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Earnings Smoothing: Does It Exacerbate or Constrain Stock Price Crash Risk?

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Abstract

We examine the relation between earnings smoothing and stock price crash risk to evaluate the role of earnings smoothing on the downside risk of equity values. We find that, within firm, a higher degree of earnings smoothing is associated with greater crash risk; and this association, in the cross-section, is more pronounced for firms with fewer analysts following, smaller institutional holdings, and positive cumulative discretionary accruals. We also use stock returns to assess the economic significance of our results. We find that, controlling for firm fixed effects, earnings smoothing is associated with sizable negative returns in the quarter following the earnings announcement. Our findings caution investors about the downside risk of firms reporting smooth earnings, in contrast to the conventional belief that these firms are low in equity risk.

Keywords: Stock price crash risk; Earnings smoothing; Managerial opportunism; Private information signalling; External monitoring

JEL: G12; G14; M41

Earnings Smoothing: Does It Exacerbate or Constrain Stock Price Crash Risk?

1. Introduction

Earnings smoothing is a wide-spread practice in financial reporting. The survey results of Graham, Harvey, and Rajgopal (2005) show that an overwhelming 97% of around 400 top executives indicate a preference for smooth earnings. However, it is still an open question whether earnings smoothing is beneficial or detrimental to a firm and its outside stakeholders (Dechow, Ge, and Schrand, 2010). On the one hand, managers may smooth earnings to communicate, to outside investors, their private information on the future performance of a firm (Sankar and Subramanyam, 2001). In such a case, a smooth path of earnings is more informative to investors (Subramanyam, 1996; Tucker and Zarowin, 2006; Badertscher, Collins, and Lys, 2012), and thus value-adding. On the other hand, managers may smooth earnings for their private gains such as meeting bonus targets (Healy, 1985) or protecting job security (Fudenberg and Tirole, 1995; DeFond and Park, 1997). In this scenario, earnings smoothing can be used as a means to obfuscate a firm's real underlying performance, and particularly, to hide bad performance (Levitt, 1998; Leuz, Nanda, and Wysocki, 2003). It is thus likely to be value-destroying.

To shed new light on this long-held, but still ongoing debate over the beneficial versus detrimental roles of earnings smoothing, we investigate the relation between earnings smoothing and stock price crash risk. Understanding this relation is important because the downside risk of stock pricing not only has a devastating impact on investor welfare, but is also central to investors' portfolio allocation (Harvey and Siddique, 2000; Chen, Hong, and Stein, 2001).

Prior research has examined the effect of earnings smoothing on the contemporaneous association between stock returns and earnings (Subramanyam, 1996), or the association

between current returns and future earnings (Tucker and Zarowin, 2006). This line of research concludes that earnings smoothing improves the informativeness of past and current earnings about future earnings and cash flows. Consistently, Chen, Huang, and Jha (2012) find that information revealed through earnings smoothing reduces idiosyncratic volatility of stock returns. These studies in general focus on the impact of earnings smoothing on the first moment (mean) or second moment (variance) of stock return distributions, and provide evidence which contradicts the view that earnings smoothing garbles information as suggested in Levitt (1998), Leuz, Nanda, and Wysocki (2003), among others.

We argue that the relation between earnings smoothing and crash risk reflects the balance of two distinct managerial incentives, namely, managerial opportunism versus efficient communication of private information. The net consequence of earnings smoothing on crash risk, therefore, is an empirical issue. While earnings smoothing might improve information transparency in general, it also opens opportunities for managers to manipulate financial information, and in particular to conceal bad news due to career and compensation concerns (Kothari, Shu, and Wysocki, 2009). Graham, Harvey, and Rajgopal (2005) survey reports that some CFOs delay bad news on the hope that firm performance may turn around in the future and therein they can bury the bad news now. This perspective has been recognized by Kirschenheiter and Melumad (2002) in their conclusion that earnings smoothing might be "the natural responses on the part of a manager wishing to maximize the value of his company" (p. 762), with the acknowledgement that through earnings smoothing "some companies have misused accounting flexibility" (p. 780). An investigation on stock price crash risk based on the third moment of stock return distributions allows us to evaluate this possibility because, if managers disclose all randomly arriving good and bad news, we would expect symmetrically distributed stock returns

(Kothari, Shu, and Wysocki, 2009). By reporting smooth earnings, managers proactively exert their influence on market expectations (Acharya and Lambrecht, 2015). However, when news is particularly bad and managers cannot hoard the bad news any longer, the one-time release of bad news could results in a large-scale, abrupt decline in stock price or simply stock price crash.

Our empirical strategy requires us to measure stock price crash risk and earnings smoothing both at the firm level. First, similar to Jin and Myers (2006), Hutton, Marcus, and Tehranian (2009), and Kim, Li, and Zhang (2011a, b),[1] we measure *quarterly* realized crash risk using three variables derived from the negative firm-specific conditional skewness of stock return distributions: (1) the negative coefficient of skewness of firm-specific daily returns (*NCSKEW*), (2) the down-to-up volatility of firm-specific daily returns (*DUVOL*), and (3) the differential frequency of extreme negative versus extreme positive firm-specific daily returns (*COUNT*) during extreme return events.

Second, consistent with prior literature (Tucker and Zarowin, 2006; Chen, Huang, and Jha, 2012), we measure earnings smoothing as the correlation (*Rho*) between changes in two earnings components, namely, unobserved pre-abnormal-accrual earnings (pre-managed earnings after removing the influence of managerial discretion measured by abnormal accruals) and abnormal accruals. A more *negative Rho* reveals a higher level of earnings smoothing through the shifting of accounting accruals over time, because the changes in abnormal accruals offset the ebbs and flows in pre-abnormal-accruals earnings, and thus, a smoother pattern in earnings arises (Chen, Huang, and Jha, 2012).

We find that, within firm, a higher degree of earnings smoothing is associated with higher realized crash risk, which is consistent with the view that earnings smoothing reflects managerial

[1] Note that these three studies measure annual crash risk using firm-specific weekly returns, while our study measures quarterly crash risk using firm-specific daily returns.

opportunism in financial reporting, particularly, through hiding poor performance in current period in anticipation of good performance in the future. Specifically, the finding suggests that managers tend to use earnings smoothing as a means to hide bad news for their private gains (Levitt, 1998; Leuz, Nanda, and Wysocki, 2003).[2] Stated another way, the finding indicates that the bad-news-hiding effect of managerial reporting opportunism, on average, dominates the private-information-signalling effect in the balance of the two reporting incentives underlying earnings smoothing. The results hold after controlling for firm size, profitability, leverage, growth, and several firm characteristics related to price crash risk as documented by prior literature. Specially, our results hold after controlling for information opacity (Hutton, Marcus, and Tehranian, 2009), and are robust to additional controls for tax avoidance (Kim, Li, and Zhang, 2011a) and accounting conservatism (Kim and Zhang, 2016).[3]

To further distinguish managerial opportunism from private information revelation, we partition our sample into two subsamples—one with firms that are more likely to conceal information through earnings smoothing, and the other with firms that are more likely to signal private information. As expected, we find that the impact of earnings smoothing on price crash risk is stronger for the former. Finally, we show that bad corporate social responsibility (CSR) firms smooth earnings to hide bad news, whereas it is not the case for good CSR firms. Our evidence extends the story of bad CSR firms hoarding bad news (Kim, Li, and Li 2014) with additional findings that earnings smoothing enables bad CSR firms, which likely to be

[2] In this paper, we demonstrate the evidence of hoarding bad news through earnings smoothing, using the third-moment skewness measure of return distributions. Therefore, our evidence also corroborates prior research that uses the first-moment of return distributions to test the prediction that managers withhold bad news (e.g., Kothari, Shu, and Wysocki, 2009).

[3] We explain the conceptual difference between earnings smoothing and these other firm characteristics in later discussion on alternative explanations.

opportunistic, to do so. Overall, the results of our subsample tests substantiate the bad news hoarding interpretation of earnings smoothing.

Next, we examine whether and how the association between earnings smoothing and crash risk is affected by the effectiveness of external monitoring by outside stakeholders. We find that, in the cross-section, crash risk is more pronounced for firms with less analyst coverage or lower institutional holdings. The finding suggests that weak external monitoring or poor information environment exacerbates the negative consequences of bad news hoarding embedded in smooth earnings. We also document that earnings smoothing, coupled with positive abnormal accruals, leads to higher crash risk, providing further evidence on the managerial opportunism view on earnings smoothing.

According to the survey by Graham, Harvey, and Rajgopal (2005), executives (e.g., Chief Financial Officers or CFOs) believe that investors demand a lower risk premium for firms with more smooth earnings.[4] This in turn implies that investors perceive income smoothing as lowering the risk profile of a firm's stock. This risk profile includes not only the volatility risk (second moment risk) but also the crash risk (third moment risk) of a firm's return distribution. Unlike the volatility risk that can be reduced via portfolio diversification, the crash risk or negative tail risk cannot be diversified away.[5] Our results thus caution investors about the downside crash risk associated with earnings smoothing.

[4] Francis, LaFond, Olsson, and Schipper (2004) provide consistent empirical evidence that earnings smoothness is associated with lower cost of equity capital. In a related study, McInnis (2010) argues that the linkage between smoother earnings and lower implied cost of capital is driven primarily by optimism in analysts' long-term earnings forecasts. He finds no evidence that owners of firms with volatile earnings are compensated with higher returns, as one would expect if volatile earnings lead to greater risk exposure.

[5] While the volatility risk (or the second moment risk) encompasses both losses and gains, the crash risk (or the moment risk) refers to the likelihood of incurring a huge loss. While the former reflects managers' risk-preferred behaviors, the latter relates to managerial bad news hoarding and/or overinvestment (Kim and Zhang, 2016; Kim, Lin, Zhang, and Zhang, 2016).

As a supplementary analysis, we evaluate the economic significance of stock price crash resulting from earnings smoothing. We run regressions of stock return measures on the earnings smoothing measure *Rho*. Controlling for firm fixed effects, we find that earnings smoothing leads to sizable negative stock returns measured over the quarter after the earnings announcement. For example, quarter *t+1* cumulative returns decrease by 37 basis points (BPS) for one standard deviation decrease in *Rho*.[6] This corresponds to about 11% decrease over the sample mean, which is economically significant. We also measure returns during extreme (both negative and positive) events, and find similar results.

Our study contributes to the literature in several ways. First, to our knowledge, our study is one of the few, if not the first, that examines whether earnings smoothing exacerbates or constrains stock price crash risk. The conventional portfolio theory is developed based upon a mean-variance analysis with an assumption that stock returns are normally distributed (e.g., Markowitz, 1991). However, Merton (1982) shows that stock returns are unlikely to be normally distributed. Therefore, higher-moments in stock return distributions, such as skewness, are crucially important to investors' portfolio allocation (Harvey and Siddique, 2000). By relating earnings smoothing to stock price crash risk, we provide fresh insights into whether earnings smoothing is beneficial or detrimental to investor wealth, which is still an unresolved question under debate in the extant literature (Dechow, Ge, and Schrand, 2010).

Second, we extend the research that uses archival data to empirically test the survey evidence of Graham, Harvey, and Rajgopal (2005) on why managers smooth earnings. According to the survey, most executives believe that investors tend to perceive firms with more volatile earnings as riskier, even if two firms have the same underlying cash flow volatility.

[6] Note that, more negative *Rho* reflects higher degree of earnings smoothing.

Therefore, executives have a natural incentive to smooth earnings; they believe that investors demand a lower "risk premium" (i.e., cost of equity capital) when earnings path is smooth. While extant research documents little evidence that smooth earnings are related to a lower risk premium (Rountree, Weston, and Allayannis, 2008; McInns, 2010), prior studies find that earnings smoothing reduces idiosyncratic return volatility (Chen, Huang, and Jha, 2012; Markarian and Gill-de-Albornoz, 2012). Therefore, managers might smooth earnings to reduce idiosyncratic risk (Markarian and Gill-de-Albornoz, 2012), which in turn enhances job security (Bushman, Dai, and Wang, 2010). Our findings suggest, however, that managers may not be able to gain job security in reality because smoother earnings are related to higher stock price crash risk and more extreme negative value loss.

Finally, we believe that our paper also addresses research design issues that are potentially useful for future research on crash risk. While prior studies generally use pooled regressions, we stress the importance of taking into account within-firm variations so as to draw more reliable inference. Further, to the extent that the area under a probability density function always equals one, conventional crash risk proxies, that are developed using the distribution of stock returns, only speak to the likelihood of having extreme events. In contrast, we evaluate the economic significance of stock price crash resulting from earnings smoothing and document evidence of sizable negative stock returns in the quarter after the earnings announcement by firms with smooth historical earnings.

Section 2 reviews the literature and develops the hypotheses. Section 3 discusses research design, including variable definitions, sample selection procedures, and model specifications. Section 4 presents descriptive and univariate analyses of the data. Section 5 presents the test results. Section 6 concludes.

2. Literature Review and Hypotheses Development

2.1 Literature Review

Earnings smoothing is a well-known business practice; for instance, under the former CEO Jack Welch, General Electric was able to "smooth the naturally jagged results of its many business lines and to produce more than 100 quarters of steady earnings growth" (Jenkins, 2002). In the extant literature, however, there are two views of earnings smoothing. One stream of research argues that managers use income smoothing to communicate their private information on future firm performance to outside stakeholders (Sankar and Subramanyam, 2001; Kirschenheiter and Melumad, 2002), and to guide uninformed traders' perception of earnings volatility with an aim to minimize these investors' expected loss that may arise from their lack of knowledge about the volatility of reported earnings (Goel and Thakor, 2003). Under this view, earnings smoothing ameliorates information opacity about the future prospect of a firm; smooth earnings are viewed as more informative and useful to investors in general and uninformed investors in particular (Geol and Thakor, 2003). Evidence consistent with this perspective has been documented in Subramanyam (1996), Tucker and Zarowin (2006), and Badertscher, Collins, and Lys (2012).

The other stream of research argues that earnings smoothing obfuscates the true underlying performance of a firm because managers smooth earnings for opportunistic incentives such as meeting bonus targets (Healy, 1985) or protecting job security (Fudenberg and Tirole, 1995; DeFond and Park, 1997). Under this view, earnings smoothing reflects managerial reporting opportunism, and thus exacerbates information opacity, which in turn enables managers to hide bad news for a sustained period of time (Levitt, 1998; Leuz, Nanda, and Wysocki, 2003; Jin and

Myers, 2006). Given the two opposing perspectives on earnings smoothing, its economic and informational consequences are unclear and thus subject to empirical validation.

Graham, Harvey, and Rajgopal (2005) conduct a survey of more than 400 top executives and show that an overwhelming 97% of respondents indicate a preference for smooth earnings. According to the survey, a vast majority of CFOs believe that investors demand a lower "risk premium" (i.e., cost of equity capital) when earnings path is smooth; even if two firms have same underlying cash flow volatility, these executives still tend to perceive firms with more volatile earnings as riskier.

Several prior studies test the impact of earnings smoothing on stock returns using archival data; however, the empirical results thus far are at best mixed. Francis, LaFond, Olsson, and Schipper (2004) show that earnings smoothness is associated with lower implied cost of equity capital, consistent with Graham, Harvey, and Rajgopal's (2005) survey evidence. By implied cost of capital, Francis et al. (2004) refer to the internal rate of return implied by an equity valuation model, which can be viewed as a measure of *ex ante expected* cost of capital. However, McInnis (2010) find no relation between earnings smoothness and average stock returns over the last 30 years. It should be noted that average stock returns are viewed as a measure of *ex post realized* cost of capital. Rountree, Weston, and Allayannis (2008) also find that firm value is unrelated to earnings smoothing resulting from managers' accrual manipulation. On the other hand, prior research documents robust evidence that earnings smoothing is negatively related to idiosyncratic return volatility (Chen, Huang, and Jha, 2012; Markarian and Gill-de-Albornoz, 2012). Markarian and Gill-de-Albornoz (2012) point out that a prime reason why managers smooth earnings might not be related to firm valuation; instead, earnings smoothing reduces

idiosyncratic risk, which is, in turn, related to job security (Bushman, Dai, and Wang, 2010) and the likelihood of promotion and pay raise in the future (Fudenberg and Tirole, 1995).

The above literature mainly focuses on the association between earnings smoothing and the mean or the first moment (Rountree, Weston, and Allayannis, 2008; McInnis, 2010) and the variance or the second moment (Chen, Huang, and Jha, 2012; Markarian and Gill-de-Albornoz, 2012) of stock return distributions. A strand of research in asset pricing literature suggests, however, that the third moment of return distribution, captured by its skewness, is central to investors' portfolio allocation decision because return distributions are unlikely to be normal (Merton, 1982), and thus, cannot be adequately characterized by mean and variance alone (Harvey and Siddique, 2000; Chen, Hong, and Stein, 2001).

A series of studies have investigated stock price crash risk, which is measured based on the negative skewness of return distributions, in the context of financial reporting quality and corporate disclosure decisions. For instance, Hutton, Marcus, and Tehranian (2009) find that firms with opaque financial reporting are more prone to stock price crashes. Kim, Li, and Zhang (2011a) argue and document supporting evidence that tax avoidance incentivizes managers to hoard bad news for an extended period, which leads to higher stock price crash risk. Kim, Li, and Zhang (2011b) present evidence that the sensitivity of executives' option portfolio to stock price is positively associated with future stock price crash risk. This is because option-based compensation incentivizes managers to conceal bad news about future growth options. Kim and Zhang (2016) show that conditional conservatism is associated with lower crash risk, consistent with the notion that conditional conservatism limits managers' ability to hide bad news. In addition, prior research shows that firms' corporate social responsibility performance is negatively associated with future crash risk (Kim, Li, and Li, 2014). Our research extends this

stream of literature by examining the relation between crash risk and earnings smoothing, which is an additional characteristic of firms' financial reporting that has not been studied by extant crash risk literature.

Capital market pressure to report smooth earnings that meet performance benchmarks is one key reason for managers to engage in earnings management (Graham, Harvey, and Rajgopa, 2005). Managers might also manipulate earnings for various opportunistic incentives (Healy and Wahlen, 1999; Dechow and Skinner, 2000); however, prior research suggests that managerial opportunistic behavior could be constrained, or exacerbated, by certain firm characteristics such as financial reporting transparency (Armstrong, Guay, and Weber, 2010), analyst coverage (Yu, 2008), and institutional holdings (Cornett, Marcus, and Tehranian, 2008). In this study, we extend prior related studies by examining whether and how the relation between earnings smoothing and crash risk is affected by firm-specific characteristics such as analyst coverage, institutional holdings, and the extent of opportunistic accrual manipulation.

Our research, focusing on earnings smoothing, is distinguished from prior research on the impact of accounting quality on stock price crash risk. One commonly studied accounting quality is information opacity. Jin and Myers (2006) provide country-level evidence that opaque information environment is positively related to price crash risk, where opaqueness refers to the lack of information that helps investors observe operating cash flows and income and determine firm value. The authors contend that information opacity enables firms to hoard bad news, and stock price will crash when a sufficiently long run of firm-specific bad news comes out all at once. Hutton, Marcus, and Tehranian (2009) document firm-level evidence on a positive relation between crash risk and financial reporting opacity, which results from earnings management that obscures information about firm fundamentals through managerial discretion on accounting

accruals. In both studies, information opacity is viewed as an outcome of managerial opportunism arising from managerial manipulation of discretionary accruals.

In accounting, earnings have two components, namely, cash flows and accruals, and accruals are further decomposed into non-discretionary and discretionary accruals. One stream of accounting literature documents evidence that discretionary accruals represent a distortion to earnings and thus lower earnings quality (Dechow, Ge, and Schrand, 2010, p. 358). For example, prior research finds that discretionary accruals are less persistent and more likely to reverse in the future (Xie 2001; Dechow and Dichev 2002) and reduce earnings informativeness in equity valuation (DeFond and Park, 2001). The findings of Hutton, Marcus, and Tehranian (2009) corroborate this line of research, showing that firms with large absolute discretionary accruals in past three years tend to hide bad news and are more likely to have high future price crash risk.

In contrast to the above literature focusing on discretionary accruals *per se* in a period, the other stream of literature focuses the co-movement of discretionary accruals and economic earnings over periods, and shows that discretionary accruals used to offset the ebbs and flows in economic earnings can actually enhance earnings informativeness (Subramanyam, 1996; Tucker and Zarowin, 2006).[7] Chen, Huang, and Jha (2012) find that earnings smoothing reduces idiosyncratic volatility of stock returns, suggesting that smooth earnings incorporates more firm-specific value relevant information. Overall, these research findings suggest that managers smooth earnings to signal their private information to the market. However, other studies (e.g., Levitt, 1998; Leuz, Nanda, and Wysocki, 2003) provide conflicting evidence that managers use earnings smoothing opportunistically to garble information about the underlying true performance.

[7] Note that economic earnings are also called unmanaged earnings. Empirically, they are measured as total reported earnings minus discretionary accruals.

The above two streams of literature demonstrate different forms of accrual management, and their corresponding impacts. While Hutton, Marcus, and Tehranian (2009) find that the form of periodic discretionary accruals results in high crash risk, the impact of the other form of accrual management over multiple periods, namely, earnings smoothing, on crash risk still warrants empirical investigation for the following reasons. First, our study recognizes two opposing views of the nature and consequences of income smoothing. Unlike earnings management via discretionary accruals, the impact of earnings smoothing on price crash risk is an empirical issues. This is because, theoretically, managers have both opportunistic and signaling incentives to smooth earnings. Earnings smoothing could be value-adding because managers might use it as a means to convey to the market their private information regarding future cash flows (the private information signaling view); however, it could also be value-destroying because managers might use it as a means to manipulate outside investors' expectation about future cash flows with an aim to capture their private benefits (the managerial opportunism or financial obfuscation view). Therefore, whether earnings smoothing pushes up price crash risk or not is ultimately an empirical question which deserves further investigation; the outcome observed *ex post* hinges on whether one effect dominates the other. Second, prior evidence that earnings smoothing results in more informative earnings is based on the impact of earnings smoothing on the first-moment or mean (Subramanyam, 1996; Tucker and Zarowin, 2006) or second moment or variance (Chen, Huang, and Jha 2012) of stock return distributions. However, as we explain in the forgoing, the consequences of managerial asymmetric incentives to hoard bad news and accelerate the release of good news (Kothari, Shu, and Wysocki, 2009) could be evaluated using a higher moment—the third moment or skewness of return distributions, particularly because bad news hoarding is likely to cause a skewed returned distribution, which

in turn increases negative tail risk or price crash risk. In addition, given that stock returns do not necessarily follow a normal distribution (Merton, 1982), the mean and variance alone cannot adequately characterize return distributions and the downside risk or negative tail risk of stock pricing is central to investors' portfolio allocation decision (Harvey and Siddique, 2000; Chen, Hong, and Stein, 2001).

Our research is also distinguished from prior studies that examine other firm-specific determinants of price crash risk. First, Kim, Li, and Zhang (2011a) argue that tax avoidance can facilitate managerial opportunism through two ways—earnings manipulation and outright resource diversion. For earnings management, the authors refer to the situation where managers utilize the book-tax differences of complex structured transactions to minimize corporate tax obligations yet overstate earnings at the same time (p. 642). For resource division, the authors illustrate their points using the Tyco example (p. 643), and point out that managerial diversion activities include expropriation of corporate funds for personal purposes, abuse of loan programs, unauthorized compensation, related party transactions, and insider trading, among others. We believe that earnings smoothing is conceptually different from tax avoidance for two reasons. First, earnings smoothing may or may not lower the present value of tax obligations. This is because when managers understate earnings, tax expenses decrease; however, when managers dip into cookie jar reserves and overstate earnings, tax expenses might increase as a result. Second, as we stated earlier, one important aspect of earnings smoothing is that the timing of understating or overstating earnings is driven by economic surprises.[8] To the extent that

[8] To smooth earnings over periods, managers, who anticipate poor earnings performance in the future, typically save current-period earnings to use it when future earnings performance turns out to be poor. Also, managers, who anticipate good earnings performance in the future, borrow future-period earnings to compensate current-period poor earnings performance. Therefore, managerial decision to smooth earnings depends critically on the expectation of future earnings performance and realization of current earnings performance which shapes managers' perception of economic surprise (Fudenberg and Tirole, 1995)

economic surprise arrives randomly, managers are less likely to use structured tax avoidance transactions, which requires long-term planning, as a response. Second, Kim and Zhang (2016) argue, and find that "conditional conservatism limits managers' incentive and ability to overstate performance and hide bad news from investors, which, in turn, reduces stock price crash risk" (p. 412). However, the notion that managers use earnings smoothing to reduce the *random* ebbs and flows in economic earnings also draws a conceptual difference between earnings smoothing and conditional conservatism. The key feature of conditional conservatism is the *asymmetric* timeliness in recognition of bad news as a loss versus good news as a gain.

In short, a key feature that distinguishes our study from other accruals-based studies mentioned above is that when managers use accruals to smooth earnings over multiple periods, earnings smoothing could either increase or decrease stock price crash risk. Given the scarcity of empirical evidence on the issue, we test whether and how earnings smoothing is associated with crash risk, after controlling for opportunistic accruals management and accounting conservatism.

2.2 Hypothesis Development

At least two factors incentivize corporate managers to engage in earnings smoothing. First, managers may use earnings smoothing as a means to hide bad performance by obfuscating the real underlying performance of the firm. In such a case, smooth earnings reflect managerial reporting opportunism. Under this scenario, stock prices of firms with smooth earnings are more prone to experience crashes with sudden drops, particularly when managers are forced to release the hidden bad news accumulated over time to the market all at once. Second, managers may use earnings smoothing as a vehicle to convey their private information to the market. To the extent that managers' private information is revealed to outside stakeholders via earnings

smoothing, firms with smooth earnings are less likely to experience stock price crash. This is because in this alternative scenario, earnings smoothing ameliorates information opacity about the future prospect of the firm, and thus, investors are better able to incorporate a firm's true underlying performance into stock price in a timely manner.

Given the two opposing views described above and the scarcity of empirical evidence on the issue, the unconditional relation between earnings smoothing and subsequent crash risk is ultimately an empirical question. In other words, since managers' incentives are not *ex ante* observable, the unconditional relation between the two is subject to a balance between the two alternative incentives for earnings smoothing. A positive (negative) relation between the two is in line with the managerial opportunism (private information signalling) incentive for earnings smoothing. To provide large-sample systematic evidence on this unresolved issue, we propose and test our first hypothesis (in null form) with no directional prediction:

H1: *There is no association between earnings smoothing and stock price crash risk.*

Evidence shows that analyst coverage and institutional holdings contribute to monitoring and constraining managerial opportunism in financial reporting. Prior research suggests that equity analysts and institutional investors can be deemed as external monitors (e.g., Jensen and Meckling, 1976; Healy and Palepu, 2001). Yu (2008) presents evidence that firms followed by more analysts tend to manage their earnings to a lesser extent. Monks and Minow (1995) argue that large institutional ownership could discipline managers and ensure that they choose investment levels to maximize firms' long-run value. Bushee (1998, 2011) reports that this monitoring role is primarily played by dedicated institutional investors who are subject to

stringent fiduciary standards. Cornett, Marcus, and Tehranian (2008) also find that large stock ownership by institutional investors constrains managerial reporting opportunism.[9]

Suppose that hypothesis H1 (in null form) is rejected. One would then observe a positive (negative) association between the extent of earnings smoothing and stock price crash risk, if earnings smoothing is caused by managerial reporting opportunism (private information signalling).[10] If the managerial opportunism perspective is supported (and thus the association is positive), one can further expect that the positive association becomes weaker (stronger) when external monitoring by equity analysts and institutional investors are more (less) effective. On the other hand, corporate managers have stronger incentives to disclose their private information to outside stakeholders, when there is a strong demand for the information or the information is actively used by outside stakeholders. If the private information signalling perspective is supported (and thus the association is negative), one can also expect that the negative association, which reflects the effect of income smoothing on reducing crash risk, becomes stronger (i.e., more negative) where external monitoring by the two outside stakeholders are more effective.

Prior research shows that the effectiveness of external monitoring by these two outside stakeholders can be captured by analyst coverage and institutional holding (the percentage of shares held by institutional investors). To provide empirical evidence on the role of external

[9] Geol and Thakor (2003) suggest that managerial choice of smoothing earnings is a response to uninformed investors' expected loss associated with the volatility of reported earnings, because informed investors are able to acquire information on their own when the volatility is high. To the extent that institutional investors are more informed than non-institutional investors (Piotroski and Roulstone, 2004), Geol and Thakor's (2003) theory would imply that, for firms with lower institutional holdings, managers are more likely to use income smoothing to discourage informed investors' welfare-reducing information acquisition, than to use it for their own self-serving interest. *Ex ante*, we do not entertain this perspective in our hypothesis development regarding cross-sectional factors that influence the income smoothing-crash risk relation. Geol and Thakor (page 153, italics added) state that "…the market understands this *income smoothing* in equilibrium and is not fooled. This means that there is no overall benefit from smoothing in equilibrium." While McInnis's (2010) empirical evidence supports Geol and Thakor's argument, the impact of earnings smoothing on the cost of capital remains an open question, as our literature review has suggested. *Ex post*, our empirical evidence suggests that managerial opportunism in earnings smoothing is more pronounced in firms with lower institutional holdings, as we discussed in later section.

[10] In a similar vein, the association between the two can be positive (or negative) if managerial opportunism incentives dominate private information signalling incentives (or *vice versa*).

monitoring in shaping the relation between earnings smoothing and crash risk, we propose the following hypotheses in alternative form:

> ***H2.1:*** *The positive association between earnings smoothing and stock price crash risk, if observed, becomes weakened (i.e., less positive) for firms with higher analyst following. On the other hand, the negative association between the two, if observed, becomes strengthened (i.e., more negative) for firms with higher analyst following.*

> ***H2.2:*** *The positive association between earnings smoothing and stock price crash risk, if observed, becomes weakened (i.e., less positive) for firms with higher institutional holdings. On the other hand, the negative association between the two, if observed, becomes strengthened (i.e., more negative) for firms with higher institutional holding.*

We posit that if managers use earnings smoothing to hoard bad news, stock price crash risk will increase. One way to hide bad news is to manipulate earnings upwardly via income-increasing discretionary accrual choice, when the true earnings are otherwise low; however, the accumulated effects of previous accounting choices impose an upper limit on the extent to which managers can opportunistically increase reported earnings (Barton and Simko, 2002). Consequently, managers could run out of accounting choices to manipulate accruals after recognizing income-increasing accruals for multiple consecutive periods, which likely results in higher crash risk in the future period. We therefore propose and test the following third hypothesis in alternative form:

> ***H3:*** *The positive association between earnings smoothing and stock price crash risk, if observed, becomes strengthened (i.e., more positive) for firms with positive cumulative discretionary accruals. On the other hand, the negative association between earnings smoothing and stock price crash risk, if observed, becomes weakened (i.e., less negative) for firms with positive cumulative discretionary accruals.*

3. Research Design

3.1 Proxy for stock price crash risk (dependent variables)[11]

[11] Appendix A elaborates on variable definitions and measurement.

Following prior literature (e.g., Jin and Myers, 2006; Hutton, Marcus, and Tehranian, 2009; Kim, Li, and Zhang, 2011a, b), we use the distribution of *firm-specific* daily returns to measure stock price crash risk. To this end, we first estimate equation (1) below, using daily return data between each firm's earnings announcements of two adjacent quarters:

$$r_{i,d} = \alpha + \beta_1 r_{j,d-1} + \beta_2 r_{m,d-1} + \beta_3 r_{j,d} + \beta_4 r_{m,d} + \beta_5 r_{j,d+1} + \beta_6 r_{m,d+1} + \varepsilon_{i,d}, \quad (1)$$

where, for firm *i* and on day *d*, $r_{i,d}$ is a firm's raw return; $r_{j,d}$ is the value-weighted industry (*j*, to which firm *i* belongs) return; and $r_{m,d}$ is the value-weighted market return on day *d*. We include the lead and lag terms to allow non-synchronous trading (Dimson, 1979). The firm-specific daily return for firm *i* on day *d* ($R_{i,d}$) is the natural log of one plus the estimated residual return, i.e., $R_{i,d} = \log(1 + \varepsilon_{i,d})$.

Consistent with prior studies, we employ the following firm-specific stock price crash risk measures for each firm *i* and quarter *t*: (a) $COUNT_{i,t}$ is the number of $R_{i,d}$ exceeding 3.09 standard deviations *below* the mean $R_{i,d}$ minus the number of $R_{i,d}$ exceeding 3.09 standard deviations *above* the mean $R_{i,d}$ over quarter *t*; (b) $NCSKEW_{i,t}$ is the negative coefficient of skewness of $R_{i,d}$ during quarter *t*; and (c) $DUVOL_{i,t}$ is the down-to-up volatility of $R_{i,d}$ during quarter *t*. Specifically, we compute *NCSKEW* and *DOVUL* as follows:

$$NCSKEW_{i,t} = (-(n(n-1)^{\frac{3}{2}} \sum R_{i,d}{}^3) / ((n-1)(n-2)(\sum R_{i,d}{}^2)^{\frac{3}{2}}), \text{ and}$$

$$DUVOL_{i,t} = \log\{((n_{up} - 1)\sum_{down} R_{i,d}{}^2) / ((n_{down} - 1)\sum_{up} R_{i,d}{}^2)\},$$

where *n* is the number of observations $R_{i,d}$ during quarter *t*, and n_{up} and n_{down} are the numbers of up and downs days (i.e., above or below the mean $R_{i,d}$) over quarter *t*, respectively. Appendix A explains the definitions of all the foregoing and other variables used in the paper, while Appendix B illustrates the timeline used for our variable construction.

3.2 Proxy for earnings smoothing (the variables of interest)

Following prior studies (Tucker and Zarowin, 2006; Chen, Huang, and Jha, 2012), earnings smoothing is measured as the correlation between changes in pre-abnormal-accruals earnings (i.e., unobserved pre-managed earnings which is measured by reported earnings minus abnormal accruals) and changes in abnormal accruals. To estimate abnormal (discretionary) accruals,[12] we follow Tucker and Zarowin (2006), and use the Jones model modified by Kothari, Leone, and Wasley (2005):

$$\frac{ACC_{i,t}}{Assets_{i,t-1}} = a_1\left(\frac{1}{Assets_{i,t-1}}\right) + a_2\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + a_3\frac{PPE_{i,t}}{A_{i,t-1}} + a_4 ROA_{i,t} + \varepsilon_{i,t}, \quad (2)$$

where *ACC* is total accruals, *PPE* is property, plant, and equipment, *ΔSales* is the change in sales relative to the previous quarter, *ROA* is return on assets, and *Assets* is total assets.[13]

We estimate Equation (2) for each 2-digit SIC industry and in each quarter. The estimated residual is our proxy for abnormal accruals ($DA_{i,t}$), and pre-managed earnings ($PME_{i,t}$) are the difference between reported earnings and abnormal accruals. As illustrated in Appendix B, our measure of earnings smoothing ($Rho_{i,t}$) is calculated as the correlation between changes in pre-abnormal-accruals earnings ($\Delta PME_{i,t}$) and changes in abnormal accruals ($\Delta DA_{i,t}$) over a rolling window of 12 quarters, ending in quarter *t* immediately before proxies of crash risk and value destruction are measured between the earnings announcements of quarter *t* and quarter *t+1*.[14] A more negative correlation reveals a higher level of earnings smoothing.

[12] In this paper, we use abnormal accruals and discretionary accruals interchangeably.

[13] "Accruals" are earnings before extraordinary items and discontinued operations minus cash flows from continuing operations (i.e., total cash from operations minus cash portion of discontinued operations and extraordinary items) obtained directly from the statement of cash flows, following Hribar and Collins (2002). Some firms report gross property, plant, and equipment in the fourth-fiscal quarter, but not in the first to the third quarters. For these firms, we follow the treatment in Matsumoto (2002). More specifically, we calculate annual change in *PPE* and add to each interim quarter a proportional amount of this change based on the proportion of annual depreciation incurred in that quarter.

[14] We use quarterly data because Graham, Harvey, and Rajgopal's (2005) survey suggests that the earnings smoothing decision is likely made on a quarter-by-quarter basis.

3.3 Conditional variables

To test the second set of hypotheses, we identify and calculate two conditional variables. To test H2.1, we measure analyst coverage as the total number of analysts (as recorded in I/B/E/S) following a firm. To test H2.2, we measure intuitional ownership as the percentage of a firm's common shares owned by institutional investors (as recorded in Spectrum 13-F). Similar to Tucker and Zarowin (2006), we rank the analyst coverage and institutional ownership variables, respectively, into quintile portfolios by industry and year, in order to simplify the interpretation of results and to mitigate the impact of observations with extremely large analyst coverage or institutional holdings.[15,16]

To test the third hypothesis, we use an indicator variable (*POSDA*) that takes the value of one if the sum of a firm's discretionary accruals (*DA*) is positive for the four-quarter rolling window ending in quarter *t* and zero otherwise. We focus on the most recent four quarters because it is difficult, if not likely, for a firm to continuously recognize income-increasing accruals to boost earnings in a period as long as 12 quarters. We also conduct robustness checks using 8-quarter and 12-quarter rolling windows to measure *POSDA.*

3.4 Control variables

We control for a set of other determinants of stock price crash risk documented in prior studies (Hutton, Marcus, and Tehranian, 2009; Kim, Li, and Zhang, 2011a, b; Kim and Zhang, 2016). These control variables include financial reporting opacity (*OPAQUE*), size (*SIZE*), market-to-

[15] For analyst ranking (*ANALYST*), we assign zero values to firms not covered by analysts; for those firms covered by analysts, we use their quartile rank of analyst following, ranging from one to four, in each industry and year.

[16] An alternative measure of analyst following is a dummy variable derived based on the sample median number of analyst following. However, when the dummy variable is zero, the subsample includes firms without analyst following and firms with low analyst following. In contrast, we believe our categorical measure of analyst following is more sensible because it separates zero from low analyst following firms.

book ratio (*MTB*), firm performance (*ROA*), financial leverage (*LEV*), changes in stock turnover (*DTURN*), return skewness (*NCSKEW*), return volatility (*SIGMA*), and past returns (*RET*). We include the standard deviation of pre-managed earnings (*STDPME*) to control for a firm's innate volatility of its business operations. We also include an indicator variable for the fourth fiscal quarter (*Q4*) because prior research suggests that fourth-quarter reporting is distinctively different from that of other quarters (Jacob and Jorgensen, 2007; Das, Shroff, and Zhang, 2009). We calculate these variables at the end of the quarter immediately before we compute our measures for crash risk and value destruction.

3.5 Proxy for value destruction (return variables)

We use stock returns to assess the change in investors' wealth. More specifically, we construct cumulative returns (*CUMRET*) and cumulative abnormal returns (*CUMARET*, adjusted by value weighted index returns) over a quarter. To evaluate the amount of wealth loss or gain, at extreme tails of the quarterly return distribution, we also calculate two additional return measures, *SUMRETEX* and *SUMARETEX*, which are the sum of raw and abnormal returns, respectively, around extremely negative events ($R_{i,d}$ exceeding 3.09 standard deviations below the mean of $R_{i,d}$) and extremely positive events ($R_{i,d}$ exceeding 3.09 standard deviations above the mean of $R_{i,d}$).[17] Negative values of *SUMRETEX* and *SUMARETEX* are considered as the amount of value destruction associated with extremely negative events after offsetting extremely positive events during the quarter. When the value is positive, the amount represents a net value

[17] We cumulate stock returns when calculating quarterly return measures, but sum stock returns when calculating extreme return measures, because the extreme events are not continuous in time. We obtain comparable results if we use cumulative stock returns during extreme events; similarly, our results are also robust if we sum stock returns over a quarter.

gain of extremely positive events after offsetting extremely negative events in the quarterly window.

3.6 Sample and Empirical Specification

Our sample period covers a 19-year period from 1993 to 2011. Our initial sample includes all non-financial, non-utility firms having common shares listed at NYSE, AMEX, or NASDAQ. Table 1 summarizes our sample filtering procedures. We start from 613,647 firm-year observations that comprise 17,769 unique firms for the 1990−2011 period.[18] The sample reduces to 486,406 firm-year observations (14,412 firms) that have common shares traded on NYSE, AMEX, or NASDAQ. The sample further decreases to 294,931 firm-year observations (10,128 firms) after dropping observations (i) with missing earnings announcement dates, (ii) that belong to regulated financial (SIC 6000−6999) and utilities (SIC 4900−4949) industries, and (iii) that fall outside the sample period. We obtain our final sample of 157,722 firm-year observations (6,627 firms) after dropping observations with missing data required to compute pre-managed earnings and changes in discretionary accruals variables over a rolling 12-quarter window and other variables used for our regression analysis.

[Insert Table 1 about here]

We specify the baseline regression model for the analyses of crash risk and value destruction as follows:

$$ExPostCrashRisk_{i,t+1}\left(ValueDestruction_{i,t+1}\right) = \alpha_0 + \beta_1 Rho_{i,t} + \sum \gamma * Controls + firm\ fixed\ effects + \varepsilon_{i,t+1}. \quad (3)$$

[18] Since we need a rolling window of 12 quarters to estimate *Rho*, the collection of raw data starts from 1990.

Prior research (e.g., Chen, Huang, and Jha, 2012) suggests that earnings smoothing is associated with lower idiosyncratic return volatility; it is hence possible that when benchmarking on the overall return volatility (standard deviation of returns), extreme events are more likely to stand out among firms with a higher degree of earnings smoothing and lower return volatility. We use the following example to illustrate this point. Suppose that the mean of firm-specific return is zero for both Firms A and B, but the standard deviation is 0.01 and 0.02, respectively. For Firm A, an extremely negative event would be identified as long as the returns are lower than −0.031 (i.e., < −3.09*0.01); in contrast, for Firm B, the return needs to be lower than −0.062 (i.e., < −3.09*0.02). In a similar vein, conditional on having an extremely negative event, the amount of investors' loss is likely to be higher for Firm B. To limit the potentially confounding impact of stock return variance and to control for time-invariant unobserved firm characteristics, we employ firm fixed-effects when analyzing the *main* effects of *Rho*.[19] In the test of H1, if, on average, earnings smoothing is beneficial (detrimental), which supports the private information-signalling (managerial reporting opportunism) perspective, we expect β_1 to be significantly positive (negative). Note here that more negative *Rho* represents higher degree of earnings smoothing. Therefore, a positive $\beta_1$suggests a negative impact of earnings smoothing on stock price crash risk, or in other words, earnings smoothing reduces stock price crash risk; in contrast, a negative $\beta_1$suggests a positive impact of earnings smoothing on stock price crash risk, or in other words, earnings smoothing increases stock price crash risk.

[19] This potentially confounding impact of stock return variance might also explain seemingly counterintuitive results documented in prior studies that in pool OLS regressions conventional proxies for information environment (such as analyst following, institutional holdings, and management forecasts) are positively associated with skewness-based measures of the crash risk (e.g., Kim, Li, and Zhang, 2011a, b; Hamm, Li, and Ng, 2014). Firms with higher analyst following, larger intuitional holdings, and more frequent earnings forecasts tend to have smaller stock return volatility. This relationship is also confirmed in our sample (untabulated).

In our conditional analyses, we attempt to investigate whether and how our baseline results are conditioned upon analyst coverage (H2.1), institutional holding (H2.2), and positive discretionary accruals (*POSDA*) (H3). To test these three hypotheses, we include in Equation (3) these conditional variables, one by one, and the interaction of each conditional variable with *Rho*.

4. Descriptive Statistics and Univariate Analysis

Table 2, Panel A, presents descriptive statistics of the variables. In our sample, the mean value for *NCSKEW* is −0.097, slightly higher than that reported in Kim, Li and Zhang (2011a). One possible explanation is that Kim, Li, and Zhang (2011a) use weekly returns to estimate firm specific returns, which may possibly remove daily stock price fluctuation within the week to some extent. The mean value for *COUNT* is −0.114; hence, firms are more likely to experience extremely positive events than extremely negative events, consistent with prior findings (e.g., Hutton, Marcus, and Tehranian, 2009).[20] For the same reason, returns around extreme events (*SUMRETEX* and *SUMARETEX*) are positive, on average. Similar to those reported in prior studies (Tucker and Zarowin, 2006; Chen, Huang, and Jha, 2012), the mean and the median for *Rho* are −0.750 and −0.932, respectively, suggesting that firms exert a high level of discretion in their accrual recognition to offset the changes in operating results, when reporting quarterly earnings. Table 2, Panel B reports the sample distribution of crash risk measures by year. The table shows that crash risk measures exhibit considerable variation across years; however, they are comparable to prior studies such as Kim, Li, and Zhang et al. (2011a).

[Insert Table 2 about here]

[20] As a comparison, Callen and Fang (2013) report a mean value of −0.459 for *COUNT*, which is about four times as large as ours; this is because Callen and Fang (2013) measure firm-specific daily returns over a year, whereas we measure firm-specific daily returns over a quarter.

The upper and lower triangles of Table 3 report the Pearson and Spearman correlation matrices, respectively. The three crash risk measures are all positively correlated with each other with their correlation coefficients ranging from 0.674 (*COUNT* and *DUVOL*) to 0.908 (*NCSKEW* and *DUVOL*), suggesting that these measures capture certain common aspects of stock price crash risk.

As expected, the four return measures (*CUMRET*, *CUMARET*, *SUMRETEX*, and *SUMARETEX*) are all negatively related to the crash risk measures with relatively large magnitude of negative correlation coefficients. Further, relative to the quarterly return measures (*CUMRET* and *CUMARET*), the negative correlation coefficients between the two return measures around extreme events (*SUMRETEX* and *SUMARETEX*) and the crash risk measures are much greater in absolute magnitude (−0.810 and −0.813 versus −0.371 and −0.372). Therefore, the univariate evidence suggests that firms having larger crash risk also have larger stock value loss in the next quarter, especially during extreme events.

We find that our earnings smoothing measure (*Rho*) is significantly and negatively correlated with all three crash risk measures. Though only suggestive of the underlying relations, the finding indicates that firms with a higher degree of earnings smoothing are associated with greater crash risk. In addition, although *Rho* is negatively related to the overall returns of the following quarter, it is positively related to the extreme return measures, suggesting that large value destruction occurs during the extreme events even at the univariate level without any further controls. This is consistent with the view that earnings smoothing is detrimental to shareholders' value when accumulated hidden bad news are revealed to the market during the period of extreme events.

[Insert Table 3 about here]

5. Regression Analysis

5.1 Baseline Results on Ex Post Crash Risk

Table 4 presents the results of firm fixed effects regression of crash risk on the extent of income smoothing and a set of control variables. In columns 1 to 3, we use *NCSKEW*, *DUVOL*, and *COUNT*, respectively, as the dependent variable. Reported numbers in parentheses represent robust standard errors corrected for double (firm and year) clustering (Petersen, 2009).

We find that, across all three columns, the coefficient on the variable of our interest, i.e., *Rho*, is all negative and highly significant at the 1% level. Given the inverse relation between *Rho* and crash risk, the significantly negative coefficients on *Rho* across all columns reject our null hypothesis in H1. In other words, the results show that our measure of earnings smoothing in the current quarter is negatively and significantly related to future realized crash risk, which is captured by one-quarter ahead *NCSKEW*, *DUVOL*, and *COUNT*. More specifically, one-quarter ahead realized crash risk increases significantly with the degree of income smoothing in the current quarter, after controlling for a set of control variables, including the extent of earnings management via discretionary accrual choice, i.e., *OPAQUE* (as well as time-invariant omitted firm-specific characteristics via firm fixed effects). Note that, more negative *Rho* reflects higher degree of earnings smoothing. The above findings are in line with the prediction in the managerial reporting opportunism perspective on earnings smoothing, while inconsistent with the prediction in the private information signaling perspective, suggesting that earnings smoothing is, on average, detrimental (rather than beneficial) to shareholders in that increased stock price crash risk can potentially destroy shareholder wealth.

The coefficients on our control variables are generally consistent with the findings of prior studies. First, consistent with Hutton, Marcus, and Tehranian (2009), we find significantly

positive coefficients for financial reporting opacity (*OPAQUE*), suggesting that firms with more opaque financial reporting, as measured by a twelve-quarter moving sum of absolute discretionary accruals, are more crash-prone in the future. These significantly positive coefficients on *OPAQUE* across all columns, coupled with the significantly negative coefficients on *Rho* across all columns, suggest that accrual manipulation (at the absolute level) and earnings smoothing (to offset the ebbs and flows in cash flows) are two distinctive, albeit related, channels through which managers hoard bad news. Second, consistent with Chen, Hong, and Stein (2001), we find that past returns (*RET*) and firm size (*SIZE*) are both significantly and positively associated with future crash risk. We document a significantly positive coefficient on past return volatility (*SIGMA*), which is consistent with Kim, Li, and Zhang (2011a, b), but inconsistent with Chen, Hong, and Stein (2001). Different from prior studies, however, we find the past negative return skewness (*NCSKEW*) is negatively related to future crash risk.[21] Finally, similar to the finding in Kim, Li, and Zhang (2011a, b), we also find that accounting performance (*ROA*) is negatively associated with future crash risk, indicating that high financial performance firms are less likely to fall into the prey of future crash risk.

In summary, our results reported in Table 4 support the managerial reporting opportunism perspective on earnings smoothing rather than the private information signalling view. In other words, our results are in line with the view that managers use earnings smoothing as a means to hide bad news from outside stakeholders for their private gains; earnings smoothing is detrimental (rather than beneficial) to shareholders as it increases stock price crash risk in the future, which in turn contributes to shareholders' wealth losses or firm value destruction. Our results hold even after controlling for: (i) financial reporting opacity of Hutton, Marcus, and

[21] Untabulated additional tests suggest that this discrepancy is attributable to the inclusion (exclusion) of firm fixed effects in our study (prior studies).

Tehranian (2009); (ii) other firm-specific factors that are known to affect crash risk; and (iii) firm fixed effects or time-invariant cross-firm variations in omitted firm-specific factors.

[Insert Table 4 about here]

To further demonstrate that our results are robust to controlling for tax avoidance and accounting conservatism (Kim, Li, and Zhang, 2011a; Kim and Zhang, 2016), we first check the correlation between our earnings smoothing measure (*Rho*) and empirical proxies for tax avoidance (long-run cash effective tax rate, *LRETR*; and book-tax difference, *BTD*) and conditional conservatism (*C_Score*), respectively. We find that the pair-wise Pearson correlations are not high (−0.021, −0.160, and 0.105; untabulated). We then run regressions with control variables *LRETR*, *BTD*, and *C_Score*, and find all our main results hold.

Table 5 summarizes the regression results, showing that earnings smoothing explains stock price crash risk over and beyond the effect of (i) tax avoidance and (ii) conditional conservatism documented by prior research (Kim, Li, and Zhang, 2011a; Kim and Zhang 2016). While our results do not show a significant effect of tax avoidance on price crash risk, consistent with Kim and Zhang (2016), we find that accounting conservatism is associated with *lower* likelihood of future stock price crashes. This relation is in contrast to our main finding that earnings smoothing, a form of accounting choice distinct from conservatism, is associated with *greater* likelihood of future stock price crashes.[22] The contrasting results reflect the differences in managerial incentives underlying their choice of accounting policy (e.g., Holthausen and Leftwich, 1983; Watts and Zimmerman, 1986; and Holthausen, 1990). Prior research indicates that conservative

[22] In the accounting literature, accounting conservatism refers to the asymmetry in the timeless of recognizing bad news as a loss than good news as a gain; accounting is more conservative when bad news is recognized as a loss in a timelier manner than good news is recognized as a gain. While income smoothing is viewed as an outcome of managerial reporting opportunism or private information signaling, accounting conservatism is often viewed as a means to constrain managerial opportunism in financial reporting or to improve monitoring efficacy (Watts, 2003; Kim and Zhang, 2016).

accounting helps minimize debt contracting cost (Watts and Zimmerman, 1986; Zhang, 2008) by accelerating the recognition of bad news and delaying the release of good news (Watts, 2003). However, income smoothing, as discussed in the forgoing, may either reveal managerial private information regarding the future cash flows of the firm or help managers extract their private benefits, for example, by hiding bad performance in the current period in anticipation of good performance in the future.

[Insert Table 5 about here]

5.2 Subsample Results where Bad News Hoarding is more likely

To substantiate our baseline results, we partition our sample into two subsamples—one with firms that are more likely to conceal information through earnings smoothing, and the other with firms that are more likely to signal private information. We use multiple methods to form the two subsamples as described below.

Our first partition method for information concealing is based on an approach developed by Tucker and Zarowin (2006: TZ). The authors find that, on average, firms who engage more in earnings smoothing have larger future earnings response coefficient (*FERC*), suggesting that the change in the current stock price of higher-smoothing firms contains more information about their future earnings than does the change in the stock price of lower-smoothing firms. Building on the same notion of *FERC*, we adapt TZ's approach in our setting, and use a firm-specific regression coefficient to separate firms that are more likely to garble earnings information or to improve earnings informativeness through earnings smoothing. More specifically, we follow TZ (equation (4), p. 257) and use the following regression model:

$$R_q = b_0 + b_1 X_{q-4} + b_2 X_q + b_3 X_{q1\sim4} + b_4 R_{q1\sim4} + b_5 IS_q + b_6 IS_q * X_{q-4}$$

$$+ b_7 IS_q * X_q + b_8 IS_q * X_{q1\sim4} + b_9 IS_q * R_{q1\sim4} + \epsilon_q,$$

where $R_q$is the stock return for fiscal quarter q; X_{q-4} and X_q is the earnings per share (*EPS*) for fiscal quarter *q-4* and *q*, respectively, as empirical proxies for earnings expectations based on past and current earnings; $X_{q1\sim4}$ and $R_{q1\sim4}$are the sum of *EPS* and the cumulative stock returns for fiscal quarters *q+1* to *q+4*, respectively; $IS_q$is the negative of earnings smoothing measure *Rho*, calculated as of fiscal quarter *q*. Following TZ, all *EPS* measures are deflated by the stock price at the beginning of fiscal quarter *q*.

Consistent with TZ, we find that FERC, i.e., the coefficient b_8, is significantly positive in the pooled regression (untabulated), suggesting a private information revelation effect of earnings smoothing, on average, dominates the information garbling effect. For our purpose, we run the regression model by firm and obtain firm-specific coefficients b_8 (TZ coefficient, hereafter). We split our full sample into two subsamples: (i) the subsample of firms with their TZ coefficients below the sample median; and (ii) the subsample of firms with their TZ coefficients above the sample median. Firms in the first subsample (low *FERC* firms) are more likely to conceal information through earnings smoothing. We therefore expect that the impact of earnings smoothing on future stock price crash risk is stronger for such firms with low *FERC*. In contrast, firms in the second subsample (high *FERC* firms) are more likely to use earnings smoothing as a means for private information signaling. Our subsample results reported in Table 6, Panel A, are largely consistent with our priors. We find that *Rho* is statistically significant in the low TZ coefficient subsample for both dependent variables *NCSKEW* and *DUVOL*; when *NCSKEW* is the dependent variable, the coefficient on *Rho* is also larger in magnitude in the low TZ coefficient subsample (−0.0467) than in the high TZ coefficient subsample (−0.0322).

Our second partition method to identify information concealing firms is based on the nature of accrual accounting. Dechow, Ge, and Schrand (2010, p. 361) state that "A basic tenet of an accrual-based earnings system is that earnings smooth random fluctuations in the timing of cash payments and receipts, making earnings more informative about performance than cash flows." If managers smooth earnings relative to fundamental performance to enhance earnings informativeness, managers use discretionary accruals in opposite directions to smooth out temporary ups and downs in economic earnings. We therefore expect discretionary accruals to exhibit low autocorrelation, assuming temporary economic surprises arrive at a random pace, because accruals are reversed over time (Dechow and Dichev, 2002; Guay, Kothari, and Watts, 1996). Further, Baber, Kang, and Li (2011) demonstrate that the probability of achieving quarterly earnings forecasts (a proxy for earnings management) varies inversely with the reversal speed of discretionary accruals. Following these rationales, we use the first-order autocorrelation of discretionary accruals to proxy for managerial motivations. More specifically, we calculate the autocorrelation in discretionary accruals over the rolling window of 12 quarters; a high autocorrelation, which could result from either continuously inflating earnings or continuously building earnings reserve, is expected to capture managerial optimism. Results in Panel B indicate that the impact of earnings smoothing on future stock price crash risk is primarily driven by firms whose autocorrelation in discretionary accruals is above the sample median. Combined our results in both Panel A and Panel B of Table 6, overall, we find that the impact of earnings smoothing on price crash risk is stronger for the firms concealing information through earnings smoothing. These findings suggest that earnings smoothing increases stock price crash risk when management uses smoothing to hide bad news.

We also conduct an analysis based on corporate social responsibility (CSR hereafter). In theory, it is not clear *ex ante* whether firms that smooth income also invest in CSR. For this reason, Kim, Li, and Li (2014, p. 1) entertain two competing hypotheses: "If socially responsible firms commit to a high standard of transparency and engage in less bad news hoarding, they would have lower crash risk. However, if managers engage in CSR to cover up bad news and divert shareholder scrutiny, CSR would be associated with higher crash risk." In light of prior research findings (e.g., Kim, Li, and Li, 2014)[23], we split our full sample into two subsamples of firms with Good and Bad CSR, using the sample median of CSR. Following Kim, Li, and Li (2014), we collect corporate social ratings data from the MSCI ESG database, and calculate the CSR net counts as total strengths minus total concerns in the following five categories: community, diversity, employee relations, environment, and product. Consistent with Kim, Li, and Li (2014), each year we calculate a firm's *CSR_Score* as the difference between its raw CSR net counts and the minimum of CSR net counts among all firms in the same industry, scaled by the range of CSR net counts. This transformation approach preserves the relative distance between CSR net counts within one industry-year.

We first compare the distribution of earnings smoothing between the two subsamples, and find that *Rho* has a mean of −0.785 and −0.722 for the Good and Bad CSR subsamples, respectively (untabulated). This implies good CSR firms tend to have smoother earnings. We then run regressions, separately, for each subsamples. We find that earnings smoothing is positively related (i.e., *Rho* is negatively related) to crash risk in the subsample of firms with Bad CSR, while it is insignificant in the subsample of firms with Good CSR (Table 6, Panel C). Our results, combined together, suggest that bad CSR firms smooth earnings to hide bad news,

[23] Gao and Zhang (2015) find that income-smoothing firms with higher CSR experience higher contemporaneous earnings-return relationship, greater Tobin's Q, and stronger current return-future earnings relationship.

whereas it is not the case for good CSR firms. Our evidence corroborates the view that bad CSR firms tend to hoard bad news (Kim, Li, and Li, 2014), yet with additional evidence that earnings smoothing enables bad CSR firms to do so.

[Insert Table 6 about here]

5.3 Conditioning Analyses: Analyst Coverage, Institutional Holding, and Positive Cumulative Discretionary Accruals

We next conduct conditioning analyses on the association between earnings smoothing and crash risk. As mentioned above, our baseline results show that the greater is the extent of earnings smoothing, the higher is the future crash risk, suggesting that the managerial reporting opportunism or financial obfuscation incentives dominate the private information signalling incentives. We predict that this baseline relation is weaker where external monitoring by outside stakeholders such as equity analysts and institutional investors is effective in constraining managerial opportunism (H2.1 and H2.2), but stronger where managers exhaust financial reporting flexibility because of the cumulative earnings-increasing discretionary accruals (H3).

In columns 1 to 3 of Table 7, we estimate an augmented version of our baseline regression after including into Equation (3) analyst following (*ANALYST*) as a condition variable and its interaction with our test variable, *Rho*. Similarly, in columns 4 to 6, we estimate Equation (3) after including institutional holding (*INST*) as a conditioning variable and its interaction with *Rho*. As shown in Table 7, we find that the main effect of earnings smoothing (*Rho*) remains negative and highly significant at less than the 1% level. We find that the interaction of *Rho* with analyst following or institutional holding (in columns 1 to 6) are positive and significant at less than the 10% level in five (out of six) columns. The significantly positive coefficients on the

interaction terms, along with the significantly negative coefficient on *Rho*, imply that analyst following and institutional holdings mitigate the crash risk-increasing effects of earnings smoothing. The above results, taken as a whole, suggest that managers' ability to hide bad news for their private gains is constrained when external monitoring by outside stakeholders such as equity analysts and institutional investors are intense and effective. This evidence is in line with the argument that both analysts and institutional investors play an important role in monitoring managers' self-serving behaviors in general and managerial reporting opportunism in particular (Skinner, 1994; Lang, Lins, and Miller, 2004; Bushee and Noe, 2000).

In columns 7 to 9, we estimate Equation (3) after including *POSDAC* as a conditional variable and its interaction with *Rho*. Recall that *POSDAC* is a dummy variable that equals one if cumulative discretionary accruals over the most recent four quarters are positive, and zero otherwise. We find that the coefficient on *Rho* remains negative and significant in regressions with *NCSKEW* and *DUVOL* as dependent variables, while the coefficient on the interaction term is negative and significant in regressions with *DUVOL* and *COUNT* as dependent variables. The results in columns 7 to 9 provide some weak support to our hypothesis H3 that the association between earnings smoothing and crash risk would be stronger when managers have built up positive discretionary accruals in earlier periods. Further, we note that the main effect of *Rho* appears to be subsumed by the interaction effect when the dependent variable is *COUNT* (column 9), suggesting that firms with greater income-increasing (i.e., positive) discretionary accruals in prior periods are more prone to extremely negative events as captured by higher crash risk in the future period.[24]

[24] We test the effect of positive cumulative discretionary accruals using data from the most recent four quarters because it seems to be difficult, if not likely, for a firm to continuously recognize income-increasing accruals to boost earnings in a period as long as 12 quarters. We run robustness checks using 8-quarter and 12-quarter rolling windows. Although none of the signs change, results are generally weaker, as expected (results are not tabulated).

[Insert Table 7 about here]

5.4 Analysis on Future Value Destruction

The results of our main regressions of crash risk on earnings smoothing consistently show that earnings smoothing in the current quarter leads to a significant increase in one-quarter-ahead crash risk. The results are consistent with the view that corporate managers use earnings smoothing to hide or withhold bad news for their private gain. To substantiate our finding that earnings smoothing reflects managerial reporting opportunism, we next examine whether earnings smoothing in the current quarter leads to value destruction—that is, destroying shareholder wealth—in the (one-quarter ahead) future period. In so doing, our analysis focuses on the effect of earnings smoothing on two different measures of cumulative quarterly returns, namely, raw and market-adjusted return cumulated over the entire quarter (*CUMRET* and *CUMARET*, respectively), and raw and market-adjusted return cumulated over extreme event periods, both negative and positive, within the quarter (*SUMRETEX* or *SUMARETEX*).

Columns 1 and 2 of Table 8 report the results of regression using, as the dependent variable, *CUMRET* and *CUMARET*, respectively, while columns 3 and 4 of the same table present the results using *SUMRETEX* and *SUMARETEX*, respectively. As shown in Table 8, we find that the coefficient on *Rho* is positive and highly significant across all four columns. In columns 1 and 2, the coefficients of *Rho* are 0.0094 and 0.0066, respectively. This is economically significant as well; one standard deviation decrease in *Rho* (an increase in the extent of income smoothing) leads to a decrease in *CUMRET* (*CUMARET*) by 37 (26) basis points, which

corresponds to an 11.4% (37.6%) decrease relative to the sample mean.[25] Similarly, as shown in columns 3 and 4, where the extreme event period returns are used as the dependent variable, we find that the coefficients of *Rho* are again positive and highly significant at less than the 1% level with the magnitude of 0.0048 and 0.0046, respectively. The coefficients are again economically significant: one standard deviation decrease in *Rho* (i.e., an increase in income smoothing) is associated with about 19 (18) basis points decrease in *SUMRETEX* (*SUMARETEX*), which corresponds to about 7.4% (7.1%) decrease relative to the sample mean.

In short, the results reported in Table 8, take together, suggest that firms with a higher degree of earnings smoothing, on average, experience larger value destruction over the subsequent quarter, as well as during extreme event periods within the quarter. The above results lend further support to the managerial reporting opportunism perspective on income smoothing, reconfirming that income smoothing is detrimental to shareholders because it not only increases stock price crash risk but also leads to a significant value destruction or valuation loss.[26]

The coefficients of financial reporting opacity (*OPAQUE*) are modestly negative in three return regressions except for the *CUMRET* regression, suggesting that earnings management facilitates bad news hoarding, which in turn contributes to value destruction. We also find firms with higher past returns (*RET*), larger investor heterogeneity (*DTURN*), larger market

[25] The economic impact of external financial reporting quality tends to be small (Zimmerman, 2013). Findings in this paper are comparable to those in prior studies. For instance, according to Francis, LaFond, Olsson, and Schipper (2005), the effect of discretionary accruals quality on the cost of debt is about 36 basis points.

[26] As reviewed earlier, the extant literature has mixed results regarding the impact of earnings smoothing on the first-moment of stock returns. This paper doesn't intend to provide new evidence to this debate. Conventional asset-pricing studies employ factor models and portfolio-based analyses, which differs from the research design choice made in this paper. In untabulated *pooled* regression analyses, we find that the earnings smoothing measure *Rho* is insignificantly correlated with stock returns in the subsequent quarter. This evidence echoes the findings in Rountree, Weston, and Allayannis (2008) that earnings smoothing through accrual manipulation is unrelated to firm value as measured by Tobin's Q.

capitalization (*SIZE*), smaller leverage (*LEV*), and/or higher expected growth (*MB*) tend to have larger value destructions during the extreme event period.

[Insert Table 8 about here]

6. Conclusion

In this paper we examine the impact of earnings smoothing on future stock price crash. We document evidence that, within firm, the greater is the extent of earnings smoothing, the higher is the crash risk, and thus the larger is the value destruction or valuation loss to shareholders. This evidence is consistent with the view that corporate managers use earnings smoothing as a means to hide or withhold bad news or unfavorable performance for their private gains (Levitt, 1998; Leuz, Nanda, and Wysocki, 2003), or that the managerial opportunism incentives for earnings smoothing dominate the private information signalling incentive. We also find that the effect of earnings smoothing on increasing crash risk is less pronounced when (i) managerial reporting opportunism is constrained by effective external monitoring by equity analysts and institutional investors; (ii) firms are more likely to conceal information; and (iii) firms perform badly in fulfilling corporate social responsibility. These conditional analyses, combined together, provide evidence that further substantiates the detrimental effect of earnings smoothing. Moreover, we show that earnings smoothing, coupled with positive cumulative discretionary accruals in the most recent four quarters, is associated with higher crash risk in the one-quarter-ahead period. The above results hold even after controlling for information opacity (Hutton, Marcus, and Tehranian, 2009), tax avoidance (Kim, Li, and Zhang, 2011a), accounting conservatism (Kim and Zhang, 2016), firms' size, profitability, leverage, and growth, as well as time-invariant unobservable firm-specific factors (that are controlled via firm fixed effects

regression). In short, our paper provides new evidence on the adverse consequences of earnings smoothing in the context of the third-moment measure of firm-specific return distribution (as reflected in its conditional negative skewness). Given the growing awareness of the importance of negative tail risk and the scarcity of empirical evidence on the effect of earnings smoothing on crash risk, we recommend further research in this direction.

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Appendix A: Variable Definitions

Measures of Crash Risk

$NCSKEW_{t+1}$	The negative coefficient of skewness of *firm-specific daily returns* (*R*). *R* is the log of one plus the residual return from estimating the following expanded market model for each firm between earnings announcements of two adjacent quarters: $r_{i,d} = \alpha + \beta_1 r_{j,d-1} + \beta_2 r_{m,d-1} + \beta_3 r_{j,d} + +\beta_4 r_{m,d} + \beta_5 r_{j,d+1} + \beta_6 r_{m,d+1} + \varepsilon_{i,d}$, where $r_{i,d}$ is the return of firm *i*, $r_{j,d}$ is the value-weighted industry (to which firm *i* belongs) return, and $r_{m,d}$ is the value-weighted market return on day *d*. $NCSKEW_i = (-(n(n-1)^{\frac{3}{2}} \sum R_{i,d}{}^3) / ((n-1)(n-2)(\sum R_{i,d}{}^2)^{\frac{3}{2}}$, where *n* is the number of observations *R* between the earnings announcement of Q_t and Q_{t+1}.
$DUVOL_{t+1}$	The down-to-up volatility of *R*. $DUVOL_i = \log\{((n_{up}-1)\sum_{down} R_{i,d}{}^2) / ((n_{down}-1)\sum_{up} R_{i,d}{}^2)\}$, where n_{up} and n_{down} are the number of up and downs days (i.e., above or below the mean *R*) between the earnings announcement of Q_t and Q_{t+1}, respectively.
$COUNT_{t+1}$	The number of days in which *R* is 3.09 standard deviation below the mean minus the number of days in which *R* is 3.09 standard deviation above the mean between the earnings announcement of Q_t and Q_{t+1}.

Measures of Value Destruction

$CUMRET_{t+1}$	The cumulative raw stock returns over Q_{t+1}.
$CUMARET_{t+1}$	The cumulative raw stock returns, adjusted by value weighted index returns, over Q_{t+1}.
$SUMRETEX_{t+1}$	The sum of raw stock returns during extremely negative (i.e., 3.09 or more standard deviations below the mean of *R* between Q_t and Q_{t+1}) and extremely positive events (i.e., 3.09 or more standard deviations above the mean) in Q_{t+1}.
$SUMARETEX_{t+1}$	The sum of abnormal stock returns during extremely negative and extremely positive events in Q_{t+1}.

Measure of Earnings Smoothing

Rho_t	The Pearson correlation between changes in pre-managed earnings (*PME*) and changes in discretionary accruals (*DA*) over a rolling window of 12 quarters ending in Q_t. *PME* is the difference between income before extraordinary items (*IBCQ*) and discretionary accruals, scaled by the beginning quarter total assets (*ATQ*). Discretionary accruals (*DA*) are estimated using the model in Tucker and Zarowin (2006).

Other Determinants of Crash Risk (Control Variables)

$STDPME_t$	The standard deviation of pre-managed earnings (*PME*) in the rolling window of 12 quarters ending in Q_t.
$OPAQUE_t$	The sum of the absolute value of abnormal accruals (*DA*) in the rolling window of 12 quarters ending in Q_t.

$NCSKEW_t$	The negative skewness of R over Q_t.
RET_t	The mean of R over Q_t.
$DTURN_t$	The average daily share turnover over Q_t minus average daily share turnover over Q_{t-1}.
$SIGMA_t$	The standard deviation of R over Q_t.
$SIZE_t$	The natural logarithm of market value of equity ($CSHOQ \times PRCCQ$) at the end of Q_t.
ROA_t	The ratio of income before extraordinary items (IBQ) to total assets (ATQ) at the end of Q_t.
LEV_t	Total liabilities (LTQ) scaled by the book value of total assets (ATQ) at the end of Q_t.
MB_t	The ratio of market value of equity ($CSHOQ \times PRCCQ$) to book value of equity ($CEQQ$) at the end of Q_t.
$Q4_t$	An indicator variable that takes the value of one if Q_t is the fourth fiscal quarter, and zero otherwise.
Other Variables	
$LRETR_t$	The long-run cash effective tax rate, computed as the sum of income tax paid ($TXPD$) over the previous five years divided by the sum of a firm's pre-tax income (PI) less special items (SPI).
BTD_t	The total book-tax difference, which equals book income less taxable income scaled by lagged assets (AT). Book income is pre-tax income (PI). Taxable income is calculated by summing the current federal tax expense ($TXFED$) and current foreign tax expense ($TXFO$) and dividing by the statutory tax rate (STR) and then subtracting the change in net operating loss(NOL) carryforwards ($TLCF$). If the current federal tax expense is missing, the total current tax expense is calculated by subtracting deferred taxes ($TXDI$), state income taxes (TXS), and other income taxes (TXO) from the total income taxes (TXT).
C_Score_t	The Khan and Watts's (2009) conservatism measure.
$ANALYST_t$	The rank of analyst following at the end of Q_t. If a firm doesn't have any analyst following, the rank is set to 0; otherwise, it is set to be 1−4 according to the quartile rank in each industry and year. An analyst is assumed to follow a firm if he issues at least one one-year ahead earnings forecast during the 12-month period ending at the end of Q_t.
$INST_t$	The rank of institutional ownership at the end of Q_t, according to the quintile rank in each industry and year.
$POSDA_t$	An indicator variable that takes the value of one if a firm's sum of discretionary accruals (DA) is positive in the rolling window of 4 quarters ending in Q_t, and zero otherwise.

Appendix B: Timeline

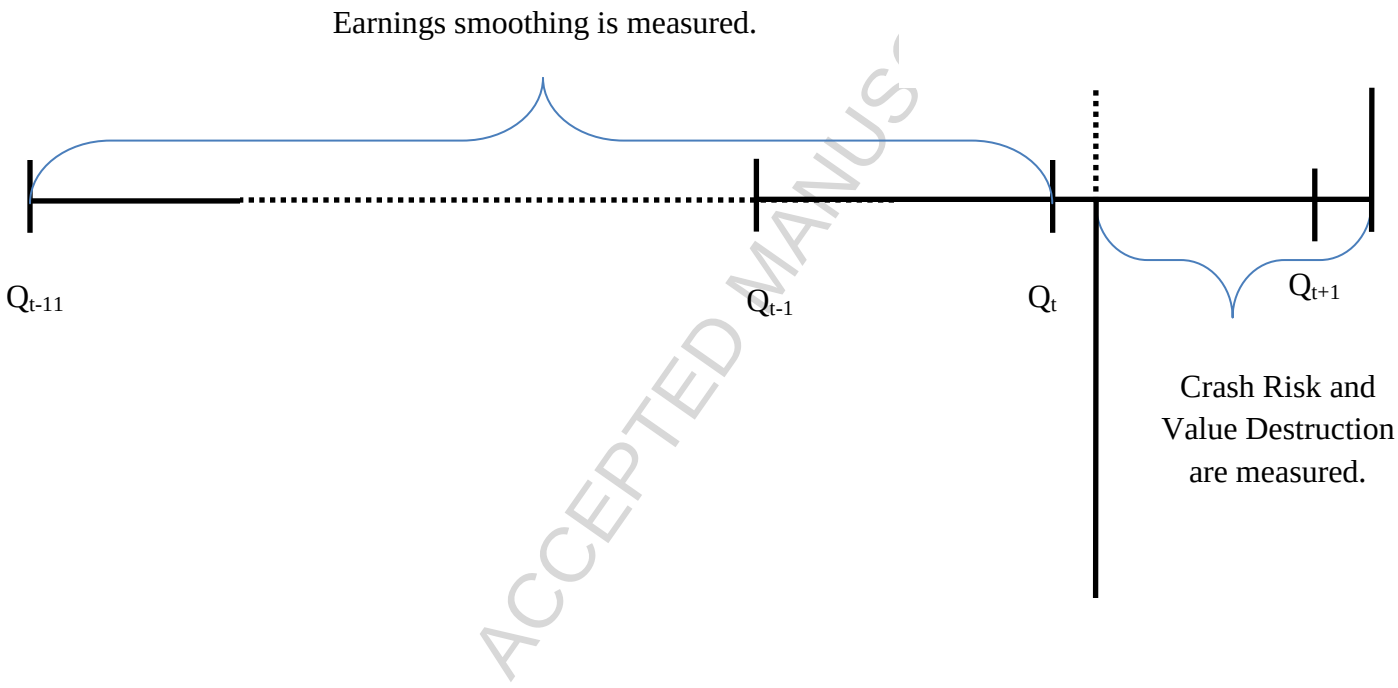

Table 1 Sample Section

This table reports the sample selection procedure.

Step	Sample Filtering	# obs.	# firms
1	All quarterly observations of COMPUSTAT/CRSP firms during Fiscal Years 1990 and 2011 (retrieved in January 2014)	613,674	17,769
2	Require firms to have common shares traded on NYSE/AMEX/NASDAQ	486,406	14,412
3	Exclude observations with missing earnings announcement dates for Q_t and Q_{t+1}	420,848	13,381
4	Remove financials (SIC 6000–6999) and utilities (SIC 4900–4949)	332,836	10,694
5	Impose the sample period (1993−2011)	294,931	10,128
6	Require changes in pre-managed earnings and changes in discretionary accruals to have non-missing values over the rolling 12-quarter window ending in Q_t	159,835	6,661
7	Remove missing values for variables used in the regression analysis	157,722	6,627

Table 2 Descriptive Statistics

Panel A

This table reports descriptive statistics. All continuous variables are winsorized at 1 and 99 percentiles. See Appendix A for all variable definitions.

NAME	N	MEAN	STD	P25	P50	P75
$NCSKEW_{t+1}$	157,722	-0.097	1.031	-0.559	-0.107	0.313
$DUVOL_{t+1}$	157,722	-0.065	0.540	-0.397	-0.074	0.247
$COUNT_{t+1}$	157,722	-0.114	0.765	-1	0	0
$CUMRET_{t+1}$	157,722	0.033	0.273	-0.122	0.014	0.154
$CUMARET_{t+1}$	157,722	0.007	0.248	-0.132	-0.011	0.115
$SUMRETEX_{t+1}$	157,722	0.026	0.136	0	0	0.067
$SUMARETEX_{t+1}$	157,722	0.026	0.136	0	0	0.066
Rho_t	157,722	-0.750	0.399	-0.981	-0.932	-0.724
$STDPME_t$	157,722	0.051	0.046	0.023	0.037	0.062
$OPAQUE_t$	157,722	0.411	0.288	0.217	0.328	0.507
$NCSKEW_t$	157,722	-0.089	1.007	-0.552	-0.107	0.310
RET_t	157,722	-0.070	0.106	-0.076	-0.032	-0.014
$DTURN_t$	157,722	0.014	3.905	-1.116	-0.027	1.062
$SIGMA_t$	157,722	0.031	0.021	0.017	0.025	0.039
$SIZE_t$	157,722	5.647	2.123	4.074	5.580	7.098
ROA_t	157,722	-0.004	0.060	-0.005	0.010	0.022
LEV_t	157,722	0.479	0.244	0.293	0.472	0.632
MB_t	157,722	2.810	3.796	1.184	1.962	3.356
$Q4_t$	157,722	0.259	0.438	0	0	1

Table 2 Descriptive Statistics (cont'd)

Panel B

This table presents the summary statics of crash risk measures by year.

Fiscal Year	Number of Obs.	Percentage of Obs. With Stock Price Crash	Mean of *NCSKEW*	Mean of *DUVOL*	Mean of *COUNT*
1993	7,527	0.156	-0.09	-0.06	-0.10
1994	7,669	0.170	-0.07	-0.04	-0.08
1995	7,382	0.162	-0.14	-0.10	-0.14
1996	7,273	0.175	-0.12	-0.08	-0.14
1997	7,502	0.181	-0.18	-0.12	-0.16
1998	7,728	0.218	-0.09	-0.06	-0.11
1999	8,686	0.214	-0.16	-0.10	-0.16
2000	9,553	0.240	-0.04	-0.02	-0.10
2001	8,725	0.251	-0.02	-0.01	-0.06
2002	8,452	0.282	0.05	0.04	-0.03
2003	8,676	0.231	-0.19	-0.13	-0.18
2004	9,000	0.268	-0.10	-0.08	-0.13
2005	8,947	0.280	-0.13	-0.10	-0.13
2006	8,451	0.282	-0.15	-0.10	-0.13
2007	8,236	0.287	-0.05	-0.05	-0.09
2008	8,307	0.284	0.04	0.04	-0.04
2009	8,381	0.253	-0.18	-0.12	-0.15
2010	8,582	0.256	-0.16	-0.10	-0.14
2011	8,645	0.276	-0.09	-0.06	-0.09

Table 3 Correlations

This table reports the correlations (Pearson correlation above the diagonal; Spearman correlation below the diagonal) among the variables over the sample period 1993−2011. The correlations in boldface are statistically significant (two-sided $p < 0.05$); the correlations in italics are statistically insignificant (two-sided $p > 0.10$). All continuous variables are winsorized at 1 and 99 percentiles. See Appendix A for all variable definitions.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1)	$NCSKEW_{t+1}$		**0.902**	**0.743**	**-0.367**	**-0.370**	**-0.715**	**-0.717**	**-0.024**	**-0.017**	**-0.010**	**0.019**	**0.019**	**0.010**	**-0.021**	**0.061**	**0.027**	*-0.004*	**0.016**	*-0.004*
(2)	$DUVOL_{t+1}$	**0.908**		**0.676**	**-0.394**	**-0.392**	**-0.615**	**-0.617**	**-0.025**	**-0.015**	**-0.006**	**0.023**	**-0.006**	**0.007**	*0.003*	**0.035**	**0.020**	*-0.002*	**0.006**	*-0.003*
(3)	$COUNT_{t+1}$	**0.816**	**0.674**		**-0.282**	**-0.282**	**-0.800**	**-0.801**	**-0.029**	**-0.035**	**-0.027**	**0.015**	**0.044**	**0.010**	**-0.048**	**0.077**	**0.040**	*-0.001*	**0.015**	**0.023**
(4)	$CUMRET_{t+1}$	**-0.371**	**-0.392**	**-0.282**		**0.950**	**0.331**	**0.332**	*0.002*	**-0.022**	**-0.022**	*-0.003*	**-0.007**	**-0.012**	**0.010**	**-0.028**	**0.049**	**0.005**	**-0.039**	**0.032**
(5)	$CUMARET_{t+1}$	**-0.372**	**-0.389**	**-0.282**	**0.922**		**0.337**	**0.338**	*-0.001*	**-0.026**	**-0.026**	*-0.003*	*-0.003*	**-0.009**	**0.006**	**-0.012**	**0.054**	**0.005**	**-0.032**	**0.032**
(6)	$SUMRETEX_{t+1}$	**-0.810**	**-0.666**	**-0.800**	**0.296**	**0.301**		**0.997**	**0.061**	**0.091**	**0.078**	**-0.012**	**-0.173**	**-0.015**	**0.181**	**-0.167**	**-0.110**	**0.010**	**-0.023**	**-0.037**
(7)	$SUMARETEX_{t+1}$	**-0.813**	**-0.668**	**-0.801**	**0.296**	**0.302**	**0.989**		**0.061**	**0.091**	**0.078**	**-0.013**	**-0.174**	**-0.016**	**0.182**	**-0.168**	**-0.110**	**0.010**	**-0.024**	**-0.037**
(8)	Rho_t	**-0.036**	**-0.031**	**-0.029**	**-0.031**	**-0.031**	**0.053**	**0.052**		**0.195**	**0.022**	**-0.026**	**-0.164**	**-0.007**	**0.192**	**-0.081**	**-0.259**	**0.025**	**0.033**	**0.011**
(9)	$STDPME_t$	**-0.022**	**-0.013**	**-0.035**	**-0.054**	**-0.059**	**0.058**	**0.059**	**0.103**		**0.839**	**-0.024**	**-0.282**	**-0.017**	**0.338**	**-0.296**	**-0.382**	**-0.024**	**0.140**	*0.004*
(10)	$OPAQUE_t$	**-0.015**	**-0.007**	**-0.027**	**-0.048**	**-0.053**	**0.047**	**0.048**	**-0.055**	**0.850**		**-0.017**	**-0.256**	**-0.016**	**0.312**	**-0.307**	**-0.305**	**-0.043**	**0.152**	*0.002*
(11)	$NCSKEW_t$	**0.032**	**0.035**	**0.015**	*0.003*	*0.002*	**-0.017**	**-0.017**	**-0.035**	**-0.026**	**-0.021**		**0.015**	**0.010**	**0.006**	**0.041**	*0.000*	**-0.005**	**-0.020**	**-0.025**
(12)	RET_t	**0.016**	*-0.001*	**0.044**	**0.059**	**0.060**	**-0.093**	**-0.094**	**-0.245**	**-0.455**	**-0.393**	**0.015**		**-0.086**	**-0.947**	**0.499**	**0.350**	**-0.041**	**0.041**	**-0.029**
(13)	$DTURN_t$	**0.010**	**0.008**	**0.010**	**-0.011**	*-0.004*	**-0.015**	**-0.015**	**-0.017**	**-0.031**	**-0.029**	**-0.005**	**-0.055**		**0.082**	**0.027**	**0.012**	**0.022**	**0.034**	**0.012**
(14)	$SIGMA_t$	**-0.016**	*0.001*	**-0.048**	**-0.059**	**-0.060**	**0.093**	**0.094**	**0.245**	**0.455**	**0.393**	**-0.009**	**-1.000**	**0.055**		**-0.610**	**-0.380**	*0.005*	**-0.045**	**0.027**
(15)	$SIZE_t$	**0.049**	**0.026**	**0.077**	**0.031**	**0.050**	**-0.118**	**-0.118**	**-0.120**	**-0.412**	**-0.378**	**0.028**	**0.661**	**0.038**	**-0.661**		**0.272**	**0.095**	**0.215**	*0.001*
(16)	ROA_t	**0.032**	**0.020**	**0.040**	**0.097**	**0.101**	**-0.066**	**-0.067**	**-0.289**	**-0.199**	**-0.095**	**-0.015**	**0.365**	**0.039**	**-0.365**	**0.341**		**-0.079**	**-0.054**	**-0.051**
(17)	LEV_t	*0.003*	*0.002*	*-0.001*	**0.008**	**0.008**	*-0.004*	*-0.004*	**-0.033**	**-0.108**	**-0.136**	*0.002*	**0.086**	**0.029**	**-0.086**	**0.116**	**-0.131**		**-0.044**	**0.006**
(18)	MB_t	**0.021**	**0.009**	**0.015**	**-0.047**	**-0.034**	**-0.052**	**-0.051**	**0.009**	**0.047**	**0.106**	**-0.034**	**0.202**	**0.041**	**-0.202**	**0.415**	**0.275**	**-0.051**		*-0.003*
(19)	$Q4_t$	*0.002*	*-0.002*	**0.023**	**0.043**	**0.046**	**-0.034**	**-0.032**	**0.017**	*0.001*	*0.001*	**-0.029**	**-0.024**	**0.019**	**0.023**	*0.001*	**-0.007**	*0.004*	*-0.004*	

Table 4 Firm Fixed Effects Regression Analyses of Crash Risk

This table presents multivariate regression results of the impact of earnings smoothing on realized stock crash risk. The sample includes 157,722 firm-quarter observations over 1993−2011. All continuous variables are winsorized at 1 and 99 percentiles. Firm fixed effects are included. Standard errors reported in parentheses are clustered by firm. ∗, ∗∗, and ∗∗∗ represent significance at 10%, 5%, and 1% (two-sided), respectively. See Appendix A for all variable definitions.

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $COUNT_{t+1}$
Rho_t	-0.0393***	-0.0150***	-0.0191**
	(0.011)	(0.006)	(0.008)
$STDPME_t$	0.0099	0.0025	-0.0678
	(0.175)	(0.092)	(0.128)
$OPAQUE_t$	0.0785***	0.0365**	0.0447**
	(0.029)	(0.015)	(0.021)
$NCSKEW_t$	-0.0313***	-0.0124***	-0.0183***
	(0.003)	(0.002)	(0.002)
RET_t	0.6225***	0.2775***	0.3505***
	(0.097)	(0.053)	(0.073)
$DTURN_t$	0.0006	-0.0000	0.0007
	(0.001)	(0.000)	(0.001)
$SIGMA_t$	5.3079***	2.8266***	2.4971***
	(0.579)	(0.308)	(0.432)
$SIZE_t$	0.1472***	0.0773***	0.0897***
	(0.005)	(0.003)	(0.004)
ROA_t	-0.1849***	-0.1519***	-0.1495***
	(0.068)	(0.037)	(0.050)
LEV_t	-0.0262	-0.0160	-0.0236
	(0.025)	(0.013)	(0.019)
MB_t	0.0007	-0.0002	0.0011
	(0.001)	(0.001)	(0.001)
$Q4_t$	-0.0135**	-0.0058*	0.0377***
	(0.006)	(0.003)	(0.004)
Constant	-1.1023***	-0.5883***	-0.7078***
	(0.040)	(0.021)	(0.029)
Firm Fixed Effects	Yes	Yes	Yes
Observations	157,722	157,722	157,722
Adj. R^2	0.0186	0.0222	0.0160

Table 5 Firm Fixed Effects Regression Analyses with Additional Controls

This table presents multivariate regression results of the impact of earnings smoothing on realized stock crash risk, with additional controls for tax avoidance (*LRETR* and *BTD*) and conational conservatism (*C_Score*). The sample includes 157,722 firm-quarter observations over 1993−2011. All continuous variables are winsorized at 1 and 99 percentiles. Firm fixed effects are included. Standard errors reported in parentheses are clustered by firm. ∗, ∗∗, and ∗∗∗ represent significance at 10%, 5%, and 1% (two-sided), respectively. See Appendix A for all variable definitions.

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $COUNT_{t+1}$	(4) $NCSKEW_{t+1}$	(5) $DUVOL_{t+1}$	(6) $COUNT_{t+1}$	(7) $NCSKEW_{t+1}$	(8) $DUVOL_{t+1}$	(9) $COUNT_{t+1}$
Rho_t	-0.0646***	-0.0261***	-0.0273**	-0.0389***	-0.0148**	-0.0191**	-0.0348***	-0.0130**	-0.0167**
	(0.016)	(0.008)	(0.011)	(0.011)	(0.006)	(0.008)	(0.011)	(0.006)	(0.008)
$LRETR_t$	-0.0149	-0.0021	-0.0193						
	(0.025)	(0.013)	(0.018)						
BTD_t				0.0090	0.0049	0.0009			
				(0.016)	(0.009)	(0.012)			
C_Score_t							-0.2276***	-0.1128***	-0.1181***
							(0.027)	(0.015)	(0.021)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.2592***	-0.6865***	-0.7986***	-1.1018***	-0.5881***	-0.7077***	-1.0474***	-0.5608***	-0.6792***
	(0.055)	(0.029)	(0.040)	(0.040)	(0.021)	(0.029)	(0.040)	(0.021)	(0.030)
Observations	117,275	117,275	117,275	157,718	157,718	157,718	157,174	157,174	157,174
Adj. R-squared	0.0184	0.0209	0.0131	0.0185	0.0222	0.0160	0.0192	0.0228	0.0162

Table 6 Subsample Analyses of Crash Risk

This table presents subsample analysis results of crash risk, where the full sample is partitioned by the sample median of firm-specific future earnings response coefficient (Panel A), the autocorrelation of discretionary accruals (Panel B), and corporate social responsibility (panel C). All continuous variables are winsorized at 1 and 99 percentiles. Firm fixed effects are included. Standard errors reported in parentheses are clustered by firm. *, **, and *** represent significance at 10%, 5%, and 1% (two-sided), respectively. See Appendix A for all variable definitions.

Panel A, Firm-specific Future Earnings Response Coefficient:

	(1)	(2)	(3)	(4)	(5)	(6)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$COUNT_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$COUNT_{t+1}$
	High (above the median)			Low (below the median)		
Rho_t	-0.0322**	-0.0117	-0.0167	-0.0467***	-0.0195**	-0.0160
	(0.015)	(0.008)	(0.011)	(0.016)	(0.008)	(0.012)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.0841***	-0.5828***	-0.7008***	-1.1033***	-0.5924***	-0.7069***
	(0.057)	(0.030)	(0.041)	(0.058)	(0.031)	(0.044)
Observations	70,341	70,341	70,341	72,284	72,284	72,284
Adj. R-squared	0.0181	0.0198	0.0184	0.0161	0.0188	0.0132

Table 6 Subsample Analyses of Crash Risk (Cont'd)

Panel B, Autocorrelation of Discretionary Accruals:

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $COUNT_{t+1}$	(4) $NCSKEW_{t+1}$	(5) $DUVOL_{t+1}$	(6) $COUNT_{t+1}$
	Low (below the median)			High (above the median)		
Rho_t	-0.0338*	-0.0109	-0.0148	-0.0550***	-0.0258***	-0.0304**
	(0.018)	(0.009)	(0.013)	(0.016)	(0.008)	(0.012)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.0959***	-0.5973***	-0.7031***	-1.2319***	-0.6492***	-0.7770***
	(0.061)	(0.033)	(0.046)	(0.059)	(0.031)	(0.043)
Observations	78,861	78,861	78,861	78,861	78,861	78,861
Adj. R-squared	0.0186	0.0233	0.0145	0.0222	0.0266	0.0179

Table 6 Subsample Analyses of Crash Risk (Cont'd)

Panel C, Corporate Social Responsibility:

	(1) $NCSKEW_{t+1}$	(2) $DUVOL_{t+1}$	(3) $COUNT_{t+1}$	(4) $NCSKEW_{t+1}$	(5) $DUVOL_{t+1}$	(6) $COUNT_{t+1}$
	Good (above the median)			Bad (below the median)		
Rho_t	-0.0294	-0.0226	-0.0060	-0.0630**	-0.0292**	-0.0297
	(0.032)	(0.016)	(0.021)	(0.030)	(0.015)	(0.020)
Other Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.9593***	-1.0736***	-1.1539***	-2.7503***	-1.4397***	-1.5073***
	(0.169)	(0.085)	(0.114)	(0.176)	(0.087)	(0.110)
Observations	31,461	31,461	31,461	31,618	31,618	31,618
Adj. R-squared	0.0238	0.0234	0.0148	0.0253	0.0267	0.0193

Table 7 Conditional Analyses of Crash Risk

This table presents cross-sectional regression results of the effects of *analyst following* (Columns 1-3), *institutional holding* (Columns 4-6), and *positive cumulative discretionary accruals* (Columns 7-9) on the association between earnings smoothing and stock crash risk. The sample includes 157,722 firm-quarter observations over 1993−2011. All continuous variables are winsorized at 1 and 99 percentiles. Standard errors reported in parentheses are clustered by both firm and year. Year and industry fixed effects are included. ∗, ∗∗, and ∗∗∗ represent significance at 10%, 5%, and 1% (two-sided), respectively. See Appendix A for all variable definitions.

	$ANALYST_t$			$INST_t$			$POSDA_t$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$COUNT_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$COUNT_{t+1}$	$NCSKEW_{t+1}$	$DUVOL_{t+1}$	$COUNT_{t+1}$
Rho_t	-0.0558***	-0.0312***	-0.0415***	-0.0486***	-0.0307***	-0.0398***	-0.0200*	-0.0115*	-0.0087
	(0.012)	(0.007)	(0.010)	(0.010)	(0.006)	(0.010)	(0.012)	(0.007)	(0.008)
Conditional Variable	0.0297***	0.0116***	0.0199***	0.0306***	0.0133***	0.0194***	-0.0170	-0.0117	-0.0206*
	(0.008)	(0.004)	(0.004)	(0.009)	(0.005)	(0.005)	(0.016)	(0.009)	(0.011)
Conditional Variable * Rho_t	0.0122*	0.0066*	0.0106*	0.0081	0.0059*	0.0090**	-0.0280	-0.0163*	-0.0291***
	(0.007)	(0.004)	(0.004)	(0.006)	(0.003)	(0.004)	(0.018)	(0.010)	(0.01)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	157,722	157,722	157,722	157,722	157,722	157,722	157,722	157,722	157,722
Adj. R^2	0.0105	0.0117	0.0114	0.0108	0.0119	0.0115	0.0102	0.0116	0.0112

Table 8 Firm Fixed Effects Regression Analyses of Value Destruction

This table presents multivariate regression results of the impact of earnings smoothing on value destruction. The sample includes 157,722 firm-quarter observations over 1993−2011. All continuous variables are winsorized at 1 and 99 percentiles. Firm fixed effects are included. Standard errors reported in parentheses are clustered by firm. ∗, ∗∗, and ∗∗∗ represent significance at 10%, 5%, and 1% (two-sided), respectively. See Appendix A for all variable definitions.

	(1) $CUMRET_{t+1}$	(2) $CUMARET_{t+1}$	(3) $SUMRETEX_{t+1}$	(4) $SUMARETEX_{t\,t+1}$
Rho_t	0.0094***	0.0066**	0.0048***	0.0046***
	(0.003)	(0.003)	(0.002)	(0.002)
$STDPME_t$	0.0059	0.0023	0.0049	0.0053
	(0.057)	(0.052)	(0.028)	(0.028)
$OPAQUE_t$	-0.0158	-0.0166*	-0.0077*	-0.0076*
	(0.010)	(0.009)	(0.004)	(0.004)
$NCSKEW_t$	0.0026***	0.0018***	0.0041***	0.0040***
	(0.001)	(0.001)	(0.000)	(0.000)
RET_t	-0.1367***	-0.0280	-0.0781***	-0.0816***
	(0.034)	(0.031)	(0.019)	(0.019)
$DTURN_t$	-0.0008***	-0.0007***	-0.0005***	-0.0005***
	(0.000)	(0.000)	(0.000)	(0.000)
$SIGMA_t$	-0.6630***	0.1055	0.0019	-0.0264
	(0.172)	(0.160)	(0.091)	(0.091)
$SIZE_t$	-0.0856***	-0.0696***	-0.0202***	-0.0204***
	(0.002)	(0.002)	(0.001)	(0.001)
ROA_t	0.2567***	0.2485***	0.0027	0.0032
	(0.025)	(0.023)	(0.012)	(0.012)
LEV_t	-0.0188**	-0.0020	0.0139***	0.0140***
	(0.008)	(0.008)	(0.004)	(0.004)
MB_t	-0.0010***	-0.0008***	-0.0003**	-0.0003**
	(0.000)	(0.000)	(0.000)	(0.000)
$Q4_t$	0.0213***	0.0192***	-0.0121***	-0.0118***
	(0.002)	(0.001)	(0.001)	(0.001)
Constant	0.5483***	0.4062***	0.1392***	0.1398***
	(0.013)	(0.012)	(0.006)	(0.006)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	157,722	157,722	157,722	157,722
Adj. R^2	0.0545	0.0546	0.0730	0.0740

Highlights
"Earnings Smoothing: Does It Exacerbate or Constrain Stock Price Crash Risk?"
MS. Ref. No.: CORFIN-D-15-00433

- High degree of earnings smoothing is associated with high stock price crash risk.
- The association is more pronounced when managers likely conceal bad information.
- Cross-sectional variations exist in external monitoring and information environment.
- Negative future stock returns suggest earnings smoothing is value destructing.
- Investors should be cautious about the downside risk of earnings smoothing.