measure (Easton 2004), rather than future realized stock returns, as a proxy for expected equity returns. We calculate RPEG as described in Botosan and Plumlee 2005 and Botosan et al. 2011 and defined in the appendix to this paper, and examine its association with $Delay_{Acct}$. The result is shown in Table 7. As the table shows, $Delay_{Acct}$ is significantly positively associated with RPEG, with a p-value < 0.01. $Delay_{NonAcct}$ is not associated with RPEG. Table 7 is therefore consistent with our hypothesis on the positive relation between $Delay_{Acct}$ and expected stock returns.

---

6. Both *FOG* and *NWords* data were graciously provided to us by Feng Li.

TABLE 7
Implied cost of capital regression

	Coeff		t -stat
Intercept	0.127		15.32***
Beta	0.022		4.52***
B/M	−0.003		−1.68**
Size	−0.006		−12.25***
$Ret_{[-1]}$	0.001		0.30
$Ret_{[-12,-2]}$	0.008		7.47**
$Ret_{[-36,-13]}$	−0.001		−0.55
Accruals	0.014		1.51*
$D_{NonAcct}$	0.005		0.19
D_{Acct}	0.663		5.79***
R^2		21.80%	

Notes:

The table presents mean coefficients and t-statistics from annual Fama and MacBeth 1973 cross-sectional regressions of the implied cost of equity capital, *RPEG*, on the variables shown. The sample consists of 19,336 observations from 1984 to 2006. *RPEG* is estimated each June and is defined as in Botosan et al. 2011. The accounting component of delay, $Delay_{Acct}$, is the fitted portion of *Delay* associated with accounting quality and is described in section 5 in the text. The nonaccounting component of *Delay*, $Delay_{NonAcct}$, is defined as the difference between *Delay* and $Delay_{Acct}$. *Beta* is the CAPM beta at the end of June each year, estimated using rolling 60-month time series firm-specific regressions. *B/M* is the log book-to-market ratio. *Size* is the log market value of equity. $Ret_{[-1]}$ is the return in month $t - 1$. $Ret_{[-12,-2]}$ is the total return from months $t - 12$ to $t - 2$. $Ret_{[-36,-13]}$ is the total return from months $t - 36$ to $t - 13$. *Accruals* is the change in working capital, minus depreciation, scaled by average total assets. Variable definitions are presented in the appendix. *, **, and *** denote one-tailed statistical significance at 10 percent, 5 percent, and 1 percent, respectively.

Alternative delay measure

Recall that *Delay* is estimated from (2) using market returns as the news to which stock i responds. We also estimate a second delay measure, *Delay_fs*, in which firm-specific news is the stimulus to which investors respond. In this case, investors attempt to assess the implications of firm-specific news (e.g., loss of foreign market share) for the firm's future cash flows. To estimate *Delay_fs* we replace the four lagged market return terms in (2) with four lagged firm-specific returns, and use (3) applied to this model.

In untabulated results, the distribution of firm-specific news delay, *Delay_fs*, is found to be similar to that of *Delay*, suggesting that stock price delay is a characteristic of the firm (i.e., of the firm's information environment) rather than of the particular type of news (market or firm-specific news). In untabulated tests we find that when *Delay_fs* is the dependent variable, all three accounting quality proxies (*AQ*, *SI*, and *ES*) load significantly in the predicted direction, suggesting the results in Table 4 are robust to the delay measure. In addition, the component of *Delay_fs* associated with poor accounting quality ($Delay\_fs_{Acct}$) is significantly positively associated with future stock returns (p-value < 0.01), suggesting the results in Table 5 are robust to this alternative delay measure.

TABLE 8
Controlling for Amihud illiquidity, innate AQ determinants, and the firm's growth options

Panel A: Delay regression

	Control for Amihud illiquidity		Control for innate factors		Control for growth options	
	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	0.545	8.38***	0.622	8.43***	0.674	8.98***
Analyst	−0.030	−6.55***	−0.021	−4.56***	−0.012	−2.99***
InstOwn	−0.145	−9.46***	−0.131	−8.55***	−0.130	−8.00***
Empl	−0.011	−6.87***	0.008	3.07***	0.006	3.07***
Adv	−0.0001	−0.07	−0.001	−1.54*	−0.001	−0.71
NASDAQ	0.037	5.01***	0.026	3.50***	0.028	3.22***
Turn-NYAM	−0.014	−0.54	0.015	0.58	0.026	0.94
Turn-NASD	−0.128	−4.79***	−0.092	−3.60***	−0.079	−2.94***
Traday	−0.001	−5.72***	−0.001	−5.94***	−0.002	−6.88***
BSM	0.111	6.75***	0.114	6.78***	0.065	4.18***
CBreadth	−0.009	−1.64**	−0.009	−1.65**	−0.003	−0.67
ES	0.0001	0.12	−0.0001	−0.62	−0.0001	−0.97
AQ	0.289	6.10***	0.102	2.58***	0.226	3.77***
SI	−0.035	−2.43***	−0.035	−2.16**	−0.040	−1.90**
Loss	0.012	1.40*	0.017	2.06**	0.013	1.78**
Illiquidity	0.006	4.46***	0.005	3.47***	0.003	2.56***
Size			−0.021	−5.69***	−0.021	−6.31***
CFVol			0.013	0.77	0.010	0.76
SALEVol			0.003	0.51	−0.004	−0.62
OperCyc			0.003	1.31*	0.002	1.01
R&D					0.000	−0.17
Q					−0.008	−3.89***
DTE					0.010	5.55***
CAPFIX					−0.018	−1.36*
PVGO					−0.001	−1.41*
R^2	39.30%		41.84%		43.55%	

Panel B: Return prediction regression

	Coeff	*t*-stat	Coeff	*t*-stat	Coeff	*t*-stat
Intercept	−0.058	−10.00***	−0.057	−9.83***	−0.046	−8.57***
Beta	0.003	1.75**	0.003	1.69**	0.002	1.06
B/M	0.007	8.33***	0.008	8.49***	0.007	7.62***
Size	0.010	14.24***	0.010	14.27***	0.008	13.64***
$Ret_{[-1]}$	−0.053	−10.09***	−0.054	−10.23***	−0.049	−8.83***
$Ret_{[-12,-2]}$	−0.002	−1.17	−0.002	−1.16	−0.001	−0.42
$Ret_{[-36,-13]}$	−0.001	−2.30**	−0.001	−1.91**	−0.001	−1.21
Accruals	−0.009	−2.17**	−0.008	−1.34*	−0.003	−0.62
$Delay_{NonAcct}$	0.110	11.71***	0.108	12.04***	0.086	8.81***
$Delay_{Acct}$	0.458	6.04***	0.510	4.31***	0.439	4.44***
R^2	22.60%		22.56%		22.01%	

(The table is continued on the next page.)

TABLE 8 (Continued)

Notes:

The table reports coefficients and t-statistics from a delay regression (panel A) and return prediction regression (panel B) controlling separately for the Amihud illiquidity measure (*Illiquidity*), innate determinants of *AQ* (Dechow and Dichev 2002; Francis et al. 2005), and proxies for the firm's growth options (Cao, Smith, and Zhao 2008). The sample from 1981 to 2006 consists of 27,289 firm-years, 23,684 firm-years and 16,969 firm-years for the first, second, and third regressions from the left, respectively. *Illiquidity* is the annual average daily absolute stock return per dollar trading volume. *Size* is logarithm of total assets. *CFVol* (*SALEVol*) is the standard deviation over years $t-5$ to $t-1$ of the ratio of operating cash flows (sales revenue) to average total assets. *Opercyc* is operating cycle, defined as the logarithm of the sum of days accounts receivable and days inventory. The growth option proxies include *R&D* expenses scaled by sales (in log, and assume zero if missing value), Tobin's *Q*, the debt to equity ratio (*DTE*), the ratio of capital expenditures to fixed assets (*CAPFIX*), and a direct measure of the present value of growth options (*PVGO*). The definitions of the growth options except *R&D* are discussed in Cao et al. 2007. Panel A follows Table 4 but adds illiquidity, innate accounting factors, and proxies for growth options sequentially. Panel B follows Table 5. See Tables 4 and 5 for the relevant regression description and the definitions of other variables. *, **, and *** denote one-tailed statistical significance at 10 percent, 5 percent, and 1 percent, respectively.

Alternative liquidity controls

We reestimate the regression in Table 4 after adding the Amihud illiquidity measure (Amihud 2002) to the reported set of independent variables. The Amihud measure is the absolute stock return per dollar trading volume, or essentially a price impact metric. More illiquid stocks are expected to experience higher price impact per dollar trading volume. The results are shown in Table 8, panel A. The first pair of columns in panel A shows that the Amihud measure loads significantly positively (p-value < 0.01), but the accounting quality loadings are robust. In particular, *AQ* loads significantly positively (p-value < 0.01), *SI* loads significantly negatively (p-value < 0.01) and *ES* is insignificant. This implies the relation between accounting quality and stock price delay is robust to the Amihud measure of illiquidity.

We further reestimate the regression in Table 5 after including the Amihud illiquidity measure in the nonaccounting determinants of delay. The first pair of columns in panel B of Table 8 indicates that the accounting-associated delay, $Delay_{Acct}$, continues to be robustly associated with future stock returns, with a p-value less than 1 percent.

In untabulated tests we find that results are robust to a host of other liquidity controls, including: (i) dropping stocks with price per share less than \$5; (ii) dropping firms with market capitalization less than \$5m; (iii) dropping stocks with monthly trading volume less than \$200k; and (iv) keeping only NYSE firms. We conclude that our results are robust to a number of different controls for liquidity suggested in the prior literature.

Controlling for innate determinants of AQ

To address any potential concern that *AQ* captures the firm's innate operating characteristics, rather than accounting quality, we reestimate the delay regression of Table 4 and the return prediction regression of Table 5 controlling for the innate determinants of *AQ* suggested in Francis et al. 2005: cash flow volatility, sales volatility, length of the operating cycle, loss frequency, and size. The results are shown in Table 8. The middle pair of columns in panel A shows that *AQ* and *SI* continue to be robustly associated with price delay, with p-values less than 1 percent and 5 percent, respectively.

The middle pair of columns in panel B shows that $Delay_{Acct}$, measured as the fitted portion of *Delay* associated with *AQ*, *SI*, and *ES*, continues to load significantly positively as predicted, with a *p*-value less than 1 percent. In summary, our results are robust to controlling for the innate determinants of *AQ*.

Controlling for firm's growth options

We test whether our accounting quality variables are capturing the firm's growth options by controlling for five growth option proxies used in Cao et al. 2008: Tobin's *Q*; R&D to Sales ratio; capital expenditures to fixed assets ratio; debt to equity ratio; and the present value of growth options. Table 8 shows the results, and the notes to the table define all five variables. The last pair of columns in panel A of Table 8 shows *AQ* and special items continue to be robustly associated with price delay, with *p*-values less than 1 percent and 5 percent, respectively.

The last pair of columns in panel B of Table 8 shows that, after controlling for growth options (as well as innate factors and the Amihud illiquidity measure), accounting-associated delay ($Delay_{Acct}$) continues to be robustly associated with future stock returns with a *p*-value less than 1 percent. In summary, the results are robust to controlling for the firm's growth options.

7. Conclusion

We examine whether poor accounting quality is associated with delayed price adjustment to information. We hypothesize that poor accounting quality is associated with a lower-quality preexisting or baseline information set that investors use to forecast cash flows. In particular, we hypothesize that processing the price implications of newly arriving value-relevant information takes longer when accounting quality is poor, leading to delayed stock price adjustment. Using the Hou and Moskowitz 2005 metric of price delay, we present evidence that accounting quality is negatively associated with price delay.

We refer to the precision with which accounting information informs equity investors about future cash flows as accounting quality. Using three proxies for accounting quality based on quantitative financial statement information — AQ, special items, and earnings surprises — we find that firms with poor accrual quality and large negative special items are associated with significantly higher price delay. Results are robust to using AQ as the sole measure of accounting quality. Results are also robust to measuring accounting quality by the FOG index of Li 2008, which is a measure of the readability of qualitative (non–financial statement) information in annual reports.

We find that high delay firms have significantly higher future stock returns of about 5 percent annually relative to low delay firms. We also find that poor accounting quality in particular is associated with a statistically significant annual return premium of about 7.7 percent in firms with the highest non–accounting-associated delay.

These results suggest several opportunities for future research. One opportunity is to examine whether poor accounting quality is associated with a delay in bond prices. Another opportunity, along the lines of Verrecchia 1980, is to examine the types of news that are associated with greater stock price delay.

Appendix

Variable definitions

Delay variables

Delay: Average delay with which market news is impounded into stock price, estimated as described in section 3.

$Delay_{Acct}$: The accounting quality component of price delay, estimated as the fitted portion of delay associated with accounting quality, and described in section 5.

$Delay_{Lex}$: The accounting quality component of price delay, estimated as the fitted portion of delay associated with *FOG* and *NWords*.

$Delay_{NonAcct}$: The difference between *Delay* and $Delay_{Acct}$.

$Delay_{NonLex}$: The difference between *Delay* and $Delay_{Lex}$.

Delay_fs: Average delay with which firm-specific news is impounded into stock price, estimated as described in section 6.

$Delay\_fs_{Acct}$: The fitted portion of *Delay_fs* associated with accounting quality.

$Delay\_fs_{NonAcct}$: The difference between *Delay_fs* and $Delay\_fs_{Acct}$.

Accounting quality variables

AQ: Accrual quality as measured by the uncertainty in the accrual-to-cash flow mapping, and described in section 3. A high (low) value of *AQ* denotes low (high) accounting quality.

SI: Special items (COMPUSTAT data item 17), divided by lagged total assets (data item 6).

ES: The absolute value of annual earnings surprise scaled by the standard deviation of annual earnings surprises in the last five years. Earnings surprise is the difference between the consensus earnings forecast and actual earnings reported in I/B/E/S. The calculation requires a minimum three years of annual earnings history.

FOG: The index of Li 2008, which is a measure of the readability of *qualitative* information in annual reports.

Other variables

Accruals: The change in working capital, minus depreciation, scaled by total assets. Specifically, the [change in (current assets – cash – current liabilities + debt in current liabilities) – depreciation] / total assets. In terms of COMPUSTAT data items this is [Δ(data4 – data1 – data5 + data34) – data14] / data6.

Adv: The logarithm of (1 + advertising expense). Advertising expense is reported in COMPUSTAT (data item 45). *Adv* is set to zero when advertising expense is missing.

Analyst: The logarithm of (1 + the number of analysts who issue annual EPS forecasts reported in I/B/E/S in calendar year *t*). If the number of analyst following is 0, *Analyst* is zero.

Beta: The CAPM beta at the end of June each year, estimated using rolling 60-month firm-specific regressions of excess stock returns on an intercept and the market excess return.

B/M: The logarithm of book value divided by market value of equity, log(data60/(data25*data199)).

BSM: The probability of default, measured using the option pricing model of Merton 1974.

CAcc: Current accruals, defined as total accruals plus depreciation, or Accruals + (data14/data6).

CBreadth: Annual percentage change in breadth, where breadth is the number of mutual funds with long positions in the stock divided by the total number of mutual funds.

CFO: Operating cash flows, defined as net income before extraordinary items, scaled by total assets, minus accruals, that is, (data18/data6) – *Accruals*.

CFVol: Volatility of operating cash flows, defined as the standard deviation over years $t - 5$ to $t - 1$ of the ratio of operating cash flows to average total assets.

Empl: The logarithm of (1 + number of employees). Number of employees is reported in COMPUSTAT (data item 29).

InstOwn: The logarithm of (1 + annual institutional ownership). Annual institutional ownership is average quarterly institutional ownership in year *t*. Quarterly institutional ownership is defined as the number of shares held by institutional investors at quarter end, as reported in 13F filings in the Thomson Financial database, divided by the number of shares outstanding.

Illiquidity: Annual average daily absolute stock return per dollar trading volume (Amihud 2002).

Loss: The relative frequency of losses in the previous three years (number of loss years divided by three). A loss year is one in which net income before extraordinary items (COMPUSTAT data item 18) is negative.

NASDAQ = 1 if the firm is listed on NASDAQ, and 0 otherwise.

NWords: The number of words in the annual report, as measured by Li 2008.

PPE: Property, plant, and equipment scaled by total assets, or data7/data6.

$Ret_{[-36,--13]}$: Total returns from month −36 to month −13, where month 0 is the regression month.

$Ret_{[-12,-2]}$: Total returns from month −12 to month −2, where month 0 is the regression month.

$Ret_{[-1]}$: Returns at month −1, where month 0 is the regression month.

Ret: Average monthly returns over months +1 to +12.

Rev: Revenues scaled by total assets, or data12/data6.

RPEG: Implied cost of equity capital defined as in Botosan and Plumlee 2005 = $\sqrt{\{(eps5 - eps4)/p0\}}$, where *eps5* is the five-year-ahead EPS forecast from I/B/E/S and *p0* is the current price. Where explicit forecasts of *eps5* and *eps4* are not given, we use the last forecast and the long-term growth rate to calculate them. *RPEG* is calculated annually in June.

Size: The logarithm of market value of equity (COMPUSTAT data25 x data199) at the end of each month.

Traday: The number of days a stock is traded in year *t*, defined as the number of days with nonzero trading volume.

Turn: The logarithm of turnover. Turnover is the average monthly number of shares traded divided by shares outstanding in year *t*.

Turn-NASD: the interaction term between the *NASDAQ* dummy and *Turn*.

Turn-NYAM: Turnover for NYSE and AMEX firms, defined as the interaction term between (1 − *NASDAQ*) and *Turn*.

References

Aboody, D., J. Hughes, and J. Liu. 2005. Earnings quality, insider trading and cost of capital. *Journal of Accounting Research* 43 (5): 651–73.

Akins, B., J. Ng, and R. Verdi. 2012. Investor competition over information and the pricing of information asymmetry. *The Accounting Review* 87 (1): 35–58.

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time series effects. *Journal of Financial Markets* 5 (1): 31–56.

Amihud, Y., and H. Mendelson. 1986. Asset pricing and bid-ask spread. *Journal of Financial Economics* 17 (2): 223–49.

Ashbaugh-Skaife, H., D. Collins, W. Kinney, and R. LaFond. 2008. The effect of SOX internal control deficiencies and their remediation on accrual quality. *The Accounting Review* 83 (1): 217–50.

Barberis, N., A. Shleifer, and R. Vishny. 1998. A model of investor sentiment. *Journal of Financial Economics* 49 (3): 307–43.

Barry, C., and S. Brown. 1984. Differential information and the small firm effect. *Journal of Financial Economics* 13 (2): 283–94.

Bawa, V., S. Brown, and R. Klein. 1979. *Estimation risk and optimal portfolio choice*. Amsterdam: North Holland.

Black, F., and M. Scholes. 1973. The pricing of options and corporate liabilities. *Journal of Political Economy* 81 (3): 637–54.

Bloomfield, R. 2002. The "incomplete revelation hypothesis" and financial reporting. *Accounting Horizons* 16 (3): 233–43.

Botosan, C. 1997. Disclosure level and the cost of equity capital. *The Accounting Review* 72 (3): 323–49.

Botosan, C., and M. Plumlee. 2005. Assessing alternative proxies for the expected risk premium. *The Accounting Review* 80 (1): 21–53.

Botosan, C., and M. Plumlee. 2002. A re-examination of disclosure level and the expected cost of equity capital. *Journal of Accounting Research* 40 (1): 21–41.

Botosan, C., M. Plumlee, and H. Wen. 2011. The relation between expected returns, realized returns and firm risk characteristics. *Contemporary Accounting Research* 28 (4): 1085–122.

Cain, C., K. Kolev, and S. McVay. 2011. A comprehensive analysis of the use of special items to manage earnings. Working paper, Purdue University, Yale University, and the University of Utah.

Callen, J., S. Govindaraj, and L. Xu. 2000. Large time and small noise asymptotic results for mean reverting diffusion processes with applications. *Economic Theory* 16: 401–19.

Cao, C., T. Simin, and J. Zhao. 2008. Can growth options explain the trend in idiosyncratic risk? *Review of Financial Studies* 21 (6): 2599–633.

Chen, J., H. Hong, and J. Stein. 2002. Breadth of ownership and stock returns. *Journal of Financial Economics* 66 (2-3): 171–205.

Chen, S., T. Shevlin, and Y. Tong. 2007. Does the pricing of financial reporting quality change around dividend changes? *Journal of Accounting Research* 45 (1): 1–40.

Core, J., W. Guay, and R. Verdi. 2008. Is accruals quality a priced risk factor? *Journal of Accounting and Economics* 46 (1): 2–22.

Daniel, K., D. Hirshleifer, and A. Subrahmanyam. 1998. Investor psychology and security market under- and over-reactions. *The Journal of Finance* 53 (6): 1839–85.

Dechow, P., and I. Dichev. 2002. The quality of accruals and earnings. *The Accounting Review* 77 (1): 35–59.

Dechow, P., W. Ge, C. Larson, and R. Sloan. 2011. Predicting material accounting misstatements. *Contemporary Accounting Research* 28 (1): 17–82.

Dechow, P., W. Ge, and C. Schrand. 2010. Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of Accounting and Economics* 50 (2-3): 344–401.

Diamond, D., and R. Verrecchia. 1987. Constraints on short-selling and asset price adjustment to private information. *Journal of Financial Economics* 18 (2): 277–311.

Diamond, D., and R. Verrecchia. 1991. Disclosure, liquidity, and the cost of capital. *The Journal of Finance* 46 (4): 1325–59.

Doyle, J., W. Ge, and S. McVay. 2007a. Accruals quality and internal control over financial reporting. *The Accounting Review* 82 (5): 1141–70.

Doyle, J., W. Ge, and S. McVay. 2007b. Determinants of weaknesses in internal control over financial reporting. *Journal of Accounting and Economics* 44 (1-2): 193–223.

Easley, D., S. Hvidkjaer, and M. O'Hara. 2002. Is information risk a determinant of asset returns? *The Journal of Finance* 57 (5): 2185–221.

Easley, D., and M. O'Hara. 2004. Information and the cost of capital. *The Journal of Finance* 59 (4): 1553–83.

Easton, P. 2004. PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital. *The Accounting Review* 79 (1): 73–96.

Fama, E., and K. French. 1992. The cross-section of expected stock returns. *The Journal of Finance* 47 (2): 427–66.

Fama, E., and K. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33 (1): 3–56.

Fama, E., and K. French. 1997. Industry costs of equity. *Journal of Financial Economics* 43 (2): 153–93.

Fama, E., and J. MacBeth. 1973. Risk, return and equilibrium: Empirical tests. *Journal of Political Economy* 81 (3): 607–36.

Francis, J., R. LaFond, P. Olsson, and K. Schipper. 2005. The market pricing of accruals quality. *Journal of Accounting and Economics* 39 (2): 295–327.

Grossman, S., and J. Stiglitz. 1980. On the impossibility of informationally efficient markets. *American Economic Review* 70 (3): 393–408.

Hillegeist, S., E. Keating, D. Cram, and K. Lundstedt. 2004. Assessing the probability of bankruptcy. *Review of Accounting Studies* 9 (1): 5–34.

Hou, K., and T. Moskowitz. 2005. Market frictions, price delay and the cross-section of expected returns. *Review of Financial Studies* 18 (3): 981–1020.

Hughes, J., J. Liu, and J. Liu. 2007. Information asymmetry, diversification, and cost of capital. *The Accounting Review* 82 (3): 705–29.

Hutton, A., A. Marcus, and H. Tehranian. 2009. Opaque financial reports and the distribution of stock returns. *Journal of Financial Economics* 94 (1): 67–86.

Jegadeesh, N. 1990. Evidence of predictable behavior of security returns. *The Journal of Finance* 45 (3): 881–98.

Jegadeesh, N., and S. Titman. 1993. Returns to buying winners and selling losers: Implications for stock market efficiency. *The Journal of Finance* 48 (1): 65–91.

Jiang, G., C. Lee, and Y. Zhang. 2005. Information uncertainty and expected returns. *Review of Accounting Studies* 10 (2): 185–221.

Kinney, W., and R. Trezevant. 1997. The use of special items to manage earnings and perceptions. *Journal of Financial Statement Analysis* 3 (1): 45–53.

Lambert, R., C. Leuz, and R. Verrecchia. 2007. Accounting information, disclosure, and the cost of capital. *Journal of Accounting Research* 45 (2): 385–420.

Li, F. 2008. Annual report readability, current earnings and earnings persistence. *Journal of Accounting and Economics* 45 (2-3): 221–47.

McNichols, M. 2002. Discussion of "The quality of accruals and earnings: The role of accrual estimation errors." *The Accounting Review* 77 (Supplement): 61–69.

Merton, R. 1974. On the pricing of corporate debt: The risks structure of interest rates. *The Journal of Finance* 29 (2): 449–70.

Merton, R. 1987. Presidential address: A simple model of capital market equilibrium with incomplete information. *The Journal of Finance* 42 (3): 483–510.

Mohanram, P., and S. Rajgopal. 2009. Is PIN priced risk? *Journal of Accounting and Economics* 47 (3): 226–43.

Ng, J. 2011. The effect of information quality on liquidity risk. *Journal of Accounting and Economics* 52 (2-3): 126–43.

Ogneva, M. 2008. A re-examination of the cost-of-capital effects of accrual quality: Evidence from the future realized returns. Working paper, Stanford University.

Petersen, M. 2009. Estimating standard errors in finance panel data sets: Comparing approaches. *Review of Financial Studies* 22 (1): 435–80.

Sloan, R. 1996. Do stock prices fully reflect information in accruals and cash flows about future earnings? *The Accounting Review* 71 (3): 289–316.

Verrecchia, R. 1980. The rapidity of price adjustments to information. *Journal of Accounting and Economics* 2 (1): 63–92.

White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48 (4): 817–38.

Zhang, F. 2006. Information uncertainty and stock returns. *The Journal of Finance* 61 (1): 105–37.