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Accounting conservatism, business strategy, and ambiguity☆

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ABSTRACT

We investigate whether accounting conservatism can be explained as a rational response to ambiguity. Decision analysis shows that decision rules that work well under ambiguity put greater weight on negative than on positive outcomes, i.e., exhibit caution. Accounting conservatism increases the timeliness of bad news that is more relevant under cautious decision rules and thereby helps corporate managers and investors implement them. We, therefore, hypothesize that firms facing greater ambiguity report more conservatively. We adopt two different measures to proxy for the firm-specific level of ambiguity. First, we identify firms pursuing the "prospector" versus "defender" business strategies. Compared with defenders, who focus on utilizing existing resources, prospectors actively create their future by seeking new business opportunities and thus face greater ambiguity. Second, we conduct an additional set of tests based on environmental scanning, which reduces ambiguity. Both sets of results suggest that firms facing greater ambiguity report more conservatively.

The Master said, "The cautious seldom err."

—Confucius, *Analects: Li Ren*, ca. 500 BCE

1. Introduction

This paper is motivated by the ongoing debate over the desirability of accounting conservatism, which is viewed as an essential characteristic of financial reporting by many practitioners yet is opposed by the standard setters. For example, the Statement of Financial Accounting Concepts (SFAS) No. 2 (FASB, 2008, § 93) points out that "conservatism has long been identified with the idea that deliberate understatement is a virtue. That notion became deeply ingrained and is still in evidence despite efforts over the past 40 years to change it." In 2010, the standard setters' opposition to conservatism culminated in the decisions by both the Financial Accounting Standards Board (FASB) and International Accounting Standards Board (IASB) to remove it from their conceptual frameworks. The FASB has expressed the following opinion in this regard:

> Financial information needs to be *neutral*—free from bias intended to influence a decision or outcome. To that end, the common conceptual framework should not include conservatism or prudence among the desirable qualitative characteristics of accounting information. However, the framework should note the continuing need to be careful in the face of uncertainty (FASB, 2005, p. 35; emphasis in the original).

The point about being "careful in the face of uncertainty" requires clarification. A growing literature in economics and finance

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distinguishes between *risk*, where the probabilities of relevant events can be easily computed, and *non-probabilistic uncertainty* (often referred to as *ambiguity*), where such probabilities are unknown. Under risk—i.e., when firms operate in predictable environments where the cause-and-effect relationships are well understood—the expected utility framework serves as a solid guide to decision-making. Neutrality mentioned in the above quote can be a desirable characteristic of financial reporting in such settings (in the absence of contracting frictions). In contrast, under ambiguity—i.e., when the future is unpredictable—the expected utility framework is unreliable as an analytical tool because it is vulnerable to error (e.g., Ben-Haim, 2014). The decision-maker facing ambiguity is advised to follow an altogether different approach: instead of maximizing expected output based on what she knows, she should use decision rules that ensure acceptable performance over the largest set of conceivable states of the world, i.e., are robust to the lack of knowledge. In this paper, we focus on robust decision rules that put more weight on negative than on positive outcomes, i.e., exhibit caution.

There are two primary reasons why the difference between risk and ambiguity has important implications for accounting. First, recent studies show that the descriptive and predictive power of the standard asset pricing theory derived in models with risk substantially improves when ambiguity is also considered (e.g., Epstein & Schneider, 2008; Maccheroni, Marinacci, & Ruffino, 2013). Further, several important phenomena that defy explanation within the standard analytical framework with risk—such as trading breakdowns during the crises (e.g., Dow & Werlang, 1992) and investors' limited participation in asset markets (e.g., Easley & O'Hara, 2009, 2010)—can be easily explained by models with ambiguity. Therefore, studying ambiguity is critical to understanding the functioning of financial markets. Yet the accounting literature to date has largely ignored it.[2] Second, contemporary accounting theory was built upon the standard expected utility framework during the period of relatively low ambiguity, when the assumption that firms operated under risk could be considered quite reasonable. Accordingly, the theoretical predictions were broadly consistent with empirical evidence. However, after the period of relative stability ended at the turn of the millennium (e.g., Baker, Bloom, & Davis, 2016), the gap between the theory and empirical evidence has grown wider, exposing the need for theories that better fit the reality. In this paper, we focus on one such theory: decision-making under ambiguity.

In brief, we argue that (*i*) decision rules that perform well under ambiguity are markedly different from those under risk; (*ii*) a large class of decision rules that perform well under ambiguity exhibits caution in the sense defined above; (*iii*) accounting conservatism accelerates the recognition of bad news relative to good news and thus helps decision-makers implement cautious decision rules; (*iv*) therefore, ambiguity provides a simple yet compelling rationale for accounting conservatism. We explicate the above arguments in the following section.

Because cautious decision rules take time to implement, we need a measure of ambiguity faced by the firm over the medium- to long-term to test our empirical predictions.[3] Based on our reading on the literature, we construct two empirical proxies. The first one identifies ambiguity through the choice of business strategy, while the second one identifies it based on *environmental scanning*, a means of reducing ambiguity documented in the management literature. Below we briefly describe the two measures; the details are to be found in Sections 3 and 4.

In our first set of tests, we use a dichotomous empirical measure of business strategy developed in the accounting literature (Bentley, Omer, & Sharp, 2013; Ittner, Larcker, & Rajan, 1997) that identifies a firm as either a *prospector* or *defender*. Management scholars have shown that firms pursue distinct management strategies that involve different levels of uncertainty (e.g., March, 1991; Miles & Snow, 2003; Miller & Friesen, 1982). “Prospectors” are defined as firms that actively seek new business opportunities by heavily investing in R&D activities and focusing on innovation. “Defenders” are defined as firms that focus on the efficient provision of existing products and services and develop an expertise in a narrow area. Because a prospector firm actively creates its own future, it faces a greater level of ambiguity than a defender firm does.

Following this stream of literature, we investigate (*i*) the relation between business strategy and accounting conservatism and (*ii*) the relation between conservatism and shareholder value, as measured by Tobin's Q. Our empirical results are generally consistent with the theoretical predictions. First, prospectors exhibit significantly greater levels of conservatism than defenders. Second, we document statistically significant and positive coefficients on the interaction term between our prospector strategy measure and the firm-year level measures of accounting conservatism. Although far from conclusive, our results thus support the explanation proposed by the literature on ambiguity.

To provide additional assurance that our empirical results are attributable to ambiguity rather than some characteristic of a prospector business strategy, we conduct an additional series of tests using an altogether different approach. Building on the literature on environmental scanning (e.g., Elenkov, 1997) and peripheral vision (Day & Schoemaker, 2004), we construct an empirical proxy to identify firms that are continually engaged in environmental scanning. Such firms are more likely to recognize unexpected threats should they emerge and thus have more time to investigate their sources and possible consequences. Once the emergent threats are reasonably well understood, the firm faces risk; as a result, the level of ambiguity in its environment in any given period is reduced. In the spirit of Hirschman (1969), we refer to these firms as *alert*. Several empirical studies (Baker et al., 2016; Bloom, 2009; Bloom, Bond, & Van Reenan, 2007; Julio & Yook, 2012) show that, when faced with unexpected developments, firms delay their hiring and capital investment. Such delays result in abnormal cuts in employee counts, capital investment, and discretionary spending. It follows that a firm simultaneously taking the three abnormal cuts just mentioned is likely to be an alert one responding to a recently discovered source of ambiguity. To capture the level of alertness, we assume that the style of corporate decision-making is a persistent characteristic (Weick, 1979) and identify a firm as alert if it simultaneously takes the three abnormal cuts at any point during the sample period.[4] We hypothesize that the firms that are not continually scanning their environment—we dub them *inert*—and thus face greater levels of ambiguity than alert ones exhibit greater levels of accounting conservatism. The empirical results are consistent with our theoretical predictions. The results are robust to various specifications of our measure of alertness.

In sum, after controlling for risk, our empirical evidence based

[2] Caskey (2009) and Willams (2015) are notable exceptions.

[3] We cannot use the methodology proposed by Williams (2015) because he studies *changes* in ambiguity over short (two-day) periods, whereas we need a measure of the prevailing *levels* of ambiguity.

[4] This assumption is justified because high-stake corporate decisions are usually made by groups of executives and, for this reason, the effect of one executive's “style” on corporate decisions is rather modest (Chang, Dasgupta, & Gan, 2013; Fee, Hadlock, & Pierce, 2013).

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on two conceptually different proxies of firm-level ambiguity offers general support to the theoretical prediction that accounting conservatism is positively associated with ambiguity. Because ambiguity is difficult to measure reliably, our empirical results cannot be classified as definitive. However, consistent findings based on the two unrelated approaches alleviate such concerns to some extent.

The study makes the following contributions. First, it contributes to the literature on accounting conservatism. The literature has identified the following explanations of conservatism: contracting with creditors and managers, litigation, regulation, and taxation (Ball, 2001; Watts, 2003), all of which are specific to modern limited-liability corporations. However, conservatism predates the limited-liability corporate form by at least a millennium (De Ste. Croix, 1956). By viewing accounting conservatism as a rational response to ambiguity, the paper offers an alternative—and complementary—explanation of this age-old phenomenon. Our explanation also suggests that the increase in conservative financial reporting over time (e.g., Ball, Kothari, & Robin, 2000; Givoly, Hayn, & Natarajan, 2007) can be at least partially attributed to the gradual increase in the ambiguity faced by firms.

Second, our study contributes to the accounting literature studying the implications of the firm's business strategy for its reporting policies (e.g., Bentley et al., 2013; Ittner et al., 1997; Simons, 1987). By investigating the relationship between accounting conservatism and ambiguity, we identify one mechanism that links the firm's business strategy with the properties of its financial reporting.

Third, our study contributes to the stream of research on organizational practices that are *ecologically rational*, in the sense of having gradually evolved over time in the process of unconscious adaptation to the environment, without anyone deliberately designing them (Goldstein & Gigerenzer, 2002; Basu & Waymire, In-Press). By considering high-uncertainty environments, we suggest one reason why caution may be ecologically rational, extending the earlier work on this topic (e.g., Dutta & Radner, 1999; Hsieh, Ma, & Novoselov, 2015).

Finally, our paper contributes to the emerging accounting literature on ambiguity (Caskey, 2009; Williams, 2015). The distinction between *risk* and *ambiguity* is important because the models with risk that form the conceptual foundation of contemporary accounting research may not be reliable as a guide to firm behavior in unstable, unpredictable environments. For example, in contrast to the principal–agent theory, which studies conflicts of interest among *known* parties, the theory of decision-making under ambiguity studies situations where potential threats emanate from *unknown* sources. Because caution, which is deeply embedded in corporate practice, is best explained in models with ambiguity, we believe that studying the desirable characteristics of financial reporting when firms face ambiguity is a promising direction for future research.

The paper proceeds as follows. Section 2 reviews the theoretical arguments and develops our empirical predictions. Sections 3 and 4 explore accounting conservatism as a solution to ambiguity. Specifically, Section 3 explains our methodology and reports the first set of empirical results based on business strategy; Section 4 explains our methodology and reports the second set of empirical results based on environmental scanning. Section 5 concludes.

2. Theory and hypotheses development

2.1. The ongoing debate over the desirability of accounting conservatism

The desirability of accounting conservatism as an essential characteristic of financial reporting has been hotly debated by practitioners, academics, and standard setters. A compelling argument in favor of conservatism is that it helps address a range of contracting problems (e.g., Dhaliwal, Huang, Khurana, & Periera, 2014; LaFond & Roychowdhury, 2008; Ramalingegowda & Yu, 2012; Watts, 2003; Zhang, 2008). The argument against conservatism championed by the regulators is premised on the belief that financial information should be neutral, i.e., free from any bias introduced deliberately to affect a decision or outcome (e.g., FASB, 2005, p. 35). Such neutrality can be derived under strong assumptions (complete and frictionless markets, full rationality, *etc.*) and serves as a useful benchmark that is rarely, if ever, attainable in real life.

Both arguments have their merits and limitations. The limitation relevant to this paper is that both arguments, their opposite conclusions notwithstanding, are based on the same conceptual framework, namely, the optimization of expected output under risk. To derive specific predictions in a contracting setting, one has to work with risk because a reliable solution concept for ambiguity is yet to be developed. Further, one has to assume that the identities of the contracting parties, their preferences, and their beliefs are all known. Although these methodological constraints limit the applicability of the standard model, its sheer ubiquity creates an impression that there is no alternative. Meanwhile, the literature on decision-making under ambiguity takes an altogether different view of the problem and thus offers its own explanation of accounting conservatism that complements the above-mentioned ones. We briefly review the relevant literature below.

2.2. Theories of ambiguity and caution

Economic theory distinguishes between risk, i.e., the kind of randomness where the precise probabilities of all outcomes are known at the beginning of the problem, and ambiguity (non-probabilistic uncertainty), where such probabilities are unknown (e.g., Heinsalu, 2012).[5] Although the distinction between the two was recognized as critical to the understanding of business enterprise almost a century ago by Knight (1921), the analytical framework explaining it has been proposed relatively recently. The principal difference is that risk and ambiguity call for markedly dissimilar approaches to decision-making. In settings with risk, there is sufficient information to optimize the expected output (e.g., maximize expected utility or shareholder value) with the goal of finding the *best* decision. In settings with ambiguity, however, output optimization is vulnerable to error because the information at the decision-maker's disposal is likely to be incomplete or incorrect. When an error can lead to catastrophic failure (such as bankruptcy), decision-makers are advised to abandon the goal of finding one best decision and instead look for *robust* decisions that ensure some acceptable level of output over the largest set of unanticipated eventualities.

In this paper, we focus on the class of robust decision rules that exhibit *caution* in the sense of putting more weight on bad than on good outcomes. The *maximin* criterion proposed in Wald (1945) serves as a prototypical example of a cautious decision rule that can be implemented even when no information about the probabilities of the outcomes is available. To implement it, the decision-maker considers the worst outcomes (hence the "min") for each

[5] The literature uses a variety of terms, including *radical*, *deep*, *fundamental*, *true*, and *Knightian uncertainty*, to denote essentially the same concept. The term *ambiguity* usually refers to the class of problems where the precise probabilities are unknown but at least some (second-order) information about them is available to the decision-maker.

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alternative—and then chooses the alternative whose worst outcome is at least as good (hence the "max") as the worst outcomes of all other alternatives. Put simply, the decision-maker assumes the worst—i.e., exercises maximal caution, which helps her avoid catastrophic failure. Caution also increases the value of learning-by-doing, where the disappointing results obtained at every interim stage can be used to improve the quality of subsequent decisions. This is so because, when the information about interim setbacks becomes available faster, decision-makers have more time to resolve the emerging problems that they did not anticipate at the beginning (e.g., Koussis, Martzoukos, & Trigeorgis, 2007; Levinthal, 1997). Thus, caution improves the quality of decision-making, increasing the probability of both survival and success.

The literature studying the link between ambiguity and caution goes back to Ellsberg (1961). Empirical evidence shows that most decision-makers exhibit *ambiguity-aversion*, i.e., prefer the alternatives whose outcomes are more robust to the lack of information. Gilboa and Schmeidler (1989) and subsequent studies (e.g., Klibanoff, Marinacci, & Mukerji, 2005) show formally that ambiguity-aversion and caution are closely related, although this stream of research is not without controversy (see, e.g., Al-Najjar & Weinstein, 2009). A different stream of research shows that caution is desirable under ambiguity because it improves the quality of decisions by making them more robust to the lack of knowledge (e.g., Hansen & Sargent, 2008; Roy, 2010).

The above discussion highlights the principal distinction between the analytical framework studying decisions under ambiguity and the standard one studying decisions under risk. Under the former, caution is a desirable characteristic. Under the latter, cautious decision-makers exhibit risk-aversion. In a competitive market with pure risk, risk-averse agents will be continually outbid by more risk-tolerant ones, who require lower risk premiums for the same level of risk. Thus, over time, risk-averse agents will be crowded out and the market will be populated by risk-neutral agents, such as mutual funds and insurance companies. In other words, in settings with pure risk, caution is maladaptive and thus undesirable. Because caution has long been viewed as a virtue (cf. the opening quote), we conclude that the analytical framework with ambiguity is better suited to study decisions in *unpredictable* environments than the standard framework with risk, which forms the foundation of contemporary accounting research.

2.3. Accounting conservatism and cautious decision rules

The definition of accounting conservatism as "a prudent reaction to uncertainty" (FASB, 2008: § 95) already implies its close connection with caution, which is advised in the face of ambiguity. Below we identify two logical links between caution and accounting conservatism.

First, because firms facing ambiguity are more likely to survive and succeed when their managers follow cautious decision rules (Ben-Haim, 2014; Dutta & Radner, 1999), investors would like to encourage the managers to do so. The problem is that managers tend to be overconfident and overoptimistic (e.g., Graham, Harvey, & Puri, 2013) and thus pay insufficient attention to bad news. By accelerating the reporting of bad news *ex post*, accounting conservatism encourages the mangers to pay sufficient attention to potential bad outcomes *ex ante* when they choose investment projects (Ball, 2001) and at interim stages of project implementation, there conservatism increases the value of learning-by-doing (Hsu, Novoselov, & Wang, 2017). Further, exercising caution is personally costly (e.g., Boyd & Fulk, 1996; Frederickson & Mitchell, 1984). Accounting conservatism helps investors and the gatekeepers (such as auditors, financial analysts, and the media) acting on their behalf to monitor the managers' actions. A firm following cautious decision rules is less likely to report a loss; therefore, the timely reporting of bad news is more effective in motivating caution than the timely reporting of good news.[6] It follows that investors would prefer the firm to report conservatively.

Second, the investors who are not fully diversified are advised to exercise caution themselves when they face ambiguity. In this case, caution again implies putting more weight on bad than on good news. Epstein and Schneider (2008, p. 198) explain:

> Bad news affect conditional actions—such as portfolio decisions—more than good news. This is because agents evaluate any action using the conditional probability that minimizes the utility of that action. If an ambiguous signal conveys good (bad) news, the worst case is that the signal is unreliable (very reliable).

That is, bad news affects the investor's actions more than good news; hence, it is more important to her to receive the former, rather than the latter, in a timely manner.

The theoretical arguments presented above can be summarized as follows:

Proposition. *Accounting conservatism is an increasing function of ambiguity.*

At this point, our challenge is that ambiguity, by its very nature, is difficult to measure. To formulate our empirical predictions in terms of observable variables, we follow two conceptually different routes. We describe the first approach in Section 3 and the second one in Section 4. Each section contains its own methodology, data, and empirical results.

3. Empirical tests I

3.1. Business strategy and ambiguity

The management literature has long acknowledged that firms pursue markedly different business strategies. Although the proposed typologies differ in their focus and sometimes include more than two types, the underlying construct is best thought of as a dichotomy between an assertive strategy of actively pursuing new opportunities—and a reactive one of capitalizing on existing strengths. The typologies proposed by Miller and Friesen (1982), who distinguish between entrepreneurial and what they term "conservative" firms; March (1991), who identifies exploration vs. exploitation as the key distinction; and Miles and Snow (2003), who anchor the endpoints of the strategy continuum as prospectors and defenders, all share the above dichotomy as their underlying characteristic. We follow Bentley et al. (2013), who propose a measure of business strategy based only on publicly observable information. Their measure builds upon the earlier work in accounting literature (Ittner et al., 1997; Simons, 1987). The strategy space that Bentley et al. (2013) consider consists of *prospectors* (innovative market leaders who actively pursue R&D activities and rapidly respond to the new opportunities in the product market) and *defenders* (who tend to maintain a narrow and stable focus on the existing core product). Business strategies are remarkably stable over time (e.g., Bentley et al., 2013). One reason for such stability is that the meticulous coordination of all activities required for a

[6] To see this, suppose that the realization of earnings below a certain level, e_0, is incompatible with caution. Investors observing $e \le e_0$ would know for sure that the managers have not exercised caution and would punish them accordingly; anticipating this, the managers would dutifully implement the cautious decision rule.

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change in business strategy to be effective is rather difficult to attain (Brynjolfsson & Milgrom, 2013).

Because prospectors actively create the future, there is no reliable basis to assess the probabilities of the possible outcomes; further, the outcomes themselves are largely unknown (e.g., Kirzner, 1997). There is always a possibility that the discovery of new opportunities by prospectors would destroy existing opportunities for defenders. When this happens, however, defenders have to respond to known threats; this involves lower ambiguity than exploring an unchartered territory. It follows that prospectors face greater levels of ambiguity than defenders.

Accordingly, we state our first hypotheses as follows:

H1a. *Prospectors, which face greater levels of ambiguity, exhibit greater levels of accounting conservatism than defenders.*

3.2. Measuring business strategy

The strategy score that we use, which follows Bentley et al. (2013), is a composite measure of six variables measured as the average over a rolling prior five-year window: a) the ratio of research and development expenditures to sales, b) the ratio of the number of employees to sales, c) one-year percentage change in total sales, d) the ratio of selling, general and administrative expenses to sales, e) the standard deviation of the total number of employees, and f) the ratio of net property plant and equipment to total assets. These measures are calculated for each firm-year and ranked into quintiles in each year and industry (two-digit SIC code). Observations in the highest (lowest) quintile receive a score of five (one). The strategy of the firm (*STRATEGY)* is measured as the sum of the six measures (*SCORE*), which has a maximum value of 30 and minimum value of 6. Higher scores represent a prospector-oriented strategy and lower scores represent a defender-oriented strategy. We further create a dummy variable (*PROSPECTOR*) that equals one if the score is greater than 18 and zero otherwise.[7]

3.3. Empirical models

3.3.1. Asymmetric timeliness model

To test H1a, we compare the levels of accounting conservatism between prospectors and defenders. Our primary measure of conservatism is based on the asymmetric timeliness model proposed in Basu (1997). Although the Basu model has been criticized on various grounds (Dietrich, Muller, & Riedl, 2007; Givoly et al., 2007; Patatoukas & Thomas, 2011), recent empirical evidence reported by Ettredge, Huang, and Zhang (2012) and Ball, Kothari, & Nikolaev (2013) shows that it does capture conservatism whenever it is present. Several studies have refined the asymmetric timeliness model by incorporating additional variables. We follow LaFond and Roychowdhury (2008) and Ramalingegowda and Yu (2012) and estimate the following specification of the model:

$$
\begin{aligned}
NI_t = {} & \beta_0 + \beta_1 NEG_t + \beta_2 STRATEGY_{t-1} + \sum\nolimits_{i=3}^{8} \beta_i CONTROLS_{t-1} + \beta_9 NEG_t \times STRATEGY_{t-1} \\
& + \sum\nolimits_{i=10}^{15} \beta_i NEG_t \times CONTROLS_{t-1} + \beta_{16} RET_t + \beta_{17} RET_t \times STRATEGY_{t-1} \\
& + \sum\nolimits_{i=18}^{23} \beta_i RET_t \times CONTROLS_{t-1} + \beta_{24} RET_t \times NEG_t + \beta_{25} RET_t \times NEG_t \times STRATEGY_{t-1} \\
& + \sum\nolimits_{i=26}^{31} \beta_i RET_t \times NEG_t \times CONTROLS_{t-1},
\end{aligned}
\tag{1}
$$

where *i* indexes the firm; *t* indexes time; *NI* is the net income before extraordinary items and discontinued operations, deflated by the market value of equity at the beginning of the year; *RET* is the CRSP 12-month buy-and-hold return over the fiscal year; and *NEG* is a dummy variable set to equal one if *RET* is negative, and zero otherwise.[8] As in Basu (1997), β_{16} measures earnings timeliness with respect to good news and β_{24} measures the asymmetric timeliness with respect to bad news. We focus on the coefficient on $RET \times NEG \times STRATEGY$ (i.e., β_{25}), which captures the effect of prospector strategy on accounting conservatism. We measure *STRATEGY* as the previously mentioned strategy score (*SCORE*) and the dummy variable (*PROSPECTOR*). *CONTROLS* represent the control variables related to conservatism, measured at year *t*-1. These variables are market-to-book ratio (*MB*), which reflects growth options; market value of equity (*SIZE*); leverage ratio (*LEV*), which reflects lenders' demand for conservatism; and litigation risk (*LIT*), an indicator variable that equals one if firm *i* is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374) and zero otherwise.

In addition, several studies (e.g., LaFond & Watts, 2008; Khan & Watts, 2009) have shown that accounting conservatism is influenced by risk (i.e., uncertainty with known probabilities of outcomes). To control for risk in the firm's operating environment, we include firm age (*AGE*) and return volatility (*STDR*), measured as the standard deviation of market-adjusted daily stock returns. Following LaFond and Roychowdhury (2008) and Ramalingegowda and Yu (2012), all variables except *STRATEGY*, *NI*, *RET*, *NEG*, and *LIT* are transformed into decile ranks from zero to one. We also include year and industry (SIC two digit) fixed effects, adjust for heteroskedasticity, and cluster the standard errors by both firm and year in the regressions.

3.3.2. Alternative measures of conservatism

To provide further assurance that our results are capturing the phenomenon of interest, we adopt four alternative measures of conservatism described below. We then estimate the following firm-year level regression for each conservatism measure:

$$CONSV = \beta_0 + \beta_1\ STRATEGY + \beta_2\ CONTROLS + \varepsilon, \tag{2}$$

where *CONSV* is one of the alternative conservatism measures described below and *STRATEGY* is the raw strategy measure (*SCORE*) or the dummy variable (*PROSPECTOR*). Following H1a, we expect the coefficient on *STRATEGY* to be positive. We also include several

[7] Bentley et al. (2013) define prospectors (defenders) as those with the strategy scores between 24 and 30 (6 and 12), while those in the middle (strategy scores between 13 and 23) are “analyzers,” who have attributes of both prospectors and defenders. The indicator variable in this paper is based on a dichotomous classification.

[8] We also measure *RET* as the CRSP 12-month buy-and-hold return of firm *i* ending in the third month after the fiscal year-end; the results remain unchanged.

Table 1
Sample selection.

Description	Firm-years
COMPUSTAT data for years between 1988 and 2012 (data with zero or negative sales and assets or with missing historical SIC codes are removed)	201,562
Less: Utilities and Financial Industries (SIC 4900–4999 and 6000–6099)	(40,042)
Less: Missing values for calculating *STRATEGY*	(77,167)
Total observations for *STRATEGY* composite score data set (1991–2012)	84,353
Less: Observations with missing control variables	(22,159)
Observations used in the regression	62,194

Table 1 presents details of the sample selection process.

controls in equation (2) such as market value of equity (*SIZE*), leverage ratio (*LEV*), the loss indicator (*LOSS*), litigation risk (*LIT*), and return volatility (*STDR*).[9] We also include year and industry (SIC two digit) fixed effects, adjust for heteroskedasticity, and cluster the standard errors by both firm and year in the regressions. The alternative measures of conservatism (*CONSV*) are as follows.

First, we rely upon the relation of accounting conservatism with the magnitude of accruals accumulated over time (Givoly & Hayn, 2000). We calculate our first proxy of unconditional conservatism, *CONSV_UACC*, as total accruals scaled by average total assets, multiplied by −1. We multiply the ratio by −1 so that the higher the value, the greater the level of accounting conservatism. This measure is calculated over a rolling window of the current year and the previous two years. We measure total accruals as net income before extraordinary items (Compustat IB) − operating cash flows (Compustat OANCF) + depreciation expense (Compustat DP). Second, we use an accrual-related measure of conditional conservatism, *CONSV_CACC*, which is equal to the ratio of nonoperating accruals to total assets times −1 for the current year. We calculate nonoperating accruals as net income (Compustat NI) + depreciation (Compustat DP) − cash flow from operations (Compustat OANCF) − Δ accounts receivable (Compustat RECT) − Δ inventories (Compustat INVT) − Δ prepaid expenses (Compustat XPP) + Δ accounts payable (Compustat AP) + Δ taxes payable (Compustat TXP). Nonoperating accruals such as restructuring charges represent the recognition of bad news (Zhang, 2008). We multiply the ratio by −1 to facilitate the interpretation of the results.

Our third and fourth measures, proposed in Basu (1997) and Zhang (2008), are computed at the firm level:

$$NI_{it} = \beta_0 + \beta_1\, NEG_{it} + \beta_2\, RET_{it} + \beta_3\, RET_{it} \times NEG_{it} + \varepsilon, \qquad (3)$$

where the variables are described as in Equation (1). Based on this model, our third measure *CONSV_COEFF* is calculated as $(\beta_2 + \beta_3)/\beta_2$. This measure captures the sensitivity of earnings to negative returns (bad news) in relation to the sensitivity to positive returns (good news). Our fourth measure is *CONSV_R2*, which is defined as the explanatory power (R^2) of bad news to earnings, divided by the explanatory power of good news to earnings (i.e., $R^2_{bad} \div R^2_{good}$). Both R^2_{bad} and R^2_{good} are from the same Basu (1997) regression mentioned above, where R^2_{bad} is from the regression applied only to the negative return period and R^2_{good} is from the regression applied only to the positive return period. Greater values of *CONSV_COEFF* and *CONSV_R2* represent greater levels of conservatism.

3.4. Data and descriptive statistics

We obtain firm financial data from COMPUSTAT and stock return data from CRSP during 1988–2012. Following Bentley et al. (2013), we delete utilities and financial industries (SIC 4900–4999; 6000–6999). Each year's strategy score requires a five-year rolling average of data. After deleting observations without sufficient data for calculating *STRATEGY* or the control variables, our final sample consists of 62,194 firm-year observations from 1991 to 2012 (see Table 1 for details of the sample selection process).[10]

Panel A of Table 2 presents the industry distribution of the sample. The 62,194 observations consist of 34,140 prospector-like firms (*SCORE* >18) and 28,054 defender-like firms (*SCORE* ≤ 18).[11] Consistent with Bentley et al. (2013), the percentage of firms adopting the two different strategies are similar in each of the industries, while the distributions of both types of firms mimic the full-sample industry distribution. Panel B reports the descriptive statistics for the variables used in the main regression analysis. We winsorize all continuous variables at the top and bottom 1% of the observations. The average annual buy-and-hold return in our sample is 15.3%, similar to that in LaFond and Roychowdhury (2008). The descriptive statistics on the negative return indicator variable, *NEG*, show that approximately 44% of the firm-years exhibit a negative buy-and-hold return. About a third of the firm-observations (34.2%) in our sample are classified as facing a litigious environment.

Table 3 reports the Pearson correlations between the variables used in the main regression. The results show that *SCORE* is negatively correlated with *NI*, indicating that prospectors are less profitable than defenders on average. *SCORE* is positively associated with market-to-book ratio (*MB*) but negatively associated with firm age (*AGE*). This suggests that prospectors are younger and grow at a higher rate than defenders. Prospectors also have smaller leverage and higher standard deviation of stock returns, suggesting that they face greater risk.

3.5. Regression analysis

3.5.1. Asymmetric timeliness model

Table 4 reports the results from model (1). In column (1), the dependent variable is the raw strategy score (*SCORE*) and in column (2), the dependent variable is the dummy variable (*PROSPECTOR*). Our main variable of interest is the relation between asymmetric timeliness and business strategy (i.e., the interaction term *RET* × *NEG* × *STRATEGY*). We find that the coefficient on *RET* × *STRATEGY* is significantly negative at the 1% level in both columns, while the coefficient on *RET* × *NEG* × *STRATEGY* is significantly positive at the 5% level in column (1) (coeff. = 0.005; z-statistic = 1.95) and the 10% level in column (2) (coeff. = 0.031; z statistic = 1.81). The positive coefficients of *RET* × *NEG* × *STRATEGY* appear to suggest that firms adopting the prospector strategy

[9] We do not include market-to-book ratio because it is also used a measure of conservatism in the literature (Ahmed & Duellman, 2007).

[10] We follow Bentley et al. (2013) by requiring a minimum of three-year data in order to preserve observations.

[11] For robustness, we also divide the observations into three groups instead of two and drop the middle part (i.e., the “analyzers”). The regression results are consistent.

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Table 2
Summary statistics.

Panel A: Industry Distribution

Two-digit SIC code	Industry affiliation	Full sample (N = 62,194)		Prospectors (N = 34,140)		Defenders (N = 28,054)	
		Number	Percent	Number	Percent	Number	Percent
01–09	Agriculture, Forestry and Fishing	235	0.38	139	0.41	96	0.34
10–14	Mining	3516	5.65	1748	5.12	1768	6.30
15–17	Construction	815	1.31	440	1.29	375	1.34
20–39	Manufacturing	34,343	55.22	18,748	54.92	15,595	55.59
40–48	Transportation and Communications Services	4183	6.73	2314	6.78	1869	6.66
50–51	Wholesale Trade	2627	4.22	1455	4.26	1172	4.18
52–59	Retail Trade	4854	7.80	2647	7.75	2207	7.87
70–89	Services	11,352	18.25	6469	18.95	4883	17.41
99	Other	269	0.43	180	0.53	89	0.32
Total		62,194	100.00	34,140	100.00	28,054	100.00

Panel B: Descriptive Statistics

Variable	N	Mean	Std Dev	25%	Median	75%
SCORE	62,194	18.037	3.656	16.000	18.000	21.000
NI	62,194	−0.016	0.226	−0.028	0.042	0.077
RET	62,194	0.153	0.611	−0.219	0.059	0.368
NEG	62,194	0.440	0.496	0.000	0.000	1.000
MB	62,194	2.686	3.332	1.116	1.873	3.216
LEV	62,194	0.494	0.241	0.311	0.487	0.645
SIZE	62,194	5.659	2.270	3.973	5.598	7.241
LIT	62,194	0.342	0.474	0.000	0.000	1.000
AGE	62,194	19.015	15.041	9.000	14.000	25.000
STDR	62,194	0.037	0.022	0.022	0.032	0.046

Table 2 presents the industry distribution and the descriptive statistics for the variables used in the analyses.
SCORE is a composite measure of six variables measured as the average over a rolling prior five-year window: a) the ratio of research and development expenditures to sales, b) the ratio of the number of employees to sales, c) one-year percentage change in total sales, d) the ratio of selling, general and administrative expenses to sales, e) the standard deviation of the total number of employees, and f) the ratio of net property plant and equipment to total assets. These measures are calculated for each firm-year and ranked into quintiles in each year and industry (2-digit SIC code). Observations in the highest (lowest) quintile receive a score of five (one). The sum of the six measures are defined as the strategy score (*SCORE*), which has a maximum value of 30 and minimum value of 6. Higher scores represent the prospector strategy and lower scores represent the defender strategy. *NI* is net income before extraordinary items divided by the beginning-of-fiscal-year market value of equity. *RET* is the buy-and-hold return over the fiscal year. *NEG* is equal to 1 if *RET* is negative and 0 otherwise. *MB* is the market-to-book ratio at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *SIZE* is the natural log of market value of equity at the beginning of the fiscal year. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *AGE* is the number of years a firm has been listed on CRSP. *STDR* is the standard deviation of daily stock returns over the previous year.

Table 3
Correlations.

	SCORE	*NI*	*RET*	*NEG*	*MB*	*LEV*	*SIZE*	*LIT*	*AGE*
NI	**−0.09**								
RET	**−0.02**	**0.21**							
NEG	**0.05**	**−0.23**	**−0.66**						
MB	**0.12**	**0.05**	**0.23**	**−0.17**					
LEV	**−0.07**	**−0.21**	**−0.06**	**0.04**	−0.01				
SIZE	**0.08**	**0.29**	**0.14**	**−0.22**	**0.23**	**0.06**			
LIT	**0.12**	**−0.08**	0.00	**0.05**	**0.11**	**−0.15**	**−0.01**		
AGE	**−0.12**	**0.12**	**−0.01**	**−0.08**	0.00	**0.11**	**0.31**	**−0.14**	
STDR	**0.08**	**−0.43**	**−0.04**	**0.21**	**−0.05**	**0.06**	**−0.59**	**0.13**	**−0.28**

Table 3 presents the Pearson correlation matrix. *SCORE* is the strategy score: see Table 2 for composition details. *NI* is net income before extraordinary items divided by the beginning-of-fiscal-year market value of equity. *RET* is the buy-and-hold return over the fiscal year. *NEG* is equal to 1 if *RET* is negative and 0 otherwise. *MB* is the market-to-book ratio at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *SIZE* is the natural log of market value of equity at the beginning of the fiscal year. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *AGE* is the number of years a firm has been listed on CRSP. *STDR* is the standard deviation of daily stock returns over the previous year. The correlations in bold are significant at the 5% level or less.

exhibit greater levels of conservatism than those that adopt the defender strategy, supporting H1a.

We find that the coefficients on *RET* × *NEG* × *STRATEGY* remain significantly positive after risk (*STDR*) is controlled for. It follows that uncertainty and risk have distinct implications for financial reporting. This result is consistent with the theoretical prediction that firms facing greater ambiguity report more conservatively. The control variables are consistent with LaFond and Roychowdhury (2008) regarding the negative relation between asymmetric timeliness and market-to-book ratio (*RET* × *NEG* × *MB*) and between asymmetric timeliness and firm size (*RET* × *NEG* × *SIZE*). The coefficients on *RET* × *NEG* × *LEV* are significantly positive, suggesting that firms that borrow more exhibit greater conditional conservatism.

3.5.2. Alternative measures of conservatism

Panel A of Table 5 reports the descriptive statistics of the four alternative measures of conservatism for our sample. The mean values for *CONSV_UACC* and *CONSV_CACC* are positive, suggesting that the sample firms on average recognize negative accruals.

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Table 4
Conservatism and business strategy: Asymmetric timeliness model.

$$NI_t = \beta_0 + \beta_1 NEG_t + \beta_2 STRATEGY_{t-1} + \sum_{i=3}^{8}\beta_i \times CONTROLS_{t-1} + \beta_9 NEG_t \times STRATEGY_{t-1} + \sum_{i=10}^{15}\beta_i \times NEG_t \times CONTROLS_{t-1} + \beta_{16} RET_t + \beta_{17} RET_t \times STRATEGY_{t-1} + \sum_{i=18}^{23}\beta_i \times RET_t \times CONTROLS_{t-1} + \beta_{24} RET_t \times NEG_t + \beta_{25} RET_t \times NEG_t \times STRATEGY_{t-1} + \sum_{i=26}^{31}\beta_i \times RET_t \times NEG_t \times CONTROLS_{t-1}$$

	Expected Sign	(1) *STRATEGY* = *SCORE*	(2) *STRATEGY* = *PROSPECTOR*
Intercept		0.027	−0.015
		(0.93)	(-0.55)
NEG		0.013	−0.011
		(0.76)	(-1.06)
STRATEGY		−0.003***	−0.014***
		(-5.61)	(-3.40)
MB		0.005***	0.005***
		(3.84)	(3.66)
LEV		−0.004***	−0.004***
		(-5.21)	(-5.04)
SIZE		0.002*	0.002
		(1.65)	(1.28)
LIT		−0.031***	−0.035***
		(-5.89)	(-6.31)
AGE		0.006	0.006
		(0.81)	(0.86)
STDR		−0.106***	−0.111***
		(-6.61)	(-6.89)
NEG × STRATEGY		−0.002	−0.010
		(-1.51)	(-1.27)
NEG × Controls		Included	Included
RET		0.215***	0.156***
		(9.38)	(7.24)
RET × STRATEGY		−0.004***	−0.024***
		(-3.27)	(-2.70)
RET × Controls		Included	Included
RET × NEG	+	−0.035	0.047
		(-0.59)	(0.87)
RET × NEG × STRATEGY	+	**0.005****	**0.031***
		(1.95)	**(1.81)**
RET × NEG × MB	−	−0.053***	−0.053***
		(-12.12)	(-12.44)
RET × NEG × LEV	+	0.015***	0.015***
		(3.27)	(3.18)
RET × NEG × SIZE	−	−0.011***	−0.011***
		(-3.46)	(-3.72)
RET × NEG × LIT	+	−0.009	−0.010
		(-0.58)	(-0.59)
RET × NEG × AGE	−	−0.029	−0.040*
		(-1.06)	(-1.30)
RET × NEG × STDR	+	0.593***	0.594***
		(10.80)	(10.43)
Year fixed effect		Included	Included
Industry fixed effect		Included	Included
Observations		62,194	62,194
R-squared		0.291	0.288

Table 4 reports the results of the pooled OLS regressions during the 1991–2012 period. All variables except *STRATEGY*, *NI*, *RET*, *NEG*, and *LIT* are transformed into decile ranks from 0 to 1. *STRATEGY* is the strategy score (*SCORE*) (see Table 2 for composition details) in column (1). *STRATEGY* is a dummy variable (*PROSPECTOR*) which is one if the strategy score is larger than 18 and zero otherwise in column (2). *NI* is net income before extraordinary items divided by the beginning-of-fiscal-year market value of equity. *RET* is the buy-and-hold return over the fiscal year. *NEG* is equal to 1 if *RET* is negative and 0 otherwise. *MB* is the market-to-book ratio at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *SIZE* is the naturel log of market value of equity at the beginning of the fiscal year. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *AGE* is the number of years a firm has been listed on CRSP. *STDR* is the standard deviation of daily stock returns over the previous year; ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels or lower, respectively; *z*-statistics reported in parentheses are robust to firm and year clustering.

Similarly, the mean values of *CONSV_R2* are above unity, suggesting that on average the explanatory power of bad news to earnings is greater than the explanatory power of good news to earnings (Zhang, 2008). Panel B compares these four measures for prospectors and defenders. The mean and median values for the prospector group are greater than those of the defender group and the differences are statistically significant for *CONSV_UACC* and *CONSV_CACC*. The comparisons partially support the prediction that firms that adopt prospector strategy are more conservative.

The results of Equation (2) are reported in Table 6. In general, the results in Table 6 partially support H1a stating that prospectors exhibit greater levels of accounting conservatism than defenders. When the dependent variables are accrual-based firm-year level measures (i.e., *CONSV_UACC* and *CONSV_CACC*), the coefficients on *SCORE* are statistically significant at a minimum of 10% level (coeff. = 0.001 and 0.001; *z*-statistics = 1.80 and 6.74, respectively). We obtain similar results when using *PROSPECTOR* to proxy for business strategy (coeff. = 0.003 and 0.009; *z*-statistics = 1.94 and

Table 5
Statistics for alternative measures for conservatism.

Panel A: Descriptive statistics						
Variable	N	Mean	Std Dev	25%	Median	75%
CONSV_UACC	61,698	0.015	0.068	−0.018	0.008	0.038
CONSV_CACC	61,971	0.029	0.098	−0.007	0.017	0.050
CONSV_COEFF	59,973	1.001	12.686	−1.318	0.341	2.140
CONSV_R2	54,319	19.960	85.067	0.215	0.940	4.114

	PROSPECTOR = 1				*PROSPECTOR* = 0				P value for mean difference	P value for median difference
	N	Mean	Std Dev	Median	N	Mean	Std Dev	Median		
Firm-year observations										
CONSV_UACC	27,176	0.019	0.077	0.010	34,522	0.012	0.060	0.007	**0.000**	**0.000**
CONSV_CACC	27,311	0.037	0.109	0.021	34,660	0.023	0.088	0.015	**0.000**	**0.000**
Firm level observations										
CONSV_COEFF	26,261	1.137	12.839	0.360	33,712	0.894	12.565	0.325	**0.020**	**0.099**
CONSV_R2	23,434	20.118	85.853	0.955	30,885	19.840	84.467	0.924	0.707	0.790

Table 5 presents the descriptive statistics for four conservatism measures as well as univariate test for two subsamples.
PROSPECTOR is a dummy variable which is one if the strategy score is larger than 18 and zero otherwise. See Table 2 for the composition detail of strategy scores.
CONSV_UACC is a proxy for unconditional conservatism. It is equal to the ratio of total accruals to average total assets times −1, calculated over a rolling window of the current year and the previous two years. Total accruals are measured as follows: Total accruals = net income before extraordinary items (Compustat IB) − operating cash flows (Compustat OANCF) + depreciation expense (Compustat DP).
CONSV_CACC is a proxy for conditional conservatism. It is equal to the ratio of accumulated non-operating accruals to accumulated total assets times −1 for the current year. Nonoperating accruals = net income (Compustat NI) + depreciation (Compustat DP) − cash flow from operations (Compustat OANCF) − Δaccounts receivable (Compustat RECT) − Δinventories (Compustat INVT) − Δprepaid expenses (Compustat XPP) + Δaccounts payable (Compustat AP) + Δtaxes payable (Compustat TXP).
CONSV_COEFF is calculated as $(\beta_2 + \beta_3)/\beta_2$ from Basu's (1997) model.
CONSV_R2: R^2_{bad}/R^2_{good}, where R^2_{bad} is from the same Basu regression for calculating *CONSV_COEFF*, applied only to the negative return period, and R^2_{good} is from the same Basu regression, applied only to the positive return period.

Table 6
Business strategy on alternative conservatism measures.

		Firm-year measures of conservatism				Firm-level measures of conservatism			
Dependent variable =	Expected Sign	*CONSV_UACC*		*CONSV_CACC*		*CONSV_COEFF*		*CONSV_R2*	
Intercept		−0.038***	−0.044***	−0.018	−0.039***	3.904	3.392	2.192	5.151
		(-3.41)	(-3.71)	(-1.29)	(-2.59)	(0.95)	(0.82)	(0.22)	(0.48)
SCORE	+	**0.001***		**0.001*****		0.038		−0.178	
		(1.80)		**(6.74)**		(0.95)		(-0.57)	
PROSPECTOR	+		**0.003***		**0.009*****		0.343		0.180
			(1.94)		**(6.02)**		(1.29)		(0.09)
SIZE		−0.000	−0.000	−0.001*	−0.001**	−0.217**	−0.217**	1.489**	1.550**
		(-0.54)	(-0.58)	(-1.87)	(-2.14)	(-2.33)	(-2.32)	(2.04)	(2.11)
LEV		0.038***	0.038***	0.044***	0.045***	0.600	0.594	4.462	4.055
		(11.48)	(11.55)	(9.33)	(9.56)	(1.01)	(1.00)	(0.90)	(0.82)
LOSS		0.032***	0.032***	0.051***	0.050***	−0.384	−0.385	−0.734	−0.521
		(19.25)	(19.61)	(9.65)	(9.51)	(-1.59)	(-1.60)	(-0.54)	(-0.39)
LIT		0.014***	0.014***	0.010***	0.009***	0.059	0.060	4.071	4.570
		(6.92)	(6.77)	(3.65)	(3.24)	(0.08)	(0.08)	(0.80)	(0.89)
STDR		0.369***	0.367***	−0.014	−0.021	−1.222	−1.189	51.904	56.016
		(9.35)	(9.39)	(-0.21)	(-0.34)	(-0.19)	(-0.19)	(1.07)	(1.15)
Year fixed effect		Included	Included	Included	Included	Included	Included	Included	Included
Industry fixed effect		Included	Included	Included	Included	Included	Included	Included	Included
Observations		61,698	61,698	61,971	61,971	59,973	59,973	54,319	54,319
R-squared		0.182	0.183	0.102	0.103	0.016	0.016	0.018	0.018

Table 6 reports the results of the pooled OLS regressions during the 1991–2012 period. *SCORE* is the strategy score: see Table 2 for the composition details. *PROSPECTOR* is a dummy variable which is one if the strategy score is larger than 18 and zero otherwise. *SIZE* is the naturel log of market value of equity at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *LOSS* is a dummy variable which is one if the firm reports a loss and zero otherwise. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *STDR* is the standard deviation of daily stock returns over the previous year; ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels or lower, respectively; *z*-statistics reported in parentheses are robust to firm and year clustering.

6.02, respectively).[12] On the other hand, the results are not significant when we regress business strategy on the firm-level conservatism measures, *CONSV_COEFF* and *CONSV_R2*. A possible explanation is that, because these measures are firm specific, they do not vary in a firm-year regression. The implicit assumption for these two measures is that the level of conservatism remains constant for a firm over time.

[12] To mitigate the shortcomings of accrual-based measures, we also follow Penman and Zhang (2002) and use an unconditional conservatism measure (*CONSV_RES*), which reflects the "hidden" reserves related to LIFO inventory accounting, R&D, and advertising. Furthermore, we combine *CONSV_RES* with the aforementioned firm-year level measures and compute a factor score estimated in terms of the first factor (*CONSV_FAC*) from the three measures (i.e., *CONSV_UACC*, *CONSV_CACC*, and *CONSV_RES*). The results are consistent with the accrual-based measures reported above.

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Table 7
Effect of strategy and conservatism on Tobin's Q.

	Dependent variable: *Tobin's Q*							
	Firm-year measures of conservatism				Firm-level measures of conservatism			
	CONSV = CONSV_UACC		*CONSV = CONSV_CACC*		*CONSV = CONSV_COEFF*		*CONSV = CONSV_R2*	
Intercept	2.350***	2.346***	2.279***	2.279***	2.251***	2.254***	2.340***	2.340***
	(6.61)	(6.62)	(6.42)	(6.42)	(6.06)	(6.08)	(6.23)	(6.23)
CONSV	1.839***	1.488***	1.129***	0.944***	−0.002	−0.001	−0.000	0.000
	(10.84)	(6.14)	(11.06)	(9.19)	(-1.15)	(-0.54)	(-0.61)	(0.12)
PROSPECTOR	0.370***	0.361***	0.365***	0.355***	0.377***	0.380***	0.376***	0.382***
	(15.17)	(14.06)	(15.47)	(14.78)	(15.25)	(15.03)	(14.19)	(14.03)
CONSV × PROSPECTOR		**0.626****		**0.340****		−0.003		−0.000
		(2.02)		**(2.03)**		(-1.57)		(-1.08)
lnAT	−0.058***	−0.058***	−0.057***	−0.057***	−0.059***	−0.059***	−0.053***	−0.053***
	(-3.58)	(-3.56)	(-3.42)	(-3.40)	(-3.49)	(-3.50)	(-3.11)	(-3.11)
LEV	0.010	0.008	0.020	0.019	0.070	0.070	0.006	0.006
	(0.10)	(0.08)	(0.18)	(0.17)	(0.62)	(0.62)	(0.05)	(0.05)
LOSS	−0.139***	−0.139***	−0.136***	−0.136***	−0.087**	−0.087**	−0.074**	−0.074**
	(-3.90)	(-3.91)	(-3.69)	(-3.69)	(-2.41)	(-2.43)	(-2.02)	(-2.02)
LIT	0.624***	0.624***	0.638***	0.638***	0.660***	0.658***	0.638***	0.638***
	(9.39)	(9.40)	(9.37)	(9.36)	(9.63)	(9.63)	(8.80)	(8.80)
STDR	−4.557***	−4.521***	−3.915***	−3.906***	−3.795***	−3.779***	−3.524***	−3.531***
	(-4.73)	(-4.70)	(-4.11)	(-4.10)	(-3.87)	(-3.84)	(-3.38)	(-3.39)
Year fixed effect	Included	Included	Included	Included	Included	Included	Included	Included
Industry fixed effect	Included	Included	Included	Included	Included	Included	Included	Included
Observations	56,245	56,245	56,503	56,503	55,198	55,198	50,939	50,939
R-squared	0.161	0.162	0.160	0.160	0.156	0.156	0.158	0.158

Table 7 reports the results of the pooled OLS regressions during the 1991–2012 period. *Tobin's Q* is defined as the market value of a firm's equity and liabilities divided by book value of asset. *CONSV* represents four different measures of conservatism: *CONSV_UACC*, *CONSV_CACC*, *CONSV_COEFF*, and *CONSV_R2*. Please refer to Table 5 for the detailed definitions of the four measures. *PROSPECTOR* is a dummy variable which is one if the strategy score is larger than 18 and zero otherwise. See Table 2 for the composition detail of strategy scores. *lnAT* is the naturel log of total assets at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *LOSS* is a dummy variable which is one if the firm reports a loss and zero otherwise. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *STDR* is the standard deviation of daily stock returns over the previous year; ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels or lower, respectively; *z*-statistics reported in parentheses are robust to firm and year clustering.

3.5.3. Additional tests: strategy and firm value

Following H1a, if the decision-makers are rationally following cautious decision rules, then for firms following a prospector strategy and thus facing greater ambiguity, being more conservative should result in greater firm valuation. Therefore, we further examine whether such firms are characterized by greater Tobin's Q. We run the following regression:

$$\text{Tobin's Q} = \beta_0 + \beta_1\, CONSV + \beta_2\, PROSPECTOR + \beta_3\, CONSV \times PROSPECTOR + \beta_4\, CONTROLS + \varepsilon, \quad (4)$$

where Tobin's Q is measured as the market value of the firm's equity and liabilities divided by book value of assets and *CONSV* represents the four alternative conservatism measures. Table 7 reports the regression results.[13] The coefficients on *PROSPECTOR* are consistently positive and significant in all of the four models, suggesting that the prospector strategy is valued by the market. When conservatism is defined as *CONSV_UACC* or *CONSV_CACC*, the coefficients on the interaction term *CONSV* × *PROSPECTOR* are significantly positive at the 5% level (coeff. = 0.626 and 0.340; *z*-statistics = 2.02 and 2.03, respectively). The results suggest that for prospectors, adopting conservative accounting results in higher market valuation.[14] This observation provides further insights as to why prospectors might want to adopt conservative accounting practices. On the other hand, we do not find significant results for the models using *CONSV_COEFF* and *CONSV_R2*. Again, a possible explanation is that these two measures are at firm level and thus do not vary across years. Overall, the results in Table 7 partially support the argument that, for firms following a prospector strategy and thus facing greater ambiguity, being more conservative results in greater firm valuation.

4. Empirical tests II

4.1. Environmental scanning and alertness

Our second set of empirical tests builds upon the literature on managerial perceptions of environmental uncertainty (e.g., Downey, Hellriegel, & Slocum, 1975; Lorenzi, Sims, & Slocum, 1981). The literature shows that managers operating in the same environment differ markedly in their perceptions of uncertainty (Bourgeois, 1985; Miller, 1993) and in the extent to which they are continually scanning the environment for emergent problems (Daft, Sormunen, & Parks, 1988; Hambrick, 1982). Scanning activities tend to be costly, and in unstable environments the costs can be substantial (e.g., Boyd & Fulk, 1996; Frederickson & Mitchell, 1984). We refer to the firms that do not continually scan their environment as *inert*. In contrast, the firms that continually monitor their environments—we refer to them as *alert*—are more likely to detect the first signs of trouble as soon as they emerge and thus have more time to investigate the sources and likely consequences of the underlying problems, converting ambiguity into risk. For this reason, in any given period alert firms face lower levels of ambiguity than inert ones. Hence our second hypothesis:

H1b. *Inert firms, which face greater levels of ambiguity, exhibit greater levels of accounting conservatism than alert ones.*

[13] Our results are similar when we use *SCORE* in this regression.

[14] Our results are robust to using other firm-year level conservatism measures (*CONSV_RES* and *CONSV_FAC*) defined in Note 12 above.

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4.2. Identifying alert firms

A large body of literature (reviewed, e.g., in Pindyck, 1991) shows that, when corporate decisions are (partially) irreversible, an increase in uncertainty in the wake of an unexpected development increases the value of waiting until uncertainty is at least partially resolved. Several empirical studies (Baker et al., 2016; Bloom, 2009; Bloom, Bond, & Van Reenen, 2007; Bontempi, Golinelli, & Parigi, 2010; Guiso & Parigi, 1999; Julio & Yook, 2012) offer overwhelming support for the theoretical prediction that corporate investment drops in response to an increase in uncertainty. Bloom (2009) studies unexpected developments (such as the 9/11 attacks) to infer an increase in uncertainty at the macro level and documents a sizeable drop in hiring and capital investment followed by a rebound and overshoot. To distinguish a reaction to uncertainty from planned changes in production, we design our empirical measure so that it only captures an abnormal drop in a corresponding activity, which is more likely when managers are caught by surprise.

To identify alert firms, we look for substantial cuts in (1) the number of employees, (2) capital investment, and (3) discretionary expenses. For each of the three, an indicator of a substantial cut in a given year equals one if the reduction is among the largest one-third of the industry and zero otherwise (see the Appendix for details). We include discretionary expenses because they contain a large portion of capital expenses (e.g., Banker, Huang, & Natarajan, 2011).

We assume that an unexpected development relevant to each firm in our sample occurred at least once during our sample period (1980–2010) characterized by constantly shifting political and technological landscape. A firm actively engaged in environmental scanning would most likely take the three above-mentioned cuts once it identifies such an unexpected development.[15] Because the cuts represent deviations from the normal levels, they should result in a decrease in the firm's long-run profitability if taken for no good reason (e.g., Bhojraj, Hribar, Picconi, & McInnis, 2009; Roychowdhury, 2006). We expect that the majority of corporate managers would not deliberately engage in activities that are detrimental to long-term performance. Accordingly, we assume that corporate decision-makers are acting in good faith. This assumption is likely to hold most of the time in the U.S. market, with its high-quality corporate governance. It follows that we can invoke the revealed preference argument and infer decision-makers' perceptions of unexpected developments from their observable actions (for otherwise they would have been deliberately reducing the value of the firm, which contradicts our assumption).

For each firm-year, we obtain the three indicators for each of the substantial cuts described above. To identify firm type, we define a binary variable *ALERT* that equals one if the firm ever takes three abnormal cuts (i.e., all three abnormal cut indicators are equal to 1) in the same year, and zero otherwise. That is, once a firm is identified as having taken the above abnormal cuts, we label all firm-years in our sample before and after the year when the cuts are taken as $ALERT = 1$. We define alertness as a firm-level variable that does not change throughout the sample period for the following three reasons. First, although we can identify the year (or, on rare occasions, years) of abnormal cuts taken by alert firms, there is no such “event-year” for inert firms. Therefore, it is impossible to compare the levels of accounting conservatism in the two types of firms in the years that follow abnormal cuts. Second, empirical studies (e.g., Hambrick, 1983) document that environmental scanning is a persistent firm characteristic. Third, the management (e.g., Forbes & Milliken, 1999; March, 1962) and law (e.g., Bainbridge, 2002) literature show that important corporate decisions are always made by groups of executives. Therefore, the degree of environmental scanning is determined by the characteristics of the executive team taken as a whole. Recent empirical studies in finance confirm that firms choose CEOs with desirable personal characteristics (Chang et al., 2013); therefore, the effect of the CEO's personal style on the firm's decisions is rather modest (Fee et al., 2013).

4.3. Empirical models

To test our main hypothesis, we compare the levels of accounting conservatism between alert and inert firms. Similar to Section 3, we follow LaFond and Roychowdhury (2008) as well as Ramalingegowda and Yu (2012), and estimate the following specification of the model:

$$\begin{aligned} NI_t = {} & \beta_0 + \beta_1 NEG_t + \beta_2 ALERT_{t-1} + \sum\nolimits_{i=3}^{8} \beta_i CONTROLS_{t-1} + \beta_9 NEG_t \times ALERT_{t-1} \\ & + \sum\nolimits_{i=10}^{15} \beta_i NEG_t \times CONTROLS_{t-1} + \beta_{16} RET_t + \beta_{17} RET_t \times ALERT_{t-1} \\ & + \sum\nolimits_{i=18}^{23} \beta_i RET_t \times CONTROLS_{t-1} + \beta_{24} RET_t \times NEG_t + \beta_{25} RET_t \times NEG_t \times ALERT_{t-1} \\ & + \sum\nolimits_{i=26}^{31} \beta_i RET_t \times NEG_t \times CONTROLS_{t-1}, \end{aligned} \quad (5)$$

where *ALERT* is our variable of interest. Similar to model (1), our focus is on the coefficient on $RET \times NEG \times ALERT$ (i.e., β_{25}), which captures the effect of alertness on accounting conservatism; we expect it to be negative because alert firms face lower levels of ambiguity.

4.4. Data and descriptive statistics

Again, we obtain firm financial data from COMPUSTAT and stock return data from CRSP. Our sample covers a relatively long period, from 1980 to 2010. As it may take a long time for a firm to reveal its type, we exclude firms with less than five years of total assets data because these firms are likely to be either at the beginning or at the end of their life cycle. Our final sample consists of 126,421 firm-years that have sufficient data to be included in our cross-sectional conservatism tests. The sample is distributed rather evenly across years.

Table 8 compares the differences between alert and inert firms for the variables used in the main regression analysis. We again

[15] In some cases, taking one or two of the three cuts may suffice for a reaction to uncertainty. To mitigate the concern that we are capturing planned changes in production instead of the reaction to unexpected developments, we only consider cases where a firm takes all three types of cuts at once.

Table 8
Descriptive statistics for alert and inert firms.

Variable	*ALERT* = 1 (N = 38,499)		*ALERT* = 0 (N = 87,922)		P value for mean difference	P value for median difference
	Mean	Median	Mean	Median		
NI	0.000	0.052	−0.015	0.046	**<0.001**	**0.001**
ROA	0.015	0.034	−0.008	0.023	**<0.001**	**<0.001**
ROE	0.034	0.091	0.000	0.090	**<0.001**	**<0.001**
RET	0.155	0.054	0.146	0.053	**0.028**	**0.002**
NEG	0.446	0.000	0.449	0.000	0.279	0.279
MB	2.395	1.596	2.808	1.781	**<0.001**	**<0.001**
LEV	0.515	0.513	0.527	0.516	**<0.001**	**<0.001**
SIZE	1157	79	1571	134	**<0.001**	**<0.001**
LIT	0.253	0.000	0.284	0.000	**<0.001**	**<0.001**
AGE	15.212	12.000	11.446	8.000	**<0.001**	**<0.001**
STDR	0.036	0.031	0.036	0.031	0.309	0.720

Table 8 presents the descriptive statistics for the alertness sample.
ALERT is coded as 1 if a firm simultaneously cuts capital investment and discretionary spending and reduces employee hiring, and the amount of the reduction is among the largest 33% of the industry in a fiscal year over the firm's history; and 0 otherwise. *NI* is net income before extraordinary items divided by the beginning-of-fiscal-year market value of equity. *RET* is the buy-and-hold return over the fiscal year. *NEG* is equal to 1 if *RET* is negative and 0 otherwise. *MB* is the market-to-book ratio at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *SIZE* is the naturel log of market value of equity at the beginning of the fiscal year. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *AGE* is the number of years a firm has been listed on CRSP. *STDR* is the standard deviation of daily stock returns over the previous year.

winsorize all continuous variables at the top and bottom 1% of the observations. Net income (*NI*), return on assets (*ROA*), and return on equity (*ROE*) are all greater for alert firms throughout the firm history, and the differences between the two groups are statistically significant (p values < 0.001). These results suggest that alert firms have higher long-term profitability, consistent with the management literature (e.g., Daft et al., 1988). The means and medians of leverage (*LEV*) are smaller for alert firms than for inert ones, indicating that the former use less debt. Alert firms are also, on average, smaller and older than inert ones, indicating that they grow at lower rates and survive longer, consistent with Dutta and Radner (1999).

Note in particular that there is no significant difference in stock return volatility between alert and inert firms, confirming the observation in Anderson, Ghysels, & Juergens (2009) that uncertainty and stock return volatility are orthogonal. To explore this relation further, we conduct multivariate tests in which we follow Low (2009) in regressing stock return volatility on *ALERT* and firm characteristics (*SIZE*, *ROA*, and market-to-book ratio) with controls for industry and year fixed effects. The results (not tabulated) show that the coefficients on *ALERT* are 0.000 and statistically insignificant ($p > 0.3$), indicating that our empirical measure of alertness is not capturing risk aversion.

4.5. Regression analysis

4.5.1. Asymmetric timeliness model

The results of the H1b tests are reported in Table 9. Similar to Empirical Tests I, we adjust for heteroskedasticity and cluster the standard errors by both firm and year in all the regressions. Following LaFond and Roychowdhury (2008) as well as Ramalingegowda and Yu (2012), all variables except *ALERT*, *NI*, *RET*, *NEG*, and *LIT* are transformed into decile ranks from zero to one. Our main variable of interest is the interaction between *RET* × *NEG* and *ALERT*. We find that the coefficient for *RET* × *ALERT* is significantly positive (coeff. = 0.019; z-statistic = 4.55) while the coefficient for *RET* × *NEG* × *ALERT* is significantly negative (coeff. = −0.059; z-statistic = −5.06). These results indicate that inert firms, which face greater levels of ambiguity, exhibit greater levels of conservatism than alert ones, supporting H1b.

We turn next to the association between conservatism and risk. We find a significantly positive coefficient for *RET* × *NEG* × *STDR*, suggesting that firms facing greater risk report more conservatively, consistent with prior studies (e.g., Ramalingegowda & Yu, 2012). We find that conservatism is positively associated with ambiguity after controlling for risk. Again, we conclude that uncertainty and risk have distinct implications for financial reporting.

4.5.2. Alternative measures of conservatism

To check the robustness of our results, we conduct additional tests using the alternative measures of conservatism introduced in Section 3. Specifically, we use the ratio of total accruals to total assets as a proxy for unconditional conservatism (e.g., *CONSV_UACC*) and the ratio of nonoperating accruals to total assets as a proxy for conditional conservatism (*CONSV_CACC*). The results (untabulated) show that alert firms exhibit significantly smaller levels of conservatism than inert ones.[16] However, we do not find significant results when we use firm-level measures to proxy for conservatism (*CONSV_COEFF* and *CONSV_R2*).

5. Summary and conclusions

In this paper, we empirically investigate the relation between accounting conservatism and ambiguity. Recent studies demonstrate that studying ambiguity often provides useful insights that are difficult to derive in the standard expected utility framework with risk. We, therefore, believe that it is important to develop reliable empirical proxies of firm-level ambiguity that prevails over relatively long periods. One of the goals of our study has been to take a step in this direction.

Although the empirical proxies that we use do not allow us to draw definitive conclusions, our results suggest that the theory of decision-making under ambiguity sheds new light on the relations between the properties of accounting information and firm fundamentals. Specifically, in contrast with the principal–agent theory, which focuses on contracting among known parties (typically, managers and the providers of capital), decision-making under ambiguity emphasizes unknown threats and for this reason offers a rather different set of insights and solutions. Cautious decision rules, which call for paying more attention to bad outcomes than to good ones and thus reduce the probability of catastrophic failure, serve as one such solution that has been widely used since ancient times. Through this lens, conservative bias in financial reporting is

[16] Our results are robust to using other firm-year level conservatism measures (*CONSV_RES* and *CONSV_FAC*) defined in Note 12 above.

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Table 9
Conservatism and alertness: Asymmetric timeliness model.

$$NI_t = \beta_0 + \beta_1 NEG_t + \beta_2 STRATEGY_{t-1} + \sum_{i=3}^{8}\beta_i \times CONTROLS_{t-1} + \beta_9 NEG_t \times STRATEGY_{t-1} + \sum_{i=10}^{15}\beta_i \times NEG_t \times CONTROLS_{t-1} + \beta_{16} RET_t + \beta_{17} RET_t \times STRATEGY_{t-1} + \sum_{i=18}^{23}\beta_i \times RET_t \times CONTROLS_{t-1} + \beta_{24} RET_t \times NEG_t + \beta_{25} RET_t \times NEG_t \times STRATEGY_{t-1} + \sum_{i=26}^{31}\beta_i \times RET_t \times NEG_t \times CONTROLS_{t-1}$$

Variable	Expected Sign	Coefficient
Intercept		0.080***
		(7.81)
NEG		−0.022
		(-1.41)
ALERT		0.006**
		(2.16)
MB		0.012
		(1.01)
LEV		−0.013**
		(-2.10)
SIZE		0.022**
		(2.57)
LIT		−0.015***
		(-3.94)
AGE		−0.008*
		(-1.88)
STDR		−0.122***
		(-10.79)
NEG × *ALERT*		0.003
		(0.70)
NEG × *Controls*		Included
RET		0.036***
		(2.66)
RET × *ALERT*		0.019***
		(4.55)
RET × *Controls*		Included
RET × *NEG*	+	0.386***
		(6.29)
RET* × *NEG* × *ALERT	−	**−0.059*** **
		(-5.06)
RET × *NEG* × *MB*	−	−0.651***
		(-10.69)
RET × *NEG* × *LEV*	+	0.291***
		(6.70)
RET × *NEG* × *SIZE*	−	−0.170***
		(-4.32)
RET × *NEG* × *LIT*	+	0.009
		(0.48)
RET × *NEG* × *AGE*	−	−0.007
		(-0.32)
RET × *NEG* × *STDR*	+	0.366***
		(9.36)
Year fixed effect		Included
Industry fixed effect		Included
Observations		126,421
R-squared		0.263

Table 9 reports the results of the pooled OLS regressions during the 1980–2010 period with available data. All variables except *ALERT*, *NI*, *RET*, *NEG*, and *LIT* are transformed into decile ranks from 0 to 1. *ALERT* is coded as 1 if a firm simultaneously cuts capital investment and discretionary spending and reduces employee hiring, and the amount of the reduction is among the largest 33% of the industry in a fiscal year over the firm's history; and 0 otherwise. *NI* is net income before extraordinary items divided by the beginning-of-fiscal-year market value of equity. *RET* is the buy-and-hold return over the fiscal year. *NEG* is equal to 1 if *RET* is negative and 0 otherwise. *MB* is the market-to-book ratio at the beginning of the fiscal year. *LEV* is total debt divided by total assets at the beginning of the fiscal year. *SIZE* is the naturel log of market value of equity at the beginning of the fiscal year. *LIT* is coded as 1 if a firm is in a litigious industry (SIC codes 2833–2836, 3570–3577, 3600–3674, 5200–5961, and 7370–7374), and 0 otherwise. *AGE* is the number of years a firm has been listed on CRSP. *STDR* is the standard deviation of daily stock returns over the previous year; ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels or lower, respectively; *z*-statistics reported in parentheses are robust to firm and year clustering.

viewed as a way of making the decision rules more robust to errors stemming from various sources, be it the actions of unknown strategic opponents or decision-makers' own cognitive biases. This decision-theoretic explanation supports the traditional rationale of conservatism as a prudent response to uncertainty.

Our results are relevant to both research and practice. Concerning practice, our decision-theoretic explanation of conservatism provides a counter-argument to the recent decisions by the standard setters to remove conservatism from the conceptual framework. Although all business firms face ambiguity, its level is firm specific. When this level is relatively high, the decision-makers will make better decisions when financial reporting is conservative than when it is unbiased (although their preferences for the *level* of conservatism may differ). The statement that information should be unbiased can be justified on theoretical grounds only for firms facing relatively low levels of ambiguity, i.e., those operating in stable, predictable environments. The evidence to date suggests that extrapolating the insights derived for such firms in models with risk to settings with ambiguity can lead to unwarranted conclusions.

Concerning research, our results suggest that the theory of decision-making under ambiguity (e.g., Binmore, 2009; Gilboa, 2009) offers insights that are relevant to accounting. First, because under ambiguity statistical tests cannot reliably determine whether the beliefs held by a given decision maker are right or wrong (Al-Najjar & Weinstein, 2015), decision makers can honestly disagree even in the absence of conflicts of interest. Second, models with ambiguity help explain several empirical phenomena that are relevant to accounting. For example, the "zone of inaction" that emerges under ambiguity (e.g., Easley & O'Hara, 2009, 2010) offers a simple rational explanation of post-earnings-announcement drift and other forms of investors' under-reaction to earnings news. Finally, insofar as a firm faces ambiguity, its future is unpredictable. Because earnings quality is often defined as the ability of earnings to predict future operating performance, higher predictability may actually imply *lower* earnings quality.

We acknowledge that our empirical results are far from conclusive and interpret them as suggesting a perspective that merits investigation. We believe that, although ambiguity is more difficult to conceptualize and measure than risk, studying its implications for financial reporting will prove to be a fruitful direction for future research.

Appendix. Measures to identify alert firms

Decrease in capital investment

Following Titman, Wei, & Xie (2004), we first calculate the expected level of capital investment using the prior three-year moving average as a benchmark. We then compute the abnormal level of capital investment as follows:

$$\Delta CI_t = CE_t - \frac{CE_{t-1} + CE_{t-2} + CE_{t-3}}{3}, \tag{A1}$$

where CE_{t-i} is capital expenditures (Compustat annual item CAPX) scaled by sales (SALE) for the fiscal year ending in calendar year $t-i$. The investment indicator is set to one if ΔCI_t is negative and among the bottom 33% of the 2-digit SIC industry in a given year, and zero otherwise—i.e., when there is a drastic drop in capital investment. To account for growth, we use sales as the deflator because capital expenditures usually grow proportionately with sales. As a robustness check, we use total assets as the deflator in the above ΔCI measure; the results are similar.

Freeze in hiring

In a similar manner, we calculate the abnormal level of employee count using the prior three-year moving average as a benchmark. Our use of this measure is motivated by the results reported by Bloom (2009), who shows that firms reduce their payroll in response to uncertainty shocks. We define

$$\Delta CT_t = CT_t - \frac{CT_{t-1} + CT_{t-2} + CT_{t-3}}{3}, \tag{A2}$$

where CT_{t-i} is the number of employees scaled by total assets for the fiscal year ending in calendar year $t-i$. We set the employee indicator equal to one if ΔCT_t is negative and is among the bottom 33% of the industry in a given year, and zero otherwise.

Cut in discretionary expenses

We first estimate the normal level of discretionary expenditures using the following equation:

$$\frac{DISX_t}{A_{t-1}} = \alpha_0 + \alpha_1\frac{1}{A_{t-1}} + \alpha_2\frac{S_{t-1}}{A_{t-1}} + \varepsilon_t, \tag{A3}$$

where $DISX_t$ is discretionary expenses (the sum of R&D, advertising, and SG&A expenses) in year t, A_{t-1} is total assets in year $t-1$, and S_{t-1} is sales in year $t-1$. When R&D or advertising expense is missing, we replace it with zero. We estimate regression (A3) in the cross-section for each industry-year (2-digit SIC). We measure the abnormal level of discretionary expenses as the estimated residual from regression (A3). The indicator variable signifying a cut in discretionary expenses is set to one if the residual is negative and is among the bottom 33% of the industry in a given year, and zero otherwise. Our measure of an abnormal decrease in discretionary expenses (*DISX*) has been used in the literature on real earnings management (e.g., DeFond & Jiambalvo, 1994; Jones, 1991).[17] Roychowdhury (2006) finds evidence of manipulation intended to avoid reporting losses. Such activities include, *inter alia*, cutting necessary discretionary expenses such as R&D and SG&A. These activities are influenced by industry membership, stock of inventories, and receivables, among other factors.

To mitigate the effect of business cycles, for the three measures described above we compute the cut-off values for each industry-year. We rerun all of our tests using an alternative specification, in which we compute the cut-off values for each industry; the results (not reported) are similar.

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[17] Incentives to manipulate earnings include maintaining high stock valuation (e.g., Dechow & Skinner, 2000) and meeting or beating analyst forecasts (e.g., Bhojraj et al., 2009).

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