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University in partial fulfilment of the requirement for
the degree of Doctor of Philosophy

2022

Statement of Originality

I hereby certify that the work embodied in this thesis is the result of original research, is free of plagiarised materials, and has not been submitted for a higher degree to any other University or Institution.

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Supervisor Declaration Statement

I have reviewed the content and presentation style of this thesis and declare it is free of plagiarism and of sufficient grammatical clarity to be examined. To the best of my knowledge, the research and writing are those of the candidate with amendments, changes and improvements as suggested by me as the Supervisor. I confirm that the investigations were conducted in accord with the ethics policies and integrity standards of Nanyang Technological University and that the research data are presented honestly and without prejudice.

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Tao Chen

Authorship Attribution Statement

This thesis contains material from 3 papers accepted at conferences in which I am listed as an author.

Chapter 1, Option Prices and Voting for Governance Proposals Evidence from a Regression Discontinuity Design (sole paper), is presented at the 2021 New Zealand Finance Meeting and the 2022 Australasian Finance and Banking Conference.

Chapter 2, Competition Laws and Earnings Management: International Evidence (with Prof. Tao Chen), is presented at the 2021 American Accounting Association Annual Meeting and the 2022 AAA International Accounting Section Midyear Meeting. The contributions of the co-authors are as follows:

1. I proposed the idea, collected the data, and wrote the manuscript.
2. The manuscript was revised under the supervision of Prof. Chen.

Chapter 3, Managers under Modern Information Technologies: EDGAR Attention and Managerial Bad News Hoarding (with Prof. Tao Chen), is presented at the 2020 Australasian Finance and Banking Conference, the 2021 European Financial Management Association Annual Meeting, and the 2021 Asian Finance Association Annual Meeting. The contributions of the co-authors are as follows:

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Summary

This dissertation includes three essays on corporate finance.

Chapter 1 discusses whether and how the voting for governance proposals is priced in the option market. By exploiting the local randomness in close-call votes, this paper finds a causal impact of passing a governance-related proposal on the cost of stock option protection against downside tail risks. In a local regression discontinuity (RD) analysis, firms that narrowly pass the majority threshold show a lower ex-ante tail risk based on implied volatility smirk and model-free implied skewness (MFIS) than those that narrowly fail. This impact is strengthened for firms with weaker corporate governance, higher information transparency, and worse operating performance. Evidence from option trading suggests that the change in ex-ante tail risk mainly comes from trading activities in put options. In additional tests, I observe that this impact mainly comes from proposals that aim to remove management entrenchment provisions, and the impact is unique in the option market and can not be explained by realized tail risk. Evidence from financial restatement as an extreme case strengthens the link between governance proposal voting and ex-ante tail risk. Overall, this paper observes how the stock option market responds to shareholder activism through shareholder proposals and sheds light on the cross-sectional determinants of option prices.

Chapter 2 shows how competition threats from local laws affect corporate financial reporting in terms of earnings management. By exploiting the staggered reforms on competition laws in 58 non-US countries, we find that, conditional on product market features, firms tend to inflate their earnings when domicile countries adopt stricter competition laws, which supports the pressure effect of legal competition threats. This impact is stronger for firms facing greater external pressure, receiving less external discipline, and lacking information transparency. In cross-country analyses,

the impact is mitigated in IFRS countries and countries with stronger investor protection. Firms with greater internationalization suffer less from stricter competition laws in domicile countries. Evidence from machine learning algorithms suggests the unique impact of competition laws that can not be predicted by other codependent macro-features. By showing earnings inflation under stricter competition laws, this paper suggests a material impact of antitrust laws on firms' financial reporting practices by increasing managers' pressure, which should not be neglected by policymakers.

Chapter 3 discusses how active attention through EDGAR affects stock price crash risk, which suggests the pressure effect of modern information technologies on managers' disclosure behaviors. This paper examines how modern information technologies affect future stock price crash risk. Using EDGAR search volume (ESV) as a direct measure, we find that firms under greater active attention through EDGAR tend to hide bad news and release it subsequently, thus increasing future stock price crash risk. EDGAR attention to non-financial information and abnormal EDGAR attention drive the results. The impact of EDGAR attention is stronger for firms with higher ex-ante cost of bad news disclosure, which indicates that modern information technologies affect managers by increasing the exposure of bad news to the public. Evidence from option prices, management guidance, and accounting practices further confirms managers' tendency to hide bad news under greater EDGAR attention. Three plausible natural experiments based on the implementation of EDGAR, shareholder distraction from unrelated industries, and the mandatory adoption of XBRL provide a causal inference. By providing systematic evidence on the impact of active attention through EDGAR on stock price crash risk, this paper sheds light on the pressure effect of EDGAR users' attention on managers' strategic bad news disclosure and a side effect of modern information technologies.

Chapter 1. Option Prices and Voting for Governance Proposals: Evidence from a Regression Discontinuity Design

Abstract

By exploiting the local randomness in close-call votes, this paper finds a causal impact of passing a governance-related proposal on the cost of stock option protection against downside tail risks. In a local regression discontinuity (RD) analysis, firms that narrowly pass the majority threshold show a lower ex-ante tail risk based on implied volatility smirk and model-free implied skewness (MFIS) than those that narrowly fail. This impact is strengthened for firms with weaker corporate governance, higher information transparency, and worse operating performance. Evidence from option trading suggests that the change in ex-ante tail risk mainly comes from trading activities in put options. In additional tests, I observe that this impact mainly comes from proposals that aim to remove management entrenchment provisions, and the impact is unique in the option market that can not be explained by realized tail risk. Evidence from financial restatement as an extreme case strengthens the link between governance proposal voting and ex-ante tail risk. Overall, this paper observes how the stock option market responds to shareholder activism through shareholder proposals and sheds light on the cross-sectional determinants of option prices.

Keywords: Shareholder Activism; Shareholder Proposals; Cost of Option Protection; Implied Volatility Smirk; Model-free Implied Skewness; Regression Discontinuity Design

JEL classification: G13; G30

1 Introduction

As an effective way to actively counter managerial agency problems, shareholder proposals are usually applied to disagree with management and seek changes in firms without any change in corporate control (Bebchuk 2005). Despite the nonbinding nature of shareholder proposals, due to reputation concerns, managers are very likely to implement shareholder proposals that win a majority vote, thus showing a nontrivial impact of shareholder proposals on corporate governance (Ertimur, Ferri, and Stubben 2010, Renneboog and Szilagyi 2011). Using a regression discontinuity (RD) design, many works analyze how voting for governance-related shareholder proposals impacts asset pricing in stock markets (Cuñat, Gine, and Guadalupe 2012) and credit markets (Chen et al. 2020). However, there is an obvious gap in this literature. First, whether governance proposals benefit shareholders and creditors is unknown when firm risks are introduced into the analysis. According prior works, the increase in equity and credit value may come as compensation for increased operational risks due to the deviation from optimal decisions when managers are restricted by shareholders (Graham and Harvey 2001) or the increase in firms' risk-taking under better corporate governance (John, Litov, and Yeung 2008). In this case, the increase in equity and credit values should not be regarded as really beneficial to shareholders and creditors. Second, since the stock market may not fully reflect firms' future risk due to the "peso problem" (Bekaert, Hodrick, and Marshall 2001, Sill 2000), it is not enough to use firms' stock return volatility to capture firm risk (Kim and Zhang 2014). Instead, option prices may provide more information on firm risks that are free from the "peso problem" (e.g., Kim, Lu, and Yu 2019, Kim and Zhang 2014). From the perspectives of financial markets, it is also important to examine whether and how the stock option market responds to the voting for shareholder proposals given its importance in financial systems (Chan, Chung, and Fong 2002) and its unique information

advantage (Pan 2002, Santa-Clara and Yan 2010). By exploiting the locally random assignment of close-call votes around the passing threshold, this paper fills this gap and examines how voting for governance proposals changes investors' expectation of future downside risk as reflected in option prices.¹

Different from stock and credit markets, the stock option market is unique because of the forward-looking and complex features of option contracts and information efficiency in option trading. On the one hand, the option market has an information advantage due to the forward-looking and complex features of option contracts. Since the option contract is exercised in the future, it is traded based on investors' expectations of firms' future performance in the stock market. This feature makes option prices reflect more forward-looking information that is not covered by stock and credit markets. Since rare events are rarely materialized in the sample, there can be a huge difference between ex-ante tail risk and ex-post tail risk, thus causing the "peso problem" (Bekaert, Hodrick, and Marshall 2001, Santa-Clara and Yan 2010).² Using ex-ante tail risk measured from option data can solve the "peso problem" in measuring tail risk from realized return and provide a more privileged view of the tail risks perceived by investors than ex-post tail risk measured by stock returns (Santa-Clara and Yan 2010). Also, because one stock can derive multiple option contracts with different features (e.g., call/put options, strike price, expiration date), the different prices of these contracts convey more useful information on investors' attitudes to future risk. On the other hand, the option market has better information efficiency due to the features of option trading. Due to the high risk and complicated design of option contracts, option

¹ Following prior works (e.g., Fan, Radhakrishnan, and Zhang 2020, Cuñat, Gine, and Guadalupe 2012), I use the terms governance-related shareholder proposals and governance proposals interchangeably throughout this paper.

² This is the "peso problem". The "peso problem" comes when the expected distribution of asset prices differs from realized distribution of asset prices. This concept is originally proposed to describe the large discount of Mexican pesos in the forward market since 1954 (Sill 2000, Bekaert, Hodrick, and Marshall 2001).

traders are often sophisticated investors with superior ability to process information (Jin, Livnat, and Zhang 2012). Given their built-in truncated payoff in option trading, informed traders prefer to trade options with a lower trading cost (Black 1975). Therefore, option traders convey more useful and inside information to the option market. As such, option information provides researchers with a more efficient way to capture investors' expectations on underlying firms' risk in the future, which can not be observed in other markets (Bakshi, Kapadia, and Madan 2003, Xing, Zhang, and Zhao 2010).

In this paper, I use two widely-used option variables on investors' cost of option protection on future tail risk to capture firms' ex-ante tail risk in the view of option traders. The first variable, *IV_SKEW*, is calculated as the difference in implied volatility between out-of-the-money put option (OTM put) and at-the-money call option (ATM call), where implied volatility is estimated by Black-Scholes model (Black and Scholes 1973). Capturing the steepness of the implied volatility smirk, this variable measures the downward pressure of stock price and identifies the downside tail risk in the stock market (Xing, Zhang, and Zhao 2010). The second variable comes from model-free implied skewness (*MFIS*). Different from *IV_SKEW*, model-free implied skewness does not rely on the Black-Scholes model and includes more information on the option market (Bakshi, Kapadia, and Madan 2003, Morellec and Zhdanov 2019, Rehman and Vilkov 2012). Since a higher *MFIS* indicates a lower downside tail risk, I follow Chen, Hong, and Stein (2001) and put a negative sign in front of *MFIS* to have the negative model-free implied volatility (*NMFIS*) as another dependent variable. In this way, an increase in *NMFIS* or *IV_SKEW* corresponds to a higher downside tail risk. Both option variables capture the cost of option protection against downward crashes, thus providing forward-looking information reflecting investors' expectations of firms' tail risk in the future (Ilhan et al. 2021, Kelly, Pástor, and Veronesi

2016).

Using 2,360 governance proposals of S&P 1500 firms, this paper finds a lower cost of option protection for firms that narrowly pass governance proposals than those that narrowly fail, suggesting an increase in ex-ante tail risk after the passage of governance proposals. Before the RD analysis, I provide evidence to support the underlying assumptions of the RD design. By testing the vote distribution according to McCrary's (2008) method and the smoothness of firm characteristics around the passing threshold, I confirm the validity of the close-call votes on governance proposals in this sample. In the local RD analysis, firms that narrowly win a governance proposal voting show significantly lower ex-ante tail risk in the following quarter, which supports the main hypothesis. Passing a governance proposal, on average, leads to a significant decrease in implied volatility smirk (IV_SKEW) and negative model-free implied skewness ($NMFIS$) in the following quarter. This effect is robust to different kernels, polynomial orders, lengths of bandwidths, optimal bandwidth selection methods, and alternative option measures reflecting firms' ex-ante tail risk. To make sure that the decrease in ex-ante tail risk comes not from reasons other than the passage of governance proposals, I further conduct placebo tests based on the Monte Carlo simulation with different artificial cutoffs and find further evidence to support the validity of the RD analysis.

Although the sample passes McCrary's (2008) discontinuity test before the RD analysis, it is still possible that the baseline results may be subject to the concern that the voting outcomes are intervened by managers (Bach and Metzger 2019). To alleviate this concern, I implement tests according to Bach and Metzger (2019). First, Bach and Metzger (2019) suggest researchers to exclude shareholder proposals submitted before 2003 because these proposals are more likely to diminish the power of McCrary tests. Following this suggestion, I find no discontinuity of votes

around the passing threshold in a restricted sample excluding proposals before 2003. Together with the evidence that the baseline results still hold in the sample without pre-2003 proposals, it is reasonable to believe that vote manipulation does not bias the RD estimation in the baseline analysis. Besides, Bach and Metzger (2019) introduce a refined version of the RD design that accounts for vote manipulation (Gerard, Rokkanen, and Rothe 2016). Different from the traditional RD test, this method estimates a treatment bound showing the interval of the local treatment effects. By this method, I find that the estimated treatment bounds are all on the negative side, meaning that the baseline results remain even in the presence of vote manipulation.

In a comprehensive analysis, I implement a variety of subsample tests across variables on other corporate governance mechanisms, firm performance, and information transparency. To investigate how shareholder proposals and other corporate governance mechanisms jointly affect the option market, I examine the cross-sectional effects of governance proposals on ex-ante tail risk across different corporate governance mechanisms. In subsample tests based on internal governance mechanisms, I find a stronger effect of governance proposals when firms suffer from weaker board monitoring, less shareholder engagement, and have a higher level of managerial risk-taking incentives. In tests by external governance mechanisms, firms with a lower level of stock market discipline and fewer threats from the market of corporate control decrease more in ex-ante tail risk after the passage of a governance proposal. These findings suggest an enhancement role of governance proposals in restricting managerial discretion and alleviating firms' future tail risk when other corporate governance mechanisms are less efficient. Further, I test the moderating role of profitability in the effect of governance proposals on ex-ante tail risk. Specifically, I observe that firms performing better in profitability and total sales are less affected in the option market by the passage of governance proposals. Given that shareholders are less likely to challenge well-

performed managers (Jensen and Murphy 1990, Jenter, Lewellen, and Denis 2021), this evidence is consistent with the argument that governance proposals decrease ex-ante tail risk by restricting managerial discretion. Finally, I examine the role of information transparency in the impact of governance proposals on option prices. I use two measures of information transparency from different sources: (1) analyst dispersion from financial analysts' expectations; and (2) MD&A readability from financial statements. Using these measures in the subsample tests, I observe consistent evidence that the effect of governance proposals on ex-ante tail risk is stronger for firms with higher information transparency, which is consistent with prior findings that information transparency facilitates corporate governance (Armstrong, Guay, and Weber 2010, Coles, Daniel, and Naveen 2008, Demsetz and Lehn 1985).

After that, I implement the following additional tests. First, I examine how voting for governance proposals affects option trading and find a decrease in O/S ratio, implied volatility, and option market liquidity of put options instead of call options, which suggests that the change in option skew may come from option trading activities in put options. Second, I test the residual part of ex-ante tail risk measures that can not be explained by realized tail risk and find that the passage of governance proposals affects the residual part of ex-ante tail risk instead of the predicted part, which supports that ex-ante tail risk measures indeed provides additional information in this work. Third, I investigate how specific governance proposals affect option prices. In this analysis, I observe that the effect of governance proposals on ex-ante tail risk mainly comes from proposals with the purpose of removing management entrenchment proposals, which suggests the prediction that governance proposals affect option prices through alleviating managerial discretion. By showing a higher probability of financial restatement in three years following the passage of governance proposals, I strengthen the link between governance proposal voting and ex-ante tail

risk and support that the passage of governance proposals decreases ex-ante tail risk by its disciplinary role in curbing extreme cases that lead to a downside crash. What is more, since the local RD analysis only provides a local treatment effect of governance proposals, it is important to know whether the baseline results can be extended out of the optimal bandwidths. Applying a global RD analysis, I observe that the negative effect of the passage of governance proposals on ex-ante tail risk remains for both option measures of ex-ante tail risk, which confirms the externality of baseline results.

This paper mainly contributes to three strands of literature. First, this paper extends the literature on corporate governance by showing how voting for governance proposals affects option prices and how other corporate governance mechanisms interplay with shareholder proposals in affecting the option market. Prior works document that corporate governance is priced in the stock market (Bebchuk, Cohen, and Ferrell 2009, Cuñat, Gine, and Guadalupe 2012, Gompers, Ishii, and Metrick 2003), bond market (Chen et al. 2020, Cremers, Nair, and Wei 2007, Klock, Mansi, and Maxwell 2005), and credit market (Ashbaugh-Skaife, Collins, and LaFond 2006). By examining the change of option measures after the passage of governance proposals, this paper shows that active intervention through shareholder proposals is priced in the option market. What is more, this paper is related to studies on shareholder proposals. Given that shareholder proposals that pass the majority threshold are very likely to be implemented by managers (Ertimur, Ferri, and Stubben 2010, Renneboog and Szilagyi 2011), the passage of these proposals provides an effective method to alleviate agency problems without the change of control (Gillan and Starks 2000). However, shareholders and creditors may not truly benefit from the passage of governance proposals if the increase in equity and credit values are compensations for the increased risks thereafter when managers are restricted by shareholders (Graham and Harvey 2001) or the increase

in firms' risk-taking under better corporate governance (John, Litov, and Yeung 2008). Using option-implied risk measures, this paper finds a negative effect of governance proposals on firms' future risk, which confirms the benefits for shareholders and creditors in this scenario. By exploiting the local randomness of shareholder proposal votes around the passing threshold, many works analyze the causal effect of corporate governance on firm value (Cuñat, Gine, and Guadalupe 2012), cost of capital (Chen et al. 2020), corporate financial reporting (Fan, Radhakrishnan, and Zhang 2020, Lin, Wei, and Xie 2020), and corporate innovation (Chemmanur and Tian 2018). Based on the same framework, this paper adds to this strand of literature by showing a causal effect of shareholder proposals in reducing firms' ex-ante tail risk as reflected in option prices, and shows how this impact is affected by other important corporate governance mechanisms.

Second, this paper contributes to option pricing literature by revealing a cross-sectional determinant of option anomalies. Black and Scholes (1973) assume that stock prices are lognormally distributed. However, empirical findings tend to reject this specification and find negatively skewed option prices. Black (1976) first attributes this pattern to firms' financial leverage, which is later on empirically supported and termed the leverage effect by Christie (1982). By constructing option pricing models with firm leverage, prior works find evidence to support this argument (e.g., Geske, Subrahmanyam, and Zhou 2016, Toft and Prucyk 1997). In this line of research, a work related to this paper is Dennis and Mayhew (2002) who examine the relation between a variety of firm characteristics and the implied volatility smirk. In addition, option implied volatility smirk is determined by factors including investor sentiment (Han 2008), short-selling cost (Atmaz and Basak 2019, Evans et al. 2009), product market competition (Morellec and Zhdanov 2019), political uncertainty (Kelly, Pástor, and Veronesi 2016), climate regulations

(Ilhan et al. 2021), financial statement comparability (Kim et al. 2016), analyst coverage (Kim, Lu, and Yu 2019), and financial reporting opacity (Kim and Zhang 2014). Different from these works, this paper uses two option variables on ex-ante risk and finds a causal effect of governance proposal voting on option prices in an RD framework.

Using the cost of option protection against potential downside tail risks to measure firms' expected tail risk, this paper also adds to the literature on corporate uncertainty (Bloom, Bond, and van Reenen 2007, Hassan et al. 2019, Pindyck 1988) and stock price crash risk (Kim et al. 2016, Kim, Lu, and Yu 2019, Kim and Zhang 2014). By showing a lower ex-ante tail risk after the passage of governance proposals, this paper suggests a positive role of governance proposals in alleviating investors' subjective expectations of firms' future uncertainty.

The remainder of this paper is organized as follows. Section 2 develops the theoretical hypothesis. Section 3 describes sample selection, variable construction, and empirical strategy. Section 4 reports the main empirical results on the effect of governance proposals on ex-ante tail risk. Section 5 examines the cross-sectional effects of governance proposals across other governance mechanisms, firm performance, and information transparency. Section 5 presents the results of additional tests. Section 7 concludes.

2 Hypothesis development

According to prior works, good corporate governance can mitigate firms' expected tail risk in the following two ways. First, from the prospect of corporate financing, good corporate governance lowers firms' default risk (Bhojraj and Sengupta 2003) and the possibility that firms suffer from the increase in the cost of equity (Albuquerque and Wang 2008, Chen, Chen, and Wei 2011) by monitoring managerial performance, mitigating agency costs, and reducing information asymmetry between firms and their stakeholders, which lowers the probability of extreme returns.

Second, managerial discretion (e.g., inefficient investment, earnings manipulation, bad news hoarding, and financial misconduct) is documented to increase firm-specific downward risk (Hutton, Marcus, and Tehranian 2009, Jensen 1986, Karpoff, Lee, and Vondracek 1999, Karpoff and Lott, Jr. 1993). Due to the importance of corporate governance in restricting managerial discretion (Fama 1980, Jensen 1986, Shleifer and Vishny 1997), firms with better corporate governance should have lower downside tail risk in the future.

Despite the nonbinding nature of shareholder proposals, due to reputation concerns, managers are very likely to implement shareholder proposals that win a majority vote, thus showing a nontrivial impact of shareholder proposals on corporate governance (Ertimur, Ferri, and Stubben 2010, Renneboog and Szilagyi 2011). Empirically, in S&P1500 firms, 40.0% of governance-related proposals were implemented in 2004, versus only 16.1% in 1997 (Ertimur, Ferri, and Stubben 2010). By enhancing firms' corporate governance, activism through shareholder proposals is value-increasing (Cuñat, Gine, and Guadalupe 2012). Therefore, the passage of governance proposals is expected to reduce firms' tail risk if these proposals improve firms' corporate governance.

Even though, it is still ambiguous whether and how such an impact can be reflected by the option market. If the passage of governance-related shareholder proposals is fully priced in the stock market and leads to a decrease in realized tail risks, the price of options may not reflect such an impact because the tail risks are already priced in the markets of both call and put options, which leads to the difference between call option price and put option price. However, if the passage of governance-related shareholder proposals is not fully priced in the stock market because of the "peso problem" (Bekaert, Hodrick, and Marshall 2001, Sill 2000), it is possible that the option market may reflect more forward-looking information that is not released in the stock market (Kim

and Zhang 2014).

Based on these arguments, if activism through shareholder proposals is efficient in curbing financing risks and managers' misconduct risks and this effect is not fully captured by the stock market, firms that narrowly pass the governance proposals are expected to have lower ex-ante tail risk implied in the option market than those that narrowly fail. I, therefore, have the following main hypothesis:

***Hypothesis 1.** The passage of governance-related shareholder proposals leads to a decrease in ex-ante tail risk reflected in the option market.*

3 Sample selection, variable construction, and empirical strategy

3.1 The sample

This sample comes from multiple sources. Option data is obtained from IvyDB OptionMetrics database. The data on shareholder proposals in annual meetings come from ISS Shareholder Proposals database. Financial data and short-selling data come from COMPUSTAT database. Stock market information comes from CRSP database. Analyst forecast data come from I/B/E/S database. Institutional investor holdings data come from Thomson Reuters Institutional (13f) Holdings database. Board information comes from BoardEx database. Merger and acquisition data are from SDC database. Managerial compensation data come from Execucomp database. Information on shareholder activism is collected from Audit Analytics Shareholder Activism database.

Each shareholder proposal included in this sample should meet the following requirements: (1) The proposal is identified as governance-related in ISS Shareholder Proposals database; (2) Two measures of ex-ante tail risk are available in the current and following quarters; (3) Basic financial and market data are not missing in the last quarter before the proposal voting; (4) There

are no important events (e.g., merger and acquisitions, CEO turnover, SEO and repurchase) happened in the voting and following quarters. For firms with multiple proposals in a quarter, I only include proposals with the maximal voting rate in the quarter into the sample (Fan, Radhakrishnan, and Zhang 2020). Measures of ex-ante tail risk are trimmed at the 1% and 99% levels to exclude outliers. Covariates are winsorized at the 1% and 99% levels. Finally, the sample contains 2,360 observations during 1997-2018. Figure 1 plots the number and average vote margin of governance proposals in this sample.

[Insert Figure 1 about here.]

As shown in Figure 1, significantly more shareholder proposals are included in the sample after 2003, which is consistent with prior works (Cuñat, Gine, and Guadalupe 2012, Lin, Wei, and Xie 2020). The negative average vote margin in most years suggests that shareholder proposals are more likely to fail due to managerial opposition (Bach and Metzger 2019).

3.2 Measures of ex-ante tail risk

Following extant literature (Ilhan et al. 2021, Kelly and Jiang 2014), I use two measures of ex-ante tail risk from the option market as dependent variables in the baseline analysis. The first measure captures the steepness of the implied volatility smirk. According to Xing, Zhang, and Zhao (2010), firm-specific implied volatility smirk is calculated as:

$$IV_SKEW = IV^{OTM\ Put} - IV^{ATM\ Call}$$

where $IV^{OTM\ Put}$ denotes the implied volatility measured by Black and Scholes (1973) for out-of-the-money (OTM) put options; $IV^{ATM\ Call}$ denotes the implied volatility (IV) measured by Black and Scholes (1973) for at-the money (ATM) call options. OTM puts are defined as put options with moneyness between 0.80 and 0.95, and ATM calls are defined as call options with moneyness between 0.95 and 1.05. Following prior works (Chan, Ge, and Lin 2015, Xing, Zhang,

and Zhao 2010), I require options to have an expiration period between 10 and 60 days to ensure the market liquidity of options. For firms with multiple satisfied puts (calls) at the same time, I average the puts IV (calls IV) weighted by options' moneyness. Since a higher IV_SKEW suggests higher demand for put options than call options (Bollen and Whaley 2004, Xing, Zhang, and Zhao 2010), prior literature uses IV_SKEW as a proxy for downside tail risk in finance literature (Chan, Ge, and Lin 2015, Xing, Zhang, and Zhao 2010). What is more, this variable is also used as a proxy for ex-ante crash risk in accounting literature (Kim et al. 2016, Kim and Zhang 2014).

The second measure comes from the individual model-free implied skewness ($MFIS$) measured according to the methodology of Bakshi, Kapadia, and Madan (2003).³ Different from IV_SKEW based on the Black-Scholes model, model-free implied skewness does not rely on any specific option pricing model. According to prior works (Bakshi, Kapadia, and Madan 2003, Morellec and Zhdanov 2019), model-free implied skewness as of time t measured over the period $[t, T]$ can be calculated as:⁴

$$MFIS(t, T) = \frac{e^{r(T-t)}W(t, T) - 3\mu(t, T)e^{r(T-t)}U(t, T) + 2(\mu(t, T))^3}{(e^{r(T-t)}U(t, T) - (\mu(t, T))^2)^{3/2}}$$

where $U(t, T)$, $W(t, T)$, and $X(t, T)$ are the prices of volatility, cubic, and quadratic contracts, and $\mu(t, T)$ denotes the risk-neutral expectation of log return of underlying stock:

$$\mu(t, T) = e^{r(T-t)} - 1 - \frac{e^{r(T-t)}}{2} U(t, T) - \frac{e^{r(T-t)}}{6} W(t, T) - \frac{e^{r(T-t)}}{24} X(t, T)$$

There are several benefits of using model-free implied skewness to estimate ex-ante skewness in the option market (Bakshi, Kapadia, and Madan 2003). First, different from IV_SKEW that only

³ Some papers also name it as risk-neutral skewness (Bali, Hu, and Murray 2013, Dennis and Mayhew 2002).

⁴ $MFIS$ is calculated by the Python code offered on Grigory Vilkov's website (<https://vilkov.net/index.html>). Detailed information on the construction of $MFIS$ is provided by Bakshi, Kapadia, and Madan (2003) and Morellec and Zhdanov (2019).

includes volatility smile at two points of options, *MFIS* extracts information from all available options, thus containing more information than *IV_SKEW*. Second, since *MFIS* does not rely on any option pricing models, it does not suffer from the potential misspecification of option pricing models.⁵ What is more, the calculation of *MFIS* only requires inputs from option prices which are easier to obtain. In the baseline analyses, model-free implied skewness is estimated using options with 30 days to maturity to make sure that the estimates of *MFIS* can promptly reflect investors' beliefs on ex-ante tail risk in the option market. In the robustness tests, I also use *MFIS* with alternative horizons (e.g., 91 days and 181 days) as dependent variables and get similar results. Following Chen, Hong, and Stein's (2001) construction of negative conditional skewness (*NCSKEW*), I put a negative sign in front of *MFIS* to have a negative model-free implied volatility (*NMFIS*) as the dependent variable so that an increase in *NMFIS* or *IV_SKEW* corresponds to a higher downside tail risk (e.g., have a more left-skewed distribution).

In this paper, I use firm-quarter measures of ex-ante tail risk to estimate the reaction of options markets to avoid market noises.⁶ In addition, I also use the percentiles of *IV_SKEW* and *NMFIS* as dependent variables in the robustness tests to alleviate the concern that the results are driven by extreme values of the two option measures.

3.3 Governance proposals and regression discontinuity design

By exploiting the voting outcomes of contentious shareholder proposals that pass or fail by a narrow margin, I use an RD design to establish the causal link between voting for governance proposals and ex-ante tail risk implied in the option market. Different from management-sponsored proposals, shareholder proposals can not be strategically removed by managers (Listokin 2008).

⁵ For example, since the Black-Scholes model calculates the price of European options, using implied volatility based on this model in analyzing U.S. option prices brings a lot of noise.

⁶ Since the high diversification of option contracts, option markets may generate more noises in a short run due to market illiquidity. The results are similar but weaker when firm-month measures are used.

Therefore, the vote distribution of shareholder proposals is less likely to be affected by managers' manipulation (Cuñat, Gine, and Guadalupe 2012, Cuñat, Gine, and Guadalupe 2016, Lin, Wei, and Xie 2020). Together with the difficulty to change the vote share by a small margin around cutoffs (Cuñat, Gine, and Guadalupe 2012), this framework provides a locally random assignment for close-call proposals to treatment (passed proposals) or control (failed proposals) groups. Following Cuñat, Gine, and Guadalupe (2012), I only focus on governance-related shareholder proposals identified in ISS voting data to examine the effect of activists' intervention in corporate governance.⁷ Because unobserved confounding factors can be ruled out as long as their effect is continuous around the threshold (Cuñat, Gine, and Guadalupe 2012) and the passage of shareholder proposals significantly increases the probability of proposal implementation (Ertimur, Ferri, and Stubben 2010), votes on governance proposals provide an ideal quasi-natural experiment to identify the effect of shareholder activism in governance problems.

In the additional tests, I investigate the effect of governance proposals on ex-ante tail risk across specific types of proposals. Following prior works (Cuñat, Gine, and Guadalupe 2012, Fan, Radhakrishnan, and Zhang 2020, Lin, Wei, and Xie 2020), I categorized the proposals into proposals aiming to remove management entrenchment provisions and proposals for other purposes. A proposal is identified to restrict management entrenchment if it aims to remove anti-takeover provisions, enhance board independence, and reform voting rules to restrict executive power. The rest of the governance proposals are identified as proposals for other purposes. Appendix Table A2 provides the distribution of proposals by resolution type.

3.4 Empirical strategy

Following prior papers (Chemmanur and Tian 2018, Lin, Wei, and Xie 2020), I estimate the

⁷ Some papers also use social-related proposals to investigate the impact of corporate social responsibility on firm performance and competing firms' SRI strategies (Flammer 2015, Cao, Liang, and Zhan 2019).

local average treatment effect (LATE) of governance proposals on ex-ante tail risk by the estimation model based on the following specification:

$$OptVar_{i,t+1} = \beta Pass_{it} + \sum_{j=1}^P \gamma_j^{Left} (v_{it} - v^*)^j + \sum_{j=1}^P \gamma_j^{Right} (v_{it} - v^*)^j Pass_{it} + \mu_{it} \quad (1)$$

where i indexes firm and t indexes quarter; $OptVar$ denotes two option measures (IV_SKEW and $NMFIS$); $Pass$ is an indicator that equals one if the vote margin ($v-v^*$) for a shareholder proposal is higher than 0, where v and v^* denote the voting rate and passing threshold. The results are estimated by regression models with three types of kernels (Triangular kernel, Epanechnikov kernel, and Uniform kernel) and polynomial orders of 1, 2, and 3. Following Imbens and Kalyanaraman (2012), I use the asymptotic mean squared error optimal bandwidth selection method to estimate the optimal bandwidth. Since a firm may have multiple shareholder proposals during the sample period, standard errors are adjusted for heteroskedasticity and clustered by firm to allow for correlation within a firm.

3.5 Validation tests

The validity of an RD design relies on two assumptions (Cuñat, Gine, and Guadalupe 2012, Lee and Lemieux 2010). First, RD requires that no manipulation exists around the threshold. To test this assumption, I examine the continuity of the vote distribution in this sample according to the method proposed by McCrary (2008). Figure 2 plots the density of the vote margins for governance proposals in this sample.

[Insert Figure 2 about here.]

As shown in Figure 2, there is no significant discontinuity at the zero vote margin, suggesting that the votes are not systematically manipulated. This evidence is consistent with the argument that shareholder proposals are less likely to be manipulated (Cuñat, Gine, and Guadalupe 2012).

Second, the RD test requires covariates to be similar between treatment and control groups

around the cutoff (Lee and Lemieux 2010). To test this assumption, I compare the pre-existing differences in firm characteristics between the treated and control firms in a [-10%,10%] bandwidth around the zero vote margin. Following prior works (Cuñat, Gine, and Guadalupe 2012, Lin, Wei, and Xie 2020, Morellec and Zhdanov 2019), I include the following firm characteristics as covariates: book-to-market ratio (*BM*), market value of equity (*MVE*), book leverage (*LEV*), investment (*INV*), tangibility (*TAN*), return of assets (*ROA*), stock return (*RET*), stock volatility (*SIGMA*), analyst dispersion (*DISP*), and analyst coverage (*NAN*). Detailed definitions of these variables are provided in Appendix Table A1. Panel A of Table 1 shows the summary statistics of dependent variables and firm characteristics.

[Insert Table 1 about here.]

From Panel A of Table 1, I find that the sample means of both option measures are positive during the sample period (0.0417 for *IV_SKEW* and 0.5571 for *NMFIS*). Given a higher value of option measures is correspondent to higher ex-ante tail risk, this evidence suggests that the return distributions of individual stocks are, on average, left-skewed, which is consistent with prior works (Conrad, Dittmar, and Ghysels 2013, Xing, Zhang, and Zhao 2010). Panel B of Table 1 shows the pre-existing differences in covariates between the treated and control firms in the [-10%,10%] bandwidth. Panel C of Table 1 shows the pre-existing differences in dependent variables between the treated and control firms in the [-10%,10%] bandwidth. Since there is no significant difference in both firm characteristics and option measures between treatment and control groups before the shareholder proposal voting, this sample satisfies the smoothness assumption. Overall, these results together provide evidence to support the validity of this RD design.

4 Main results

4.1 Graphical analysis

Before RD analysis, I first plot the raw data to visually examine whether there is a discontinuity in option measures around the passing threshold. Figure 3 reports regression discontinuity plots on two option measures using a fitted quadratic polynomial estimate with a 95% confidence interval around the fitted value. The x-axis shows the percentage of votes.

[Insert Figure 3 about here.]

Figure 3 shows a significant discontinuity in *IV_SKEW* and *NMFIS* at the threshold in the following quarter after the vote on governance proposals, which provides preliminary results on the effect of governance proposals on option prices.

4.2 Baseline results

After a basic graphical examination on the effect of governance proposals, I move on to more rigorous RD tests based on Equation (1).

[Insert Table 2 about here.]

In Columns (1)-(3) in panels of Table 2, where the dependent variable is *IV_SKEW*, the coefficient estimates of *Pass* are all negative and statistically significant across different kernels and polynomial orders. In terms of economic magnitude, firms that narrowly pass a governance proposal have a 0.0091 lower value of *IV_SKEW* in the following quarter than those that narrowly fail. Since this magnitude is about 20% of the sample mean of *IV_SKEW*, the coefficient on *Pass* is both statistically significant and economically meaningful. Similarly, in Columns (4)-(6) in panels of Table 2, where the dependent variable is *NMFIS*, the coefficient estimates of *Pass* are also negatively significant and economically meaningful. These findings suggest a negative impact of governance proposals on ex-ante tail risk reflected in options markets, which supports the main prediction.

4.3 Robustness tests

Next, I conduct a series of tests to examine the robustness of the baseline results. First, I estimate the local average treatment effects of shareholder voting outcomes when adopting different lengths of optimal bandwidth based on asymptotic mean squared error optimal bandwidth selection method across different kernel functions with linear polynomials. Panel A of Table 3 shows the results.

[Insert Table 3 about here.]

As shown in Panel A of Table 3, the coefficients of interest remain across different kernels and different lengths of optimal bandwidth. To provide further evidence that the baseline results are not driven by the selection of optimal bandwidth, I follow prior works (Bradley, Kim, and Tian 2017) and repeat the RD regression for alternative bandwidths around the passing threshold. Figure 4 reports RD estimates with a spectrum of bandwidths using local linear regressions with the choice of optimal bandwidth based on Imbens and Kalyanaraman (2012). In all these tests, I reestimate Equation (1) with linear polynomial and triangular kernel.

[Insert Figure 4 about here.]

From Figure 4, I find that the negative coefficients remain over the spectrum of bandwidth choices, which further suggests that the baseline results are robust to different lengths of Imbens-Kalyanaraman (IK) optimal bandwidth.

Second, I test whether the baseline results are driven by specific bandwidth selection methods. Specifically, I apply asymmetric mean square error (*AsyMSE*) in Imbens and Kalyanaraman (2012), symmetric coverage error rate (*CER*), and asymmetric coverage error rate (*AsymCSR*) in Calonico, Cattaneo, and Titiunik (2014) as alternative selection methods of optimal bandwidth. Panel B of Table 3 reports the local average treatment effects when using alternative bandwidth selection methods across different polynomials with the triangular kernel. As shown in Panel B of Table 3,

the baseline results are robust to different bandwidth selection methods. Taken results shown in Panels A and B together, the baseline results are robust to bandwidth selections.

What is more, I use alternative option-implied measures as dependent variables. To make sure that the baseline results are not driven by extreme values, I use percentile measures of *IV_SKEW* and *NMFIS* as dependent variables. For convenience, the percentile measures are scaled by 100. Panel C of Table 3 shows the results. Further, I test whether the results for *NMFIS* are robust to different estimation horizons and show the results in Panel D of Table 3. *NMFIS_91*, and *NMFIS_181* denote the negative model-free implied skewness estimated in the 91-day and 181-day horizons, respectively. In Panels C and D, the coefficients of interest are all negatively significant across these dependent variables, which further confirms the robustness of baseline results.

4.4 Placebo tests

To make sure that the decrease in *IV_SKEW* and *NMFIS* comes not from reasons other than the passage of governance proposals, I implement 400 replications using different artificial cutoffs between [-20%, 20%] interval of vote margin by a 0.001 step length. Figure 5 shows the histogram of the pseudo estimates.

[Insert Figure 5 about here.]

From Figure 5, I observe that the actual estimate for *IV_SKEW* (denoted by the vertical line in Panel A of Figure 5) is lower than the 5% percentile of the distribution of the pseudo estimates. Together with similar results for *NMFIS*, these findings suggest that the baseline results are less likely to happen because of reasons other than the passage of a governance proposal.

4.5 Vote manipulation concern

According to Bach and Metzger (2019), the effect of proposals may be subject to the concern

that the voting outcomes are not randomly drawn due to managerial intervention, which invalidates the RD design. Following Bach and Metzger's (2019) suggestions, I conduct two tests to examine whether proposals in the sample are systematically manipulated or not and whether the baseline results still hold after considering vote manipulation.

First, according to Bach and Metzger (2019), the inclusion of proposals before 2003 may diminish the power of McCrary tests because there is no significant discontinuity in the density of these proposals. Therefore, I exclude proposals before 2003 to see whether there is systematic vote manipulation in proposals after 2003. In the McCrary plot shown in Figure 6, there is no significant discontinuity around the cutoff in the restricted sample with proposals after 2003, meaning that proposals in the sample are less likely to suffer from vote manipulation after 2003.

[Insert Figure 6 about here.]

Then, I reestimate Equation (1) in the restricted sample to see whether the baseline results are driven by proposals before 2003. As shown in Panel A of Table 4, the coefficient estimates of *Pass* remain significant, suggesting that the baseline results are not biased due to the inclusion of pre-2003 proposals.

[Insert Table 4 about here.]

After showing that the sample is less likely to suffer from vote manipulation according to the McCrary test, I further implement a refined method (Gerard, Rokkanen, and Rothe 2016) to estimate the treatment effect of proposals as suggested by Bach and Metzger (2019). By estimating the bounds of treatment effects, a refined RD analysis proposed by Gerard, Rokkanen, and Rothe (2016) provides credibly causal but less powerful estimations of the treatment effect when accounting for vote manipulation. The confidence interval is estimated by a bootstrap method for 500 times, and the Triangular kernel is used as the estimating kernel. Panel B of Table 4 shows the

results. The treatment bounds and 90% confidence interval on bounds shown in Panel B indicate that our baseline results remain even when vote manipulation is considered. By doing the above tests, I further confirm the validity of this RD setting and support the main hypothesis.

5 Cross-sectional effects

To lend further credence to the main hypothesis, I implement a variety of subsample tests by variables on other corporate governance mechanisms, firm performance, and information transparency. If governance proposals decrease ex-ante tail risk by restricting managerial discretion, the effect of governance proposals should be stronger when firms suffer from weakened corporate governance (Shleifer and Vishny 1997), when agency conflicts are alleviated by better firm performance (Graham, Harvey, and Rajgopal 2005), and when higher information transparency facilitates corporate governance (Demsetz and Lehn 1985).

5.1 Corporate governance mechanisms

If governance proposals decrease firms' ex-ante tail risk by restricting managerial discretion, passing a proposal is expected to result in a greater impact on options markets when firms suffer from more severe agency problems. To examine this prediction, I investigate the cross-sectional effects of governance proposals on ex-ante tail risk measures across different governance mechanisms.

5.1.1 Internal governance mechanisms

First, I examine the cross-sectional effects of shareholder proposals on ex-ante tail risk across alternative internal governance mechanisms including board governance, managerial incentives, and shareholder governance.

Board governance. Since the board of directors can exert a monitoring effect on managers, managers are less likely to deviate from shareholders' interests under greater pressure from

directors (Fama and Jensen 1983). Based on this argument, the passage of governance proposals will exert a greater impact on firms' ex-ante tail risk for firms with worse board monitoring. Since a board with more co-opted directors who are appointed after the CEO's appointment is more connected with the manager (Coles, Daniel, and Naveen 2014), firms with more co-opted directors will suffer from weakened board governance, which in turn increases managerial discretion. Therefore, I test this prediction by using subsample tests based on the rate of co-opted directors. This rate ranges between 0 and 1, with an increase in its value indicating a decrease in board monitoring.

[Insert Table 5 about here.]

From Table 5, the coefficient estimates of *Pass* are larger in magnitude and more significant in the High co-opted rate group than those in the Low co-opted rate group, meaning that passing a governance proposal triggers a higher decrease in firms' ex-ante tail risk for firms with weaker monitoring power of boards. This evidence is consistent with the above prediction and suggests a moderating role of board governance in the relation between governance proposals and option prices.

Managerial incentives. According to Core and Guay (2002), firms with higher managerial risk-taking incentives are prone to make more risky investments and increase firms' uncertainty in the future, which finally intensifies the cost of managerial discretion. Therefore, if the passage of governance proposals decreases firms' tail risk by restricting managerial discretion, the effect of governance proposals would be more powerful for firms with higher managerial risk-taking incentives. Table 6 presents the results of subsample tests based on managerial risk-taking incentives measured by the executive-average *Vega* (Coles, Daniel, and Naveen 2006, Core and Guay 2002).

[Insert Table 6 about here.]

In Panel A of Table 6, the coefficient estimates of *Pass* are significant across both option measures. However, in Panel B, the coefficient estimates of *Pass* do not show any significance. Besides, the coefficient estimates on *Pass* are larger in Panel A than those in Panel B. Therefore, these findings are consistent with the above prediction and support the main hypothesis.

Shareholder governance. Institutional investors play one of the most important roles in corporate governance (Shleifer and Vishny 1986, Shleifer and Vishny 1997). Since firms under greater monitoring of institutional investors should have less managerial discretion, the impact of shareholder proposals is expected to be stronger when firms suffer from weaker monitoring of institutional investors. To test this prediction, I use three measures to capture different aspects of shareholder governance. First, I implement a subsample analysis based on institutional blockholder ownership, where blockholders are defined as 13F investors holding over 5% of firms' shares outstanding. Second, breadth of ownership is used as the separating variable (Chen, Hong, and Stein 2002). Based on the evidence that firms experiencing shareholder campaigns receive greater monitoring pressure from shareholders, I further test the moderating effect of shareholder activism by splitting the sample into two groups based on whether the firm has experienced at least one shareholder campaign in the past 3 years before the proposal voting (Brav et al. 2008, Klein and Zur 2009). Following prior works (Brav et al. 2008, Klein and Zur 2009), a shareholder campaign is defined as the investors' submission of Schedule 13D filings to the SEC. Table 7 shows the results.

[Insert Table 7 about here.]

In Panels A and B of Table 7, the coefficient estimates of *Pass* are higher for firms with lower blockholder ownership than those with higher blockholder ownership, suggesting that the effect

of passing a governance proposal is stronger when firms suffer from weaker blockholder monitoring. Panels C and D show that firms with lower breadth of block ownership decrease more in ex-ante tail risk, which provides consistent results as those in Panels A and B. In the rest panels of Table 7, the coefficient estimates of *Pass* are negative and significant in Panel F, while those in Panel E do not show any significant results, which suggests a moderating role of activist shareholders in the effect of passing a governance proposal on firms' ex-ante tail risk. Overall, from different aspects of shareholder governance, the results of the three subsample tests consistently support the prediction that passing a governance proposal has a greater impact on firms' ex-ante tail risk when firms suffer from weaker monitoring of shareholders.

5.1.2 External governance mechanisms

Next, I investigate the cross-sectional effects of governance proposals on ex-ante tail risk across different external governance mechanisms such as the stock market (Massa, Zhang, and Zhang 2015) and the market of corporate control (Jensen and Ruback 1983, Manne 1965).

Stock market discipline. According to prior literature, short selling has a disciplinary effect on managers' behavior, such as earnings management and M&A decisions (Chang, Lin, and Ma 2019, Massa, Zhang, and Zhang 2015). If short selling restricts managerial discretion, firms with less pressure from short-selling should experience a larger decrease in ex-ante tail risk after the passage of governance proposals. To investigate the stock market discipline through short-selling, I apply a subsample test based on short-selling exposure measured as short interest ratio. Following prior literature (Massa, Zhang, and Zhang 2015), a higher short interest ratio, which is defined as the short interest divided by the share outstanding, indicates an increase in short-selling exposure. Panels A and B of Table 8 show the results.

[Insert Table 8 about here.]

As shown in Panels A and B, the coefficient estimates of *Pass* are larger in magnitude and more significant for firms with lower short-selling exposure, which suggests that the effect of governance proposals on ex-ante tail risk is stronger for firms that have weaker stock market discipline from short sellers.

Market of corporate control. The market of corporate control has long been regarded as an effective governance mechanism to restrict managerial opportunism (Jensen and Ruback 1983, Manne 1965). Therefore, firms facing fewer threats from the market of corporate control are expected to suffer more from managerial discretion and have a larger decrease in ex-ante tail risk after the passage of governance proposals. To test this prediction, I perform a subsample test based on the median value of takeover risk measure (Cremers, Nair, and John 2009, He and Tian 2013) that proxies for threats from the market of corporate control.

Panels C and D of Table 8 present the results of subsample tests based on threats from the market of corporate control. In these panels, the coefficient estimates for both *IV_SKEW* and *NMFIS* are higher in magnitude and more significant for firms in the low takeover risk group than those in the high takeover risk group, which implies that the effect of passing a governance proposal on ex-ante tail risk is stronger when firms receive less effective governance from the market of corporate control.

To sum up, by testing the effects of the passage of a governance proposal on firms' ex-ante tail risk across different internal and external governance mechanisms, this paper suggests a stronger effect of corporate governance on firms' ex-ante tail risk when firms suffer from weaker corporate governance, which usually indicates greater managerial discretion.

5.2 Firm Performance

As implied in prior works (Graham, Harvey, and Rajgopal 2005, Jensen and Murphy 1990,

Jenter, Lewellen, and Denis 2021), shareholders exert fewer engagements to managers when firms perform well. Therefore, if the effect of passing a governance proposal on ex-ante tail risk comes from restricting managerial discretion, the option market's response to the passage of governance proposals will be less intensive for firms with better performance. To test this prediction, I first conduct a subsample test based on firms' profitability, which is measured as the firm's return of assets (*ROA*) in the last quarter.

[Insert Table 9 about here.]

As shown in Panels A and B of Table 9, firms with higher *ROA* have a smaller decrease in *IV_SKEW* and *NMFIS* in the following quarter, which suggests a weaker negative impact of corporate governance on firms' ex-ante tail risk when firms' profitability is higher. Further, I conduct another subsample test based on total sales measured by a firm's total sales scaled by total assets. As shown in Panels C and D of Table 9, the coefficient estimates are lower in absolute value and less significant for firms with higher sales, thus suggesting a weaker impact of governance proposals on ex-ante tail risk when firms perform well in sales. Taken together, these findings suggest a moderating role of firm performance in the effect of governance proposals on ex-ante tail risk.

5.3 Information transparency

Finally, I examine the role of information transparency in the impact of the passage of a governance proposal on firms' ex-ante tail risk by conducting subsample tests based on different measures on information transparency. Since higher information transparency decreases the cost of monitoring (Armstrong, Guay, and Weber 2010, Coles, Daniel, and Naveen 2008, Demsetz and Lehn 1985), firms with higher information transparency are expected to have lower ex-ante tail risk after the passage of governance proposals. I use two information transparency measures from

different sources: (1) analyst dispersion from analysts' expectations (Gu and Wu 2003); and (2) MD&A readability from financial statements (Lehavy, Li, and Merkley 2011). Analyst dispersion is measured as the standard deviation of individual analysts' earnings forecasts scaled by the stock price at the end of the fiscal year. Firms' MD&A readability is the Dale-Chall readability score (Dale and Chall 1948) of the Management's Discussion and Analysis (Item 7) part of the 10-K filing in each firm-year. According to prior literature, lower analyst dispersion and MD&A readability indicate higher information transparency (Boone and White 2015, Gu and Wu 2003, Lehavy, Li, and Merkley 2011, Leuz, Nanda, and Wysocki 2003).

[Insert Table 10 about here.]

From Table 10, I find a larger magnitude and higher significance in coefficient estimates of *Pass* for both *IV_SKEW* and *NMFIS* in low analyst dispersion and low MD&A readability groups. These findings suggest that information transparency facilitates corporate governance in decreasing firms' ex-ante risk after the passage of governance proposals.

6 Additional Tests

6.1 Governance proposal voting and option trading activities

After testing the effect of passing a governance proposal on firms' ex-ante tail risk, I examine how voting for governance proposals affects ex-ante tail risk by testing option trading activities. Following prior works (Mayhew 2002, Roll, Schwartz, and Subrahmanyam 2010), I test the change in O/S ratio, implied volatility, and option market liquidity in the quarter after the passage of governance proposals. O/S ratio is measured as the option trading volume scaled by stock trading volume (Roll, Schwartz, and Subrahmanyam 2010). Implied volatility is based on Black-Scholes formula (Black and Scholes 1973). Option market liquidity is measured as the negative value of the bid-ask spread in the option market (Mayhew 2002).

[Insert Table 11 about here.]

As shown in Table 11, the passage of governance proposals does not affect option trading measures in all options and call options but significantly affects those in put options. Specifically, firms that narrowly pass the governance proposals show a significant decrease in O/S ratio, implied volatility, and option market liquidity, meaning that the passage of governance proposals leads to decreased trading in put options. These findings suggest that the decrease in ex-ante tail risk mainly comes from trading activities in put options.

6.2 Does ex-ante tail risk provide unique information?

To alleviate the concern that ex-ante tail risk may not provide unique information given materialized tail risk, I future separate ex-ante tail risk measures into two parts and examine how the passage of governance proposals affects the predicted and unpredicted parts of ex-ante tail risk given the realized tail risk reflected in the stock market (Kim, Lu, and Yu 2019, Kim and Zhang 2014). First, I regress the ex-ante tail risk measures (*IV_SKEW* or *NMFIS*) on stock price crash risk measures (*NCSKEW* and *DUVOL*) in the following model:

$$OptVar_{i,t} = \alpha + \beta_1 NCSKEW_{i,t} + \beta_2 DUVOL_{i,t} + \varepsilon_{i,t} \quad (2)$$

where *NCSKEW* and *DUVOL* are measured by papers on stock price crash risk (Chang, Chen, and Zolotoy 2017, Kim, Li, and Zhang 2011). By conducting this regression, I separate the ex-ante tail risk measures into two parts: (1) the predicted part that can be explained by realized tail risk (*PRE_IV_SKEW* and *PRE_NMFIS*), and (2) the unpredicted part that can not be captured by realized tail risk (*RES_IV_SKEW* and *RES_NMFIS*). Table 12 shows the results when the dependent variables are the predicted and unpredicted parts of ex-ante tail risk.

[Insert Table 12 about here.]

In Panel A of Table 12, the coefficient estimates of *Pass* are negative and significant when

the dependent variable is the unpredicted part of IV_SKEW but not significant for predicted part of IV_SKEW , meaning that the baseline results mainly come from the part that can not be explained by realized tail risk in the stock market. Panel B of Table 12 shows similar results when the dependent variables are PRE_NMFIS and RES_NMFIS . Taken together, these results support that, under the passage of governance proposals, ex-ante tail risk reflected in the option market indeed provides unique information that can not be explained by realized tail risk (Kim and Zhang 2014).

6.3 Types of governance proposals

Next, I further examine how the passage of proposals affects ex-ante tail risk across proposals aiming to remove managerial entrenchment provisions and proposals for other purposes. I identify a governance proposal as a proposal aiming to remove managerial entrenchment provisions if it is categorized as antitakeover, board, and voting proposals in the list of Lin, Wei, and Xie (2020). Appendix Table A2 shows the distribution of governance proposals in this study across resolution types. Table 13 shows the results for proposals aiming to restrict managerial entrenchment provisions and proposals for other purposes.

[Insert Table 13 about here.]

In Panel A of Table 13, the coefficient estimates of $Pass$ are negative and significant for both IV_SKEW and $NMFIS$, meaning that the restriction of managerial entrenchment alleviates investors' ex-ante concerns on firms' future tail risk. In Panel B, the insignificant coefficient estimates on $Pass$ indicate that the option market responds less intensively to other governance. Overall, these findings suggest that option market has a more intense response to proposals that aim to remove management entrenchment provisions, which supports the main argument that voting for governance proposals is priced in the option market by alleviating managerial discretion.

6.4 Governance proposal voting and extreme losses: evidence from restatements

To strengthen the link between voting for governance proposals and ex-ante tail risk, I future conduct additional analysis to examine how the passage of governance proposals decreases ex-ante tail risk. In this test, financial restatement is used as an extreme case because it is rare and often associated with a huge loss in shareholder wealth (Chen, Cheng, and Lo 2013, Kravet and Shevlin 2010). There are two outcome variables used in this analysis: (1) an indicator that equals one if the firm experiences financial restatements in the following three years after governance proposal voting (*Restatement_3yrs*), and (2) the number of financial restatements in the following three years after governance proposal voting (*#Restatement_3yrs*).⁸

[Insert Table 14 about here.]

As shown in Panel A of Table 14, firms that narrowly pass the governance proposals are more likely to have financial restatements in the following three years. By restricting governance proposals to those that aim to remove management entrenchment provisions, the results remain for both outcome variables. These findings strengthen the link between governance proposal voting and ex-ante tail risk and support that the passage of governance proposals decreases ex-ante tail risk by its disciplinary role in curbing extreme cases that lead to a downside crash.

6.5 External validity: Global regression discontinuity design

Since results in local RD analyses only estimate the local average treatment effect of shareholder proposals around the cutoff, it is unknown whether the baseline results are still valid outside of the optimal bandwidth. Following extant literature (Cuñat, Gine, and Guadalupe 2012, Fan, Radhakrishnan, and Zhang 2020), I implement a global RD analysis in the global interval based on the following regression specification:

⁸ Information on financial restatements comes from Audit Analytics.

$$\begin{aligned}
OptVar_{i,t+1} = & \beta Pass_{it} + \sum_{j=1}^P \gamma_j^{Left} (v_{it} - v^*)^j + \sum_{j=1}^P \gamma_j^{Right} (v_{it} - v^*)^j Pass_{it} \\
& + \gamma Controls_{it} + Year FE + Industry FE + \varepsilon_{it}
\end{aligned} \tag{3}$$

where $Pass$ is an indicator that equals one if the vote margin ($v-v^*$) for a shareholder proposal is higher than 0, where v and v^* denote the voting rate and passing threshold. The model is estimated by regression models with polynomial orders of 1, 2, and 3. Year and industry fixed effects are included to control for year- and industry-invariant factors. Industries are classified by Fama-French 12 Classification (Fama and French 1997). Control variables are covariates shown in Table 1. Standard errors are adjusted for heteroskedasticity and clustered by firm. Table 14 reports the results.

[Insert Table 15 about here.]

From Panel A of Table 15, when the dependent variable is IV_SKEW , the coefficient estimates of $Pass$ are negative and significant at 1% level across different polynomial orders and whether control variables are included. In terms of economic magnitude, firms passing governance proposals, on average, have a 0.004 decrease in IV_SKEW , which is smaller than that in the local RD analysis due to the intervention outside of the optimal bandwidth. Nevertheless, these coefficients are still statistically significant and economically meaningful considering the sample mean of IV_SKEW (0.0417). Similarly, as shown in Panel B of Table 14, when the dependent variable is $NMFIS$, the coefficient estimates of $Pass$ are also statistically significant and economically meaningful. Therefore, the results in the global RD analysis support the external validity of the negative and significant impact of passing a governance proposal on ex-ante tail risk reflected in option prices.

7 Conclusion

By exploiting the local randomness of votes around the passing threshold, this paper finds a

causal effect of governance proposals in reducing ex-ante tail risk implied by option prices and documents that voting for governance proposals is priced in the option market. In cross-sectional tests, this effect is stronger for firms with weaker corporate governance in different mechanisms (i.g., board, shareholder, stock market, and the market of corporate control) and is weaker when firms perform well in profitability and total sales. Also, I observe an amplifying role of information transparency in the effect of governance proposals on ex-ante tail risk, which is consistent with prior works documenting the role of information in facilitating corporate governance (Armstrong, Guay, and Weber 2010, Coles, Daniel, and Naveen 2008, Demsetz and Lehn 1985). In tests on option trading, the passage of governance proposals leads to a significant decrease in O/S ratio, implied volatility, and option market liquidity of put options instead of call options, which suggests that the change in option skew mainly comes from trading activities in put options. By separating the ex-ante tail risk measures into two parts, I find that the impact of governance proposals mainly comes from the residual part of ex-ante tail risk measures that can not be explained by realized tail risk reflected in the stock market. This evidence supports that option market indeed provides additional information on firms' future tail risk. Furthermore, the impact mainly comes from proposals aiming to remove management entrenchment provisions, which further supports that voting for governance proposals is priced in the option market by restricting managerial discretion. Evidence from financial restatement in the following three years after the passage of governance proposals strengthens the link between governance proposal voting on ex-ante tail risk. Finally, the global RD analysis provides further evidence to confirm the external validity of the baseline results. Overall, this paper contributes to the literature by establishing a causal link between voting for governance proposals and option prices. By showing that governance proposals decrease firms' ex-ante tail risk, this paper finds a corporate governance determinant of option prices and suggests

a positive role of shareholder proposals in alleviating investors' expected uncertainty, which further extends our understanding of how corporate governance benefits shareholders.

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Figure 1
Governance-Related Shareholder Proposals in the Sample

This figure plots the number and average vote margin of governance-related shareholder proposals in this sample. The data on shareholder proposals come from ISS Shareholder Proposals database. The shareholder proposals included in this sample must meet the following requirements: (1) The proposal has the maximal voting rate in the quarter; (2) Basic financial and market data are not missing in the last quarter before the proposal; (3) Two option measures are available in the current and following quarters; (4) There are no important events (e.g., merger and acquisitions, CEO turnover, SEO and repurchase) happened in the voting and following quarters. Option measures on ex-ante tail risk are trimmed at 1% and 99% levels. Finally, the sample contains 2,360 observations during 1997-2018.

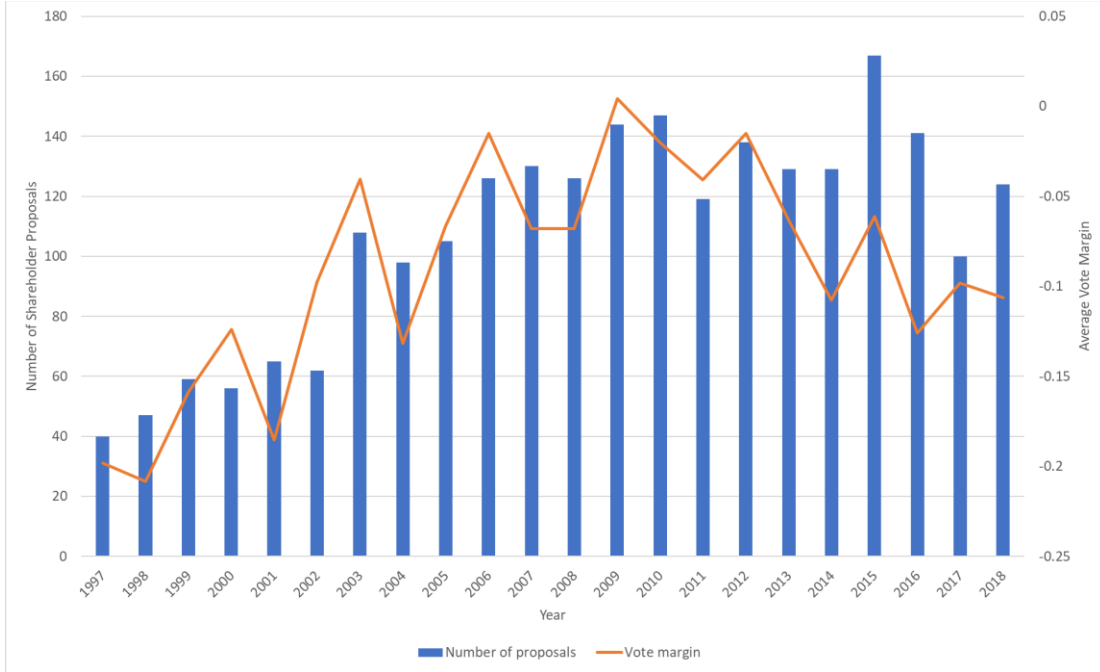


Figure 2
Density of Vote Margins for Governance-related Shareholder Proposals

This figure plots the density of the vote margins for governance-related shareholder proposals in this sample, following the method proposed by McCrary (2008). The x-axis shows the vote margin. The y-axis shows the density estimates. Each dot denotes the density estimates of the proposal groups in each 1% local range of the vote margin as shown on the y-axis. The solid lines show the fitted density function of the percentage of votes with a 95% confidence interval around. The x-axis ranges from -50% to 50%.

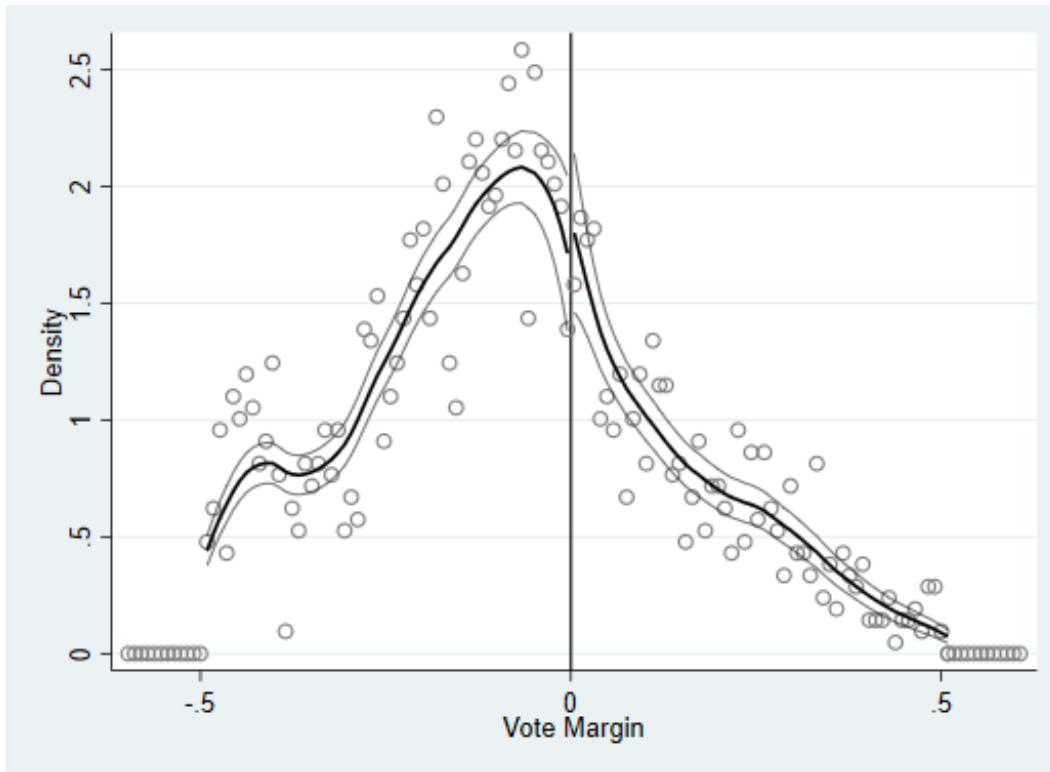
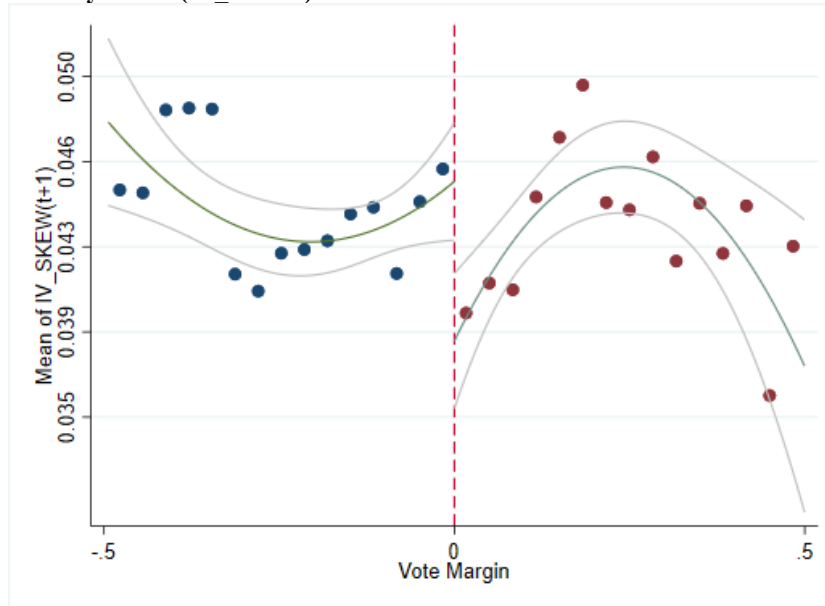


Figure 3
Regression Discontinuity Plot on Option measures

This figure reports regression discontinuity plots on option measures using a fitted quadratic polynomial estimate with a 95% confidence interval around the fitted value. The x-axis shows the percentage of votes. The y-axis shows the value of option measures one quarter after the voting of shareholder proposals. Panel A shows the results for implied volatility smirk (*IV_SKEW*). Panel B shows the results for negative model-free implied skewness (*NMFIS*).

Panel A: Implied volatility smirk (*IV_SKEW*)



Panel B: Negative model-free implied skewness (*NMFIS*)

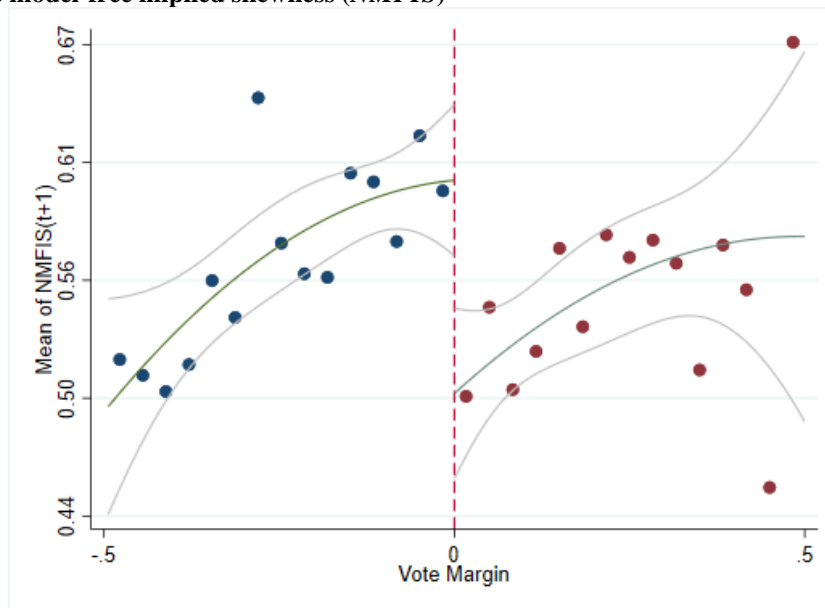
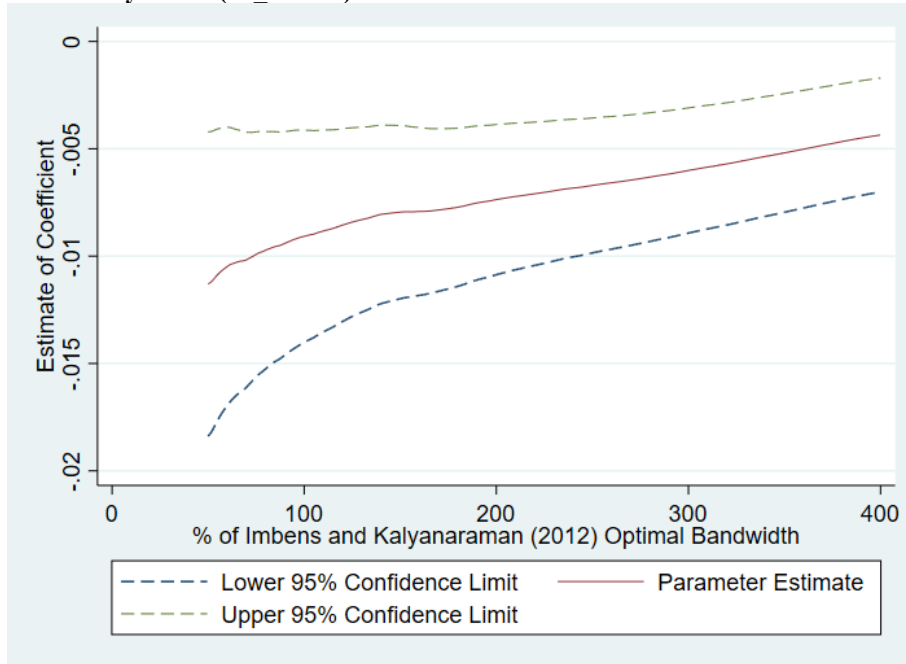


Figure 4
Regression Discontinuity Design Bandwidths

This figure reports RD estimates with alternative bandwidths using local linear regressions with the choice of optimal bandwidth based on Imbens and Kalyanaraman (2012). The x-axis represents the percentage of IK optimal bandwidth. The y-axis shows the estimation results. In all the tests, we estimate the model with polynomial order is 1 and the triangular kernel. Panel A shows the results for implied volatility smirk (*IV_SKEW*). Panel B shows the results for negative model-free implied skewness (*NMFIS*).

Panel A: Implied volatility smirk (*IV_SKEW*)



Panel B: Negative model-free implied skewness (*NMFIS*)

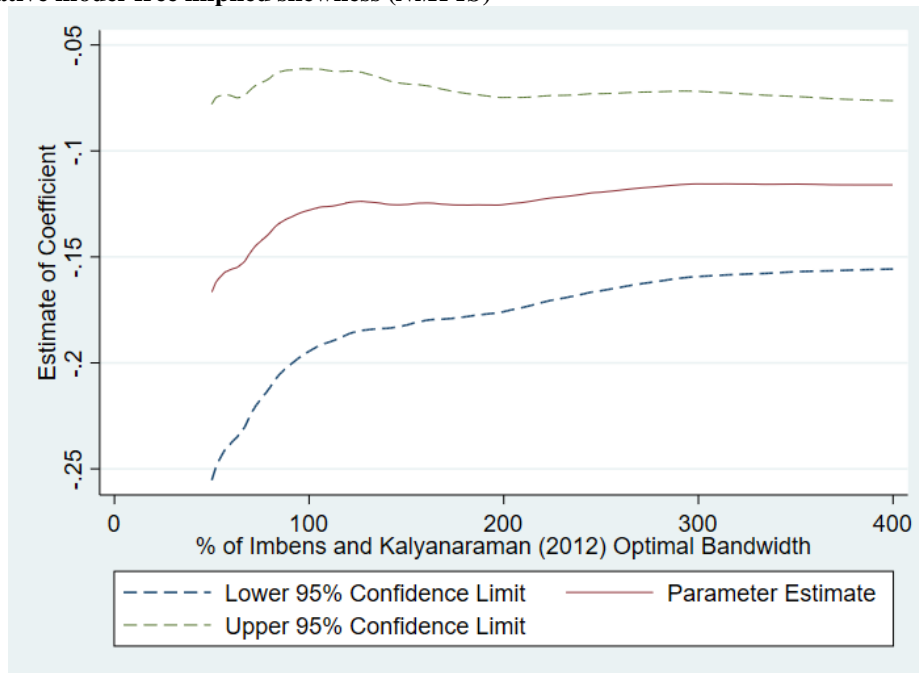
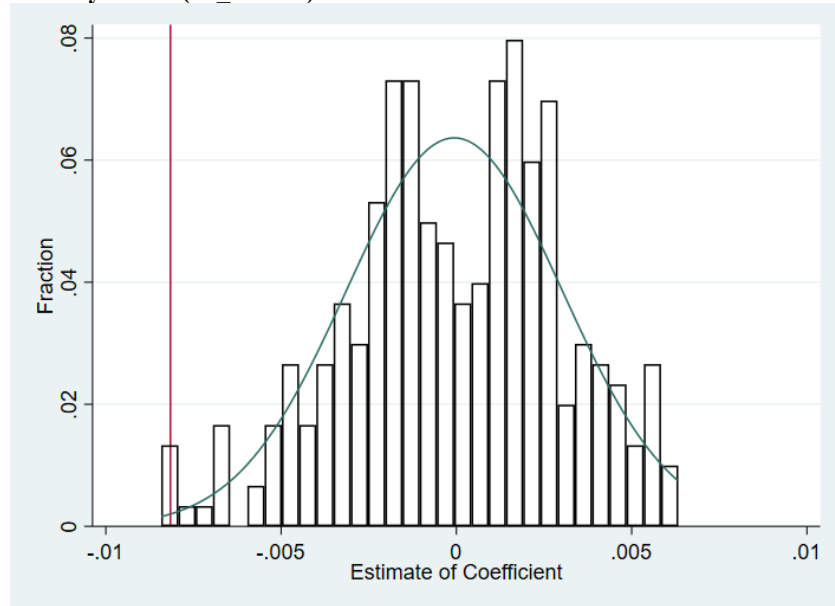


Figure 5
Placebo Tests

This figure reports the histogram of RD estimates with alternative cutoffs. The x-axis represents the RD estimates from a placebo test under an artificial cutoff between $[-20\%, 20\%]$. The y-axis shows the fraction of the estimates. In all the tests, we estimate the model with linear polynomial and the triangular kernel. The vertical line shows the actual value in the baseline regressions. Panel A shows the results for implied volatility smirk (IV_SKEW). Panel B shows the results for negative model-free implied skewness ($NMFIS$).

Panel A: Implied volatility smirk (IV_SKEW)



Panel B: Negative model-free implied skewness ($NMFIS$)

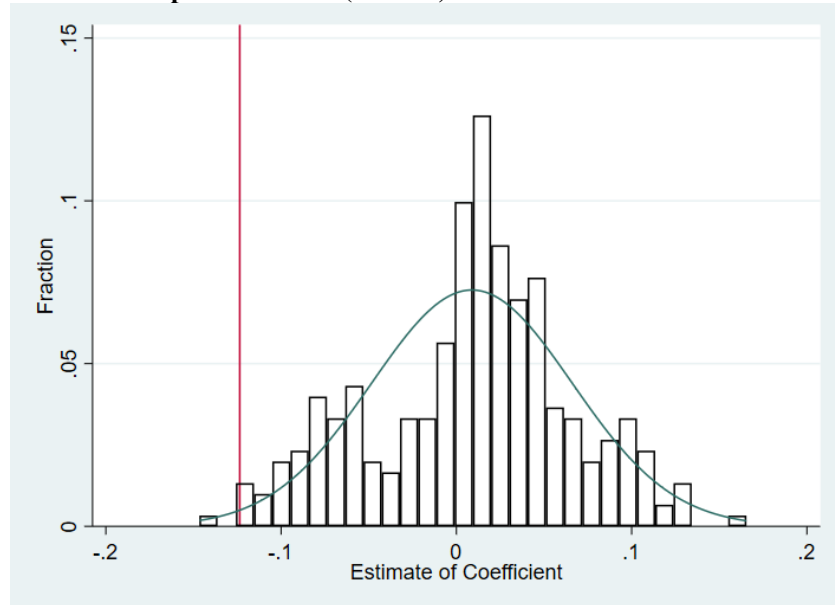


Figure 6
Density of Vote Margins for Governance-related Shareholder Proposals: After 2003

This figure plots the density of the vote margins for governance-related shareholder proposals, following the method proposed by McCrary (2008), in a restricted sample excluding proposals before 2003. The x-axis shows the vote margin. The y-axis shows the density estimates. Each dot denotes the density estimates of the proposal groups in each 1% local range of the vote margin as shown on the y-axis. The solid lines show the fitted density function of the percentage of votes with a 95% confidence interval around. The x-axis ranges from -50% to 50%.

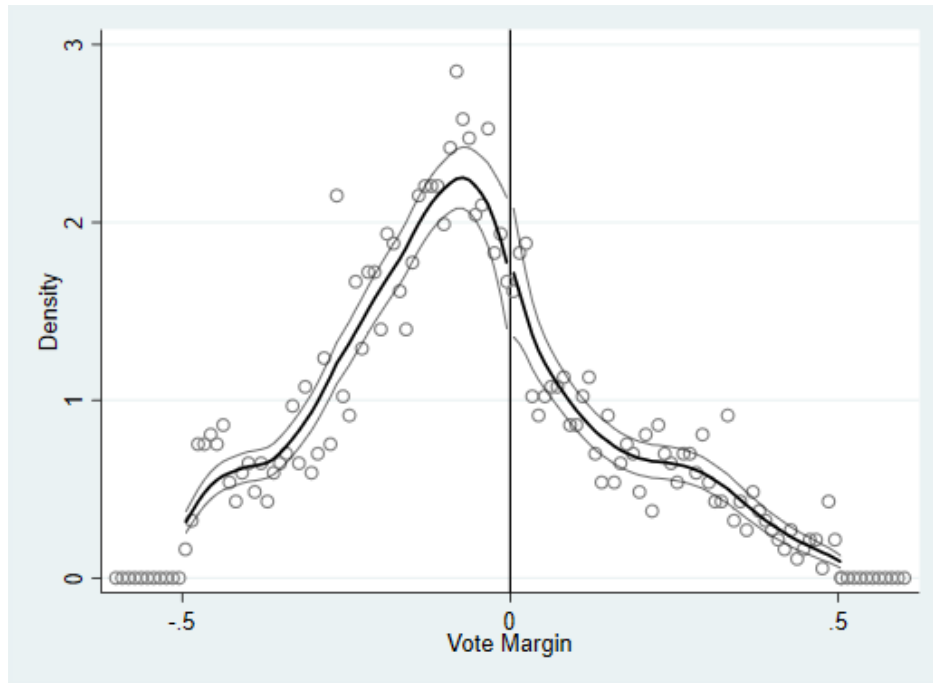


Table 1
Summary Statistics and Pre-existing Differences between the Treated and Control Firms

This table shows the summary statistics of dependent variables and firm characteristics and the pre-existing differences between treated and control firms. The dependent variables are quarterly-level implied volatility smirk (*IV_SKEW*), which is measured as the difference between the implied volatility of OTM put options and that of ATM call options, and negative model-free implied skewness, which is the negative value of model-free implied skewness proposed by Bakshi, Kapadia, and Madan (2003). The firm characteristics include Book-to-market ratio (*BM*), Market value of equity (*MVE*), Book leverage (*LEV*), Investment (*INV*), Tangibility (*TAN*), return of assets (*ROA*), stock return (*RET*), stock volatility (*SIGMA*), analyst dispersion (*DISP*), and analyst coverage (*NAN*). Detailed definitions of these variables are provided in Appendix Table A1. Panel A shows the summary statistics of dependent variables and firm characteristics. Panel B shows the pre-existing differences in firm characteristics between the treated and control firms in the [-10%,10%] bandwidth. Panel C shows the pre-existing differences in option measures between the treated and control firms in the [-10%,10%] bandwidth. The z-statistics are shown in the parentheses.

Panel A: Summary statistics of dependent variables and firm characteristics

	N	Mean	St.Dev	p25	Median	p75
<i>IV_SKEW</i>	2,360	0.0417	0.0217	0.0298	0.0385	0.0494
<i>NMFIS</i>	2,360	0.5571	0.2870	0.3762	0.5326	0.7162
<i>BM</i>	2,360	0.4046	0.2948	0.2046	0.3361	0.5404
<i>MVE</i>	2,360	16.6140	0.7973	16.1024	16.8634	17.3252
<i>LEV</i>	2,360	1.5098	2.5776	0.3131	0.6185	1.3732
<i>INV</i>	2,360	0.0483	0.0899	0.0032	0.0289	0.0712
<i>TAN</i>	2,360	0.4318	0.1342	0.3445	0.4362	0.5172
<i>ROA</i>	2,360	0.0155	0.0158	0.0059	0.0139	0.0241
<i>RET</i>	2,360	0.0107	0.0451	-0.0160	0.0106	0.0349
<i>SIGMA</i>	2,360	0.0177	0.0092	0.0115	0.0153	0.0208
<i>DISP</i>	2,360	0.0743	0.1618	0.0147	0.0264	0.0576
<i>NAN</i>	2,360	2.9296	0.3831	2.7300	2.9957	3.2055
<i>INSTO</i>	2,360	0.6948	0.2272	0.6202	0.7389	0.8350

Panel B: Local smoothness tests on firm characteristics

	<i>MVE</i>	<i>BM</i>	<i>LEV</i>	<i>INV</i>	<i>TANG</i>	<i>ROA</i>	<i>RET</i>	<i>SIGMA</i>	<i>DISP</i>	<i>NAN</i>	<i>INSTO</i>
Difference	-0.1973 (-1.64)	0.0062 (0.15)	-0.5028 (-1.26)	0.0123 (0.98)	-0.0063 (-0.26)	-0.0026 (-1.09)	0.0060 (1.07)	0.0019 (1.33)	0.0058 (0.23)	-0.0576 (-1.03)	-0.0188 (-0.56)
Bandwidth	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]	[-0.1,0.1]
Eff. Left N	496	496	496	496	496	496	496	496	496	496	496
Eff. Right N	300	300	300	300	300	300	300	300	300	300	300
N	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360	2,360

Panel C: Local smoothness tests on option measures

	<i>IV_SKEW</i>	<i>NMFIS</i>
Difference	0.0002 (0.05)	-0.0555 (-1.45)
Bandwidth	[-0.1,0.1]	[-0.1,0.1]
Effective Left N	496	496
Effective Right N	300	300
N	2,360	2,360

Table 2
Voting for Governance Proposals and Option Measures on Ex-ante Tail Risk

This table reports the local average treatment effect of passing a governance proposal on option measures on ex-ante tail risk. The estimation model is based on the specification as follows:

$$OptVar_{i,t+1} = \beta Pass_{it} + \sum_{j=1}^P \gamma_j^{Left} (v_{it} - v^*)^j + \sum_{j=1}^P \gamma_j^{Right} (v_{it} - v^*)^j Pass_{it} + \mu_{it}$$

where *OptVar* denotes the two option measures on ex-ante tail risk (*IV_SKEW* and *NMFIS*); *Pass* is an indicator that equals one if the vote margin ($v-v^*$) for a shareholder proposal is higher than 0, where v and v^* denote the vote rate and threshold. I estimate the results using regression models with three types of kernels (Triangular kernel, Epanechnikov kernel, and Uniform kernel) and polynomial orders of 1, 2, and 3. Following Imbens and Kalyanaraman (2012), I use the asymptotic mean squared error optimal bandwidth selection method to estimate the optimal bandwidth. The corresponding results when using triangular kernel, Epanechnikov kernel, and Uniform kernel as the estimating kernel are shown in Panels A, B, and C, respectively. Standard errors are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: Kernel=Triangular

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0091*** (-3.54)	<i>IV_SKEW_{t+1}</i> -0.0106*** (-3.23)	-0.0120*** (-3.00)	-0.1274*** (-3.42)	<i>NMFIS_{t+1}</i> -0.1639*** (-3.40)	-0.2007*** (-3.48)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1143, 0.1143]	[-0.1496, 0.1496]	[-0.1744, 0.1744]	[-0.1369, 0.1369]	[-0.1411, 0.1411]	[-0.1568, 0.1568]
Effective Observations: Left	556	721	806	661	692	738
Effective Observations: Right	340	412	458	393	405	431
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel B: Kernel= Epanechnikov

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
		<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>	
<i>Pass</i>	-0.0087*** (-3.52)	-0.0106*** (-3.16)	-0.0119*** (-3.01)	-0.1208*** (-3.31)	-0.1482*** (-3.16)	-0.1974*** (-3.42)
Polynomial Order	1	2	3	1	2	3
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1139, 0.1139]	[-0.1382, 0.1382]	[-0.1735, 0.1735]	[-0.1424, 0.1424]	[-0.1517, 0.1517]	[-0.1549, 0.1549]
Effective Observations: Left	554	674	803	693	726	737
Effective Observations: Right	338	395	457	405	424	430
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel C: Kernel= Uniform

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
		<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>	
<i>Pass</i>	-0.0084*** (-3.62)	-0.0094*** (-2.76)	-0.0123*** (-3.25)	-0.1232*** (-3.08)	-0.1187*** (-2.71)	-0.1452*** (-2.82)
Polynomial Order	1	2	3	1	2	3
Kernel	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1134, 0.1134]	[-0.1197, 0.1197]	[-0.1739, 0.1739]	[-0.1006, 0.1006]	[-0.182, 0.1820]	[-0.2135, 0.2135]
Effective Observations: Left	554	579	803	496	843	969
Effective Observations: Right	338	353	457	308	474	519
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Table 3
Robustness Tests

This table shows the results of robustness tests in the local RD analysis. Panel A reports the local average treatment effects when adopting different lengths of optimal bandwidth based on asymptotic mean squared error optimal bandwidth selection method across different kernel functions with linear polynomials. Panel B reports the local average treatment effects when using alternative bandwidth selection methods across different order polynomials with triangular kernel. The selection methods include asymmetric mean square error (*AsyMSE*) in Imbens and Kalyanaraman (2012), symmetric coverage error rate (*CER*), and asymmetric coverage error rate (*AsymCSR*) in Calonico, Cattaneo, and Titiunik (2014). Panel C shows the results when the dependent variables are percentiles of option measures. The percentile measures are scaled by 100 for convenience. Panel D shows the results when different estimation windows are used in calculating *NMFIS*. *NMFIS_91* denotes the negative model-free implied skewness estimated with a 91-day horizon. *NMFIS_181* denotes the negative model-free implied skewness estimated with a 181-day horizon. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: Different lengths of optimal bandwidth (Poly. Order =1)

Dependent Var.	<i>IV_SKEW_{t+1}</i>				<i>NMFIS_{t+1}</i>			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	75%×IK	80%×IK	120%×IK	125%×IK	75%×IK	80%×IK	120%×IK	125%×IK
Triangular	-0.0099*** (-3.35)	-0.0097*** (-3.39)	-0.0086*** (-3.66)	-0.0084*** (-3.67)	-0.1415*** (-3.48)	-0.1367*** (-3.41)	-0.1241*** (-3.51)	-0.1238*** (-3.53)
Epanechnikov	-0.0096*** (-3.34)	-0.0094*** (-3.37)	-0.0082*** (-3.65)	-0.0081*** (-3.66)	-0.1308*** (-3.27)	-0.1257*** (-3.20)	-0.1200*** (-3.45)	-0.1211*** (-3.53)
Uniform	-0.0087*** (-3.25)	-0.0087*** (-3.34)	-0.0073*** (-3.45)	-0.0074*** (-3.58)	-0.1410*** (-3.23)	-0.1471*** (-3.47)	-0.1193*** (-3.19)	-0.1161*** (-3.13)

Panel B: Bandwidths from alternative selection methods (Kernel=Triangular)

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
	Poly. Order=1	Poly. Order =2	Poly. Order =3	Poly. Order=1	Poly. Order =2	Poly. Order =3
<i>Asymmetric MSE</i>	-0.0089*** (-3.57)	-0.0101*** (-3.09)	-0.0134*** (-3.57)	-0.1271*** (-3.48)	-0.2009*** (-4.19)	-0.2248*** (-4.17)
<i>CER</i>	-0.0101*** (-3.33)	-0.0117*** (-2.94)	-0.0126*** (-2.68)	-0.1439*** (-3.50)	-0.1939*** (-3.51)	-0.2120*** (-3.23)
<i>Asymmetric CER</i>	-0.0100*** (-3.45)	-0.0104*** (-2.64)	-0.0137*** (-3.11)	-0.1420*** (-3.51)	-0.2193*** (-3.97)	-0.2217*** (-3.60)

Panel C: Alternative option measures

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>IV_SKEW_PERCENTILES_{t+1}</i>			<i>NMFIS_PERCENTILES_{t+1}</i>		
<i>Pass</i>	-0.1319*** (-3.51)	-0.1564*** (-3.16)	-0.1871*** (-3.03)	-0.1338*** (-3.15)	-0.1739*** (-3.18)	-0.2209*** (-3.39)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1426, 0.1426]	[-0.1715, 0.1715]	[-0.1822, 0.1822]	[-0.1175, 0.1175]	[-0.1371, 0.1371]	[-0.1546, 0.1546]
Effective Observations: Left	693	797	848	567	668	737
Effective Observations: Right	405	453	474	349	394	430
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel D: Alternative estimation windows of negative model-free implied skewness

	(1)	(2)	(3)	(4)	(5)	(6)
		<i>NMFIS_91_{t+1}</i>			<i>NMFIS_181_{t+1}</i>	
<i>Pass</i>	-0.1436*** (-3.18)	-0.1555*** (-2.88)	-0.1949*** (-2.92)	-0.1246** (-2.57)	-0.1256** (-2.16)	-0.1272** (-2.02)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1213, 0.1213]	[-0.1615, 0.1615]	[-0.1722, 0.1722]	[-0.1092, 0.1092]	[-0.1481, 0.1481]	[-0.2125, 0.2125]
Effective Observations: Left	596	755	801	528	720	965
Effective Observations: Right	363	439	456	319	410	519
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Table 4
Vote Manipulation Concerns

This table reports the effect of governance proposals on ex-ante tail risk accounting for vote manipulation concerns. Panel A shows the results when shareholder proposals before 2003 are excluded from the sample. Panel B shows the results when the estimation method accounting for vote manipulation is used. The effect of the passage of governance proposals on ex-ante tail risk is estimated as treatment bounds using the method suggested by Gerard, Rokkanen, and Rothe (2016). The treatment bounds and 90% confidence interval on bounds are shown in the table. The confidence interval is estimated by a bootstrap method for 500 times. Triangular kernel is used as the estimating kernel. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: Excluding shareholder proposals before 2003

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
<i>Pass</i>	-0.0085***	-0.0096***	-0.0115***	-0.1484***	-0.2089***	-0.2513***
	(-3.65)	(-3.31)	(-2.92)	(-3.63)	(-4.03)	(-4.18)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.136, 0.1360]	[-0.1874, 0.1874]	[-0.1712, 0.1712]	[-0.1112, 0.1112]	[-0.122, 0.1220]	[-0.1456, 0.1456]
Effective Observations: Left	582	759	698	476	529	620
Effective Observations: Right	303	371	345	259	283	311
Observations	1,923	1,923	1,923	1,923	1,923	1,923

Panel B: Estimating treatment bounds accounting for vote manipulation

	(1)	(2)	(3)	(4)
	<i>IV_SKEW_{t+1}</i>		<i>NMFIS_{t+1}</i>	
Treatment bounds	[-0.0125, -0.0124]	[-0.0096, -0.0096]	[-0.1933, -0.1928]	[-0.2594, -0.2594]
90% CI on bounds	[-0.0200, -0.0053]	[-0.0224, -0.0011]	[-0.2764, -0.1134]	[-0.4679, -0.1651]
Polynomial Order	1	2	1	2
Kernel	Triangular	Triangular	Triangular	Triangular
Observations	2,360	2,360	2,360	2,360

Table 5
Internal Governance: Board Governance

This table presents the results of subsample tests based on board governance. Board corporate governance is measured as the rate of co-opted directors who are appointed after the CEO assumed office (Coles, Daniel, and Naveen 2014). Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High rate of co-opted directors

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0095*** (-2.60)	-0.0111** (-2.43)	-0.0144** (-2.56)	-0.1789*** (-3.46)	-0.2246*** (-3.29)	-0.2331*** (-3.27)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1170, 0.1170]	[-0.1613, 0.1613]	[-0.1696, 0.1696]	[-0.1375, 0.1375]	[-0.1468, 0.1468]	[-0.238, 0.2380]
Effective Observations: Left	320	426	434	377	404	581
Effective Observations: Right	173	216	219	195	201	275
Observations	1,223	1,223	1,223	1,223	1,223	1,223

Panel B: Low rate of co-opted directors

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0081** (-2.50)	-0.0095** (-2.14)	-0.0105* (-1.92)	-0.0669 (-1.37)	-0.0634 (-1.11)	-0.1665** (-2.21)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1306, 0.1306]	[-0.1567, 0.1567]	[-0.1908, 0.1908]	[-0.1343, 0.1343]	[-0.1929, 0.1929]	[-0.1431, 0.1431]
Effective Observations: Left	280	322	395	286	396	300
Effective Observations: Right	196	219	246	197	246	205
Observations	1,137	1,137	1,137	1,137	1,137	1,137

Table 6
Internal Governance: Managerial Incentives

This table presents the results of subsample tests based on risk-taking incentives. Panels A and B report results of subsample analysis based on managerial risk-taking incentives, which is measured as executive-average *Vega* defined as prior works (Coles, Daniel, and Naveen 2006, Core and Guay 2002). Information on managerial compensation comes from Execucomp database. Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High managerial risk-taking incentives

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0125*** (-3.80)	-0.0140*** (-3.38)	-0.0150*** (-3.06)	-0.1721*** (-3.39)	-0.2326*** (-3.31)	-0.2497*** (-3.17)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1102, 0.1102]	[-0.1524, 0.1524]	[-0.1968, 0.1968]	[-0.1249, 0.1249]	[-0.1313, 0.1313]	[-0.1773, 0.1773]
Effective Observations: Left	318	438	543	360	383	488
Effective Observations: Right	163	206	230	181	192	220
Observations	1,267	1,267	1,267	1,267	1,267	1,267

Panel B: Low managerial risk-taking incentives

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0055 (-1.43)	-0.0052 (-1.09)	-0.0076 (-1.21)	-0.0864 (-1.55)	-0.0838 (-1.26)	-0.1114 (-1.48)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1247, 0.1247]	[-0.1827, 0.1827]	[-0.1785, 0.1785]	[-0.1304, 0.1304]	[-0.1558, 0.1558]	[-0.1949, 0.1949]
Effective Observations: Left	243	340	330	257	296	356
Effective Observations: Right	186	251	245	197	223	261
Observations	1,093	1,093	1,093	1,093	1,093	1,093

Table 7
Internal Governance: Shareholder Governance

This table presents the results of subsample tests based on shareholder governance. Panels A and B report results of subsample analysis based on institutional blockholder ownership. Blockholders are defined as 13F investors holding over 5% of firms' shares outstanding. Panels C and D report results of subsample analysis based on the breadth of block ownership. Blockholder holding data come from Thomson Reuters Institutional (13F) Holdings database. Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. Panels E and F report results of subsample analysis based on whether the firm experienced shareholder activism events in the past 3 years before the proposal voting. Activism events, defined as the submission of Schedule 13D filings, are collected from Audit Analytics Shareholder Activism database. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High blockholder ownership

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0058 (-1.61)	-0.0053 (-1.30)	-0.0056 (-1.10)	-0.0830 (-1.49)	-0.0901 (-1.36)	-0.0974 (-1.35)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.101, 0.1010]	[-0.1646, 0.1646]	[-0.1805, 0.1805]	[-0.1317, 0.1317]	[-0.1693, 0.1693]	[-0.2297, 0.2297]
Effective Observations: Left	274	431	472	353	438	583
Effective Observations: Right	137	202	214	175	203	243
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel B: Low blockholder ownership

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0138*** (-3.49)	-0.0202*** (-3.46)	-0.0208*** (-3.51)	-0.1611*** (-3.50)	-0.2188*** (-3.27)	-0.2398*** (-2.85)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1144, 0.1144]	[-0.1213, 0.1213]	[-0.2092, 0.2092]	[-0.1647, 0.1647]	[-0.1414, 0.1414]	[-0.158, 0.1580]
Effective Observations: Left	248	265	407	333	306	325
Effective Observations: Right	187	202	284	241	225	237
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel C: High breadth of block ownership

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0088** (-1.99)	-0.0095* (-1.74)	-0.0109 (-1.49)	0.0244 (0.37)	-0.0909 (-1.11)	-0.1738* (-1.79)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1251, 0.1251]	[-0.1798, 0.1798]	[-0.1773, 0.1773]	[-0.121, 0.1210]	[-0.1217, 0.1217]	[-0.1349, 0.1349]
Effective Observations: Left	204	296	291	201	202	222
Effective Observations: Right	124	157	157	123	123	134
Observations	831	831	831	831	831	831

Panel D: Low breadth of block ownership

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0088*** (-3.01)	-0.0118*** (-2.78)	-0.0126*** (-2.78)	-0.1990*** (-4.82)	-0.2175*** (-4.49)	-0.2242*** (-3.67)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1263, 0.1263]	[-0.1283, 0.1283]	[-0.1961, 0.1961]	[-0.1509, 0.1509]	[-0.208, 0.2080]	[-0.2126, 0.2126]
Effective Observations: Left	404	408	578	471	606	621
Effective Observations: Right	244	246	326	279	339	343
Observations	1,529	1,529	1,529	1,529	1,529	1,529

Panel E: Experience shareholder activism events in the past 3 years

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	0.0038 (0.44)	0.0041 (0.36)	-0.0057 (-0.58)	-0.0064 (-0.04)	-0.2865 (-1.43)	-0.3003 (-1.46)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1524, 0.1524]	[-0.2045, 0.2045]	[-0.1793, 0.1793]	[-0.1766, 0.1766]	[-0.1443, 0.1443]	[-0.1965, 0.1965]
Effective Observations: Left	17	24	21	21	17	23
Effective Observations: Right	24	32	28	28	22	31
Observations	105	105	105	105	105	105

Panel F: Not experience shareholder activism events in the past 3 years

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0093*** (-3.53)	-0.0105*** (-3.21)	-0.0117*** (-3.00)	-0.1298*** (-3.40)	-0.1541*** (-3.22)	-0.1788*** (-3.15)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1106, 0.1106]	[-0.1533, 0.1533]	[-0.1847, 0.1847]	[-0.1366, 0.1366]	[-0.1483, 0.1483]	[-0.1682, 0.1682]
Effective Observations: Left	526	718	840	647	703	753
Effective Observations: Right	319	405	447	372	387	421
Observations	2,255	2,255	2,255	2,255	2,255	2,255

Table 8
External Governance: Stock Market Discipline and Market of Corporate Control

This table presents the results of subsample tests based on external governance mechanisms, including stock market discipline and market of corporate control. Panels A and B show the results of subsample analysis based on short-selling exposure measured as short interest ratio. The short interest ratio is calculated as the short interest divided by the share outstanding. Panels C and D present the results of subsample tests based on threats from the market of corporate control measured as firms' takeover risk. The takeover risk is measured according to Cremers, Nair, and John (2009) and He and Tian (2013). Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High short-selling exposure

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0066** (-2.10)	-0.0090** (-1.97)	-0.0104* (-1.91)	-0.0820* (-1.71)	-0.1039 (-1.60)	-0.1334* (-1.78)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1576, 0.1576]	[-0.1635, 0.1635]	[-0.194, 0.1940]	[-0.1449, 0.1449]	[-0.1471, 0.1471]	[-0.1659, 0.1659]
Effective Observations: Left	325	334	403	305	312	338
Effective Observations: Right	228	237	265	211	213	240
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel B: Low short-selling exposure

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0111*** (-2.84)	-0.0124** (-2.57)	-0.0141** (-2.43)	-0.1685*** (-3.11)	-0.2167*** (-3.01)	-0.2900*** (-3.03)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.0979, 0.0979]	[-0.1425, 0.1425]	[-0.1648, 0.1648]	[-0.1472, 0.1472]	[-0.1537, 0.1537]	[-0.1539, 0.1539]
Effective Observations: Left	268	393	430	406	413	413
Effective Observations: Right	143	194	205	195	202	202
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel C: High takeover risk

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0079** (-2.29)	-0.0080** (-2.19)	-0.0104* (-1.88)	-0.1231*** (-3.01)	-0.1206** (-2.11)	-0.1355* (-1.82)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.106, 0.1060]	[-0.2065, 0.2065]	[-0.174, 0.1740]	[-0.1687, 0.1687]	[-0.1759, 0.1759]	[-0.1692, 0.1692]
Effective Observations: Left	295	509	448	440	450	441
Effective Observations: Right	173	286	255	250	259	251
Observations	1,289	1,289	1,289	1,289	1,289	1,289

Panel D: Low takeover risk

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0097*** (-2.91)	-0.0126** (-2.54)	-0.0120** (-2.28)	-0.1548** (-2.44)	-0.2351*** (-2.99)	-0.2544*** (-3.11)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1592, 0.1592]	[-0.1428, 0.1428]	[-0.2189, 0.2189]	[-0.1118, 0.1118]	[-0.1246, 0.1246]	[-0.193, 0.1930]
Effective Observations: Left	324	299	453	235	260	404
Effective Observations: Right	192	177	230	149	161	213
Observations	1,071	1,071	1,071	1,071	1,071	1,071

Table 9
Firm Performance

This table presents the results of subsample tests based on firm performance. Panels A and B show the results of subsample analysis based on firm profitability. Profitability is measured as a firm's quarterly return of assets (*ROA*). Panels C and D show the results of subsample analysis based on firms' quarterly total sales scaled by total assets. Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High profitability

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0063** (-2.19)	-0.0062 (-1.60)	-0.0063 (-1.19)	-0.1317*** (-2.85)	-0.1317** (-2.27)	-0.1845** (-2.45)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1717, 0.1717]	[-0.194, 0.1940]	[-0.1685, 0.1685]	[-0.179, 0.1790]	[-0.2075, 0.2075]	[-0.1738, 0.1738]
Effective Observations: Left	406	449	396	416	476	410
Effective Observations: Right	230	247	226	238	261	233
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel B: Low profitability

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0150*** (-3.40)	-0.0180*** (-3.30)	-0.0167*** (-3.13)	-0.1372** (-2.47)	-0.1868** (-2.51)	-0.2099** (-2.54)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.0815, 0.0815]	[-0.1156, 0.1156]	[-0.2164, 0.2164]	[-0.1188, 0.1188]	[-0.1271, 0.1271]	[-0.1779, 0.1779]
Effective Observations: Left	190	272	484	278	298	403
Effective Observations: Right	117	159	258	162	178	227
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel C: High total sales

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0060 (-1.57)	-0.0063 (-1.54)	-0.0059 (-0.98)	-0.1203** (-2.41)	-0.1079* (-1.73)	-0.1390 (-1.63)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1132, 0.1132]	[-0.2082, 0.2082]	[-0.1813, 0.1813]	[-0.1824, 0.1824]	[-0.2146, 0.2146]	[-0.1692, 0.1692]
Effective Observations: Left	277	464	416	419	479	386
Effective Observations: Right	192	291	269	269	294	255
Observations	1,199	1,199	1,199	1,199	1,199	1,199

Panel D: Low total sales

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0114*** (-3.51)	-0.0155*** (-3.44)	-0.0161*** (-3.19)	-0.1765*** (-3.13)	-0.2138*** (-3.21)	-0.2426*** (-3.36)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1358, 0.1358]	[-0.1442, 0.1442]	[-0.2082, 0.2082]	[-0.0947, 0.0947]	[-0.1316, 0.1316]	[-0.186, 0.1860]
Effective Observations: Left	323	347	480	230	318	437
Effective Observations: Right	172	175	224	128	171	209
Observations	1,161	1,161	1,161	1,161	1,161	1,161

Table 10
Information Transparency

This table presents the results of subsample tests based on information transparency. Two transparency measures from different sources (analyst dispersion and MD&A readability) are used in this analysis. Panels A and B show the results of subsample analysis based on analyst dispersion. Analyst dispersion is measured as the standard deviation of individual analysts' earnings forecasts scaled by the stock price at the end of the fiscal year. Panels C and D show the results of subsample analysis based on readability of firms' MD&A in 10-K filings. Dale-Chall readability score is used to measure readability. Cases are grouped into Low (High) group for firms with characteristics lower (higher) than the median value. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: High analyst dispersion

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0064* (-1.67)	-0.0072 (-1.40)	-0.0080 (-1.33)	-0.0553 (-1.17)	-0.1110* (-1.71)	-0.1368* (-1.85)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1253, 0.1253]	[-0.1464, 0.1464]	[-0.1849, 0.1849]	[-0.1404, 0.1404]	[-0.1333, 0.1333]	[-0.1708, 0.1708]
Effective Observations: Left	278	327	408	313	293	365
Effective Observations: Right	194	212	250	211	206	242
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel B: Low analyst dispersion

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0131*** (-3.84)	-0.0142*** (-3.73)	-0.0178*** (-3.46)	-0.2158*** (-3.77)	-0.2203*** (-3.59)	-0.2584*** (-3.22)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.0977, 0.0977]	[-0.1729, 0.1729]	[-0.164, 0.1640]	[-0.1153, 0.1153]	[-0.2151, 0.2151]	[-0.1752, 0.1752]
Effective Observations: Left	258	431	412	302	508	436
Effective Observations: Right	140	214	207	160	249	216
Observations	1,180	1,180	1,180	1,180	1,180	1,180

Panel C: High readability

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0118*** (-3.70)	-0.0132*** (-3.33)	-0.0148*** (-2.96)	-0.1680*** (-4.05)	-0.1831*** (-3.48)	-0.2186*** (-3.42)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1168, 0.1168]	[-0.164, 0.1640]	[-0.1752, 0.1752]	[-0.1769, 0.1769]	[-0.1796, 0.1796]	[-0.1635, 0.1635]
Effective Observations: Left	383	517	552	554	560	517
Effective Observations: Right	235	305	318	320	320	305
Observations	1,596	1,596	1,596	1,596	1,596	1,596

Panel D: Low readability

Dependent Variable=	<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	-0.0024 (-0.63)	-0.0033 (-0.65)	-0.0029 (-0.53)	-0.0358 (-0.52)	-0.0750 (-0.83)	-0.1181 (-1.11)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Vote Range	[-0.1315, 0.1315]	[-0.1635, 0.1635]	[-0.2347, 0.2347]	[-0.1274, 0.1274]	[-0.1523, 0.1523]	[-0.1914, 0.1914]
Effective Observations: Left	204	246	338	194	235	283
Effective Observations: Right	121	136	182	119	129	155
Observations	764	764	764	764	764	764

Table 11
Option Trading and Governance Proposals

This table reports the effect of voting for governance-related shareholder proposals on option trading measures. Panel A shows the results for O/S ratio measured as the option trading volume scaled by stock trading volume (Roll, Schwartz, and Subrahmanyam 2010). Panel B shows the results for proposals for implied volatility based on Black-Scholes formula (Black and Scholes 1973). Panel C shows the results for option market liquidity measured as the negative value of the bid-ask spread in the option market (Mayhew 2002). The model specification is the same as Table 2. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: O/S ratio

Dependent Variable= <i>O/S ratio</i>	(1)	(2)	(3)	(4)	(5)	(6)
	All options		Call options		Put options	
<i>Pass</i>	-0.0047 (0.703)	0.0066 (0.681)	-0.0059 (0.643)	0.0107 (0.530)	-0.0446*** (0.001)	-0.0344** (0.045)
Polynomial Order	1	2	1	2	1	2
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1427, 0.1427]	[-0.1414, 0.1414]	[-0.1454, 0.1454]	[-0.1329, 0.1329]	[-0.1161, 0.1161]	[-0.1342, 0.1342]
Effective Observations: Left	693	692	706	648	565	654
Effective Observations: Right	405	405	406	389	346	390
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel B: Implied volatility

Dependent Variable= <i>Implied volatility</i>	(1)	(2)	(3)	(4)	(5)	(6)
	All options		Call options		Put options	
<i>Pass</i>	-0.0065 (0.739)	-0.0122 (0.597)	-0.0005 (0.857)	-0.0013 (0.702)	-0.0101** (0.027)	-0.0119** (0.029)
Polynomial Order	1	2	1	2	1	2
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.0996, 0.0996]	[-0.1482, 0.1482]	[-0.1011, 0.1011]	[-0.1493, 0.1493]	[-0.0956, 0.0956]	[-0.1441, -0.1441]
Effective Observations: Left	486	720	499	721	471	701
Effective Observations: Right	300	410	309	412	293	405
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel C: Option market liquidity

Dependent Variable= <i>Option market liquidity</i>	(1)	(2)	(3)	(4)	(5)	(6)
	All options		Call options		Put options	
<i>Pass</i>	-0.0016 (0.009)	0.0027 (0.009)	0.0003 (0.010)	0.0084 (0.006)	-0.0376*** (0.000)	-0.0417*** (0.000)
Polynomial Order	1	2	1	2	1	2
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1366, 0.1366] [-0.1749, 0.1749]		[-0.129, 0.1290] [-0.1551, 0.1551]		[-0.1623, 0.1623] [-0.1889, 0.1889]	
Effective Observations: Left	661	806	616	738	758	873
Effective Observations: Right	393	458	373	430	440	484
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Table 12
Does Option Market Provide Unique Information?

This table shows the results for predicted and unpredicted parts of ex-ante tail risk measures given realized tail risk. First, I regress the ex-ante tail risk measures (*IV_SKEW* or *NMFIS*) on stock price crash risk measures (*NCSKEW* and *DUVOL*) in the following model:

$$OptVar_{i,t} = \alpha + \beta_1 NCSKEW_{i,t} + \beta_2 DUVOL_{i,t} + \varepsilon_{i,t}$$

where *NCSKEW* and *DUVOL* are measured by papers on stock price crash risk (Chang, Chen, and Zolotoy 2017, Kim, Li, and Zhang 2011). By conducting this regression, I separate the ex-ante tail risk measures into two parts: (1) the predicted part that can be explained by realized tail risk (*PRE_IV_SKEW* and *PRE_NMFIS*), and (2) the unpredicted part that can not be captured by realized tail risk (*RES_IV_SKEW* and *RES_NMFIS*). Panel A shows the results for *IV_SKEW*. Panel B shows the results for *NMFIS*. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: IV_SKEW

Dependent Variable=	<i>RES_IV_SKEW</i> _{t+1}		<i>PRE_IV_SKEW</i> _{t+1}	
	(1)	(2)	(3)	(4)
<i>Pass</i>	-0.0093*** (0.000)	-0.0083*** (0.000)	0.0001 (0.213)	0.0001 (0.236)
Polynomial Order	1	1	1	1
Kernel	Triangular	Uniform	Triangular	Uniform
Vote Range	[-0.1136, 0.1136]	[-0.1087, 0.1087]	[-0.1554, 0.1554]	[-0.1196, 0.1196]
Effective Observations: Left	554	527	738	579
Effective Observations: Right	338	318	430	353
Observations	2,360	2,360	2,360	2,360

Panel B: NMFIS

Dependent Variable=	<i>RES_NMFIS</i> _{t+1}		<i>PRE_NMFIS</i> _{t+1}	
	(1)	(2)	(3)	(4)
<i>Pass</i>	-0.1233*** (0.001)	-0.1165*** (0.002)	-0.0016 (0.183)	-0.0017 (0.162)
Polynomial Order	1	1	1	1
Kernel	Triangular	Uniform	Triangular	Uniform
Vote Range	[-0.1279, 0.1279]	[-0.1018, 0.1018]	[-0.1107, 0.1107]	[-0.0842, 0.0842]
Effective Observations: Left	614	499	539	414
Effective Observations: Right	373	309	333	268
Observations	2,360	2,360	2,360	2,360

Table 13
Types of Governance Proposals

This table reports the effect of shareholder voting in types of governance-related shareholder proposals. According to Lin, Wei, and Xie (2020), the shareholder proposals are categorized as shown in Appendix Table A2. Panel A shows the results for proposals aiming to remove management entrenchment provisions. Panel B shows the results for proposals for other purposes. A proposal is identified as a proposal aiming to remove management entrenchment provisions if it requests to remove anti-takeover provisions, enhance board independence, and reform voting rules to restrict executive power. The model specification is the same as that in Table 2. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: Proposals aiming to remove management entrenchment provisions

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
		<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>	
<i>Pass</i>	-0.0105*** (-3.40)	-0.0108*** (-3.10)	-0.0129*** (-2.89)	-0.1593*** (-3.49)	-0.1979*** (-3.51)	-0.2292*** (-3.53)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[0.1046, 0.1046]	[0.1742, 0.1742]	[0.1735, 0.1735]	[0.1263, 0.1263]	[0.1464, 0.1464]	[0.1685, 0.1685]
Effective Observations: Left	382	588	586	453	522	562
Effective Observations: Right	246	372	371	294	325	361
Observations	1,657	1,657	1,657	1,657	1,657	1,657

Panel B: Proposals for other purposes

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
		<i>IV_SKEW_{t+1}</i>			<i>NMFIS_{t+1}</i>	
<i>Pass</i>	-0.0070 (-1.05)	-0.0122 (-1.09)	-0.0101 (-0.94)	-0.0216 (-0.29)	-0.0380 (-0.39)	-0.0428 (-0.40)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[0.0915, 0.0915]	[0.0956, 0.0956]	[0.1734, 0.1734]	[0.0820, 0.0820]	[0.1066, 0.1066]	[0.1620, 0.1620]
Effective Observations: Left	111	118	217	96	132	206
Effective Observations: Right	61	62	86	58	66	84
Observations	703	703	703	703	703	703

Table 14
Voting for Governance Proposals and Following Extreme Cases: Evidence from Restatements

This table reports how voting for governance proposals affects the following extreme cases in terms of financial restatements. The outcome variables are: (1) an indicator that equals one if the firm experiences financial restatements in the following three years after governance proposal voting (*Restatement_3yrs*), and (2) the number of financial restatements in the following three years after governance proposal voting (*#Restatement_3yrs*). Panel A shows the results for all proposals in this sample. Panel B shows the results for proposals aiming to remove management entrenchment provisions. According to Lin, Wei, and Xie (2020), the shareholder proposals are categorized as shown in Appendix Table A2. A proposal is identified as a proposal aiming to remove management entrenchment provisions if it requests to remove anti-takeover provisions, enhance board independence, and reform voting rules to restrict executive power. The model specification is the same as Table 2. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. The z-statistics are shown in the parentheses.

Panel A: Governance proposals

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	<i>Restatement_3yr</i>			<i>#Restatement_3yr</i>		
<i>Pass</i>	-0.3530*** (0.000)	-0.3798*** (0.000)	-0.4022*** (0.000)	-0.6531*** (0.000)	-0.6895*** (0.000)	-0.7422*** (0.000)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1066, 0.1066]	[-0.1725, 0.1725]	[-0.199, 0.1990]	[-0.0912, 0.0912]	[-0.1656, 0.1656]	[-0.2013, 0.2013]
Effective Observations: Left	519	801	909	451	768	922
Effective Observations: Right	313	456	495	287	445	503
Observations	2,360	2,360	2,360	2,360	2,360	2,360

Panel B: Proposals aiming to remove management entrenchment provisions

Dependent Variable=	(1)	(2)	(3)	(4)	(5)	(6)
<i>Pass</i>	<i>Restatement_3yr</i>			<i>#Restatement_3yr</i>		
<i>Pass</i>	-0.3417*** (0.000)	-0.3574*** (0.001)	-0.3464*** (0.004)	-0.6295*** (0.000)	-0.6362*** (0.001)	-0.6622*** (0.003)
Polynomial Order	1	2	3	1	2	3
Kernel	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
Bandwidth	IK	IK	IK	IK	IK	IK
Range of Vote Margin	[-0.1177, 0.1177]	[-0.1567, 0.1567]	[-0.2037, 0.2037]	[-0.1066, 0.1066]	[-0.1815, 0.1815]	[-0.2246, 0.2246]
Effective Observations: Left	427	539	674	387	613	716
Effective Observations: Right	280	348	413	247	387	434
Observations	1,657	1,657	1,657	1,657	1,657	1,657

Table 15
External Validity: Global Regression Discontinuity Design

This table reports the results in the global regression discontinuity design.

$$OptVar_{i,t+1} = \beta Pass_{it} + \sum_{j=1}^P \gamma_j^{Left} (v_{it} - v^*)^j + \sum_{j=1}^P \gamma_j^{Right} (v_{it} - v^*)^j Pass_{it} + \gamma Controls_{it} + Year\ FE + Industry\ FE + \varepsilon_{it}$$

where *Pass* is an indicator that equals one if the vote margin ($v-v^*$) for a shareholder proposal is higher than 0, where v and v^* denote the voting rate and threshold. The model is estimated by regression models with polynomial orders of 1, 2, and 3. Year and industry fixed effects are included in the regression models. Industries are classified by Fama-French 12 Classification (Fama and French 1997). Control variables are shown in Table 1. Panels A shows the results of global parametric RDD for *IV_SKEW*. Panels C shows the results of global parametric RDD for *NMFIS*. Standard errors are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors are shown in the parentheses.

Panel A: Global regression discontinuity design (*IV_SKEW*)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable= <i>IV_SKEW</i> _{<i>t+1</i>}					
<i>Pass</i>	-0.0034** (0.0014)	-0.0046*** (0.0014)	-0.0041*** (0.0014)	-0.0048*** (0.0014)	-0.0052*** (0.0016)	-0.0063*** (0.0016)
Constant	0.0451*** (0.0008)	0.1203*** (0.0131)	0.0449*** (0.0008)	0.1199*** (0.0131)	0.0456*** (0.0010)	0.1215*** (0.0131)
Controls	No	Yes	No	Yes	No	Yes
Bandwidth	Global	Global	Global	Global	Global	Global
Poly. Order	1	1	2	2	3	3
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,360	2,360	2,360	2,360	2,360	2,360
R-squared	0.2180	0.2672	0.2189	0.2672	0.2194	0.2681

Panel B: Global regression discontinuity design (*NMFIS*)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable= <i>NMFIS</i> _{<i>t+1</i>}					
<i>Pass</i>	-0.0564*** (0.0185)	-0.0494*** (0.0175)	-0.0531*** (0.0189)	-0.0489*** (0.0180)	-0.0607*** (0.0224)	-0.0524** (0.0210)
Constant	0.5866*** (0.0115)	0.2278 (0.1764)	0.5876*** (0.0119)	0.2289 (0.1773)	0.5921*** (0.0139)	0.2326 (0.1768)
Controls	No	Yes	No	Yes	No	Yes
Bandwidth	Global	Global	Global	Global	Global	Global
Poly. Order	1	1	2	2	3	3
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,360	2,360	2,360	2,360	2,360	2,360
R-squared	0.2740	0.3288	0.2741	0.3288	0.2743	0.3288

Appendix

Table A1
Definitions of Variables

Variable	Definition	Source
Implied volatility smirk (<i>IV_SKEW</i>)	Implied volatility smirk measured as the difference between implied volatility of out-of-the-money (OTM) put option and implied volatility of at-the-money (ATM) call option, where OTM put options are defined as put options with moneyness (stock price/strike price) between 0.80 and 0.95 and ATM call options are defined as call options with moneyness between 0.95 and 1.05. For stock with multiple option contracts, we calculate the weighted average of the implied volatility for the options by option open interest. Finally, we average the daily implied volatility smirk over the quarter.	IvyDB OptionMetrics
Negative model-free implied skewness (<i>NMFIS</i>)	The negative value of individual model-free implied skewness.	IvyDB OptionMetrics
Market value (<i>MVE</i>)	The logarithm of market equity ($\#PRCC_FQ \times \#CSHOQ$).	CRSP
Book-to-market ratio (<i>BM</i>)	The ratio of book value ($\#ATQ$) to market value, where market value is defined as total assets ($\#ATQ$) minus common equity ($\#CEQQ$) and deferred taxes ($\#TXDBQ$) plus the market equity ($\#PRCC_FQ \times \#CSHOQ$).	COMPUSTAT/CRSP
Leverage (<i>LEV</i>)	Long-term debt ($\#DLTTQ$) and debt in current liabilities ($\#DLCQ$) scaled by total assets ($\#ATQ$).	COMPUSTAT
Investment (<i>INV</i>)	The sum of annual change in gross property, plant, and equipment ($\#PPEGTQ$) + annual change in inventories ($\#INVTQ$) scaled by lagged total assets ($\#ATQ$).	COMPUSTAT
Tangibility (<i>TANG</i>)	Tangibility measured according to Almeida and Campello (2007): Cash holdings ($\#CHEQ$)+Receivables ($\#RECTQ$)*0.715+ Inventory ($\#INVTQ$)*0.547+Net property, plant, and equipment ($\#PPENTQ$)*0.535)/($\#ATQ$).	COMPUSTAT
Return of assets (<i>ROA</i>)	Return of assets measured as operating income before depreciation ($\#OIBDPQ$) scaled by the book value of total assets ($\#ATQ$).	COMPUSTAT
Stock market return (<i>RET</i>)	Monthly stock return of the firm in the last month.	CRSP

Stock market volatility (<i>SIGMA</i>)	Monthly stock volatility of the firm in the last month.	CRSP
Analyst dispersion (<i>DISP</i>)	Standard deviation of analyst forecasts in month prior to the proposal voting divided by the absolute value of the mean forecast. <i>DISP</i> is set to zero if the mean forecast is 0.	I/B/E/S
Analyst coverage (<i>NAN</i>)	The logarithm of one plus the number of analysts following the firm in the latest quarter.	I/B/E/S
Institutional ownership (<i>INSTO</i>)	Percentage of shares held by institutional investors who are defined as 13F investors.	Thomson Reuters Institutional (13f) Holdings
Rate of co-opted directors	The percentage of directors appointed after CEO assumed office (Coles, Daniel, and Naveen 2014).	BoardEx
Managerial risk-taking incentives	Executive average <i>Vega</i> calculated as Coles, Daniel, and Naveen (2006) and Core and Guay (2002).	Execucomp
Blockholder ownership	Percentage of shares held by blockholders who are defined as 13F investors holding over 5% of firms' shares outstanding.	Thomson Reuters Institutional (13f) Holdings
Breadth of block ownership	Number of blockholders who are defined as 13F investors holding over 5% of firms' shares outstanding.	Thomson Reuters Institutional (13f) Holdings
Short interest ratio	Short interest divided by the share outstanding.	COMPUSTAT/CRSP
Shareholder activism (indicator)	An indicator that equals one if the firm has at least one shareholder activism event in the year. Shareholder activism is defined as the submission of SC 13D filings.	Audit Analytics Shareholder Activism
Takeover risk	Takeover risk measured as Cremers, Nair, and John (2009) and He and Tian (2013).	COMPUSTAT/SDC
Total sales	Firms' quarterly sales (<i>#SALEQ</i>) scaled by total assets (<i>#ATQ</i>).	COMPUSTAT
Analyst dispersion	The standard deviation of individual analysts' earnings forecasts scaled by the stock price at the end of the fiscal year.	I/B/E/S
MD&A readability	The Dale-Chall readability score (Dale and Chall 1948) of the Management's Discussion and Analysis (Item 7) part of the 10-K filing in each firm-year.	EDGAR

Table A2
Distribution of Governance-Related Shareholder Proposals across Types

This table shows the distribution of governance-related shareholder proposals across types. Following prior works (Cufiat, Gine, and Guadalupe 2012, Lin, Wei, and Xie 2020), I categorized the proposals into proposals aiming to remove management entrenchment provisions and proposals for other purposes. The shareholder proposals included in this sample must meet the following requirements: (1) The proposal has the maximal voting rate in the quarter; (2) Basic financial and market data are not missing in the quarter of the proposal; (3) Implied volatility smirk data in the future quarter are available. Following prior works, implied volatility smirk and MFIS are trimmed at 1% and 99% levels. Finally, the sample contains 2,593 observations during 1997-2018.

Resolution Type	Number of Proposals
Proposals Aiming to Remove Management Entrenchment Provisions	1,657
Antitakeover	559
Board	499
Voting	599
Proposals for Other Purposes	703
Audit	14
Employee	20
Information Transparency	27
Manager Compensation (Say-on-Pay)	528
Others	114
Total	2,360

Chapter 2. Competition Laws and Earnings Management: International Evidence

Abstract

By exploiting the staggered reforms on competition laws in 58 non-US countries, we find that, conditional on product market features, firms tend to inflate their earnings when domicile countries adopt stricter competition laws, which supports the pressure effect of legal competition threats. This impact is stronger for firms facing greater external pressure, receiving less external discipline, and lacking information transparency. In cross-country analyses, the impact is mitigated in IFRS countries and countries with stronger investor protection. Firms with greater internationalization suffer less from stricter competition laws in domicile countries. Evidence from machine learning algorithms suggests the unique impact of competition laws that can not be predicted by other codependent macro-features. By showing earnings inflation under stricter competition laws, this paper suggests a material impact of antitrust laws on firms' financial reporting practices by increasing managers' pressure, which should not be neglected by policymakers.

Keywords: Antitrust; Earnings Management; Competition Laws; Legitimacy Pressure

JEL Classification: M41; G30; K21; L4

1 Introduction

Due to the increasing demand for strengthening antitrust laws in major economies¹ and the great importance of nationwide laws in affecting corporate behaviors (Cumming et al. 2017), it is critical to understand how competition legislation reshapes firms' financial reporting practices, especially in an era when market liberalization meets economic globalization (Bradford and Chilton 2019, Gerber 2010). Different from real competition threats resulting from the interaction among market participants, competition laws reshape corporate decisions through totally different channels. Besides penalizing anti-competition actions that have already happened, competition laws can also reshape corporate decisions by their ex-ante function before any material change happens (e.g., Darley, Carlsmith, and Robinson 2001, Kolstad, Ulen, and Johnson 1990). By adopting stricter competition laws, governments draw a "bright line" between allowable and unallowable conducts, which affects managers' understanding of the future business environment before making decisions. Despite extensive studies on product market competition (Giroud and Mueller 2010, Giroud and Mueller 2011, Huang, Jennings, and Yu 2016, Peress 2010, Raith 2003, Schmidt 1997), it is surprising that limited attention is paid to the potential effects of nationwide competition legalization (Bradford et al. 2019). Since earnings are the most important accounting numbers for managers to communicate with stakeholders (Dichev et al. 2013), understanding how earnings management is affected by stricter nationwide antitrust laws becomes not only an important topic in academic research but also an urgent need in international financial reporting practices. Using a new dataset with a comprehensive collection of country-level competition laws,

¹ In the U.S., both governments and political parties stressed the need to adopt stricter antitrust regulations, policies, and enforcement (MacCarthy 2021, Tracy and Kendall 2021). European Union planned to have major reforms to competition laws to curb anticompetitive behavior (Schechner 2020). Japan's Fair Trade Commission claimed to engage in strengthening the power of competition laws (Kihara and Wada 2020). China's State Administration for Market Regulation announced to stop monopolistic actions (Zhang 2022).

we try to investigate the impact of competition laws on firms' earnings management and discuss how this effect is influenced by different institutional environments.

Different from real competition threats resulting from the interaction among market participants, competition laws affect firms through both the ex-post function by penalizing anti-competition actions and the ex-ante function by drawing "bright lines" between allowable and unallowable conducts (Darley, Carlsmith, and Robinson 2001, Kolstad, Ulen, and Johnson 1990), which in turn reshapes corporate decisions before material changes happen in product market competition. Together with the recent question on the effect of competition legislation in curbing firms' market power under the background of global declining competition (Díez, Fan, and Villegas-Sánchez 2019), whether and how nationwide competition laws affect firms' earnings management decisions are still largely underexplored.

Theoretically, competition laws exert greater pressure on managers in multiple ways. First, in terms of ex-ante function, competition laws increase the threats of new entrants (Becker and Stigler 1974, Fudenberg and Tirole 1987, Jacquemin 1974, Levi 1946, Stigler 1966). To mitigate the negative impact coming from potential new entrants, incumbent firms under stricter competition laws should be more intended to inflate earnings in order to make a better advantage over entrants in the financial markets (Shleifer 2004). Second, in terms of ex-post function, competition laws punish the existing monopoly markets by forcing big firms to dissolve into smaller firms and breaking up cartel organizations (Breit and Elzinga 1973, Levenstein and Suslow 2011). As such, affected firms are more likely to inflate earnings when the monopoly profit is diminished by stricter competition laws. What is more, if competition laws strengthen the monitoring power of antitrust institutions (e.g., DoJ Antitrust Division in the U.S., The Anti-monopoly Bureau in P.R. China), the stronger antitrust enforcement will lead to stricter scrutiny on firms' revenue, thus exerting

greater pressure on managers (e.g., Ha, Ma, and Zaldokas 2020). Based on these arguments, firms are expected to increase earnings under stricter competition laws.

Following prior works (e.g., Levine et al. 2020, Levine, Lin, and Xie 2021), we apply Bradford and Chilton's (2018) overall competition law index and its sub-components as measures of legal competition stringency. By compiling and codifying nationwide competition laws in 123 countries during 1888-2010, Bradford and Chilton (2018) create the competition law index to measure the degree to which competition laws and authorities restrict firms' anti-competitive actions from merger and acquisitions, the abuse of dominant positions, the use of anti-competitive agreements, and the power of tools and authorities to address legal violations (Levine, Lin, and Xie 2021). Due to the comprehensive collection of competition laws in Bradford and Chilton (2018), using these measures provides us with several benefits. First, in a large sample with a long period, we can have more comprehensive findings on how legal competition risks affect firms' behaviors, which may not always be available in other settings. Second, the large sample coverage helps us to alleviate the intervention from the change of country-level features in the same period because it is less likely that these features move towards the same direction across a large number of countries simultaneously with competition laws. By exploiting the variation in competition law indexes, we employ the staggered change of international competition laws as a plausible quasi-natural experiment to investigate how firms react to changes in the legal competition environment in terms of earnings management. Following prior papers, we construct earnings management measures as discretionary accruals based on modified Jones model, Jones model, and Kothari model adjusted for past performance (e.g., Dechow, Sloan, and Sweeney 1995, Jones 1991, Kothari, Leone, and Wasley 2005). In order to mitigate potential measurement errors in the models (Lel 2019), we also construct the fourth measure as the first component among the three earnings

management measures in a principal component analysis.

Using a large cross-country sample of 234,067 firm-year observations from 58 countries, we implement the country-level change of competition laws as a plausible quasi-natural experiment and observe that, after controlling for time-varying features in product markets, stricter competition laws are more likely to push firms to inflate their earnings, which is consistent with the pressure effect of competition (e.g., Gaspar and Massa 2006, Raith 2003, Schmidt 1997, Shleifer 2004).² In the robustness tests, our baseline results are robust to alternative sets of fixed effects and three variations of competition law index following Bradford and Chilton (2018) and Levine et al. (2020). In order to make sure that our results are not driven by any specific country, we conduct a series of replications of baseline regressions with samples excluding one specific country each time. Although having different estimates in the replications, the coefficients of interest are all positive and significant, which suggests that the effect of competition laws on earnings management is a general phenomenon and is unlikely to be driven by any specific country.

Further, we implement a series of cross-sectional tests to strengthen that the positive effect of competition laws on earnings management comes from the pressure effect as hypothesized in prior literature (Schmidt 1997, Shleifer 2004). In the cross-sectional tests, we first observe that the effect of competition laws is significantly stronger for firms failing to meet earnings benchmarks measured by consensus analyst forecast, and for firms with a higher level of financial constraint measured by SA-index (Hadlock and Pierce 2010) and lower level of growth opportunity measured by market-to-book ratio. These findings support the pressure hypothesis of competition (Dichev et

² In the baseline regressions, the coefficients of interest are positive and significant at 1% level across measures of earnings management. In terms of magnitude, a one-standard-deviation increase in the overall competition law index, on average, is associated with an increase of about 19% of the sample standard deviation of earnings management measures. Based on these findings, the impact of competition laws on earnings management is both statistically significant and economically meaningful.

al. 2013, Graham, Harvey, and Rajgopal 2005, Linck, Netter, and Shu 2013). In addition, we observe a weaker effect of competition laws for firms with higher institutional ownership and media coverage, which suggests the disciplinary roles of external governance and information transparency in restricting managerial discretion (Baker, Nofsinger, and Weaver 2002, Lang, Lins, and Miller 2003, Linck, Netter, and Shu 2013, McConnell and Servaes 1990, Shleifer and Vishny 1997). In cross-country tests, we observe that the effect of competition laws is attenuated in IFRS countries and common law countries, which suggests the importance of country-level information transparency and investor protection in moderating the pressure effect of competition laws (Ahmed, Neel, and Wang 2013, Baker, Nofsinger, and Weaver 2002, George, Li, and Shivakumar 2016, La Porta et al. 1997, La Porta et al. 1998, Shleifer and Vishny 1997).

In additional tests, we first find that multinational corporations (MNCs) and cross-listed firms are less affected by competition laws in the domicile countries, which suggests the moderating role of firm internationalization in the relation between competition laws and earnings management. Second, we find that firms with greater product market power are less affected by competition laws. Third, we first find that the baseline results hold when using the Competition Law and Policy (CLP) from Hoj (2007) and the Competition Policy Index (CPI) from Buccirosi et al. (2011) to measure the stringency of competition laws. Fourth, we observe consistent results when applying model-free earnings management measures based on accounting numbers (Dechow, Ge, and Schrand 2010, Lel 2019). Fifth, due to the concern that our results come from other country-level factors that are codependent with the change of competition laws (Isidro, Nanda, and Wysocki 2019), we use seven machine learning algorithms with 13 widely used macro-factors to predict the competition law index. In these tests, we find that our baseline results remain, which means that the competition law has a unique impact on earnings management that can not be predicted by the

change of other important country attributes in the same period. Finally, we separate the overall competition law index and find that the sub-component related to substance provisions has a larger and more significant effect on firms' earnings management level than the sub-component related to authority, which suggests the ex-ante function of competition laws that changes managers' expectation before making decisions.

This paper contributes to the literature in several ways. First, this paper contributes to the literature on institutional determinants of earnings management in international studies on corporate financial reporting. Firms' earnings management decisions are observed to be affected by macro-factors like the strength of legal regimes (Choi, Choi, and Sohn 2018), IFRS adoption (Ahmed, Neel, and Wang 2013), short-selling regulations (Massa, Zhang, and Zhang 2015), and national culture (e.g., Han et al. 2010). This paper extends this stream of literature by providing evidence on the effect of competition laws on earnings management in an international setting. What is more, in cross-country tests, we find that this effect is attenuated in more transparent environments and under better legal investor protection. Taking into account other country-level factors as suggested by Isidro, Nanda, and Wysocki (2019), this paper also shows the unique impact of competition laws that are not from the change of other macro-factors in the same period.³

Second, this paper contributes to the literature on competition. Previous works recognize the monitoring and pressure effects of competition (e.g., Gaspar and Massa 2006, Giroud and Mueller 2011, Hart 1983, Nalebuff and Stiglitz 1983, Raith 2003, Schmidt 1997) and have conflicting empirical results (e.g., Datta, Iskandar-Datta, and Singh 2013, Dhaliwal et al. 2014, Healy et al. 2014) from different views of competition. Different from real competition threats resulting from

³ By showing the cross-country differences in earnings management driven by the divergence of legal competition environment, our work also sheds light on a broader literature discussing the cross-country differences in financial reporting practices (e.g., Alford et al. 1993, Amir, Harris, and Venuti 1993, Ball, Kothari, and Robin 2000, Barth and Clinch 1996, Joos and Lang 1994, Salter and Niswander 1995).

the interaction among product market participants, competition laws reshape corporate decisions through totally different channels even before material changes happen in product market competition (e.g., Darley, Carlsmith, and Robinson 2001, Kolstad, Ulen, and Johnson 1990). In terms of competition laws, prior works focus on how competition regulations affect firms' valuation and innovation activities (e.g., Levine et al. 2020, Levine, Lin, and Xie 2021). Based on the change of competition laws, this paper shows the inflation of earnings for firms under the stringency of competition laws, which supports a pressure effect of competition threats from nationwide legislation.

Third, this paper adds to the literature discussing the impact of nationwide policies and regulations. Prior literature documents the important role of legislation systems in affecting corporate behavior (La Porta et al. 1997, La Porta et al. 1998, Shleifer and Vishny 1997), and the important role of laws in international studies (e.g., Cumming et al. 2017). Many papers discuss the positive effect of competition laws on global business, innovation, information disclosure, industrial organization, and investment (e.g., Bourveau, She, and Žaldokas 2020, Bradford and Chilton 2019, Levine et al. 2020, Phillips and Zhdanov 2017, Stigler 1966). By showing a positive impact of competition laws on earnings management, this paper reveals a side effect of competition laws that decreases firms' financial reporting quality, which complements the argument that the stringency of competition laws might not always benefit the economies (Baumol and Ordoover 1985).

The remainder of the paper is organized as follows. Section 2 shows the related literature and hypothesis development. Section 3 introduces the sample selection and variables construction. Section 4 presents the main empirical results. Section 5 reports the results of cross-sectional tests. Section 6 shows additional evidence. Section 7 concludes.

2 Related Literature and Hypothesis Development

2.1 Main effect

The impact of product market competition on firms does not necessarily lead to a similar impact of competition laws. Through both the ex-post function by penalizing anti-competition actions and the ex-ante function by drawing “bright lines” between allowable and unallowable conducts (e.g., Darley, Carlsmith, and Robinson 2001, Kolstad, Ulen, and Johnson 1990), competition laws may have a different impact on firms by introducing real competition threats resulting from the interaction among market participants and reshaping managerial expectations on earnings before material changes happen in product market competition. Therefore, in spite of massive literature on product market competition and earnings management, whether and how competition laws affect earnings management is still an empirical question.

By the ex-ante and ex-post functions, competition laws can exert greater pressure on managers in multiple ways. By the ex-ante function, competition laws can affect the product market by lowering the entry threshold of potential entrants (Becker and Stigler 1974, Fudenberg and Tirole 1987, Jacquemin 1974, Levi 1946, Stigler 1966), thus decreasing incumbent firms’ revenues (Fudenberg and Tirole 1987). To offset the decrease in revenues, incumbent firms under stricter competition laws are more likely to inflate earnings so that they can have a greater advantage over entrants in external financing (Shleifer 2004). By the ex-post function, competition laws can penalize the existing monopoly markets and forces big firms to dissolve into smaller firms (Breit and Elzinga 1973, Edwards 1946, Levenstein and Suslow 2011). For example, in 1982, AT&T agreed to break up its business into seven smaller regional operating companies known as “Baby Bells ” as an agreement with the U.S. Department of Justice (Temin and Galambos 1987). As such, after being dissolved, affected firms may inflate earnings when the monopoly profit

decreases as the market power reduces. What is more, in most competition laws, the antitrust institutions, including DoJ Antitrust Division in the U.S., the Anti-monopoly Bureau in P.R. China, are often given more resources and power to monitor firms' anti-competition actions (Baker 2003, Block, Nold, and Sidak 1981). As a result, the greater monitoring power will lead to stricter scrutiny on firms' revenue, thus exerting greater pressure on managers (Besanko and Spulber 1989, Ha, Ma, and Zaldokas 2020, Schwartz 1979). Overall, all these channels suggest that firms are expected to increase earnings under stricter competition laws. Therefore, we propose the following hypothesis based on the pressure effect.

***Hypothesis 1.** All else being equal, stricter competition laws restrict firms' earnings management.*

2.2 Heterogeneous effects

If competition laws affect firms' earnings management through the pressure effect, firms with higher external pressure are more intended to inflate earnings in the stricter legal competition environment because external pressure (e.g., the need to meet earnings target and attract external financing) further motivates managers to inflate earnings (e.g., Graham, Harvey, and Rajgopal 2005, Healy and Wahlen 1999, Linck, Netter, and Shu 2013). Therefore, we propose the following hypothesis.

***Hypothesis 2.** The impact of competition laws on firms' earnings management is strengthened when firms have greater external pressure.*

If competition laws motivate firms to inflate earnings, external discipline that restricts managers' unethical behavior should attenuate the pressure effect of competition laws firms. Based on this argument, we have the next hypothesis as follows.

***Hypothesis 3.** The impact of competition laws on firms' earnings management is attenuated*

for firms with stricter external discipline.

We also investigate the role of information transparency under the pressure effect of competition laws. If information transparency facilitates outsiders' monitoring, firms with greater information transparency should mitigate the pressure effect of competition laws (e.g., Armstrong, Guay, and Weber 2010, Coles, Daniel, and Naveen 2008, Demsetz and Lehn 1985). Therefore, we propose and test our fourth hypothesis.

***Hypothesis 4.** The impact of competition laws on firms' earnings management is mitigated for firms with better information transparency.*

3 Sample Selection and Variable Construction

3.1 Sample selection

This sample comes from multiple sources. Firm-level financial data come from Thomson Reuters Worldscope database. Analyst coverage data come from I/B/E/S database. Trade/GDP, GDP per capital, GDP growth, and FDI/GDP come from World Development Index. Market capitalization/GDP and Deposit/GDP come from the World Bank Financial Structure database (FSD). The competition law index comes from Bradford and Chilton (2018) who provide the most comprehensive datasets on competition laws of countries in 1889-2010.⁴ In cross-sectional tests, we include institutional ownership data from Factset Institutional Ownership database and ADR issuance data from BNY-Mellon ADR List. Observations included satisfy the following criteria: (1) Firms are not in the financial industries (one-digit SIC code 6); (2) Firms should have a market capitalization above \$1 million; (3) A firm must have at least 2 consecutive years of non-missing variables used in the baseline analysis; (4) Each country should have at least 20 firms with

⁴ In robustness tests, we also include the Competition Law and Policy (CLP) data for the OECD countries in 2003-2004 from Hoj (2007), and the Competition Policy Index (CPI) data measuring legal competition stringency across a sample of 13 OECD countries over the period of 1995-2005 from Buccirossi et al. (2011).

complete data. Since the sample contains a large fraction of observations from the U.S. (104,509 out of 338,587), we exclude those observations to address the concern that our empirical results are driven by the financial reporting decisions of U.S. firms.⁵ Finally, the sample consists of 234,067 firm-year observations in 58 countries during the period 1980-2010. Table 2 reports the distribution of observations across countries. All the continuous variables are winsorized at 5% and 95% to remove outliers.

3.2 Measures of earnings management

We construct four variables to measure earnings management. Following Dechow, Sloan, and Sweeney (1995), Jones (1991), and Kothari, Leone, and Wasley (2005), we first construct earnings management measures as discretionary accruals based on modified Jones model (*DA_MJONES*), Jones model (*DA_JONES*), and Kothari model (*DA_KOTHARI*), respectively. Following Gopalan and Jayaraman (2012), we implement a principal component analysis to construct the fourth measure (*DA_FCOMP*) as the first component among all three discretionary measures.⁶

3.3 Measures of competition law index

Bradford and Chilton (2018) provide the most comprehensive dataset on competition laws of 123 countries during 1889-2010. To construct the index, Bradford and Chilton (2018) collect all competition laws around the world when countries adopted their first competition law. They code 700 individual laws and codify provisions of the competition-related laws for a panel of countries.⁷ Based on the panel, Bradford and Chilton (2018) construct four indexes regarding two categories: (1) the power of competition authority (*CLI_AUTHORITY*), and (2) the substance of competition laws (*CLI_SUBSTANCE*), where *CLI_SUBSTANCE* reflects the regulation of merger and

⁵ All the results are similar when including U.S. firms.

⁶ From Panel C of Table 2, we observe that these four measures of earnings management are highly correlated with each other.

⁷ Those indexes are provided by Bradford and Chilton (2018) on the website of Comparative Competition Law. See the following website for detailed information: <http://comparativecompetitionlaw.org>.

acquisitions (*CLI_MERGERS*), the prohibition of agreements among firms that limit competition (*CLI_DOMINANCE*), and the limit of strategies used by dominant firms to abuse their positions the substance of the law (*CLI_ANTICOMP*).⁸ Finally, the competition law index is calculated as the equal-weighted average of *CLI_AUTHORITY* and *CLI_SUBSTANCE*.⁹ Due to the comprehensive collection of competition laws in Bradford and Chilton (2018), using these measures provides us several benefits. First, in a large sample with a long period, we can have more comprehensive findings on how nationwide competition laws affect firms' behaviors. Second, the large sample coverage helps us to alleviate the intervention from the change of other country-level features in the same period because it is less likely that these features move towards the same direction across a large number of countries simultaneously with competition laws.

3.4 Summary statistics

Table 1 reports the number of firms, observations, and median values of earnings management measures by country. In the sample, Japan contributes the most observations (53,120 out of 234,067) and firms (4,149 out of 27,631), followed by the United Kingdom (25,571 out of 234,067 observations and 2,625 out of 27,631 firms) and Australia (13,471 out of 234,067 observations and 1,862 out of 27,631 firms), which is similar to the extant literature (e.g., Le1 2019). The means of earnings management measures vary across countries. For example, the mean of *DA_MJONES* varies from -0.0101 in Argentina to 0.323 in Oman.

[Insert Table 1 about here.]

In Panel A of Table 2, the means of earnings management measures are close to zero, which is similar to prior works. Other variables also show similar statistics comparable to prior papers.

⁸ Following Bradford and Chilton (2018), we calculate *CLI_SUBSTANCE* as the equal-weighted average of *CLI_MERGERS*, *CLI_DOMINANCE*, and *CLI_ANTICOMP*.

⁹ Also, it can be expressed as:

$$CLI = 50\% \times CLI_AUTHORITY + 16.7\% \times CLI_MERGERS + 16.7\% \times CLI_DOMINANCE + 16.7\% \times CLI_ANTICOMP.$$

Next, we conduct univariate tests for earnings management measures across levels of competition law index. Firms in countries with competition law index higher (lower) than the sample median are sorted into High (Low) CLI group. From Panel B of Table 2, firms in the High CLI group show a significantly higher level of earnings management in all four measures. On average, in the first three measures, the level of earnings management for firms with low CLI is about half of that in firms with high CLI. This evidence provides us with a basic outlook on the positive relation between earnings management and the strictness of the legal competition environment.

[Insert Table 2 about here.]

Panel C of Table 2 shows the pairwise correlations among measures of earnings management and competition law indexes. From Panel C of Table 2, we observe that the four measures of earnings management are highly correlated to each other, and those measures are positively correlated with the competition law index and the sub-indexes. Together with results in Panel B of Table 2, these findings are consistent with the prediction on pressure effect that firms tend to inflate earnings under a stricter legal competition environment.

4 Main Results

4.1 Empirical strategy

We implement the following regression specification to estimate the effect of country-level competition laws on firms' earnings management decisions.

$$EM_{i,c,t+1} = \alpha + \beta Competition\ Law\ Index_{c,t} + \gamma Controls_{i,c,t} + FEs + \varepsilon_{i,c,t+1} \quad (1)$$

where i , c , and t index firms, country, and year, respectively. Following papers on earnings management, we include firm-level control variables such as Firm size, Leverage, Market-to-book ratio, Profitability, Cash flow, Tangibility, and Analyst coverage. Country-level control variables include Market Capitalization/GDP, Trade/GDP, GDP per capita, GDP growth, FDI/GDP, and

Deposit/GDP to control for macroeconomic status and financial development. To alleviate the concern that the impact of competition laws is driven by other policies and regulations that are adopted in the same period, we also include measures on nationwide policies and regulations, including financial liberalization (e.g., Moshirian et al. 2021), board reform (e.g., Fauver et al. 2017), insider trading restrictions (Bhattacharya and Daouk 2002, Levine, Lin, and Wei 2017, Zhang and Zhang 2018), and IFRS adoptions (George, Li, and Shivakumar 2016). Firm, year, and industry-year fixed effects are included to control for firm- and time-invariant factors and all factors at the industry level. We also include region-year fixed effects to further control for all regional features (e.g., local culture, geographical location) on firms' financial reporting practices (Han et al. 2010). Industries are classified by Fama-French 48 industries (Fama and French 1997). Regions are classified by the World Bank.¹⁰ Standard errors are adjusted for heteroskedasticity and clustered by country because the competition law index varies at the country level.

4.2 Validity test

Although a firm's financial reporting decision is impossible to affect the adoption of competition laws, the reverse causality problem still exists if the trend in firms' earnings management is considered by governments when they make decisions on competition laws. To address this concern, we test whether country-level earnings management predicts changes in competition laws by applying the following regression model.

$$\text{Competition Law Index}_{c,t+1} = \alpha + \beta \text{Averaged EM}_{c,t} + \gamma \text{Controls}_{c,t} + \text{FEs} + \varepsilon_{c,t+1} \quad (2)$$

where *Averaged EM* denotes the country average of earnings management measures across firms in each country-year. Country and year fixed effects are included to control for any invariant factors at time and country levels. Standard errors are clustered at the country level.

¹⁰ Appendix Table A2 lists the sample distribution across regions defined by the World Bank.

[Insert Table 3 about here.]

From Table 3, we observe no evidence showing that earnings management predicts changes in competition law. For all measures of earnings management and all model settings, the estimated coefficients of interest are all insignificantly different from zero. This evidence means that it is unlikely the case that firms' earnings management level is taken into consideration by governments when changing nationwide competition laws. To this end, we alleviate the concern of the reverse causality problem.¹¹

4.3 Baseline results

Table 4 reports the results of baseline regressions testing the effect of competition law on earnings management. In these tests, we include firm and year fixed effects to control for firm- and time-invariant factors and include firm, industry-year, and region-year fixed effects to further control for all the factors at industry and region levels.

[Insert Table 4 about here.]

As shown in Table 4, the coefficients of interest are positive and significant at 1% level, and the results are robust to alternative sets of fixed effects and four measures on earnings management. In terms of economic magnitude, on average, a one-standard-deviation increase in the competition law index is associated with a $0.015 \times 0.55 = 0.008$ increase in *DA_MJONES*. Compared to the sample standard deviation of *DA_MJONES* (0.05), the estimated coefficients are statistically and economically meaningful. Estimates for other earnings management measures show similar results. Taken together, these results suggest that firms under stricter competition laws are more likely to inflate their earnings in order to survive in a more competitive environment, which supports the pressure hypothesis.¹² Interestingly, we observe positive estimates of Post-IFRS,

¹¹ The results are similar when U.S. firms are included in the sample. Appendix Table A3 shows the results.

¹² Appendix Table A4 reports the baseline results based on the larger sample with U.S. firms.

which contradicts the prior argument that firms located in countries that have adopted IFRS decrease their earnings management level (Ahmed, Neel, and Wang 2013). This finding supports Isidro, Nanda, and Wysocki's (2019) argument that the conclusions drawn on the impact of IFRS adoption are problematic due to the codependence between IFRS adoption and other country attributes.¹³

4.4 Robustness tests

Alternative fixed effects. To show the robustness of baseline results when using alternative sets of fixed effects, we include firm, industry-year fixed effects, and firm, region-year fixed effects into our regressions.

[Insert Table 5 about here.]

As reported in Table 5, the coefficients of interest are all positive and significant at 1% across different sets of fixed effects. Given the similar coefficient estimates for all earnings management measures to those in the baseline regressions, these results suggest that the baseline results are robust to alternative sets of fixed effects.

Alternative measures of competition law index. We use several variations of the competition law index according to prior works. Bradford and Chilton (2018) suggest using a region-adjusted index in order to take the effect of region-wide regulation into consideration. In their work, they adjust the competition law index for European Union and construct a region-adjusted index. On the other hand, Levine et al. (2020) argue that the weights assigned to each sub-indexes when constructing the overall competition law index are arbitrary and may lead to undesirable outcomes in empirical tests. Therefore, following Levine et al.'s (2020) construction, we calculate a weight-adjusted overall index by equally averaging the four sub-indexes (Authority, Merger Control,

¹³ The discrepancy may also come from the different sample coverage and sample period, or because of the bias in the estimation of staggered DID (Baker, Larcker, and Wang 2022).

Abuse of Dominance, and Anticompetitive Agreements). What is more, we use a principal component analysis to further address the arbitrary construction of the competition law index. Specifically, we use the first component among sub-indexes in a principal component analysis as another measure of competition laws.¹⁴

[Insert Table 6 about here.]

From Table 6, we find that our baseline results are robust to all these alternative versions of the competition law index, meaning that our results are not driven by the specific construction of the overall competition law index in Bradford and Chilton (2018).

Excluding specific country. In the baseline analysis, we exclude U.S. firms to address the concern that our results are driven by observations from the U.S. To further analyze whether our results are driven by any specific country in the sample, we conduct a robustness test by replicating the baseline regression on samples excluding a country each time. Specifically, we conduct 59 replications based on an enlarged sample with U.S. firms and reestimating the baseline regression in Columns (2) and (4) of Table 4 for *DA_MJONES* and *DA_JONES* in the restricted sample. We plot the estimated coefficients in Figure 1.

[Insert Figure 1 about here.]

As shown in panels of Figure 1, all the estimates are positive and significant at 10% level for both earnings management measures. Specifically, the estimated coefficients of interest range from 0.0109 (0.0113) for Japan to 0.0162 (0.0166) for Singapore when the dependent variable is *DA_MJONES* (*DA_JONES*). Compared to the coefficient estimates reported in Table 4 (0.0147 for *DA_MJONES* and 0.0150 for *DA_JONES*), this evidence suggests that dropping observations from any specific country does not overturn our main conclusion.¹⁵

¹⁴ For comparison, the first component measure is standardized into the range from 0 to 1.

¹⁵ The results are similar when the dependent variables are *DA_KOTHARI* and *DA_FCOMP*.

5 Cross-Sectional Effects

In this section, we strengthen our argument on the pressure effect of competition laws by testing the following predictions. First, we examine the pressure effect by the motivation of earnings management. Firms with higher external pressure are more intended to inflate earnings in the stricter legal competition environment because external pressure (e.g., the need to meet earnings target and attract external financing) further motivates managers to inflate earnings (Graham, Harvey, and Rajgopal 2005, Healy and Wahlen 1999, Linck, Netter, and Shu 2013). Therefore, if the pressure effect works, the impact of competition laws on firms' earnings management should be stronger when firms face greater external pressure.

Second, we analyze the joint impact of external discipline and competition laws on firms' earnings management. If external discipline restricts managers' unethical behavior, firms' earnings management should be lower for firms with greater external discipline because they are more likely to be restricted to conduct self-serving behavior (Chung, Firth, and Kim 2002). In this way, the pressure effect should be attenuated for firms with stricter external discipline.

Third, we also investigate the moderating role of information transparency under the impact of competition laws. If information transparency facilitates outsiders' monitoring, firms with greater information transparency should mitigate the pressure effect of competition laws (e.g., Armstrong, Guay, and Weber 2010, Coles, Daniel, and Naveen 2008, Demsetz and Lehn 1985).

5.1 *External pressure*

Benchmark Beating. First, we analyze the heterogeneous effects of firms across whether firms beat earnings benchmarks or not. According to prior works (e.g., Dichev et al. 2013, Graham, Harvey, and Rajgopal 2005, Healy and Wahlen 1999), managers failing to beat earnings benchmarks will be punished by the markets. In order to avoid punishment, firms failing to beat

earnings benchmarks are expected to inflate their earnings more than other firms. Therefore, if the pressure effect of competition laws works, the external pressure on earnings is expected to amplify the legitimacy pressure of competition laws. Following prior works (e.g., Doyle, Jennings, and Soliman 2013, Kirk, Reppenhagen, and Tucker 2014, McInnis and Collins 2011), we use the consensus analyst forecast on EPS as the proxy of earnings benchmarks and separate the sample into two groups by whether the actual EPS is larger than the expected EPS or not.

[Insert Table 7 about here.]

Results shown in Panel A of Table 7 suggest that, across measures of earnings management, firms failing to beat earnings benchmarks are more likely to inflate their earnings under stricter competition laws, which provides further evidence supporting the pressure hypothesis.

Financial constraint. Next, we analyze the heterogeneous effects of firms across levels of financial constraint. According to Linck, Netter, and Shu (2013), firms with more financial constraints are more likely to inflate earnings in order to raise capital. Therefore, firms with more financial constraints are expected to inflate their earnings more than firms with fewer financial constraints. We separate the sample into two groups by firms' financial constraint level measured by the Size-Age index (SA-index) in Hadlock and Pierce (2010).¹⁶ Results shown in Panel B of Table 7 suggest that firms with a higher level of financial constraint are more likely to inflate their earnings under stricter competition laws, which is consistent with the pressure hypothesis.¹⁷

Growth opportunity. Since firms with fewer growth opportunities face more external pressure (Graham, Harvey, and Rajgopal 2005, Healy and Wahlen 1999), managers in these firms are expected to inflate more of their earnings with the expectation of a more competitive market that reduces firms' earnings. We separate the sample into two groups by firms' growth opportunity

¹⁶ Following Hadlock and Pierce (2010), SA index is calculated as $-0.737*Size+0.043*Size^2-0.040*Age$.

¹⁷ The results hold across measures of earnings management.

measured by market-to-book ratio. As shown in Panel C of Table 7, the effect of competition laws is stronger among firms with fewer growth opportunities. The estimated coefficients on the competition law index are larger and more significant in the Low market-to-book group than in the High market-to-book group. This evidence supports our view that firms with fewer growth opportunities are more likely to be shocked by the strength of the legal competition environment.

5.2 *External discipline and information transparency*

Institutional ownership. Since institutional investors are proved to have a monitoring effect in restricting managers' unethical behavior (McConnell and Servaes 1990, Shleifer and Vishny 1997), firms with higher institutional ownership are expected to do less earnings management (Chung, Firth, and Kim 2002). From Panel A of Table 8, we observe that the coefficients of interest are significantly lower in the High institutional ownership group than those in the Low institutional ownership group. This evidence suggests that higher institutional ownership can mitigate the shock from competition laws on earnings management, which is consistent with the monitoring role of institutional investors.

[Insert Table 8 about here.]

Media coverage. By alleviating information asymmetry, media coverage enhances the informational efficiency of the stock market and increases information transparency (Chen et al. 2020, Drake, Guest, and Twedt 2014). Therefore, with a higher level of transparency, firms with higher media coverage are expected to have lower earnings management under stricter competition laws. Using the number of news released in the firm-year to separate the sample,¹⁸ we observe in Panel B of Table 8 that the coefficient estimates of competition law index are significantly lower in the High media coverage group than those in the Low media coverage group, which suggests

¹⁸ Information on firms' news comes from RavenPack database.

the moderating role of information transparency in the pressure effect of competition laws on firms' earnings management.

5.3 Cross-country tests

IFRS adoption. The effects of the adoption of International Financial Reporting Standards (IFRS) have been widely discussed since its first adoption in the European Union (George, Li, and Shivakumar 2016). Until now, it is widely believed in the literature that IFRS adoption increases information transparency, stock informativeness, and financial statement comparability (e.g., Ball, Li, and Shivakumar 2015, Cascino and Gassen 2015, Kim and Shi 2012). Based on these arguments, we expect firms in IFRS countries to engage less in earnings management because of the improved information environment. As shown in Panel A of Table 9, firms in IFRS countries do not have a significant increase in earnings management under competition laws, while firms in countries that have not adopted IFRS are significantly affected by competition laws. These results indicate that the information benefits from IFRS adoption can mitigate firms' earnings inflation under stricter competition laws.

[Insert Table 9 about here.]

Legal origin. Next, we investigate the role of investor legal protection in the impact of competition laws on firms' earnings management. According to prior literature (La Porta et al. 1997, La Porta et al. 1998, Shleifer and Vishny 1997), common law countries have better investor legal protection than civil law countries. Therefore, we separate our sample into two groups according to countries' legal origin. In Panel B of Table 9, we observe that common law countries are less affected by the side effect of competition laws in terms of earnings management. Given that common law provides better investor protection, this evidence suggests that better investor legal protection attenuates the impact of competition laws on earnings management, which also

highlights the role of the legal environment in affecting firms' financial reporting decisions.

Collectively, we observe that the effect of competition laws on earnings management is stronger for firms failing to meet earnings benchmarks and for firms with a higher level of financial constraint and a lower level of growth opportunities, which supports the pressure hypothesis. Evidence from country-level factors also suggests the important role of external discipline through investor legal protection and information transparency through international accounting standards in mitigating the unfavorable impact from the legitimacy pressure of competition.

6 Additional Evidence

6.1 The moderating role of firm internationalization

In this subsection, we investigate the different impacts of competition laws across firms with different levels of internationalization based on multinational corporations (MNCs) and cross-listed firms.

Multinational corporations. Since multinational corporations have business in multiple countries, their decisions should be different from domestic firms that only focus on domestic markets (Aguilera, Marano, and Haxhi 2019). Therefore, the change in competition laws in the domicile countries should have less impact on multinational corporations. Following prior works, we identify a firm as MNC if it contains at least one foreign subsidiary in the firm-year.¹⁹ From Panel A of Table 10, we find that the impact of competition laws is significantly weaker in MNCs than in domestic firms, which suggests the moderating role of multinational operation in the relation between competition laws and earnings management.

[Insert Table 10 about here.]

Cross-listing in multiple countries. According to prior works, cross-listing increases firms'

¹⁹ Information of subsidiaries come from WorldScope Segment database.

transparency by requiring high standards of disclosure practices (Shi, Magnan, and Kim 2012), increasing analyst coverage and media coverage (Baker, Nofsinger, and Weaver 2002, Lang, Lins, and Miller 2003), enhancing price informativeness (Fernandes and Ferreira 2008), and receiving stronger monitoring effect from institutional investors (Lel and Miller 2008). Therefore, with a higher level of transparency, cross-listed firms are expected to have lower earnings management under stricter competition laws.²⁰ Results in Panel B of Table 10 show that the effect of competition laws is significant only in the group of non-cross-listed firms, which suggests that cross-listing can mitigate the pressure effect of competition laws on firms' earnings management.

6.2 Firm market power and the impact of competition laws

Furthermore, we focus on how firm market share affects the impact of competition laws on earnings management. According to prior works (Datta, Iskandar-Datta, and Singh 2013, Shervani, Frazier, and Challagalla 2007), firms with greater market power are less likely to be affected by the change in the business environment. Therefore, the impact of competition laws should be attenuated for these firms. To test the moderating role of product market power, we separate the sample by whether the firm is among the top 10 sales in the country-industry over the year.

[Insert Table 11 about here.]

Consistent with the prediction, results in Table 11 show that the coefficient estimates of interest are only significant in firms that are not top 10 sellers in the country's industry over the year. This evidence shows the moderating role of market power in the impact of competition laws.

6.3 Alternative sources of competition law stringency

We further examine whether our results remain when applying measures of competition law stringency from alternative sources. In this test, we use measures of competition law from two

²⁰ We identify cross-listed firms under the guidance of BNY-Mellon ADR List. Firms that have issued ADRs in the U.S. market are identified as cross-listed firms.

sources: (1) the Competition Law and Policy (CLP) score for the OECD countries from 2003-2004 (Hoj 2007); and (2) the Competition Policy Index (CPI) data measuring the legal competition environment across a sample of 13 OECD countries over the period of 1995-2005 (Buccirossi et al. 2011).

[Insert Table 12 about here.]

As shown in Table 12, although these two data sources only provide cross-sectional data on competition law for short periods of time so that we can only analyze the effect of competition law on earnings management across countries, the results in these restricted samples also reflect the positive relation between competition law index and earnings management measures, which supports that the pressure effect of competition law on earnings management is not driven by the construction of the overall competition index in the baseline regressions.

6.4 Additional evidence from accounting numbers

Additional evidence from accounting numbers also implies the positive impact of competition laws on earnings management. Following prior works (e.g., Dechow, Ge, and Schrand 2010, Lel 2019), we use four model-free measures of earnings management that are calculated from financial statements: (1) impairment of goodwill scaled by total assets (*Good Impair*), (2) impairment of property, plant, and equipment scaled by total assets (*PPE Impair*), (3) accruals scaled by total assets (*Accruals/AT*), and (4) accruals scaled by cash flow from operations (*Accruals/CFO*).²¹

[Insert Table 13 about here.]

From Columns (1) and (2) of Table 13, we observe that firms decrease their impairments in goodwill and PPE under stricter competition laws. Since the impairment of goodwill and PPE reflects firms' earnings management decisions (Dechow, Ge, and Schrand 2010), this evidence is

²¹ Accruals and cash flow from operations are measured according to Lel (2019).

consistent with our prediction that competition laws push firms to inflate their earnings. The positive and significant relation between competition laws and accruals from Columns (3) and (4) also supports earnings inflation under stricter nationwide competition laws.

6.5 The unique impact of competition laws: Evidence from machine learning algorithms

As suggested by Isidro, Nanda, and Wysocki (2019), it is problematic to draw a conclusion on the impact of country-level regulations in international studies due to the codependence between these regulations and other country-level attributes.²² In the baseline regressions, we try to alleviate such a concern in two ways. First, since it is less likely that other macro-factors change simultaneously with competition laws across all the countries, the broad coverage of competition laws from Bradford and Chilton (2018) alleviates the concern that competition laws are systematically associated with any specific macro-factor in the same period. Second, we use region-year fixed effects to control for macro-factors at the region level (e.g., regional culture, geographical location) that may affect both the decisions of competition laws and firms' financial reporting practices (Han et al. 2010). To further examine whether our baseline results are driven by other country attributes rather than the change in legal competition environment, we use machine learning (ML) to test the uniqueness of competition laws. First, we apply seven machine learning algorithms to predict the competition law index. These algorithms include OLS, Ridge regression, LASSO, ElasticNet, Principal Component Regression (PCR), Random Forest, and Artificial Neural Network (ANN). According to Isidro, Nanda, and Wysocki (2019), we use 13 additional time-variant macro-factors from economic, sociological, regulatory, and political sides as the predictors.²³ Then, we use the residual part of competition law index that can not be

²² In this paper, the authors use IFRS adoption as an example and show that the impact of IFRS adoption on financial reporting quality documented in prior works disappears after controlling for other country-level factors that are also associated with firms financial reporting practices.

²³ Since some ML algorithms do not accept non-missing values as inputs, we use the regional average in the year as

predicted by these time-variant macro-factors as the independent variable and reestimate Equation (2). If competition laws have a unique impact on firms' earnings management decisions, we would observe a significant coefficient estimate of the unpredicted part of competition law index.

[Insert Table 14 about here.]

Table 14 shows a positive and significant impact of the unpredicted part of competition laws on firms' earnings inflation across measures of earnings management and machine learning algorithms. These findings support that the impact of competition laws on earnings management is unique and less likely to be driven by other important macro-factors mentioned in prior literature.

6.6 Sub-components of competition law index

Finally, we investigate the effects of sub-components of competition law on earnings management by separating the competition law index into Authority (*CLI_AUTHORITY*) and Substance Provision (*CLI_SUBSTANCE*).

[Insert Table 14 about here.]

From Table 14, we find that the coefficient estimates of substance provision are all positive and significant across earnings management measures, but those of authority are all insignificant. This evidence suggests that the impact of competition law on earnings inflation mainly comes from more stringent substance provisions rather than the strengthened authority power of competition. Due to the mandatory features of earnings report, this evidence is consistent with our argument that firms' earnings management decision is affected by competition laws by drawing "bright lines" between allowable and unallowable conducts.

7 Conclusion

a substitute for missing value in the country year. The regions (East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, North America, South Asia, and Sub-Saharan Africa) are defined by the World Bank (see Appendix Table A2).

This paper examines the impact of competition laws on earnings management. Using a comprehensive dataset of competition laws that capture the staggered change of nationwide legal competition threats, we find a positive impact of competition laws on firms' earnings management. Based on the evidence that firms inflate earnings under stricter competition laws, our paper supports the pressure effect of competition on firms' financial reporting decisions. This result is robust to alternative measures of earnings management and model specifications. Under replications of the baseline regressions by excluding firms in a specific country each time, we find that our results are not driven by any specific country.

In the cross-sectional tests, we first observe a stronger impact of competition laws on earnings management for firms failing to beat earnings benchmarks, firms with a higher level of financial constraint, and firms with a lower level of growth opportunity, which supports the pressure effect of legal competition threats. Then, we observe that firms with higher institutional ownership and firms cross-listed in the U.S. market inflate less of their earnings under stricter competition laws, which suggests the moderating role of external discipline and information transparency. In cross-country tests, firms in IFRS countries and common law countries are observed to inflate less of their earnings under the stringency of competition laws, which provides country-level evidence to support the important role of external discipline and information transparency in mitigating the side effect of competition laws.

Further, we find the moderating role of firm internationalization and product market power in the relation between competition laws and earnings management. Applying different measures of legal competition environments from other sources and accounting numbers as measures of earnings management, we still find consistent results to support our arguments. Using seven machine learning algorithms with other important macro-factors, we find the unique impact of

competition laws on earnings management that can not be predicted by other country attributes. By separating the competition law index into sub-components, we find a more significant effect of law stringency in terms of substance provisions than that of authority power, which is consistent with the ex-ante function of competition laws in reshaping managers' expectations before making decisions. Overall, this paper provides evidence on how the legitimacy pressure from nationwide competition laws affects firms' financial reporting decisions and reveals a side effect of competition laws on financial reporting quality that should not be neglected by policymakers.

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Figure 1
Robustness Tests: Excluding Specific Country

This figure plots the coefficient estimates in samples excluding observations from specific countries. We replicate the baseline regression 59 times by dropping observations from one country each time. Panel A shows the results of replications for *DA_MJONES* (Column (2) of Table 4). Panel A shows the results of replications for *DA_JONES* (Column (4) of Table 4). The X-axis denotes the coefficient estimates of the replications. The Y-axis denotes the ISO code of the country excluded in the replications. The coefficient estimates are shown in the bars. The range of each bar denotes the 90% confidence interval.

Panel A: Modified Jones Model (*DA_MJONES*)

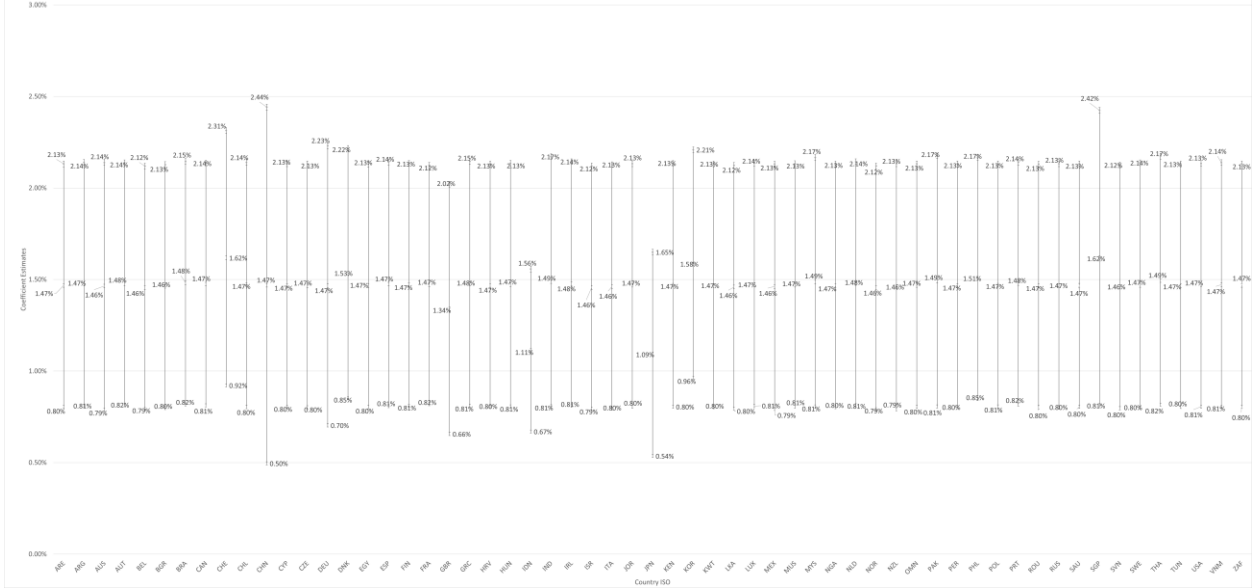


Table 1
Country Distribution

This table reports the number of firms, observations, median values for earnings management measures by country. Observations included should satisfy the following criteria: (1) Firms are not in the financial industries (one-digit SIC code 6); (2) Firms should have a market capitalization above \$1 million. (3) A firm must have at least 2 consecutive years of non-missing variables used in the baseline analysis; (4) Each country should have at least 20 firms with complete data. Since the sample contains a large fraction of observations from the U.S. (104,509 out of 338,587), we exclude those observations to address the concern that our empirical results are driven by the effect shown in prior studies (e.g., Chen et al. 2018). Finally, the sample includes 234,067 observations in 58 countries during the period of 1980-2010.

Country	#Firms	#Obs	Modified Jones Model (<i>DA_MJONES</i>)	Jones Model (<i>DA_JONES</i>)	Kothari Model (<i>DA_KOTHARI</i>)	First Component (<i>DA_FCOMP</i>)
Argentina	65	533	-0.0101	-0.0093	-0.0097	-0.6438
Australia	1,862	13,471	0.0161	0.0166	0.0133	0.1817
Austria	117	994	0.0047	0.0047	0.0045	-0.1691
Belgium	153	1,401	0.0016	0.0015	-0.0003	-0.2839
Brazil	310	2,089	-0.0078	-0.0073	-0.0114	-0.6207
Bulgaria	116	514	0.0342	0.0351	0.0298	0.7656
Canada	1,862	12,964	0.0071	0.0077	0.0070	-0.0731
Chile	159	1,790	0.0126	0.0138	0.0096	0.0828
China	2,113	13,102	0.0054	0.0058	0.0022	-0.1797
Croatia	27	82	0.0175	0.0173	0.0131	0.2452
Cyprus	61	163	0.0138	0.0143	0.0081	0.0919
Czech Republic	41	225	-0.0034	-0.0023	-0.0046	-0.4541
Denmark	176	1,732	0.0069	0.0073	0.0047	-0.1187
Egypt, Arab Rep.	102	402	0.0148	0.0147	0.0025	0.0301
Finland	142	923	0.0077	0.0081	0.0032	-0.1256
France	1,120	10,291	0.0047	0.0050	0.0024	-0.1843
Germany	930	9,711	0.0043	0.0045	0.0027	-0.1845
Greece	307	1,939	0.0168	0.0171	0.0149	0.2129
Hungary	30	164	0.0039	0.0038	-0.0013	-0.2306
India	1,962	9,882	0.0223	0.0231	0.0162	0.3582
Indonesia	324	3,233	0.0144	0.0142	0.0136	0.1526
Ireland	84	641	0.0148	0.0154	0.0132	0.1880
Israel	404	2,420	0.0178	0.0179	0.0148	0.2324
Italy	251	1,525	0.0103	0.0103	0.0086	-0.0041
Japan	4,149	53,120	0.0187	0.0189	0.0186	0.2957
Jordan	91	301	0.0298	0.0304	0.0243	0.6653
Kenya	32	149	0.0108	0.0139	0.0051	-0.0606

Korea, Rep.	1,696	13,231	-0.0023	-0.0017	-0.0041	-0.4165
Kuwait	37	104	0.0401	0.0411	0.0215	0.7867
Luxembourg	35	199	0.0224	0.0258	0.0136	0.3190
Malaysia	1,027	10,432	0.0165	0.0168	0.0135	0.1929
Mauritius	24	101	0.0304	0.0300	0.0283	0.6419
Mexico	141	1,446	0.0102	0.0107	0.0086	0.0139
Netherlands	264	2,938	0.0084	0.0088	0.0059	-0.0689
New Zealand	156	1,299	0.0145	0.0147	0.0088	0.0873
Nigeria	51	209	0.0000	0.0010	-0.0049	-0.3518
Norway	287	2,221	0.0049	0.0058	0.0061	-0.1318
Oman	77	375	0.0323	0.0346	0.0152	0.5686
Pakistan	208	1,651	0.0141	0.0147	0.0107	0.1016
Peru	89	655	0.0152	0.0157	0.0109	0.1162
Philippines	147	1,324	0.0134	0.0143	0.0116	0.1215
Poland	322	1,554	0.0180	0.0190	0.0129	0.2364
Portugal	91	930	0.0176	0.0184	0.0174	0.2746
Romania	131	634	0.0221	0.0225	0.0194	0.3777
Russian Federation	186	372	0.0110	0.0127	0.0080	0.0232
Saudi Arabia	68	136	0.0099	0.0094	0.0047	-0.0418
Singapore	678	6,493	0.0182	0.0185	0.0136	0.2311
Slovenia	43	202	0.0151	0.0152	0.0128	0.1655
South Africa	404	3,691	0.0117	0.0129	0.0056	0.0069
Spain	203	2,418	0.0097	0.0106	0.0078	-0.0038
Sri Lanka	130	718	0.0126	0.0132	0.0088	0.0745
Sweden	348	2,303	0.0034	0.0042	0.0028	-0.2066
Switzerland	265	2,845	0.0109	0.0115	0.0072	0.0025
Thailand	499	5,078	0.0083	0.0086	0.0038	-0.1021
Tunisia	27	124	0.0176	0.0179	0.0112	0.1933
United Arab Emirates	46	151	0.0127	0.0121	0.0056	0.0281
United Kingdom	2,625	25,571	0.0175	0.0183	0.0136	0.2241
Vietnam	336	901	0.0299	0.0303	0.0250	0.6061
Total	27,631	234,067	0.0132	0.0137	0.0111	0.0948

Table 2
Basic Characteristics

This table reports the basic characteristics of the sample. Panel A shows the summary statistics of variables used in the regression analysis. We construct four variables to measure earnings management. Specifically, following Dechow et al. (1995), Jones (1991), and Kothari et al. (2005), we construct earnings management measures as discretionary accruals based on modified Jones model (*DA_MJONES*), Jones model (*DA_JONES*), and Kothari model (*DA_KOTHARI*), respectively. Enlightened by Gopalan and Jayaraman (2012), we implement a principal component analysis to construct the fourth measure (*DA_FCOMP*) as the first component among all three discretionary measures. The competition law index comes from Bradford and Chilton (2018) who provide the most comprehensive datasets on competition laws of countries in 1889-2010. Trade/GDP, GDP per capita, GDP growth, and FDI/GDP come from World Development Index. Market capitalization/GDP and Deposit/GDP come from World Bank Financial Structure database (FSD). Measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS) are from prior literature (Bhattacharya and Daouk 2002, George, Li, and Shivakumar 2016, Levine, Lin, and Wei 2017, Moshirian et al. 2021, Zhang and Zhang 2018). Firm-level financial data come from Thomson Reuters Worldscope database. Analyst coverage data come from I/B/E/S database. All the continuous variables are winsorized at 5% and 95% to remove outliers. Panel B shows the univariate tests of four measures of earnings management across different levels of competition law index. Firms in countries with competition law index higher (lower) than the sample median are sorted into the High (Low) CLI group. The means, differences, standard errors, t-values, and p-values in the group comparisons are provided in Panel B. Panel C shows the pairwise correlations among measures of earnings management and competition law indexes. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

Panel A: Summary Statistics

	N	Mean	St.Dev	p25	Median	p75
Earnings management measures: Discretionary accruals						
Modified Jones model (<i>DA_MJONES</i>)	234,067	0.0100	0.0528	-0.0126	0.0132	0.0388
Jones model (<i>DA_JONES</i>)	234,067	0.0107	0.0529	-0.0121	0.0137	0.0394
Kothari model (<i>DA_KOTHARI</i>)	234,067	0.0089	0.0520	-0.0149	0.0111	0.0367
First component (<i>DA_FCOMP</i>)	234,067	0.0000	1.7079	-0.7481	0.0948	0.9282
Legal competition measures						
Competition Law Index (<i>CLI</i>)	953	0.5557	0.2779	0.3908	0.6437	0.7471
CLI Authority (<i>CLI_AUTHORITY</i>)	953	0.5794	0.2849	0.4286	0.6429	0.7857
CLI Substance (<i>CLI_SUBSTANCE</i>)	953	0.5311	0.2841	0.3488	0.5814	0.7442
CLI Mergers (<i>CLI_MERGERS</i>)	953	0.4808	0.3207	0.1250	0.5000	0.7500
CLI Dominance (<i>CLI_DOMINANCE</i>)	953	0.6005	0.3072	0.5000	0.7500	0.8125
CLI Anticomp (<i>CLI_ANTICOMP</i>)	953	0.5378	0.2862	0.4000	0.6000	0.7000
Competition Law Index: Region-adjusted	953	0.5606	0.2661	0.4023	0.6322	0.7471
Competition Law Index: Weight-adjusted	953	0.2325	0.2389	0.0372	0.1120	0.5023
Competition Law Index: PCA First Component	953	5.0092	3.9413	1.9555	5.6086	8.6080
Firm-level control variables						
Firm size	234,067	7.3721	3.0635	4.9204	7.2471	9.9886
Leverage	234,067	0.2315	0.1846	0.0666	0.2082	0.3607
Market-to-book ratio	234,067	2.0216	1.8728	0.7921	1.4125	2.5112
Profitability	234,067	0.0826	0.1308	0.0478	0.0971	0.1518

Cash flow	234,067	0.0595	0.0998	0.0264	0.0679	0.1137
Tangibility	234,067	0.5937	0.3578	0.3022	0.5597	0.8533
Log(1+#Analysts)	234,067	0.6932	0.8900	0.0000	0.0000	1.2657
Country-level control variables						
Trade/GDP	953	0.7545	0.3984	0.4924	0.6368	0.9399
GDP per capita (\$Mil)	953	0.0176	0.0142	0.0048	0.0143	0.0267
GDP growth	953	0.0353	0.0269	0.0162	0.0350	0.0527
FDI/GDP	953	0.0307	0.0292	0.0084	0.0215	0.0427
Market Capitalization/GDP	953	0.6232	0.4541	0.2418	0.4575	0.8328
Deposit/GDP	953	0.0083	0.0040	0.0049	0.0078	0.0106
Post-Financial Liberalization	953	0.8090	0.3933	1.0000	1.0000	1.0000
Post-Board Reform	953	0.3075	0.4617	0.0000	0.0000	1.0000
Post-Insider Trading Restriction	953	0.4669	0.4992	0.0000	0.0000	1.0000
Post-Takeover Laws	953	0.3778	0.4851	0.0000	0.0000	1.0000
Post-IFRS	953	0.1406	0.3478	0.0000	0.0000	0.0000

Panel B: Univariate Tests across Competition Law Index

	High <i>CLI</i>		Low <i>CLI</i>		Differences	p-value
	N	Mean	N	Mean		
<i>DA_MJONES</i>	117,246	0.013	117,245	0.007	0.007***	0.000
<i>DA_JONES</i>	117,246	0.014	117,245	0.007	0.007***	0.000
<i>DA_KOTHARI</i>	117,246	0.013	117,245	0.005	0.007***	0.000
<i>DA_FCOMP</i>	117,246	0.111	117,245	-0.111	0.221***	0.000

Panel C: Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) <i>DA_MJONES</i>	1.000									
(2) <i>DA_JONES</i>	0.997***	1.000								
(3) <i>DA_KOTHARI</i>	0.940***	0.937***	1.000							
(4) <i>DA_FCOMP</i>	0.993***	0.992***	0.972***	1.000						
(5) <i>CLI</i>	0.049***	0.047***	0.055***	0.051***	1.000					
(6) <i>CLI_AUTHORITY</i>	0.041***	0.041***	0.046***	0.043***	0.955***	1.000				
(7) <i>CLI_SUBSTANCE</i>	0.047***	0.045***	0.055***	0.050***	0.920***	0.770***	1.000			
(8) <i>CLI_MERGERS</i>	0.052***	0.050***	0.057***	0.054***	0.788***	0.653***	0.849***	1.000		
(9) <i>CLI_DOMINANCE</i>	0.027***	0.025***	0.029***	0.027***	0.779***	0.650***	0.878***	0.664***	1.000	
(10) <i>CLI_ANTICOMP</i>	0.032***	0.031***	0.043***	0.036***	0.837***	0.746***	0.866***	0.534***	0.699***	1.000

Table 3
Competition Law and Preexisting Earnings Management

This table presents the connection between pre-existing measures of earnings management and the competition law index. The dependent variable is the one-year forward competition law index from Bradford and Chilton (2018). The independent variables are the country average of earnings management measures used in this analysis. Country-level control variables are Trade/GDP, GDP per capita, FDI/GDP, Market Capitalization/GDP, and Deposit/GDP and measures on nationwide policies and regulations. Measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS) are from prior literature (Bhattacharya and Daouk 2002, George, Li, and Shivakumar 2016, Levine, Lin, and Wei 2017, Moshirian et al. 2021, Zhang and Zhang 2018). Country and year fixed effects are included in the models. Standard errors clustered at the country level are shown in the parentheses. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

	Dependent Variable= <i>Competition Law Index</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>DA_MJONES</i>	0.0932 (0.3549)	0.1335 (0.3147)						
<i>DA_JONES</i>			0.1198 (0.3455)	0.1588 (0.3059)				
<i>DA_KOTHARI</i>					0.0282 (0.3634)	0.1119 (0.3202)		
<i>DA_FCOMP</i>							0.0021 (0.0094)	0.0036 (0.0083)
Trade/GDP		-0.1872* (0.1071)		-0.1871* (0.1070)		-0.1882* (0.1072)		-0.1876* (0.1071)
GDP per capita		-3.4696** (1.6390)		-3.4750** (1.6377)		-3.4834** (1.6382)		-3.4770** (1.6379)
GDP growth		-0.1570 (0.2266)		-0.1604 (0.2256)		-0.1535 (0.2284)		-0.1569 (0.2268)
FDI/GDP		0.1114 (0.1547)		0.1117 (0.1548)		0.1114 (0.1540)		0.1116 (0.1545)
Market Capitalization/GDP		0.0373 (0.0330)		0.0371 (0.0332)		0.0375 (0.0329)		0.0373 (0.0330)
Deposit/GDP		0.0036 (0.0642)		0.0039 (0.0642)		0.0031 (0.0641)		0.0035 (0.0641)
Post-Financial Liberalization		0.0503 (0.0664)		0.0505 (0.0664)		0.0501 (0.0664)		0.0503 (0.0664)
Post-Board Reform		-0.0128 (0.0260)		-0.0127 (0.0260)		-0.0127 (0.0260)		-0.0127 (0.0260)
Post-Insider Trading Restriction		-0.0216 (0.0506)		-0.0218 (0.0507)		-0.0214 (0.0505)		-0.0216 (0.0506)
Post-Takeover Laws		0.0679 (0.0434)		0.0679 (0.0434)		0.0679 (0.0434)		0.0679 (0.0434)
Post-IFRS		0.0166 (0.0453)		0.0163 (0.0453)		0.0171 (0.0451)		0.0167 (0.0453)
Constant	0.5542*** (0.0024)	0.6877*** (0.1336)	0.5539*** (0.0027)	0.6874*** (0.1336)	0.5547*** (0.0018)	0.6892*** (0.1332)	0.5548*** (0.0001)	0.6891*** (0.1331)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	978	978	978	978	978	978	978	978
R-squared	0.8152	0.8259	0.8153	0.8259	0.8152	0.8259	0.8152	0.8259

Table 4
Competition Law and Earnings Management: Baseline Regressions

This table reports the effect of competition law on earnings management. Four measures of earnings management are used in this analysis. The dependent variables, *DA_MJONS*, *DA_JONES*, and *DA_KOTHARI* are the discretionary accruals based on modified Jones model, Jones model, and Kothari et al.'s (2005) model, respectively. *DA_FCOMP*, is the first component among *DA_MJONES*, *DA_JONE*, and *DA_KOTHARI* in a principal component analysis. The independent variable, *Competition Law Index*, indicates the overall stringency of a country's competition laws. This measure comes from Bradford and Chilton (2018). Firm-level control variables include Firm size, Leverage, Market-to-book ratio, Profitability, Cash flow, Tangibility, and Log(1+#Analysts). Country-level control variables include Market Capitalization/GDP, Trade/GDP, GDP per capita, GDP growth, FDI/GDP, Deposit/GDP, and measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS). Firm, year, industry-year, and region-year fixed effects are included to control for firm- and time-invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=							
	(1) <i>DA_MJONES</i>		(2) <i>DA_JONES</i>		(3) <i>DA_KOTHARI</i>		(4) <i>DA_FCOMP</i>	
Competition Law Index	0.0129*** (0.0038)	0.0147*** (0.0040)	0.0134*** (0.0038)	0.0150*** (0.0040)	0.0130*** (0.0037)	0.0144*** (0.0040)	0.4320*** (0.1248)	0.4840*** (0.1319)
Firm size	-0.0046*** (0.0009)	-0.0054*** (0.0009)	-0.0055*** (0.0009)	-0.0063*** (0.0008)	-0.0046*** (0.0006)	-0.0052*** (0.0006)	-0.1619*** (0.0251)	-0.1859*** (0.0245)
Leverage	-0.0114*** (0.0032)	-0.0108*** (0.0031)	-0.0122*** (0.0031)	-0.0116*** (0.0031)	-0.0061* (0.0031)	-0.0058* (0.0031)	-0.3272*** (0.1021)	-0.3108*** (0.1016)
Market-to-book ratio	0.0010*** (0.0002)	0.0009*** (0.0002)	0.0012*** (0.0002)	0.0010*** (0.0002)	0.0010*** (0.0002)	0.0009*** (0.0002)	0.0356*** (0.0065)	0.0305*** (0.0056)
Profitability	-0.0038 (0.0044)	-0.0038 (0.0041)	-0.0030 (0.0044)	-0.0030 (0.0042)	-0.0977*** (0.0064)	-0.0986*** (0.0063)	-1.1448*** (0.1639)	-1.1550*** (0.1569)
Cash flow	0.0018 (0.0060)	0.0027 (0.0056)	0.0021 (0.0060)	0.0030 (0.0056)	-0.0003 (0.0069)	-0.0004 (0.0065)	0.0398 (0.2028)	0.0585 (0.1900)
Tangibility	-0.0051* (0.0026)	-0.0044* (0.0023)	-0.0047* (0.0026)	-0.0040* (0.0023)	0.0000 (0.0026)	0.0005 (0.0024)	-0.1074 (0.0844)	-0.0874 (0.0775)
Log(1+#Analysts)	-0.0007 (0.0004)	-0.0008* (0.0004)	-0.0007 (0.0004)	-0.0007 (0.0005)	-0.0008* (0.0004)	-0.0008* (0.0004)	-0.0235 (0.0143)	-0.0258* (0.0144)
Trade/GDP	0.0088 (0.0053)	0.0110* (0.0062)	0.0086 (0.0054)	0.0110* (0.0063)	0.0085 (0.0051)	0.0102* (0.0057)	0.2836 (0.1727)	0.3537* (0.1993)
GDP per capita	0.0000 (0.0001)	-0.0002 (0.0002)	0.0001 (0.0001)	-0.0002 (0.0002)	0.0000 (0.0001)	-0.0002 (0.0002)	0.0014 (0.0029)	-0.0067 (0.0055)
GDP growth	-0.0218 (0.0143)	-0.0194 (0.0175)	-0.0176 (0.0140)	-0.0159 (0.0173)	-0.0207 (0.0134)	-0.0159 (0.0163)	-0.6603 (0.4541)	-0.5623 (0.5589)
FDI/GDP	0.0216	-0.0219	0.0190	-0.0244	0.0105	-0.0252	0.5616	-0.7859

Market Capitalization/GDP	(0.0165) 0.0051**	(0.0208) 0.0032**	(0.0166) 0.0055***	(0.0205) 0.0034**	(0.0159) 0.0039*	(0.0203) 0.0024	(0.5343) 0.1595**	(0.6752) 0.0986*
Deposit/GDP	(0.0020) -0.0017	(0.0016) -0.0035	(0.0020) -0.0020	(0.0016) -0.0037	(0.0020) -0.0028	(0.0017) -0.0049*	(0.0655) -0.0715	(0.0540) -0.1325
Post-Financial Liberalization	(0.0022) -0.0038	(0.0029) -0.0041	(0.0021) -0.0039	(0.0029) -0.0041	(0.0020) -0.0042	(0.0027) -0.0029	(0.0691) -0.1306	(0.0921) -0.1217
Post-Board Reform	(0.0029) -0.0016	(0.0035) -0.0019	(0.0028) -0.0018	(0.0034) -0.0020	(0.0025) -0.0018	(0.0035) -0.0024	(0.0900) -0.0573	(0.1149) -0.0701
Post-Insider Trading Restriction	(0.0018) 0.0048**	(0.0017) 0.0058***	(0.0018) 0.0046**	(0.0017) 0.0058***	(0.0019) 0.0048**	(0.0017) 0.0058***	(0.0599) 0.1557**	(0.0561) 0.1911***
Post-Takeover Laws	(0.0020) 0.0054**	(0.0020) 0.0031*	(0.0020) 0.0054**	(0.0020) 0.0029*	(0.0021) 0.0048**	(0.0021) 0.0024	(0.0672) 0.1721**	(0.0669) 0.0926*
Post-IFRS	(0.0021) 0.0042***	(0.0017) 0.0066**	(0.0021) 0.0042***	(0.0017) 0.0067**	(0.0020) 0.0036**	(0.0017) 0.0062**	(0.0680) 0.1313***	(0.0551) 0.2155**
Constant	(0.0014) 0.0927***	(0.0026) 0.1165***	(0.0014) 0.1111***	(0.0026) 0.1357***	(0.0014) 0.0972***	(0.0025) 0.1182***	(0.0468) 2.9819***	(0.0848) 3.7440***
	(0.0198)	(0.0190)	(0.0194)	(0.0190)	(0.0149)	(0.0153)	(0.5815)	(0.5726)
Firm, Year FEs	Yes	No	Yes	No	Yes	No	Yes	No
Firm, Industry-Year, Region-Year FEs	No	Yes	No	Yes	No	Yes	No	Yes
Observations	234,067	234,067	234,067	234,067	234,067	234,067	234,067	234,067
R-squared	0.3743	0.3841	0.3739	0.3838	0.3578	0.3666	0.3632	0.3727

Table 5
Robustness Tests: Alternative Fixed Effects

This table shows the effect of competition law on earnings management using alternative sets of fixed effects. Firm, industry-year, and region-year fixed effects are included to control for firm-invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Country-level control variables include Market Capitalization/GDP, Trade/GDP, GDP per capita, GDP growth, FDI/GDP, Deposit/GDP, and measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS). Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
Competition Law Index	0.0136*** (0.0038)	0.0138*** (0.0041)	0.0140*** (0.0039)	0.0142*** (0.0041)	0.0133*** (0.0037)	0.0138*** (0.0041)	0.4493*** (0.1249)	0.4585*** (0.1356)
Constant	0.1032*** (0.0196)	0.1047*** (0.0190)	0.1221*** (0.0192)	0.1233*** (0.0191)	0.1080*** (0.0136)	0.1060*** (0.0164)	3.3375*** (0.5676)	3.3449*** (0.5856)
Firm, Industry-Year FEs	Yes	No	Yes	No	Yes	No	Yes	No
Firm, Region-Year FEs	No	Yes	No	Yes	No	Yes	No	Yes
Observations	234,067	234,067	234,067	234,067	234,067	234,067	234,067	234,067
R-squared	0.3817	0.3767	0.3813	0.3764	0.3644	0.3600	0.3702	0.3656

Table 6
Robustness Tests: Alternative Measures of Competition Law Index

This table reports the effect of competition law on earnings management using alternative measures of competition law index. Panel A shows the results for the region-adjusted competition law index according to Bradford and Chilton (2018). Panel B shows the results for weight-adjusted competition law index. Following Levine et al. (2020), we construct the competition law index as the simple average of the four sub-indexes (Authority, Merger Control, Abuse of Dominance, and Anticompetitive Agreements) instead of using the weight assigned by Bradford and Chilton (2018). Panel C shows the results for the first component among sub-indexes in a principal component analysis. For comparison, the first component measure is standardized into the range from 0 to 1. Other model settings are the same as those in the baseline regressions. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Region-adjusted Competition Law Index

	Dependent Variable=			
	(1) <i>DA_MJONES</i>	(2) <i>DA_JONES</i>	(3) <i>DA_KOTHARI</i>	(4) <i>DA_FCOMP</i>
Region-adjusted CLI	0.0149*** (0.0040)	0.0151*** (0.0041)	0.0145*** (0.0040)	0.4891*** (0.1324)
Constant	0.1162*** (0.0190)	0.1354*** (0.0190)	0.1178*** (0.0153)	3.7334*** (0.5726)
Controls	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes
Observations	234,067	234,067	234,067	234,067
R-squared	0.3842	0.3838	0.3666	0.3727

Panel B: Weight-adjusted Competition Law Index

	Dependent Variable=			
	(1) <i>DA_MJONES</i>	(2) <i>DA_JONES</i>	(3) <i>DA_KOTHARI</i>	(4) <i>DA_FCOMP</i>
Weight-adjusted CLI	0.0175*** (0.0057)	0.0178*** (0.0057)	0.0174*** (0.0056)	0.5790*** (0.1865)
Constant	0.1157*** (0.0194)	0.1349*** (0.0195)	0.1172*** (0.0156)	3.7155*** (0.5866)
Controls	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes
Observations	234,067	234,067	234,067	234,067
R-squared	0.3842	0.3838	0.3667	0.3727

Panel C: First Component of CLI Sub-Components

	Dependent Variable=			
	(1) <i>DA_MJONES</i>	(2) <i>DA_JONES</i>	(3) <i>DA_KOTHARI</i>	(4) <i>DA_FCOMP</i>
First Component CLI	0.0021*** (0.0007)	0.0022*** (0.0007)	0.0021*** (0.0007)	0.0709*** (0.0232)
Constant	0.1275*** (0.0189)	0.1469*** (0.0190)	0.1290*** (0.0152)	4.1069*** (0.5712)
Controls	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes
Observations	234,067	234,067	234,067	234,067
R-squared	0.3842	0.3838	0.3667	0.3727

Table 7
Firm-level Cross-sectional Tests: External Pressure

This table presents the effects of competition laws on earnings management across different types of external pressure. Panel A reports the effects of competition laws on earnings management across whether firms fail to beat earnings benchmarks. We use the consensus analyst forecast on EPS as the proxy of the earnings benchmark. Panel B presents the effects of competition laws on earnings management across the extent of financial constraints measured by the Size-Age index (SA index) proposed in Hadlock and Pierce (2010). Panel C presents the effects of competition laws and earnings management across the extent of growth opportunity measured by market-to-book ratio. The dependent variables are the four measures of earnings management used in this paper (*DA_MJONES*, *DA_JONES*, *DA_KOTHARI*, and *DA_FCOMP*). The independent variable, *Competition Law Index*, measures the overall stringency of a country's competition laws. Control variables are the same as those in the baseline regressions. Firm, industry-year, and region-year fixed effects are included in the models. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Earnings Benchmark Beating

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) Yes	(2) No	(3) Yes	(4) No	(5) Yes	(6) No	(7) Yes	(8) No
Beat Benchmarks?								
Competition Law Index	0.0172*** (0.0034)	0.0244** (0.0109)	0.0175*** (0.0034)	0.0246** (0.0108)	0.0166*** (0.0032)	0.0243** (0.0107)	0.5648*** (0.1091)	0.8062** (0.3549)
Constant	0.0960*** (0.0205)	0.2231*** (0.0334)	0.1242*** (0.0206)	0.2498*** (0.0330)	0.1192*** (0.0167)	0.2430*** (0.0283)	3.4031*** (0.6320)	7.5396*** (1.0294)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	60,743	42,222	60,743	42,222	60,743	42,222	60,743	42,222
R-squared	0.4935	0.4720	0.4936	0.4720	0.4829	0.4597	0.4862	0.4622
Difference: High-Low p-value H0: High-Low	-0.0072** [0.035]		-0.0071** [0.034]		-0.0077** [0.035]		-0.2414** [0.034]	

Panel B: Financial Constraints

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
SA Index								
Competition Law Index	0.0471*** (0.0156)	0.0089*** (0.0022)	0.0479*** (0.0154)	0.0092*** (0.0022)	0.0457*** (0.0146)	0.0086*** (0.0021)	1.5454*** (0.5004)	0.2942*** (0.0712)
Constant	0.0106 (0.0269)	0.1448*** (0.0153)	0.0320 (0.0256)	0.1630*** (0.0150)	0.0525*** (0.0181)	0.1400*** (0.0132)	0.7187 (0.7632)	4.5948*** (0.4632)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	57,332	176,303	57,332	176,303	57,332	176,303	57,332	176,303
R-squared	0.3910	0.3920	0.3892	0.3921	0.3761	0.3734	0.3821	0.3800
Difference: High-Low p-value H0: High-Low	0.0381*** [0.000]		0.0386*** [0.000]		0.0370*** [0.000]		1.2512*** [0.000]	

Panel C: Growth Opportunities

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Market-to-book Ratio	High	Low	High	Low	High	Low	High	Low
Competition Law Index	0.0100*** (0.0032)	0.0185*** (0.0064)	0.0103*** (0.0032)	0.0188*** (0.0064)	0.0095*** (0.0030)	0.0178*** (0.0063)	0.3278*** (0.1040)	0.6061*** (0.2105)
Constant	0.0541*** (0.0175)	0.1945*** (0.0312)	0.0768*** (0.0171)	0.2091*** (0.0308)	0.0589*** (0.0159)	0.1919*** (0.0249)	1.7598*** (0.5357)	6.2169*** (0.9485)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	113,640	113,452	113,640	113,452	113,640	113,452	113,640	113,452
R-squared	0.4561	0.4249	0.4566	0.4242	0.4401	0.4052	0.4453	0.4143
Difference: High-Low	-0.0085*		-0.0084*		-0.0083*		-0.2782*	
p-value H0: High-Low	[0.077]		[0.075]		[0.083]		[0.077]	

Table 8
Firm-level Cross-sectional Tests: External Discipline and Information Transparency

This table presents the effects of competition laws on earnings management across different firm-level characteristics on external discipline and information transparency. Panel A presents the impacts of competition laws on earnings management across the extent of institutional ownership. The information on institutional ownership comes from Factset database. Panel B shows the effects of competition laws on earnings management across the extent of media coverage. Media coverage is measured as the number of news released related to the firm in the year covered by the RavenPack database. Observations with firm-level characteristics higher (lower) than the sample median are sorted into the High (Low) group. Firm, industry-year, and region-year fixed effects are included in the models. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Institutional Ownership

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
Institutional Ownership								
Competition Law Index	0.0032 (0.0059)	0.0144*** (0.0045)	0.0033 (0.0061)	0.0147*** (0.0045)	0.0035 (0.0066)	0.0144*** (0.0045)	0.1096 (0.2050)	0.4779*** (0.1482)
Constant	0.2037*** (0.0692)	0.1190*** (0.0202)	0.2300*** (0.0713)	0.1391*** (0.0197)	0.2244*** (0.0627)	0.1200*** (0.0154)	6.9050*** (2.2297)	3.8284*** (0.5922)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	49,480	181,475	49,480	181,475	49,480	181,475	49,480	181,475
R-squared	0.4819	0.3999	0.4827	0.3993	0.4702	0.3787	0.4710	0.3883
Difference: High-Low	-0.0112*		-0.0113*		-0.0108*		-0.3682*	
p-value H0: High-Low	[0.069]		[0.069]		[0.090]		[0.075]	

Panel B: Media Coverage

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) High	(2) Low	(3) High	(4) Low	(5) High	(6) Low	(7) High	(8) Low
Number of News Released								
Competition Law Index	0.0112*** (0.0035)	0.0153** (0.0067)	0.0122*** (0.0037)	0.0154** (0.0067)	0.0116*** (0.0038)	0.0150** (0.0066)	0.3843*** (0.1208)	0.5031** (0.2202)
Constant	0.1505*** (0.0353)	0.1255*** (0.0205)	0.1772*** (0.0352)	0.1527*** (0.0211)	0.1316*** (0.0299)	0.1395*** (0.0225)	4.7217*** (1.0798)	4.2633*** (0.6992)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	114,606	115,810	114,606	115,810	114,606	115,810	114,606	115,810
R-squared	0.4626	0.4246	0.4625	0.4239	0.4410	0.4045	0.4491	0.4150
Difference: High-Low	-0.0041*		-0.0033*		-0.0034*		-0.1187**	
p-value H0: High-Low	[0.089]		[0.065]		[0.059]		[0.046]	

Table 9
Competition Law and Earnings Management: Cross-country Analyses

This table presents the effects of competition laws and earnings management across different country-level features. Panel A presents the effects of competition laws on earnings management, differentiating countries by whether they have adopted IFRS. Panel B shows the effects of competition laws on earnings management across different legal origins. The dependent variables are the four measures of earnings management used in this paper (*DA_MJONES*, *DA_JONES*, *DA_KOTHARI*, and *DA_FCOMP*). The independent variable, Competition Law Index, measures the overall stringency of a country's competition laws. Control variables are the same as those in the baseline regressions. Firm, industry-year, and region-year fixed effects are included in the models. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: IFRS Adoption

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) Yes	(2) No	(3) Yes	(4) No	(5) Yes	(6) No	(7) Yes	(8) No
IFRS Countries?								
Competition Law Index	-0.0052 (0.0031)	0.0154*** (0.0044)	-0.0054 (0.0032)	0.0159*** (0.0044)	-0.0049 (0.0031)	0.0156*** (0.0043)	-0.1697 (0.1027)	0.5153*** (0.1445)
Constant	0.1903*** (0.0367)	0.1070*** (0.0198)	0.2198*** (0.0389)	0.1287*** (0.0202)	0.1480*** (0.0374)	0.1227*** (0.0177)	5.8081*** (1.2200)	3.6118*** (0.6248)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29,255	203,196	29,255	203,196	29,255	203,196	29,255	203,196
R-squared	0.4812	0.4028	0.4818	0.4023	0.4609	0.3833	0.4685	0.3913
Difference: High-Low p-value H0: High-Low	-0.0206*** [0.008]		-0.0212*** [0.007]		-0.0204*** [0.004]		-0.6849*** [0.006]	

Panel B: Legal Origin

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1) Common	(2) Civil	(3) Common	(4) Civil	(5) Common	(6) Civil	(7) Common	(8) Civil
Legal Origin								
Competition Law Index	0.0018 (0.0028)	0.0161*** (0.0057)	0.0019 (0.0028)	0.0166*** (0.0058)	0.0022 (0.0026)	0.0162*** (0.0056)	0.0648 (0.0898)	0.5366*** (0.1875)
Constant	0.1317*** (0.0220)	0.1081*** (0.0366)	0.1485*** (0.0203)	0.1288*** (0.0374)	0.1167*** (0.0141)	0.1299*** (0.0309)	4.0361*** (0.6146)	3.7036*** (1.1488)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94,938	139,074	94,938	139,074	94,938	139,074	94,938	139,074
R-squared	0.3711	0.4081	0.3717	0.4069	0.3520	0.3929	0.3584	0.3980
Difference: High-Low p-value H0: High-Low	-0.0142** [0.047]		-0.0147** [0.042]		-0.0139** [0.041]		-0.4718** [0.043]	

Table 10
The Moderating Role of Firm Internationalization

This table shows the moderating role of firm internationalization in the relation between competition laws and earnings management. Panel A reports the moderating role of multinational corporations (MNCs). A firm is identified as a multinational corporation if it has at least one foreign subsidiary in the firm-year. Information on firm subsidiaries comes from WorldScope Segment database. Panel B presents the effects of competition laws and earnings management, differentiating firms by whether they are cross-listed in multiple markets. The information on firms' ADR issuance in the U.S. market is from BNY-Mellon ADR List. The independent variable and control variables are the same as those in the baseline regressions. Firm, industry-year, and region-year fixed effects are included to control for firm invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Multinational Corporations (MNCs)

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Multinational Corporations?	Yes	No	Yes	No	Yes	No	Yes	No
Competition Law Index	0.0057 (0.0056)	0.0149*** (0.0043)	0.0061 (0.0056)	0.0152*** (0.0043)	0.0052 (0.0056)	0.0147*** (0.0043)	0.1862 (0.1850)	0.4920*** (0.1424)
Constant	-0.0298 (0.1073)	0.1288*** (0.0182)	-0.0057 (0.1108)	0.1487*** (0.0181)	-0.0038 (0.1075)	0.1295*** (0.0148)	-0.7584 (3.5731)	4.1469*** (0.5466)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,730	219,367	12,730	219,367	12,730	219,367	12,730	219,367
R-squared	0.6169	0.3890	0.6172	0.3886	0.6042	0.3704	0.6069	0.3774
Difference: High-Low	-0.0092**		-0.0091**		-0.0095**		-0.3058**	
p-value H0: High-Low	[0.018]		[0.028]		[0.036]		[0.037]	

Panel B: Cross-listing in Multiple Countries

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Cross-listed in Multiple Countries?	Yes	No	Yes	No	Yes	No	Yes	No
Competition Law Index	-0.0091 (0.0114)	0.0149*** (0.0040)	-0.0075 (0.0109)	0.0152*** (0.0040)	-0.0076 (0.0112)	0.0145*** (0.0040)	-0.2669 (0.3671)	0.4906*** (0.1322)
Constant	-0.1000 (0.1372)	0.1174*** (0.0194)	-0.0669 (0.1392)	0.1367*** (0.0194)	-0.0543 (0.1509)	0.1188*** (0.0153)	-2.7581 (4.6695)	3.7715*** (0.5815)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,203	229,480	4,203	229,480	4,203	229,480	4,203	229,480
R-squared	0.5826	0.3848	0.5824	0.3844	0.5833	0.3669	0.5780	0.3732
Difference: High-Low	-0.0240**		-0.0227**		-0.0221**		-0.7575**	
p-value H0: High-Low	[0.040]		[0.046]		[0.047]		[0.044]	

Table 11
Firm Market Share and the Impact of Competition Laws

This table shows how firm market share affects the relation between competition laws and earnings management. Specifically, we separate the sample by whether the firm is among the top 10 sales in the country-industry over the year. The independent variable and control variables are the same as those in the baseline regressions. Firm, industry-year, and region-year fixed effects are included to control for firm invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=							
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Top 10 in the country-industry?	Yes	No	Yes	No	Yes	No	Yes	No
Competition Law Index	0.0033 (0.0034)	0.0156*** (0.0042)	0.0037 (0.0035)	0.0159*** (0.0042)	0.0035 (0.0033)	0.0153*** (0.0042)	0.1157 (0.1110)	0.5136*** (0.1385)
Constant	0.0728 (0.0615)	0.1188*** (0.0189)	0.0995 (0.0617)	0.1376*** (0.0189)	0.0900 (0.0609)	0.1180*** (0.0155)	2.5565 (2.0118)	3.7883*** (0.5695)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,438	217,638	15,438	217,638	15,438	217,638	15,438	217,638
R-squared	0.5214	0.3862	0.5216	0.3859	0.5097	0.3680	0.5142	0.3745
Difference: High-Low	-0.0123***		-0.0122***		-0.0118***		-0.3979***	
p-value H0: High-Low	[0.001]		[0.002]		[0.001]		[0.001]	

Table 12
Supplementary Analyses: Alternative Sources of Competition Law Measures and Accounting Numbers

This table shows the results of supplementary analyses based on alternative competition law measures and earnings management reflected by accounting numbers. Panel A reports the effect of competition law on earnings management when applying measures of the legal competition environment from alternative sources. Columns (1)-(4) show the results for the cross-sectional data on the Competition Law and Policy (CLP) for the OECD countries from 2003-2004 (Hoj 2007). Columns (5)-(8) report the results for the cross-sectional Competition Policy Index (CPI) data across a sample of 13 OECD countries over the period of 1995-2005 (Buccirossi et al. 2011). Panel B reports the evidence on firms' earnings management under stricter competition laws from accounting numbers. Four dependent variables are used in this analysis. Column (1) shows the results for impairment of goodwill scaled by total assets (*Good Impair*). Column (2) shows the results for impairment of property, plant, and equipment scaled by total assets (*PPE Impair*). The impairment of goodwill and the impairment of property, plant, and equipment are scaled by total assets. Column (3) shows the results for accruals scaled by total assets (*Accruals/AT*). Column (3) shows the results for accruals scaled by cash flow from operations (*Accruals/CFO*). Accruals and cash flow from operations are measured according to Lel (2019). The independent variable and control variables are the same as those in the baseline regressions. Firm, industry-year, and region-year fixed effects are included to control for firm invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Alternative Sources of Competition Law Measures

Dependent variables=	Competition Law and Policy (CLP)				Competition Policy Index (CPI)			
	(1) <i>DA_MJONES</i>	(2) <i>DA_JONES</i>	(3) <i>DA_KOTHARI</i>	(4) <i>DA_FCOMP</i>	(5) <i>DA_MJONES</i>	(6) <i>DA_JONES</i>	(7) <i>DA_KOTHARI</i>	(8) <i>DA_FCOMP</i>
Competition Law Measures	0.0076** (0.0034)	0.0078** (0.0033)	0.0076** (0.0032)	0.2531** (0.1083)	0.0013*** (0.0003)	0.0013*** (0.0003)	0.0010*** (0.0002)	0.0389*** (0.0086)
Constant	-0.0126 (0.0144)	-0.0105 (0.0143)	-0.0221* (0.0126)	-0.8212* (0.4477)	-0.0390** (0.0137)	-0.0343** (0.0134)	-0.0390** (0.0156)	-1.5597*** (0.4382)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry, Region, and Year FEs	No	Yes	No	Yes	No	Yes	No	Yes
Observations	23,238	23,238	23,238	23,238	48,297	48,297	48,297	48,297
R-squared	0.0609	0.0613	0.0926	0.0603	0.0943	0.0936	0.1176	0.0924

Panel B: Evidence from Accounting Numbers

Dependent Variable=	Competition Law Index			
	(1) <i>Goodwill Impair</i>	(2) <i>PPE Impair</i>	(3) <i>Accruals/AT</i>	(4) <i>Accruals/CFO</i>
Competition Law Index	-0.0008** (0.0004)	-0.0013* (0.0008)	0.0156** (0.0068)	0.3093*** (0.1055)
Constant	-0.0367*** (0.0084)	-0.0101* (0.0058)	0.0141 (0.0310)	0.8706* (0.4449)
Controls	Yes	Yes	Yes	Yes
Firm, Industry-Year, and Region-Year FEs	Yes	Yes	Yes	Yes
Observations	234,067	234,067	205,862	187,969
R-squared	0.2711	0.3626	0.2895	0.4133

Table 13
The Unique Impact of Competition Laws on Earnings Management: Evidence from Machine Learning Algorithms

This table shows the results when the independent variable is the residual part of the competition law index that can not be predicted by time-variant macro-factors suggested by Isidro, Nanda, and Wysocki (2019). Seven machine learning algorithms (OLS, Rigid regression, LASSO, ElasticNet, Principal Component Regression (PCR), Random Forest, and Artificial Neural Network (ANN)) are applied to predict competition law index using multiple time-variant macro-factors as predictors. Panels A-D shows the results for *DA_MJONES*, *DA_JONES*, *DA_KOTHARI*, and *DA_FCOMP*, respectively. The additional macro-factors and their definitions are listed in Appendix Table A3. Control variables are the same as those in the baseline regressions. Firm, Industry-Year, and Region-Year fixed effects are included in the models. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Modified Jones Model (*DA_MJONES*)

Dependent variable= Prediction Method=	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	Rigid	Lasso	<i>DA_MJONES</i> ElasticNet	PCR	Random Forest	ANN
<i>Unpredicted Competition Law Index</i>	0.0030*** (0.0009)	0.0039*** (0.0011)	0.0038*** (0.0011)	0.0039*** (0.0011)	0.0039*** (0.0011)	0.0026*** (0.0007)	0.0020*** (0.0006)
Constant	0.1292*** (0.0192)	0.1284*** (0.0193)	0.1284*** (0.0193)	0.1284*** (0.0193)	0.1284*** (0.0193)	0.1278*** (0.0196)	0.1268*** (0.0198)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,576	229,576	229,576	229,576	229,576	229,576	229,576
R-squared	0.3847	0.3846	0.3846	0.3846	0.3846	0.3846	0.3843

Panel B: Jones Model (*DA_JONES*)

Dependent variable= Prediction Method=	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	Rigid	Lasso	<i>DA_JONES</i> ElasticNet	PCR	Random Forest	ANN
<i>Unpredicted Competition Law Index</i>	0.0031*** (0.0009)	0.0040*** (0.0011)	0.0039*** (0.0011)	0.0039*** (0.0011)	0.0040*** (0.0011)	0.0027*** (0.0007)	0.0020*** (0.0006)
Constant	0.1486*** (0.0193)	0.1478*** (0.0193)	0.1478*** (0.0193)	0.1478*** (0.0193)	0.1478*** (0.0193)	0.1472*** (0.0197)	0.1462*** (0.0198)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,576	229,576	229,576	229,576	229,576	229,576	229,576
R-squared	0.3843	0.3843	0.3843	0.3843	0.3843	0.3842	0.3840

Panel C: Kothari Model (*DA_KOTHARI*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable= Prediction Method=	OLS	Rigid	Lasso	<i>DA_KOTHARI</i> ElasticNet	PCR	Random Forest	ANN
<i>Unpredicted Competition Law Index</i>	0.0030*** (0.0009)	0.0038*** (0.0011)	0.0037*** (0.0010)	0.0038*** (0.0010)	0.0038*** (0.0010)	0.0025*** (0.0007)	0.0019*** (0.0006)
Constant	0.1294*** (0.0156)	0.1286*** (0.0156)	0.1287*** (0.0156)	0.1287*** (0.0156)	0.1287*** (0.0156)	0.1281*** (0.0159)	0.1271*** (0.0155)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,576	229,576	229,576	229,576	229,576	229,576	229,576
R-squared	0.3669	0.3668	0.3668	0.3668	0.3668	0.3668	0.3665

Panel D: First Component (*DA_FCOMP*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable= Prediction Method=	OLS	Rigid	Lasso	<i>DA_FCOMP</i> ElasticNet	PCR	Random Forest	ANN
<i>Unpredicted Competition Law Index</i>	0.1001*** (0.0291)	0.1289*** (0.0354)	0.1266*** (0.0348)	0.1269*** (0.0348)	0.1280*** (0.0349)	0.0858*** (0.0244)	0.0645*** (0.0199)
Constant	4.1492*** (0.5812)	4.1225*** (0.5817)	4.1229*** (0.5817)	4.1228*** (0.5817)	4.1232*** (0.5816)	4.1027*** (0.5942)	4.0712*** (0.5926)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,576	229,576	229,576	229,576	229,576	229,576	229,576
R-squared	0.3731	0.3731	0.3731	0.3731	0.3731	0.3730	0.3727

Table 14
Competition Law and Earnings Management: Sub-Components

This table presents the association between sub-components of the CLI score and measures of earnings management. The sub-components used in this analysis contain Authority (*CLI_AUTHORITY*) and Substance Provisions (*CLI_SUBSTANCE*), where Substance Provisions is calculated as the average of Merger Control (*CLI_MERGERS*), Abuse of Dominance (*CLI_DOMINANCE*), and Anticompetitive Agreements (*CLI_ANTICOMP*). Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=			
	<i>DA_MJONES</i> (1)	<i>DA_JONES</i> (2)	<i>DA_KOTHARI</i> (3)	<i>DA_FCOMP</i> (4)
<i>CLI_AUTHORITY</i>	-0.0006 (0.0046)	-0.0006 (0.0046)	-0.0028 (0.0044)	-0.0446 (0.1494)
<i>CLI_SUBSTANCE</i>	0.0159** (0.0076)	0.0162** (0.0075)	0.0179** (0.0072)	0.5493** (0.2449)
Firm size	-0.0054*** (0.0009)	-0.0063*** (0.0008)	-0.0052*** (0.0006)	-0.1856*** (0.0246)
Leverage	-0.0107*** (0.0031)	-0.0115*** (0.0030)	-0.0057* (0.0030)	-0.3071*** (0.0995)
Market-to-book ratio	0.0009*** (0.0002)	0.0010*** (0.0002)	0.0009*** (0.0002)	0.0310*** (0.0056)
Profitability	-0.0039 (0.0041)	-0.0031 (0.0042)	-0.0986*** (0.0063)	-1.1563*** (0.1568)
Cash flow	0.0027 (0.0056)	0.0030 (0.0056)	-0.0003 (0.0065)	0.0591 (0.1899)
Tangibility	-0.0044* (0.0023)	-0.0041* (0.0023)	0.0004 (0.0024)	-0.0891 (0.0771)
Log(1+#Analysts)	-0.0008* (0.0004)	-0.0008* (0.0005)	-0.0009** (0.0004)	-0.0271* (0.0144)
Trade/GDP	0.0097 (0.0067)	0.0097 (0.0067)	0.0086 (0.0062)	0.3078 (0.2143)
GDP per capita	-0.0002 (0.0002)	-0.0002 (0.0002)	-0.0002 (0.0002)	-0.0068 (0.0056)
GDP growth	-0.0211 (0.0163)	-0.0177 (0.0162)	-0.0181 (0.0151)	-0.6262 (0.5204)
FDI/GDP	-0.0247 (0.0211)	-0.0272 (0.0207)	-0.0287 (0.0206)	-0.8852 (0.6829)
Market Capitalization/GDP	0.0033** (0.0017)	0.0034** (0.0017)	0.0025 (0.0017)	0.1017* (0.0548)
Deposit/GDP	-0.0035 (0.0029)	-0.0038 (0.0029)	-0.0049* (0.0027)	-0.1344 (0.0925)
Post-Financial Liberalization	-0.0039 (0.0036)	-0.0038 (0.0035)	-0.0026 (0.0036)	-0.1137 (0.1172)
Post-Board Reform	-0.0017 (0.0017)	-0.0018 (0.0017)	-0.0022 (0.0017)	-0.0622 (0.0564)
Post-Insider Trading Restriction	0.0054** (0.0020)	0.0054** (0.0021)	0.0053** (0.0021)	0.1766** (0.0690)
Post-Takeover Laws	0.0031* (0.0017)	0.0029* (0.0017)	0.0023 (0.0017)	0.0909* (0.0544)
Post-IFRS	0.0064** (0.0027)	0.0065** (0.0027)	0.0059** (0.0025)	0.2067** (0.0870)
Constant	0.1170*** (0.0190)	0.1362*** (0.0190)	0.1188*** (0.0153)	3.7629*** (0.5735)
Controls	Yes	Yes	Yes	Yes
Firm, Industry-Year, Region-Year FEs	Yes	Yes	Yes	Yes
Observations	234,067	234,067	234,067	234,067
R-squared	0.3842	0.3839	0.3667	0.3728

Appendix Table A1
Variable Definition

Variable	Definition	Source
Measures of Earnings Management		
<i>DA_MJONES</i>	The residual term of modified Jones model proposed by Dechow et al. (1995).	Thomson Reuters Worldscope
<i>DA_JONES</i>	The residual term of modified Jones model proposed by Jones (1991).	Thomson Reuters Worldscope
<i>DA_KOTHARI</i>	The discretionary accruals measured by Kothari et al. (2005).	Thomson Reuters Worldscope
<i>DA_FCOMP</i>	The first component among all three discretionary measures (<i>DA_MJONES</i> , <i>DA_JONES</i> , <i>DA_KOTHARI</i>) in a principal component analysis.	Thomson Reuters Worldscope
Measures of Competition Law		
Competition Law Index (CLI)	Competition Law Index calculated as the equal-weighted average of <i>CLI Authority</i> and <i>CLI Substance</i> , or $50\% \times CLI Authority + 16.7\% \times CLI Mergers + 16.7\% \times CLI Dominance + 16.7\% \times CLI Anticomp$.	Bradford and Chilton (2018)
<i>CLI Authority</i>	The sub-index of the Competition Law Index based on variables related to “Authority Power”.	Bradford and Chilton (2018)
<i>CLI Substance</i>	The sub-index of the Competition Law Index based on variables related to “Substance Provisions”, which is calculated as the equal-weighted average of <i>CLI Mergers</i> , <i>CLI Dominance</i> , and <i>CLI Anticomp</i> .	Bradford and Chilton (2018)
<i>CLI Mergers</i>	The sub-index of the Competition Law Index based on variables related to “Mergers”.	Bradford and Chilton (2018)
<i>CLI Dominance</i>	The sub-index of the Competition Law Index based on variables related to “Dominance”.	Bradford and Chilton (2018)
<i>CLI Anticomp</i>	The sub-index of the Competition Law Index based on variables related to “Anticompetitive Agreement”.	Bradford and Chilton (2018)
Firm-level Control Variables		
Firm size	The logarithm of total assets (WS02999) in millions.	Thomson Reuters Worldscope
Leverage	Total debt (WS03255) scaled by total assets (WS02999).	Thomson Reuters Worldscope
Market-to-book ratio	Market capitalization (WS08001) scaled by total assets (WS02999).	Thomson Reuters Worldscope
Profitability	Earnings before interest, taxes, depreciation and amortization (WS18198) scaled by total assets (WS02999).	Thomson Reuters Worldscope

Cash flow	The sum of net income before extraordinary items/preferred dividends (WS01551) and depreciation, depletion and amortization (WS01151) scaled by total assets (WS02999).	Thomson Reuters Worldscope
Tangibility	Net property plant and equipment (WS02501) scaled by total assets (WS02999).	Thomson Reuters Worldscope
Log(1+#Analysts)	The logarithm of one plus analyst followed in the firm-year.	I/B/E/S
Country-level Control Variables		
Trade/GDP	Total trade scaled by gross domestic product.	World Development Index
GDP per capita	Gross domestic product per capita.	World Development Index
GDP growth	The growth of gross domestic product.	World Development Index
FDI/GDP	Total foreign direct investment scaled by gross domestic product.	World Development Index
Market Capitalization/GDP	Stock-market capitalization scaled by gross domestic product.	Financial Structure database
Deposit/GDP	Deposit assets scaled by gross domestic product.	Financial Structure database
Post-Finance Liberalization	An indicator that equals one if the country has adopted policies on financial liberalization and zero otherwise.	Moshirian et al. (2021)
Post-Board Reform	An indicator that equals one if the country has adopted policies on board reform and zero otherwise.	Fauver et al. (2017)
Post-Insider Trading Restriction	An indicator that equals one if the country has adopted insider trading restrictions and zero otherwise.	Levine, Lin, and Wei (2017)
Post-Takeover Laws	An indicator that equals one if the country has adopted takeover laws and zero otherwise.	Lel and Miller (2008)
Post-IFRS	An indicator that equals one if the country has adopted IFRS and zero otherwise.	George, Li, and Shivakumar (2016)
Additional Macro Factors: PCA Score	The first component of the additional macro factors in a principal component analysis, where the additional factors and their definitions are listed in Appendix Table A3.	Multiple sources shown in Appendix Table A3
Additional Macro Factors: Rank Score	The average rank of macro-factors listed in Appendix Table A3. The rank of each macro-factor is its percentile scaled by 100	Multiple sources shown in Appendix Table A3

Appendix Table A2
Regions defined by the World Bank

Region	#Obs	Fraction (%)
East Asia & Pacific	121,684	51.99
Europe & Central Asia	72,492	30.97
Latin America & Caribbean	6,513	2.78
Middle East & North Africa	4,013	1.71
North America	12,964	5.54
South Asia	12,251	5.23
Sub-Saharan Africa	4,150	1.77
Total	234,067	100

Appendix Table A3
List of Additional Macro-level Factors

Variable	Description	Source
Voice and Accountability	The score of voice and accountability	Worldwide Governance Indicators
Political Stability and Absence of Violence	The score of political stability and absence of violence/terrorism	Worldwide Governance Indicators
Government Effectiveness	The score of government effectiveness	Worldwide Governance Indicators
Regulatory Quality	The score of regulatory quality	Worldwide Governance Indicators
Rule of Law	The score of the quality of the rule of law	Worldwide Governance Indicators
Control of Corruption	The score of control of corruption	Worldwide Governance Indicators
Domestic Competition	The score of domestic competition	Global Competitiveness Report
Foreign Competition	The score of foreign competition	Global Competitiveness Report
Property rights	The score of property rights	Global Competitiveness Report
Religiousness	The percentage of people who think religion is important in their life	World Values Survey
Hierarchy vs. Independence	100+%(should follow instructions)-%(must be convinced first)	World Values Survey
Individualism in Income	Index equal to 100+%(completely agree we need large income difference)-%(completely agree with income should be equal)	World Values Survey
Polity Score of Democracy and Autocracy	Combined Polity Score in Polity IV database. The higher value indicates a higher level of democracy.	Polity IV

**Appendix Table A4
Competition Law and Preexisting Earnings Management: Including U.S. Firms**

This table presents the connection between pre-existing measures of earnings management and competition law index on the sample including U.S. firms. The dependent variable is the one-year forward competition law index from Bradford and Chilton (2018). The independent variables are measures of earnings management used in this analysis. Country-level control variables are Trade/GDP, GDP per capita, FDI/GDP, Market Capitalization/GDP, and Deposit/GDP. Measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS) are from prior literature (Bhattacharya and Daouk 2002, George, Li, and Shivakumar 2016, Levine, Lin, and Wei 2017, Moshirian et al. 2021, Zhang and Zhang 2018). Country and year fixed effects are included in the models. Standard errors clustered at the country level are shown in the parentheses. *, **, and *** denotes significance at 10%, 5%, and 1% levels, respectively.

	Dependent Variable= <i>CLI</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>DA_MJONES</i>	0.2627 (0.3503)	0.2492 (0.3048)						
<i>DA_JONES</i>			0.2882 (0.3400)	0.2740 (0.2918)				
<i>DA_KOTHARI</i>					0.1719 (0.3560)	0.2051 (0.3113)		
<i>DA_FCOMP</i>							0.0064 (0.0092)	0.0064 (0.0080)
Trade/GDP		-0.1872* (0.0989)		-0.1871* (0.0988)		-0.1890* (0.0996)		-0.1879* (0.0991)
GDP per capita		-3.6163** (1.7093)		-3.6214** (1.7086)		-3.6546** (1.7112)		-3.6329** (1.7097)
GDP growth		-0.0196 (0.1953)		-0.0236 (0.1949)		-0.0121 (0.1966)		-0.0184 (0.1955)
FDI/GDP		0.0952 (0.1546)		0.0951 (0.1548)		0.0950 (0.1538)		0.0952 (0.1544)
Market Capitalization/GDP		0.0263 (0.0299)		0.0261 (0.0300)		0.0266 (0.0298)		0.0263 (0.0299)
Deposit/GDP		0.0195 (0.0648)		0.0197 (0.0648)		0.0189 (0.0649)		0.0193 (0.0648)
Post-Financial Liberalization		0.0561 (0.0631)		0.0563 (0.0632)		0.0558 (0.0632)		0.0561 (0.0632)
Post-Board Reform		-0.0257 (0.0241)		-0.0256 (0.0241)		-0.0257 (0.0241)		-0.0257 (0.0241)
Post-Insider Trading Restriction		0.0004 (0.0442)		0.0003 (0.0442)		0.0010 (0.0442)		0.0006 (0.0442)
Post-Takeover Laws		0.0595 (0.0412)		0.0594 (0.0411)		0.0596 (0.0412)		0.0595 (0.0411)
Post-IFRS		0.0227 (0.0488)		0.0224 (0.0488)		0.0239 (0.0488)		0.0230 (0.0488)
Constant	0.5565*** (0.0021)	0.6705*** (0.1220)	0.5560*** (0.0024)	0.6702*** (0.1220)	0.5573*** (0.0016)	0.6731*** (0.1223)	0.5581*** (0.0001)	0.6729*** (0.1221)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,006	1,006	1,006	1,006	1,006	1,006	1,006	1,006
R-squared	0.8246	0.8347	0.8246	0.8347	0.8244	0.8346	0.8245	0.8347

Appendix Table A5
Competition Law and Earnings Management: Including U.S. Firms

This table reports the effect of competition law on earnings management on the sample including U.S. firms. Four measures of earnings management are used in this analysis. The dependent variables, *DA_MJONES*, *DA_JONES*, and *DA_KOTHARI* are the discretionary accruals based on modified Jones model, Jones model, and Kothari et al.'s (2005) model, respectively. *DA_FCOMP*, is the first component among *DA_MJONES*, *DA_JONES*, and *DA_KOTHARI* in a principal component analysis. The independent variable, *Competition Law Index*, measures of overall stringency of a country's competition laws. This measure comes from Bradford and Chilton (2018). Firm-level control variables include Firm size, Leverage, Market-to-book ratio, Profitability, Cash flow, Tangibility, and Log(1+#Analysts). Country-level control variables include Market Capitalization/GDP, Trade/GDP, GDP per capita, GDP growth, FDI/GDP, Deposit/GDP, and measures on nationwide policies and regulations (Post-Financial Liberalization, Post-Board Reform, Post-Insider Trading Restriction, Post-Takeover Laws, Post-IFRS). Firm, year, industry-year, and region-year fixed effects are included to control for firm- and time-invariant factors and all factors at industry and region levels. Industries are classified by Fama-French 48 industries. Regions are classified by the World Bank. Standard errors shown in the parentheses are adjusted for heteroskedasticity and clustered by country. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>DA_MJONES</i>		<i>DA_JONES</i>		<i>DA_KOTHARI</i>		<i>DA_FCOMP</i>	
Competition Law Index	0.0124*** (0.0038)	0.0145*** (0.0039)	0.0128*** (0.0039)	0.0147*** (0.0039)	0.0126*** (0.0036)	0.0141*** (0.0039)	0.3973*** (0.1184)	0.4542*** (0.1229)
Firm size	-0.0043*** (0.0006)	-0.0050*** (0.0006)	-0.0051*** (0.0006)	-0.0058*** (0.0006)	-0.0045*** (0.0004)	-0.0050*** (0.0004)	-0.1461*** (0.0155)	-0.1657*** (0.0157)
Leverage	-0.0103*** (0.0018)	-0.0096*** (0.0019)	-0.0111*** (0.0018)	-0.0104*** (0.0018)	-0.0060*** (0.0018)	-0.0056*** (0.0018)	-0.2881*** (0.0557)	-0.2686*** (0.0565)
Market-to-book ratio	0.0010*** (0.0001)	0.0008*** (0.0001)	0.0011*** (0.0001)	0.0009*** (0.0001)	0.0011*** (0.0001)	0.0009*** (0.0001)	0.0333*** (0.0037)	0.0282*** (0.0031)
Profitability	0.0058 (0.0061)	0.0057 (0.0058)	0.0066 (0.0061)	0.0065 (0.0059)	-0.0886*** (0.0063)	-0.0898*** (0.0060)	-0.7962*** (0.1922)	-0.8099*** (0.1835)
Cash flow	0.0003 (0.0040)	0.0016 (0.0036)	0.0005 (0.0040)	0.0017 (0.0036)	-0.0038 (0.0050)	-0.0034 (0.0045)	-0.0318 (0.1329)	-0.0012 (0.1185)
Tangibility	-0.0057*** (0.0017)	-0.0050*** (0.0016)	-0.0054*** (0.0017)	-0.0047*** (0.0016)	-0.0011 (0.0018)	-0.0004 (0.0017)	-0.1276** (0.0540)	-0.1072** (0.0510)
Log(1+#Analysts)	-0.0012** (0.0005)	-0.0015*** (0.0005)	-0.0011** (0.0005)	-0.0014*** (0.0005)	-0.0011** (0.0004)	-0.0014*** (0.0004)	-0.0357** (0.0149)	-0.0444*** (0.0152)
Trade/GDP	0.0100**	0.0097	0.0098*	0.0097	0.0096*	0.0089	0.3091*	0.2962

	(0.0050)	(0.0061)	(0.0050)	(0.0061)	(0.0049)	(0.0055)	(0.1554)	(0.1847)
GDP per capita	0.0000	-0.0002	0.0000	-0.0001	-0.0000	-0.0002	0.0003	-0.0051
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0025)	(0.0045)
GDP growth	-0.0195	-0.0190	-0.0155	-0.0159	-0.0147	-0.0137	-0.5216	-0.5099
	(0.0146)	(0.0152)	(0.0144)	(0.0151)	(0.0132)	(0.0138)	(0.4392)	(0.4609)
FDI/GDP	0.0220	0.0025	0.0196	-0.0001	0.0104	0.0001	0.5460	0.0252
	(0.0177)	(0.0253)	(0.0181)	(0.0250)	(0.0182)	(0.0253)	(0.5626)	(0.7913)
Market Capitalization/GDP	0.0034*	0.0035**	0.0036*	0.0037**	0.0021	0.0026*	0.0956	0.1030**
	(0.0018)	(0.0014)	(0.0019)	(0.0014)	(0.0018)	(0.0014)	(0.0585)	(0.0430)
Deposit/GDP	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0001**	-0.0003	-0.0014*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0008)	(0.0008)
Post-Financial Liberalization	-0.0030	-0.0045	-0.0030	-0.0043	-0.0028	-0.0033	-0.0921	-0.1275
	(0.0028)	(0.0037)	(0.0027)	(0.0035)	(0.0024)	(0.0037)	(0.0816)	(0.1146)
Post-Board Reform	-0.0011	-0.0006	-0.0012	-0.0007	-0.0011	-0.0011	-0.0346	-0.0246
	(0.0013)	(0.0018)	(0.0013)	(0.0019)	(0.0016)	(0.0019)	(0.0439)	(0.0586)
Post-Insider Trading Restriction	0.0047**	0.0059***	0.0045**	0.0059***	0.0049**	0.0059***	0.1481**	0.1856***
	(0.0019)	(0.0021)	(0.0020)	(0.0022)	(0.0020)	(0.0022)	(0.0611)	(0.0674)
Post-Takeover Laws	0.0044*	0.0034**	0.0044*	0.0032*	0.0037*	0.0028	0.1301*	0.0978*
	(0.0022)	(0.0016)	(0.0022)	(0.0016)	(0.0021)	(0.0017)	(0.0686)	(0.0514)
Post-IFRS	0.0037***	0.0054**	0.0037***	0.0055**	0.0035***	0.0051**	0.1143***	0.1670**
	(0.0012)	(0.0025)	(0.0012)	(0.0025)	(0.0013)	(0.0024)	(0.0390)	(0.0760)
Constant	0.0767***	0.0986***	0.0934***	0.1159***	0.0884***	0.1052***	2.5543***	3.1958***
	(0.0134)	(0.0131)	(0.0133)	(0.0134)	(0.0095)	(0.0113)	(0.3663)	(0.3870)
Firm, Year FEs	Yes	No	Yes	No	Yes	No	Yes	No
Firm, Industry-Year, Region-Year FEs	No	Yes	No	Yes	No	Yes	No	Yes
Observations	338,587	338,587	338,587	338,587	338,587	338,587	338,587	338,587
R-squared	0.3930	0.4003	0.3920	0.3995	0.3615	0.3679	0.3763	0.3832

Chapter 3. Managers under Modern Information Technologies: EDGAR Attention and Stock Price Crash Risk

Abstract

This paper examines how modern information technologies affect future stock price crash risk. Using EDGAR search volume (ESV) as a direct measure, we find that firms under greater active attention through EDGAR tend to hide bad news and release it subsequently, thus increasing future stock price crash risk. EDGAR attention to non-financial information and abnormal EDGAR attention drive the results. The impact of EDGAR attention is stronger for firms with higher ex-ante cost of bad news disclosure, which indicates that modern information technologies affect managers by increasing the exposure of bad news to the public. Evidence from option prices, management guidance, and accounting practices further confirms managers' tendency to hide bad news under greater EDGAR attention. Three plausible natural experiments based on the implementation of EDGAR, shareholder distraction from unrelated industries, and the mandatory adoption of XBRL provide a causal inference. By providing systematic evidence on the impact of active attention through EDGAR on stock price crash risk, this paper sheds light on the pressure effect of EDGAR users' attention on managers' strategic bad news disclosure and a side effect of modern information technologies.

Keywords: Modern Information Technologies; EDGAR Attention; Pressure Effect; Stock Price Crash Risk; Managerial Bad News Hoarding

JEL Classification: G12; G14; G41

1 Introduction

Modern information technologies fundamentally change the way people acquire information. Before the advent of the U.S. SEC's Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system, people could only acquire information on SEC filings in SEC public reference rooms in Washington DC, New York, and Chicago. Nowadays, the vast majority of SEC filings are available on the EDGAR system, with an increase of about 3,000 filings per day. According to the website of EDGAR, it serves up 3,000 terabytes of data to the public and accommodates 40,000 new filers per year on average.¹ This revolution in information technologies (Cox 1984) changes the information environment in both financial markets and firms. According to prior works, the implementation of EDGAR leads to a significant increase in market participants' information production (Gao and Huang 2020), stock price informativeness (Asthana, Balsam, and Sankaraguruswamy 2004), and firms' investment efficiency (Goldstein, Yang, and Zuo 2020). Given the importance of information environment in corporate financial reporting (Beyer et al. 2010), it is surprising that few works discuss whether and how modern information technologies reshape managerial disclosure decisions. Using EDGAR search volume as a direct measure of attention through EDGAR, this paper tries to fill this gap by examining the impact of EDGAR attention on managerial bad news hoarding reflected by stock price crash risk (Jin and Myers 2006).

Information technologies distort managers' disclosure decisions by increasing the cost of bad news releases. Essentially, managers' decision on hiding negative information is a cost-benefit tradeoff (e.g., Graham, Harvey, and Rajgopal 2005, Hermalin and Weisbach 2012). Since the new information is less efficiently priced into the market when investors are distracted (e.g., Ben-

¹ For detailed information, see <https://www.sec.gov/edgar/about>.

Rephael, Da, and Israelsen 2017, DellaVigna and Pollet 2009, Hirshleifer, Lim, and Teoh 2009), the price drop due to the bad news disclosure should be lower under market inattention. As a result, in order to lower the cost of bad news disclosure, managers are expected to hold bad news under greater market attention and release it when the attention is lower. Since the implementation of modern information technologies facilitates outsiders' information acquisition and increases firms' exposure to the public, the attention through modern information technologies should have a greater impact on corporate decisions (e.g., Drake, Roulstone, and Thornock 2015).

The search volume from EDGAR system gives us a direct proxy for active attention through modern information technologies.² Attention through EDGAR is unique in the following ways. First, unlike market-based attention measures (e.g., Li and Yu 2012), measures based on EDGAR attention provide us with a direct way to investigate the attention of sophisticated market participants from non-market sources (Loughran and McDonald 2017, Ryans 2017), which alleviates the spurious regression problem when we examine the relation between attention and other market-based variables. Second, different from information content from the supply side (Baloria and Heese 2018, Chen and Lin 2017), EDGAR attention reflect the active attention of sophisticated market participants from the demand side, which conveys additional information about markets' attitudes (e.g., Chen et al. 2020, Chen, Kelly, and Wu 2020, Drake et al. 2020, Drake, Roulstone, and Thornock 2015, Iliev et al. 2021, Li and Sun 2022). Third, apart from other platforms that offer processed information to the page viewers (e.g., Ben-Rephael, Da, and Israelsen 2017, Drake, Roulstone, and Thornock 2012), EDGAR, which contains all SEC filings of required firms, is a first-source repository for firms' information (Loughran and McDonald

² Following a Freedom of Information Act (FOIA) request, the U.S. SEC made the page view record of SEC filings from EDGAR available to the public. These data are included in the EDGAR Server Log File Data Set at <https://www.sec.gov/dera/data/edgar-log-file-data-set.html>. Each observation in the dataset records the firms' CIK, basic information on filings (e.g., access number, file size), view time, and partially masked request IP.

2017). In EDGAR, page viewers can access more information that is important but often unavailable on other information platforms.³ Due to the threshold of processing the raw information in EDGAR, EDGAR viewers are more skilled and experienced in collecting information and affecting managerial behaviors (Loughran and McDonald 2017).⁴ Overall, these unique features in EDGAR search information help get rid of the noise from naïve participants and focus on the active attention of sophisticated market participants, which suggests greater pressure on managers under modern information technologies.

Before the baseline analysis, we first test the cost of bad news disclosure in earnings announcements. Comparing the announcement returns in high and low EDGAR attention weeks, we observe a significantly lower cumulative abnormal return (CAR) in high EDGAR attention weeks than in low EDGAR attention weeks for announcements with a loss, which suggests a higher cost of bad news disclosure under greater attention through modern information technologies. Consistently, earnings announcements with a loss are more likely to be scheduled in weeks with lower attention through EDGAR, which provides us preliminary evidence on how managers strategically deal with bad news under pressure from EDGAR attention.

In the baseline analysis, we focus on managers' bad news hoarding behavior measured by firms' stock price crash risk (e.g., Hutton, Marcus, and Tehranian 2009, Jin and Myers 2006). Based on the skewness of stock returns, stock price crash risk is widely used in the literature as a measure of managerial bad news hoarding (e.g., Baloria and Heese 2018, Kim, Li, and Zhang 2011, Piotroski, Wong, and Zhang 2015). Once the accumulated bad news comes out at once in

³ For example, information on the tone and readability in the Business, Risk Factor Disclosure, and Management Discussion and Analysis (MD&A) sections is documented to have a real impact on financial markets and corporate actions (e.g., Feldman et al. 2010, Loughran and McDonald 2011).

⁴ In this paper, we investigate active attention from all EDGAR users in order to provide evidence on the total effect of attention from sophisticated market participants under the interaction among different types of sophisticated market participants in information acquisition (Chen, Kelly, and Wu 2020).

the market, the stock price crashes (Jin and Myers 2006). Empirically, firms with greater negative skewness returns imply a higher possibility of negative stock crashes, indicating the sudden release of bad news (e.g., Chang, Chen, and Zolotoy 2017, Kim, Li, and Zhang 2011). Using this proxy provides us two benefits. First, since stock price information is largely available to listed firms, using stock price crash risk to proxy for managerial bad news hoarding provides us a more comprehensive sample than using other related measures. Second, stock price crash risk captures all value-relevant information flow incorporated in stock prices (Baloria and Heese 2018). In baseline regressions, we use two widely-used measures of stock price crash risk: (1) down-up volatility ratio (*DUVOL*), and (2) negative conditional skewness (*NCKSEW*) (e.g., Chang, Chen, and Zolotoy 2017, Hutton, Marcus, and Tehranian 2009, Jin and Myers 2006, Kim, Li, and Zhang 2011).

Using a large sample of U.S. listed firms for the period 2003-2015, we first find a significantly positive impact of EDGAR attention on managerial bad news hoarding measured by stock price crash risk, which is consistent with our prediction that managers strategically disclose bad news to minimize the cost of bad news disclosure under greater attention through modern information technologies. This evidence is robust to different model specifications, alternative measures of stock price crash risk, and other measures of EDGAR attention. To eliminate alternative explanations, we test whether the impact of active attention through EDGAR can be driven by three highly related factors: (1) attention through general information platforms, (2) firms' information supply, and (3) media coverage. To do this, we further control for attention through general information platforms measured by Google search volume, information supply measured by the number of filings in EDGAR, and media coverage measured by the number of firms' news released by media institutions. As a result, we find that the impact of attention through EDGAR is

not driven by these alternative explanations. Separating the EDGAR attention by the types of SEC filings, we observe that the attention to non-financial information drives the baseline results, which suggests the value of sophisticated market participants in collecting non-financial information from EDGAR that can not be captured by the information demand from other information platforms. Further, we decompose the EDGAR attention into normal and abnormal attention and find that abnormal attention plays a more important role in affecting managerial bad news hoarding. This evidence supports the pressure effect because abnormal EDGAR attention is more likely to exert greater external pressure on managers.

Next, we implement a variety of heterogeneity tests based on different firm-level characteristics related to the ex-ante cost of bad news disclosure. In these tests, we find that the impact of attention through EDGAR on stock price crash risk is stronger for firms failing to beat the earnings benchmark (measured by analysts' earnings expectation), firms with more financial constraints, and firms with higher information transparency. Since these variables reflect the ex-ante cost of bad news disclosure, these findings suggest that managers with the higher cost of bad news disclosure are more likely to hide bad news under greater external attention pressure from EDGAR.

To further validate the use of stock price crash risk in measuring managerial bad news hoarding, we employ related measures on option prices, management guidance, and accounting practices as our dependent variables. Consistent with the cost-increasing hypothesis, we find that firms under greater EDGAR attention are more likely to have higher implied volatility smirk, fewer bad news disclosures in management guidance, lower financial reporting quality, and higher accounting conservatism, which supports our main hypothesis and further extends our understanding of how EDGAR attention reshapes managerial bad news hoarding behavior.

Although the positive relation between EDGAR attention and stock price crash risk is robust to alternative measures and model specifications, the potential omitted variable and reverse causality problems are not entirely eliminated. To alleviate such concerns, we implement three plausible natural experiments that exogenously affect market participants' EDGAR attention based on (1) EDGAR implementation in 1993-1996 as a shock to information dissemination technologies; (2) shareholder distraction by other industries; and (3) the mandatory adoption of XBRL that decreases the cost of information processing. First, we follow prior works (e.g., Gao and Huang 2020, Goldstein, Yang, and Zuo 2020) and use the staggered implementation of the EDGAR system during 1993-1996 to examine how the introduction of EDGAR attention affects managerial bad news hoarding. The second plausible natural experiment comes from Kempf, Manconi, and Spalt's (2017) shareholder distraction measure. This measure captures exogenous stock return shocks from unrelated industries based on the argument that institutional investors allocate attention across firms subject to a limited constraint as attention is a scarce resource (e.g., Fich, Harford, and Tran 2015, Kahneman and Tversky 1979). Third, we use another plausible natural experiment based on the staggered mandatory adoption of XBRL required by the U.S. SEC during 2009-2011 that increases market participants' attention by reducing the cost of information processing (e.g., Cheng et al. 2021, Dong et al. 2016, Kim, Li, and Liu 2019). Using these plausible natural experiments in difference-in-differences (DID) and instrumental variable approaches, we find consistent results to support that the impact of EDGAR attention on stock price crash risk is likely to be causal.

This paper contributes to the literature in three ways. First, we contribute to the growing body of research discussing the impact of modern information technologies and information acquisition by showing a dark side of active attention through EDGAR. Modern information technologies

greatly facilitate the public to acquire firms' information and increase financial market transparency. The implementation of EDGAR leads to a significant increase in market participants' information acquisition efficiency (Gao and Huang 2020), stock price informativeness (Asthana, Balsam, and Sankaraguruswamy 2004), and firms' investment efficiency (Goldstein, Yang, and Zuo 2020). Although the information role of investor attention has been documented in both theoretical and empirical works (e.g., Hirshleifer, Lim, and Teoh 2009, Hirshleifer and Teoh 2003, Israeli, Kasznik, and Sridharan 2021, Peng 2005, Peng and Xiong 2006), whether and how the implementation of modern information technologies change the power of investor attention is still largely unknown. Using EDGAR search volume, many recent works investigate the impact of information acquisition on capital markets and corporate actions (Bozanic et al. 2017, Chen et al. 2020, Chen, Kelly, and Wu 2020, Drake, Roulstone, and Thornock 2015, 2012, Iliev et al. 2021, Li et al. 2019). However, few papers discuss the pressure that may distort managerial behavior (e.g., Graham, Harvey, and Rajgopal 2005) from EDGAR attention. Different from the literature showing that EDGAR attention can alleviate information asymmetry in the market (Drake, Roulstone, and Thornock 2015, 2012) and discipline managers' behavior (e.g., Iliev et al. 2021), our paper adds to this strand of literature by showing that, at a higher cost of bad news disclosure, active attention through EDGAR distorts managerial behaviors in releasing bad news, which further extends our understanding of how modern information technologies reshape managerial behaviors.

Second, this paper adds to the literature on managerial bad news disclosures. According to prior works, pressure from both managerial labor markets and financial markets makes it costly to disclose unfavorable news and pushes managers to hide bad news (e.g., Baginski et al. 2017, Bao et al. 2019, DeFond and Park 1999, Fama 1980, Fee and Hadlock 2000, Gibbons and Murphy

1992, Kothari, Shu, and Wysocki 2009, Nagar 1999).⁵ Based on these arguments, this paper examines managers' bad news hoarding strategies under pressure from sophisticated outsiders' attention in order to minimize the cost of bad news disclosure, which responds to Blankespoor, deHaan, and Marinovic's (2020) call for more research on managers' strategic disclosure. Different from papers documenting managers' strategy to schedule negative earnings announcements on busy days (e.g., de Haan, Shevlin, and Thornock 2015, DellaVigna and Pollet 2009), our work provides more direct and general evidence on how attention through modern information technologies affects managers' bad news disclosure. Moreover, our work is also related to a broader literature on managers' disclosure strategies (e.g., Healy and Palepu 2001, Healy and Wahlen 1999, Verrecchia 2001).

In addition, this paper extends the literature on stock price crash risk. Prior literature examines the determinants of stock price crash risk such as financial analysts, stock market, accounting practices, managers' features, and institutional features (e.g., Chang, Chen, and Zolotoy 2017, Chen, Hong, and Stein 2001, DeFond and Park 1999, Kim, Li, and Zhang 2011, Kim and Zhang 2016). Our work is one of the first works to provide systematic evidence on the impact of active attention on firms' future crash risk under modern information technologies. Based on the bad news concealment theory of stock price crash risk (e.g., Jin and Myers 2006, Kim, Li, and Zhang 2011), we find evidence to support our conjecture that, considering the cost of bad news disclosure, managers tend to hold bad news when receiving greater active attention through EDGAR, thus increasing stock crash risk in the future. A paper related to ours is Baloria and Heese (2018), who document a positive effect of media slant on managerial bad news suppressing proxied by stock

⁵ Prior evidence also shows that firms failing to meet external expectations will be severely punished by financial markets and leads to market value destroy and increased cost of capital (Burgstahler and Dichev 1997, Skinner and Sloan 2002). Therefore, managers tend to hide bad news as a tradeoff between the cost and benefit (Dichev et al. 2013, Graham, Harvey, and Rajgopal 2005).

price crash risk. Using novel measures of active attention through EDGAR, we complement Baloria and Heese (2018) by examining how the information demand from modern information technologies affects firm behaviors.

The remainder of this paper is organized as follows. Section 2 reviews related literature and develops the hypotheses. Section 3 defines the main variables, source of our sample, and summary statistics. Section 4 reports the main results on the impact of attention through EDGAR on stock price crash risk. Section 5 shows the identification attempts. Section 6 concludes.

2 Related literature and empirical prediction

2.1 Managerial bad news hoarding and stock price crash risk

In theoretical and survey works, catering to stakeholders by beating earnings benchmarks is the most important factor considered by managers when they choose their disclosure strategies (e.g., Dichev et al. 2013, Graham, Harvey, and Rajgopal 2005, Healy and Palepu 2001, Healy and Wahlen 1999). Failing to meet external expectations, firms will be severely punished by stock markets in the form of destroying market value and by debt markets through increasing cost of capital (e.g., Burgstahler and Dichev 1997, Skinner and Sloan 2002). Therefore, due to career and reputation concerns, managers are more opportunistic to hide negative news and gamble that the bad news can be offset by positive information in the future (e.g., DeFond and Park 1999, Fee and Hadlock 2000, Kothari, Shu, and Wysocki 2009, Nagar 1999).

In the extant literature, managerial bad news hoarding is often associated with stock price crash risk. In an agency framework where insiders have an information advantage over outside stakeholders, managers can decide to hide bad news and release it in the future (e.g., Hutton, Marcus, and Tehranian 2009, Jin and Myers 2006). Finally, when the managers are not willing or able to keep hiding the bad news, the accumulated bad news comes to the market all at once and

leads to a stock price crash (Jin and Myers 2006). Since the bad news hidden by the managers is not priced in the stock market once it is released, the increase in stock price crash risk makes firms' stock return distribution negatively skewed (Hsu, Wang, and Whipple 2022, Hutton, Marcus, and Tehranian 2009).

Based on the argument that modern information technologies change the exposure of firms to the public and the cost of disclosure, we investigate how the disclosure cost from attention through EDGAR affects managers' decisions on bad news hoarding reflected by stock price crash risk.

2.2 EDGAR attention

Investor attention has been proved to have a significant impact on the capital market.⁶ In recent literature, EDGAR search data are used in various studies focusing on the effect of information acquisition from sophisticated market participants. In this strand of literature, Li and Sun (2022) document that the investor can get an abnormal return of 8% that does not reverse in the long run by constructing a zero investment portfolio based on the attention in EDGAR. Ryans (2021) finds that EDGAR downloads of firms' comment letters can predict future earnings, the probability of restatement, and the rate of future write-downs. Bauguess, Cooney, and Hanley (2018) find that pre-IPO firms with more page viewers experience higher negative price revision. Drake, Roulstone, and Thornock (2015) find that information acquisition is highly correlated with corporate events (e.g., restatements, earnings announcements), stock performance, and the information environment. Drake et al. (2017) use EDGAR search volume as a measure of investor attention to investigate the comovement of investor attention and its consequences. All of these

⁶ Many theoretical works discuss the importance of investor attention to market under-reaction and argue that attention from investors leads to the slow price adjustment (e.g., Hirshleifer and Teoh 2003, Peng 2005, Peng and Xiong 2006). In empirical studies, anomalies like post-earnings announcement drift (Hirshleifer, Lim, and Teoh 2009), the slow reaction to earnings news on Fridays (DellaVigna and Pollet 2009), the 52-week high puzzle (Li and Yu 2012), and the under-reaction to liquid stocks (Bali et al. 2014) are discussed as consequences of investor inattention.

papers agree that information acquisition from EDGAR alleviates information asymmetry and increases market efficiency. Since page viewers can be identified in EDGAR searching data through request IP, many other papers also investigate the information acquisition behavior of various types of market participants and find the consequences of information acquisition of different types of market participants like institutional investors (e.g., Drake et al. 2020, Iliev et al. 2021), financial analysts (Chen et al. 2020, Gibbons, Iliev, and Kalodimos 2021), auditors (Drake et al. 2019), and government sectors (Bozanic et al. 2017, Li et al. 2019, Ryans 2021). These studies together document the importance of EDGAR in facilitating market participants. However, few works document how attention through EDGAR reshapes managers' disclosure strategies. We try to fill this gap by testing the impact of attention through EDGAR on managerial bad news hoarding.

2.3 Hypothesis development

Theoretically, corporate financial reporting strategy is a tradeoff between the cost and benefit (e.g., Graham, Harvey, and Rajgopal 2005, Healy and Wahlen 1999, Hermalin and Weisbach 2012). As such, factors that change the cost and benefit of bad news disclosure affect managers' strategy of bad news disclosure. Among the factors, market attention increases the cost of bad news disclosure by facilitating the incorporation of bad news into the stock price. Prior evidence shows that investor distraction decreases market efficiency in incorporating new information (e.g., Ben-Rephael, Da, and Israelsen 2017, Hirshleifer, Lim, and Teoh 2009) and renders lower immediate response and higher delayed response (DellaVigna and Pollet 2009), suggesting a lower cost of bad news disclosure under reduced market attention. If EDGAR increases firms' exposure to the public (Gao and Huang 2020), the cost of releasing bad news becomes higher. Also, since most EDGAR users are sophisticated market participants, the cost of bad news releasing should be

higher due to the easier access to information for these users. Therefore, in order to mitigate the higher releasing cost caused by EDGAR attention, managers are expected to strategically hide bad news when they receive greater EDGAR attention and release it when the attention is lower, thus increasing the probability of stock price crash risk in the future. Drawing upon the aforementioned arguments, we predict a positive impact of attention through EDGAR on stock price crash risk and propose the following hypothesis.

***Hypothesis 1.** All else being equal, active attention through EDGAR increases the probability of stock price crash risk.*

If this hypothesis is correct, we would observe an increase in future stock price crash risk under greater attention through EDGAR. Also, we would observe consistent results that other measures reflecting managerial bad news hoarding are also affected by EDGAR attention in the same direction.

Since the prediction of the positive relation between EDGAR attention and stock price crash risk is based on the cost of bad news disclosure, the impact of EDGAR attention on stock price crash risk is expected to be stronger for firms with a higher ex-ante cost of bad news disclosure. This argument leads to our second hypothesis.

***Hypothesis 2.** All else being equal, the positive impact of EDGAR attention on stock price crash risk is stronger when the ex-ante cost of bad news disclosure is higher.*

Empirical findings consistent with Hypothesis 2 lend further support to the pressure effect in Hypothesis 1.

3 Data and summary statistics

3.1 Data sources

Our sample comes from multiple sources. Firm-level financial data come from the

COMPUSTAT database. Stock price and return data come from the Center for Research in Security Prices (CRSP). Institutional holdings data come from Thomson Reuters Institutional Holdings (13f). Information on earnings announcements and analyst coverage comes from Institutional Brokers Estimate System (I/B/E/S). The EDGAR search volume data come from James Ryans' EDGAR Log File Data.⁷ Information on SEC filings comes from EDGAR. To provide further evidence on managerial bad news hoarding, we also use option data from Ivy DB OptionMetrics and management guidance data from I/B/E/S Guidance. Following most extant literature on stock price crash risk, we only include observations that satisfy the following criteria: (1) Book equity is positive; (2) Year-end stock price is above one U.S. dollar; (3) At least 26 observations are available in CRSP weekly data for each firm-year; (4) Variables used in the research are available; (5) Each firm should at least have 2-year consecutive observations. What is more, firms in the financial industries (SIC codes 6000-6999) and utility industries (SIC codes 4900-4999) are excluded from the sample. All continuous variables are winsorized at 1st and 99th percentiles to alleviate the potential disturbance from outliers. Finally, our sample consists of 21,617 observations in 2003-2015.⁸

3.2 Measuring stock price crash risk

Following prior works (e.g., Baloria and Heese 2018, Chen, Hong, and Stein 2001, Jin and Myers 2006), we use stock price crash risk as a summary proxy of managerial bad news hoarding. Based on the validity of stock price crash risk to measure managerial bad news hoarding (e.g., Kim, Li, and Zhang 2011, Piotroski, Wong, and Zhang 2015), using this proxy provides us two benefits. First, since stock price information is largely available to listed firms, using stock price

⁷ This data are available in James Ryans' personal website and are arranged in several zip files by year. In each file, firms' CIK number, file accession key, the date of file being viewed, and the number of page view are included.

⁸ In Ryans' files, we find few observations in 2016. In order to avoid potential truncation problem in the last sample year, we choose not to use those observations. The results are similar if those observations are included.

crash risk to proxy for managerial bad news hoarding provides us a more comprehensive sample than using other related measures.⁹ Second, stock price crash risk captures all value-relevant information flow incorporated in stock prices (Baloria and Heese 2018).

According to prior literature (e.g., Hutton, Marcus, and Tehranian 2009), in order to isolate firm-specific risk from common risk, we first estimate the following model based on CRSP weekly return data in each firm-year:¹⁰

$$r_{i,t} = \alpha_i + \beta_1 r_{m,i,t-2} + \beta_2 r_{m,i,t-1} + \beta_3 r_{m,i,t} + \beta_4 r_{m,i,t+1} + \beta_5 r_{m,i,t+2} + \varepsilon_{i,t} \quad (1)$$

where $r_{i,t}$ is a firm's weekly return; $r_{m,i,t}$ is the weekly value-weighted market return. According to prior studies on crash risk (e.g., Dimson 1979), we include the lead and lag terms of market returns to eliminate the impact of nonsynchronous trading. To estimate Equation (1), we require that at least 26 weeks of stock returns be available for each firm-year. Following extant literature on crash risk (Kim, Li, and Zhang 2011), we estimate firm-specific weekly return $W_{i,t}$ as the logarithm of 1 plus the residual term of Equation (1), namely $W_{i,t} = \ln(1 + \varepsilon_{i,t})$.

Two measures of stock price crash risk are used in baseline regressions. The first one is the negative conditional skewness of return (*NCSKEW*) developed by Chen, Hong, and Stein (2001). Specifically, *NCSKEW* for a firm i in year j is defined as the negative of the ratio of the third momentum of $W_{i,t}$ to its standard deviation raised to the third power, as shown below:

$$NCSKEW = -\frac{n(n-1)^{3/2} \sum W_{i,t}^3}{(n-1)(n-2)(\sum W_{i,t}^2)^{3/2}}$$

As mentioned in prior literature (e.g., Chen, Hong, and Stein 2001), multiplying -1 here is to

⁹ Our additional tests in Section 4.7 provides the evidence.

¹⁰ The results are similar if we use another model presented in related papers (e.g., Chang, Chen, and Zolotoy 2017):

$$r_{i,t} = \alpha_i + \beta_1 r_{m,i,t-1} + \beta_2 r_{ind,i,t-1} + \beta_3 r_{m,i,t} + \beta_4 r_{ind,i,t} + \beta_5 r_{m,i,t+1} + \beta_6 r_{ind,i,t+1} + \varepsilon_{i,t}$$

where the value-weighted industry index are added in order to control for industrial common factors, and only current returns and one-period lead and lag returns are included.

make sure that *NCSKEW* increases as the stock crash risk becomes higher.

The second measure is the down-to-up volatility (*DUVOL*), which is calculated as the logarithm of the ratio of standard deviation in weeks with negative returns to the standard deviation in weeks with positive returns.

$$DUVOL = \ln \left[\left((n_u - 1) \sum_{Down} W_{it}^2 \right) / \left((n_d - 1) \sum_{Up} W_{it}^2 \right) \right]$$

where n_d and n_u are the number of weeks with negative returns and weeks with positive returns, respectively.

In robustness tests, we also include another two measures frequently used in extant literature (e.g., Jin and Myers 2006, Kim, Li, and Zhang 2011), namely *CRASH* and *COUNT*. *CRASH* is a dummy variable indicating the extreme losses in a firm-year. The value of *CRASH* equals 1 if the firm experiences a firm-specific return falling three times or more of its standard deviation below the average return within the year, and equals 0 otherwise. *COUNT* refers to the balance of extremely negative and positive returns. Following Jin and Myers (2006), *COUNT* is calculated as the difference between the frequency of firm-specific returns falling three times of its standard deviation or more below the average return within the year (*COUNT_DOWN*) and the frequency of firm-specific returns rising three times of its standard deviation or more above the average return within the year (*COUNT_UP*). In this paper, we use measures of stock price crash risk at year $t+1$ as our dependent variables.

To alleviate the concern that our baseline results simply come from measurement error, we also employ a measure from option prices to reflect managerial bad news hoarding. Following prior works (e.g., Kim, Lu, and Yu 2019, Kim and Zhang 2016), we use implied volatility smirk as the measure of ex-ante crash risk, where the implied volatility smirk is calculated as the

difference between the implied volatility of the OTM put option and implied volatility of the ATM call option (Xing, Zhang, and Zhao 2010).

Despite the advantage of using stock price crash risk measures, these measures do not provide direct evidence on managers' bad news hoarding behavior. To provide more granular evidence, we identify specific accounting practices taken by managers to hide bad news, such as financial reporting quality (e.g., Dechow, Ge, and Schrand 2010) and accounting conservatism (e.g., Khan and Watts 2009).

3.3 Measuring active attention through EDGAR

In this paper, we use the three measures of EDGAR search volume to proxy for active attention through EDGAR. Since there are many robot requests (requests from web crawlers) recorded in the EDGAR server log dataset that contain less information on market attention, researchers need to screen out those records from the log file before constructing EDGAR search volume. In the extant literature, three methods are commonly used as criteria to count the non-robot requests, deriving the counting variables of non-robot requests: (1) *LM* from Loughran and McDonald (2017); (2) *DRT* from Drake, Roulstone, and Thornock (2015); and (3) *RYANS* from Ryans (2017). Specifically, Loughran and McDonald (2017) identify non-robot page viewers under the assumption that human does not download more than 50 items in a day. Drake, Roulstone, and Thornock (2015) require that human does not download more than 5 items per minute. Ryans (2017) loosens the two above criteria to 500 items/day and 25 items/minute and introduces another restriction that human does not search more than 3 firms in a minute. In order to alleviate the concern that our results may be biased for the skewness of counting data, we use the logarithm form of these counting variables as our proxies of attention through EDGAR and have *ESV_LM*,

ESV_DRT, *ESV_RYANS*.¹¹ Since there is no consensus on which measure is the best among *ESV_LM*, *ESV_DRT*, and *ESV_RYANS*, we further include *ESV_FCOMP*, the first principal component score of *ESV_RYANS*, *ESV_DRT*, and *ESV_LM* in a principal component analysis, as another independent variable. According to Ryans (2017), *ESV_RYANS* performs the best among the three measures, especially after the adoption of XBRL. Since our sample period coincides with phrases of XBRL adoption, we choose *ESV_RYANS* to be the main independent variable throughout this paper.¹²

3.4 Control variables

Following prior studies on EDGAR attention and stock price crash risk (e.g., Drake, Roulstone, and Thornock 2015, Hutton, Marcus, and Tehranian 2009, Jin and Myers 2006), we include a set of control variables that may affect both the dependent and independent variables. The control variables include: (1) firm size (*SIZE*) measured by the logarithm of 1 plus inflation-adjusted book value of total assets; (2) Tobin's Q (*TOBINQ*) measured by market value of total assets over book value of total assets; (3) cash flow scaled by book value of total assets (*CASH_FLOW*); (4) book leverage (*BLEV*) calculated as the total liability over book value of total assets; (5) capital expenses scaled by book value of total assets (*CAPX*); (6) growth of sales scaled by book value of total assets (*GSALE*); (7) analyst coverage (*NAN*) calculated as the logarithm of 1 plus the arithmetic mean of the 12 monthly numbers of analysts following a firm over the year; (8) institutional ownership (*IO*) measured by the percent of shares held by institutional investors; (9) the mean of firm-specific weekly return (*RET*); (10) the standard deviation of firm-specific weekly return

¹¹ Table A2 presents the two-way distributions among *ESV_LM*, *ESV_DRT*, and *ESV_RYANS*, from which we find that the three variables are quite similar to each other. Besides, from the density of the upper triangle and lower triangle in the tables, we find that the values of *ESV_RYANS*, *ESV_DRT*, and *ESV_LM* are in ascending order, which is consistent with our common knowledge that stricter criteria result in lower value of EDGAR search volume.

¹² The other two measures are used in robustness tests, and we find similar results.

(*SIGMA*); (11) change in stock turnover (*DTURN*); (12) negative conditional skewness of return (*NCSKEW*) in current year; and (13) opacity proxy based on modified Jones model (*OPAQUE*).

The detailed definitions of these variables are listed in Appendix Table A1.

3.5 Summary statistics

Table 1 reports the summary statistics and correlation matrix of variables used in this paper. As shown in Panel A of Table 1, the summary statistics of variables are similar in magnitude to those in prior studies, which suggests that the sample we use does not have a structural difference from samples used in other related research.¹³

[Insert Table 1 about here]

Next, we conduct a univariate comparison between high and low attention groups. The observations are sorted into two groups according to the median of *ESV_RYANS* over the year. From Panel B of Table 1, we find significant differences in firms' characteristics at the 1% level between groups with different levels of attention through EDGAR. Specifically, firms with larger size (higher *SIZE*), more investment opportunities (higher *TOBINQ*), more cash flow (higher *CASH_FLOW*), higher book leverage (higher *BLEV*), higher investment (higher *CAPX*), higher sales performance (higher *GSALE*), higher firm-specific stock return (higher *RET*), lower firm-specific stock volatility (lower *SIGMA*), higher increase in turnover (higher *DTURN*), and lower opacity (lower *OPAQUE*) are more likely to receive greater attention through EDGAR. These findings are consistent with Drake et al. (2015), showing the necessity to include those variables into our regression models in order to alleviate omitted variable problems. What is more, from the

¹³ Interestingly, we find that the means of dependent variables *DUVOL* and *NCSKEW* are a little bit higher than those used in prior literature. This phenomenon might happen because our sample starts in 2003, which is later than many prior studies. Not surprisingly, this is consistent with the finding of Irvine and Pontiff (2009) that documents the increasing trend in idiosyncratic volatility in the past 40 years resulting from the increasingly competitive external environment over the years. What is more, the financial crisis that happened around 2008 might be another reason for the higher crash risk. In untabulated tables, the exclusion of observation in 2008 does not change our results.

comparison of dependent variables between the two groups, we find preliminary evidence on the positive relationship between crash risk and EDGAR attention, which will be illustrated in detail in the following analysis.

In Panel C of Table 1, the pairwise correlations between dependent variables and independent variables show positive associations at the 1% level of significance among all these variables, and also reveal a positive association between active attention through EDGAR and firm-specific crash risk.

4 Main results

4.1 The cost and timing of bad news disclosure: Evidence from earnings announcement

To test the underlying assumption that EDGAR attention increases bad news disclosure cost, we use earnings announcement as a specific news release channel to examine how attention through EDGAR affects the stock market response to bad news. We identify an earnings announcement as bad news if it reports a loss ($Loss=1$) and separate good and bad news by the total attention through EDGAR in the announcement weeks. We first test the stock market response measured by cumulative abnormal return (CAR) calculated based on Fama-French 3 factor model with the estimation window [-160,-11]. Panels A-B of Table 2 show the cumulative abnormal return (in percentage points) of the announcing firm from 1 day before to 1 day after the earnings announcement in weeks with high and low EDGAR attention (ESV_RYANS , ESV_LM , and ESV_DRT) in the announcement week.

[Insert Table 2 about here]

From Panels A-C of Table 2, we find significantly positive CARs for good news and significantly negative CARs for bad news, which is consistent with prior works. By comparing the announcement CARs in high and low attention weeks, we find significantly lower CARs in high

attention weeks for bad news and no significant difference in weeks for good news. In terms of magnitude, announcement CARs of bad news in high attention weeks are, on average, lower by 0.44 base point than those in low attention weeks, which shows a statistically significant and economically magnitude cost of bad news disclosure under greater EDGAR attention.

Next, we follow prior works (e.g., deHaan, Shevlin, and Thornock 2015, Israeli, Kasznik, and Sridharan 2021) and test the timing of bad news disclosure. Following Israeli, Kasznik, and Sridharan (2021), we measure the likelihood of reporting bad news as the number of loss reports divided by the total number of earnings announcements in the week. As shown in Panel D of Table 2, we observe a significantly higher likelihood to report bad news in weeks under weaker EDGAR attention, which provides preliminary evidence on managerial bad news hoarding under greater EDGAR attention. Overall, evidence from earnings announcements supports our hypothesis that attention through modern information technologies motivates managers to hide bad news because of the increase in the cost of bad news disclosure.

4.2 Baseline regression

In baseline regression analysis, we employ the following regression specification based on extant literature on stock price crash risk and EDGAR attention (e.g., Drake, Roulstone, and Thornock 2015, Gibbons, Iliev, and Kalodimos 2021, Hutton, Marcus, and Tehranian 2009, Kim, Li, and Zhang 2011). The basic model specification is as follows:

$$CrashVar_{i,t+1} = \alpha + \beta ESV_{i,t} + \gamma Controls_{i,t} + FE + \varepsilon_{i,t+1} \quad (2)$$

where $CrashVar_{i,t+1}$ denotes measures of future stock market crash risk ($DUVOL$ and $NCSKEW$); $ESV_{i,t}$ denotes measures of EDGAR search volume (including ESV_RYANS , ESV_LM , and ESV_DRT); $\varepsilon_{i,t+1}$ denotes the error term. Control variables are mentioned in Section 3.4. Firm, year, and industry×year fixed effects are included to control for invariant factors

at firm and year levels and all factors at the industry level. Industries are classified by Fama-French 48 industries based on Fama and French (1997).

[Insert Table 3 about here]

From Table 3, we find that the coefficients on *ESV_RYANS* are all positive and significant at the 1% level across different dependent variables (*DUVOL* and *NCSKEW*), and different sets of fixed effects. In terms of economic magnitude, a one-standard-deviation increase in *ESV_RYANS* is associated with a $1.0894 \times 0.026 = 0.0283$ increase in firms' future *DUVOL* when firm and industry×year fixed effects are included. Compared to the sample standard deviation of *DUVOL* (0.3566), the magnitude of the coefficient on *ESV_RYANS* is both statistically and economically significant. The results are similar when firm and year fixed effects are included and when *NCSKEW* is used as the dependent variable. This evidence implies that firms will experience a higher crash risk if they receive greater attention through EDGAR, which is consistent with Hypothesis 1. In addition, we find differences in coefficients of interest between different sets of fixed effects. These findings suggest that, although not affecting the main results, controlling for industry-level factors is necessary for our regression analysis. Therefore, we include firm and industry×year fixed effects in the following OLS analyses.

4.3 Robustness tests

In this section, we conduct several tests to ensure the robustness of our baseline results. First, we choose another two frequently mentioned proxies of stock price crash risk, *COUNT* and *CRASH*. Second, we use different measures of EDGAR search volume based on prior studies.

Alternative measures of crash risk. Besides *DUVOL* and *NCSKEW*, another two measures of stock price crash risk, *CRASH* and *COUNT*, are also frequently used in extant literature (Hutton, Marcus, and Tehranian 2009). Different from *DUVOL* and *NCSKEW*, *CRASH* and *COUNT*

account for the real stock crashes that happen over the year.¹⁴

[Insert Table 4 about here]

Panel A of Table 4 presents results for robustness tests using alternative measures of stock price crash risk. *COUNT* and *CRASH* are used in these regressions as dependent variables. In addition, *COUNT* is decomposed into *COUNT_UP* and *COUNT_DOWN* to further test the asymmetric effect of EDGAR search volume on the frequency of sudden jump and sudden crash. From Panel A of Table 4, we find that the coefficient estimates on *ESV_RYANS* are significant for all the dependent variables. In Column (1), the coefficient on *ESV_RYANS* is 0.1139, suggesting that a one-standard-deviation increase in *ESV_RYANS* is associated with a $0.1139 \times 1.0894 = 0.1241$ increase in *COUNT*. Compared to the sample mean of *COUNT* (0.0414), this estimate is both statistically significant and economically meaningful. In Columns (2)-(3), the estimates of the independent variable are -0.0430 and 0.0707 for *COUNT_UP* and *COUNT_DOWN* with significance levels at 10% and 1%, respectively. These results show that the impact of attention through EDGAR on stock crash risk mainly comes from increasing the frequency of sudden crashes and slightly from decreasing the frequency of sudden jumps. In terms of magnitude, a one-standard-deviation increase in the independent variable is associated with about a 4% increase in future crash risk, which suggests that the impact of EDGAR attention on firms' future stock price crash risk is both statistically significant and economically meaningful.

Alternative measures of EDGAR search volume. In robustness tests, we apply additional measures (*ESV_LM*, *ESV_DRT*, *ESV_FCOMP*) as the independent variables. From Panel B of Table 4, we find that the estimates of *ESV_LM* and *ESV_DRT* are quite close to that of *ESV_RYANS* in the corresponding model shown in Table 3. For example, the coefficient estimate of *ESV_LM* is

¹⁴ The definitions of these variables are listed in Appendix Table A1.

0.0266 (0.0721) when the dependent variable is *DUVOL (NCSKEW)*, which is quite close to the corresponding coefficient estimate shown in Table 3. Tests on other measures of ESV show similar results.

4.4 Alternative explanations

Attention through general information platforms. Besides EDGAR attention, attention through general information platforms is also discussed in extant literature. Prior studies use search volume from general information platforms (e.g., Yahoo! Finance, Google, Bloomberg, and Twitter) as an attention measure to analyze the real effect of investor attention on firms' operating performance and market performance (e.g., Bartov, Faurel, and Mohanram 2017, Ben-Rephael, Da, and Israelsen 2017, Drake, Roulstone, and Thornock 2012). In this case, it is possible that our baseline results are driven by the attention through other general information platforms that may be associated with both managerial bad news hoarding and EDGAR attention. To alleviate such concern, we include Google search volume index (*GOOGLE_SVI*) to capture the effect of attention through general information platforms (Drake, Roulstone, and Thornock 2015).¹⁵

[Insert Table 5 about here]

Panel A of Table 5 shows that our baseline results still hold after controlling for attention through general information platforms measured by *GOOGLE_SVI*, which suggests that the attention through EDGAR provides additional value beyond that through general information platforms. This evidence is consistent with Drake, Roulstone, and Thornock's (2015) findings.

Information supply. The baseline results show that greater attention through EDGAR motivates firms' bad news hoarding. However, if the increased page view of firms simply comes from more filings submitted to SEC, our results may be driven by firms' information supply. To

¹⁵ The Google search volume index data come from Google Trends. *GOOGLE_SVI* is calculated as the average searching index of months over the year, scaled by 100.

alleviate such concern, we include the number of firms' SEC filings in the regressions. In this test, we include the logarithm form of the total number of filings (*LN_TOTAL_FILINGS*) to control for the total information content that firms submit to SEC and add the logarithm form of the number of voluntary 8-K filings (*LN_VOL_8K*) to control for the effect of firms' voluntary disclosure.¹⁶ As shown in Panel B of Table 5, the baseline results remain after controlling for the number of SEC filings, which suggests that the impact of EDGAR attention on managerial bad news hoarding can not be explained by firms' information supply.

Media coverage. As shown in Baloria and Heese (2018), managers under greater media coverage are more likely to hide bad news. Since prior works show the positive relation between media coverage and active attention through EDGAR (Drake, Roulstone, and Thornock 2015), it is possible that our baseline results may simply come from greater media coverage that increases both managerial bad news hoarding measures and EDGAR attention. To alleviate such concern, we follow Drake, Roulstone, and Thornock (2015) and include the number of firms' news released by media institutions. Specifically, we include the logarithm of one plus the number of business press news wires and articles disseminated in the firm-year (*BUSINESS PRESS*) as a measure of media coverage.¹⁷ As shown in Panel C of Table 5, the results do not change the significance of the coefficient on EDGAR search volume measures when *Business Press* is included. This evidence suggests that our baseline results are not driven by media coverage.

4.5 Decomposition of EDGAR search volume

Attention to different types of filings. To test which part of attention mostly affects managers' bad news hoarding decisions, we separate the attention to SEC filings into attention to financial

¹⁶ According to Lerman and Livnat (2010), an 8-K filing is identified as voluntary if it contains Item 2.02, Item 7.01, and Item 8.01.

¹⁷ The information of business press news wires and articles comes from RavenPack.

and non-financial filings. Following Iliev et al. (2021), we identify 10-K and 10-Q filings as financial filings and other filings as non-financial filings. Since financial information is largely available in other platforms (e.g., Yahoo! Finance, Bloomberg) and is more efficiently incorporated into the stock market, the impact of attention through EDGAR to financial information is expected to be weaker on managerial bad news.

[Insert Table 6 about here]

Consistently, Panel A of Table 6 shows that the effect of attention through EDGAR to non-financial information is larger than that to financial information. Consistent with prior literature documenting the value of non-financial information (e.g., Loughran and McDonald 2011), these results support our argument that attention to non-financial information through EDGAR provides additional impact on managerial decisions.

Normal and abnormal EDGAR search volume. Next, we separate the total ESV into normal and abnormal parts. According to prior literature, many factors are highly related to firms' EDGAR attention, including institutional investors, financial analysts, media institutions, firm size, Tobin's q, book leverage, stock turnover, and firm-specific return (e.g., Chen, Kelly, and Wu 2020, Drake, Roulstone, and Thornock 2015, Gibbons, Iliev, and Kalodimos 2021, Iliev et al. 2021, 2021, Li and Sun 2022). Following these arguments, we measure the abnormal (normal) EDGAR search volume as the residual term (fitted value) by estimating Equation (3):¹⁸

$$ESV_{i,t} = \delta_0 + \delta_1 SIZE_{i,t} + \delta_2 TOBINQ_{i,t} + \delta_3 BLEV + \delta_4 DTURN + \delta_5 NAN_{i,t} + \delta_6 IO_{i,t} + \delta_7 RET_{i,t} + \delta_8 BUSINESS PRESS_{i,t} + IndustryFE + Year FE + \varepsilon_{i,t} \quad (3)$$

where *ESV* refers to *EDGAR* search volume measures (*ESV_RYANS*, *ESV_LM*, *ESV_DRT*).

From Panel B of Table 6, we find that the coefficient estimates of abnormal *ESV* are all positive and significant at the 1% level for all measures of *ESV* while those of normal *ESV* do not

¹⁸ Appendix Table A3 shows the estimation results of Equation (3).

show any significance, which suggests that EDGAR abnormal attention plays a more important role in affecting managerial bad news hoarding. Since abnormal attention is more related to the excess pressure on managers, these findings are consistent with our prediction that external pressure increases the cost of bad news releasing.

Overall, by separating attention through EDGAR into different parts, we find that EDGAR attention to non-financial information and the abnormal part of EDGAR attention have a greater impact on managerial bad news hoarding.

4.6 Heterogeneity analysis across the cost of bad news disclosure

In this section, we test Hypothesis 2 by examining the heterogeneous effects of attention through EDGAR on stock price crash risk across the ex-ante cost of bad news disclosure from external pressure and information transparency.

External pressure. Because firms with bad performance (e.g., failing to beat earnings benchmarks) or more financial constraints face higher pressure from the financial markets (e.g., Graham, Harvey, and Rajgopal 2005), releasing bad news becomes more costly in this case. Therefore, if Hypothesis 2 is correct, firms failing to beat earnings benchmarks or with more financial constraints are more likely to hide bad news under greater EDGAR attention.

First, we investigate the heterogeneous effects across whether firms beat earnings benchmarks. Due to the punishment by the market if managers fail to beat earnings benchmarks (e.g., Graham, Harvey, and Rajgopal 2005), the cost of bad news disclosure becomes higher when firms' performance is lower than expected. If Hypothesis 2 is correct, managers should hide more bad news under greater EDGAR attention. To test this prediction, we conduct a subsample analysis by whether firms beat analysts' expected EPS. Consistent with our prediction, we observe that coefficients of interest in the Beat group are significantly lower than those in the Not-beat group,

which is consistent with our prediction.

[Insert Table 7 about here]

Second, we investigate the heterogeneous effects across the level of financial constraint. In prior studies, firms' performance becomes more volatile when they are financially constrained (e.g., Kothari, Shu, and Wysocki 2009), thus increasing CEOs' turnover risk (e.g., Jenter and Kanaan 2015). This potential cost makes managers in financially constrained firms more reluctant to release bad news under greater EDGAR attention. To examine this argument, we use WW-Index (Whited and Wu 2006) as the measure of financial constraint. A firm is included in the High (Low) financial constraint group if the WW-Index is higher (lower) than the sample median over the fiscal year. In Panel B of Table 7, we find a significant difference in coefficients on *ESV_RYANS* between High and Low financial constraint groups, which suggests that managers in more financially constrained firms are more likely to hide bad news when receiving greater attention through EDGAR.

Information transparency. Since information transparency makes bad news more efficiently incorporated into the stock price (e.g., Hong and Stein 1999), it amplifies the negative impact of bad news and makes bad news disclosure more costly. Therefore, according to Hypothesis 2, we predict that firms with higher information transparency are more likely to hide bad news under greater EDGAR attention. First, we use analyst coverage as a measure of information transparency following prior works (e.g., Chen and Lin 2017, Hong and Kacperczyk 2010) because financial analysts are active EDGAR users (Chen et al. 2020, Gibbons, Iliev, and Kalodimos 2021) and have an important impact on managerial behaviors through information channel (Chen and Lin 2017). We conduct a subsample analysis of the impact of attention through EDGAR on managerial bad news hoarding by firms' analyst coverage. A firm is included in the High (Low) group if its analyst

coverage is higher (lower) than its sample median. Consistent with our prediction, we observe that coefficients of interest in the High analyst coverage group are significantly lower than those in the Low analyst coverage group, which supports our prediction that information transparency increases the cost of bad news disclosure.¹⁹

[Insert Table 8 about here]

Second, we investigate the heterogeneous effects across the increase in trading volume. Since trading volume facilitates the price discovery process (e.g., Chen, Hong, and Stein 2001, Hong and Stein 1999), a higher increase in trading volume implies a faster speed of information incorporation, which in turn increases the cost to release bad news. Therefore, managers are more likely to hide bad news under greater active attention when the increase in trading volume is higher. Consistent with our argument, results in Panel B of Table 8 show a higher impact of attention through EDGAR on managerial bad news hoarding for firms with greater change in stock trading.

Overall, results in the heterogeneity tests across the ex-ante cost of bad news disclosure show the importance of bad news disclosure cost in managers' bad news hoarding decisions under greater attention through EDGAR, which supports Hypothesis 2 and corroborates Hypothesis 1.

4.7 Additional evidence on bad news hoarding

Evidence from option prices. To further examine the effect of active attention on firms' bad news hoarding, we test whether managers' bad news hoarding under greater attention through EDGAR can also be observed from option markets. Following Kim, Lu, and Yu (2019), among others, we use ex-ante crash risk to proxy for managerial bad news hoarding from investors' subjective expectations. Ex-ante crash risk is measured by firms' option implied volatility smirk (*IV_SKEW*), which is calculated as the difference between the implied volatility of the OTM put

¹⁹ The differences in coefficient estimates of *ESV_RYANS* between the two groups are all significant for both measures of stock price crash risk.

option and implied volatility of the ATM call option (Xing, Zhang, and Zhao 2010). To examine the impact of EDGAR attention on managerial bad news hoarding reflected in the option market, we estimate the model in Equation (4):

$$Ex\text{-}ante\ CrashRisk_{i,t} = \alpha + \beta_1 ESV_{i,t} + \gamma Controls_{i,t} + FE + \varepsilon_{i,t+1} \quad (4)$$

where *Ex-ante CrashRisk* denotes *IV_SKEW*, *ESV* denotes EDGAR search volume measures (*ESV_RYANS*, *ESV_DRT*, and *ESV_LM*).

[Insert Table 9 about here]

In Table 9, we observe that the coefficients of interest are all significantly positive across different independent variables and sets of fixed effects. On average, the coefficients of interest are above 0.005, suggesting that a one-standard-error increase in the attention measure results in about a 0.04 increase in option implied volatility smirk. Given the mean and standard deviation of *IV_SKEW* in this sample (0.0272 and 0.0269, respectively), these results are both statistically significant and economically meaningful. These consistent results corroborate the positive relation between active EDGAR attention and managerial bad news hoarding in Hypothesis 1.

Evidence from management guidance. Following Bao et al. (2019), we use information on management guidance to measure managers' release of bad news. If managers hide bad news under greater attention through EDGAR, we would observe a negative association between *ESV* and the number of bad news released in the management guidance. To examine this prediction, we follow prior works (e.g., Bao et al. 2019) and use the number of bad-news management guidance in each firm-year (*FREQ_BAD_MG*) as our dependent variable, where a management guidance is defined as bad news if the EPS of management guidance is lower than the most recent consensus analyst forecast.

[Insert Table 10 about here]

From Panel A of Table 10, we find a positive relation between ESV and the number of bad news released. This relation is robust to alternative sets of fixed effects and calculation methods of EDGAR search volume. By showing that managers under greater attention through EDGAR release fewer bad news in management guidance, we further confirm the positive impact of EDGAR attention on managerial bad news hoarding.

Evidence from accounting practices. In order to alleviate the cost of bad news disclosure, managers have the incentive to change accounting practices to hide bad news, even if the methods are harmful to firms' long-term value (e.g., Dichev et al. 2013, Graham, Harvey, and Rajgopal 2005, Hutton, Marcus, and Tehranian 2009). Therefore, we examine specific accounting practices taken by managers to hide bad news under greater EDGAR attention. Following prior works (e.g., Dechow and Dichev 2002, Dechow, Ge, and Schrand 2010, Zang 2012), we use several methods to measure financial reporting quality: (1) the absolute value of discretionary accruals based on Dechow, Sloan, and Sweeney's (1995) model ($/DA_MJONES/$); (2) the absolute value of real earnings management based on Zang's (2012) calculation ($/RM/$); (3) the standard deviation of firm-level residual in Dechow and Dichev's (2002) model (AQ_DD); (4) the standard deviation of firm-level residual in modified Dechow and Dichev's (2002) model proposed by McNichols (2002) (AQ_MDD), and (3) a model-free measure from the special item and use SPI as 100 times the special item scaled by total assets. In addition, since firms can hide bad news by delaying recognizing a loss (e.g., Kim and Zhang 2016), we also use Khan and Watts's (2009) accounting conservatism measure (C_SCORE) as another dependent variable to examine how EDGAR attention reshapes accounting conservatism.

To find evidence on managerial bad news hoarding from accounting practices, we regress measures of financial reporting quality and accounting conservatism on EDGAR search volume

with the same set of fixed effects and the clustering level as those in baseline regressions.²⁰ In Columns (1)-(5) of Panel B of Table 10, coefficients on *ESV_RYANS* are all positive and significant at the 1% level, which implies that managers decrease financial reporting quality to hide bad news under greater attention pressure from sophisticated market participants. From Column (6), we observe a negative and significant estimate of *ESV_RYANS* when the dependent variable is *C-SCORE*, which indicates a delay in recognizing bad news. Taken together, we find evidence from accounting practices to support the managerial bad news hoarding under greater attention through EDGAR.

5 Identification Attempts

5.1 Implementation of EDGAR

First, we use the staggered implementation of EDGAR system as a shock to information dissemination technologies, which triggers the attention to firms' SEC filings (e.g., Gao and Huang 2020). Before the EDGAR implementation, information on SEC filings is only available in SEC public reference rooms in Washington DC, New York, and Chicago, which makes investors almost impossible to put pressure on firms through information acquisition. To provide more accessible information to the public, the U.S. SEC developed the EDGAR system and required SEC filings to be transmitted electronically to EDGAR. On February 23, 1993, the U.S. SEC issued a phase-in schedule of EDGAR implementation. Public firms are assigned to 10 groups (Group CF-01 to Group CF-10), and each group was phased in at different times from April 1993 to May 1996.²¹ By exploiting the staggered implementation of EDGAR, prior works find that the introduction of EDGAR increases information production by corporate outsiders and facilitates equity financing

²⁰ We drop opacity measure *OPAQUE* in these regressions because *OPAQUE* is defined as the moving average of discretionary accruals, which may distort our results. The results are the similar if *OPAQUE* is not dropped.

²¹ Appendix Table A4 shows the timetable of the schedule.

and corporate investment (e.g., Gao and Huang 2020, Goldstein, Yang, and Zuo 2020). We start with the list of firms on the phase-in schedule of EDGAR implementation from Appendix B of SEC Release No. 33-6977, which contains company name, CIK, and the group number. Then, we match those firms to other datasets through CIK to have our sample in this analysis.²²

Following prior works (e.g., Gao and Huang 2020, Goldstein, Yang, and Zuo 2020), we estimate the introduction of EDGAR attention by a difference-in-differences model as follows:

$$CrashVar_{i,t+1} = \alpha + \beta POST-EDGAR_IMPLEMENT + \gamma Controls_{i,t} + FE + \varepsilon_{i,t+1} \quad (5)$$

where *CrashVar* denotes the measures on stock price crash risk (*NCSKEW*, *DUVOL*, *CRASH*, *COUNT*). The independent variable, *POST-EDGAR_IMPLEMENT*, is an indicator that equals 1 if the firm-year is subject to the mandatory filing on EDGAR, and 0 otherwise. Control variables are the same as those in baseline regressions. Year and firm fixed effects are used to control for year- and firm-invariant factors. Since the time of EDGAR implementation differs at the implementation group level, the standard errors are adjusted for heteroskedasticity and clustered by the implementation group.

[Insert Table 11 about here]

From Table 11, we find that the coefficients on *POST-EDGAR_IMPLEMENT* are all positive and significant across different dependent variables, which suggests that the introduction of

²² We include observations that satisfy the following criteria: (1) Book equity is positive; (2) Year-end stock price is above 1 U.S. dollar; (3) At least 26 observations are available in CRSP weekly data for each firm-year; (4) Variables used in our research are available; (5) Each firm should at least have 2-year consecutive observations. Firms in financial industry (SIC codes 6000-6999) and utility industry (SIC codes 4900-4999) are excluded from our sample. All continuous variables are winsorized at 1st and 99th percentiles to alleviate the potential disturbance from outliers. Different from prior works that focus on the long-term effect of EDGAR implementation (Gao and Huang 2020, Goldstein, Yang, and Zuo 2020), we focus on the short-term impact of EDGAR implementation because managers behavior will change in the long-term as submitting filings to EDGAR becomes a common practice. Therefore, we restrict our sample to the implementation period from 1993 to 1996. In this way, firms in Group CF-10 are treated as control firms. The final sample consists of 7,131 observations during 1993-1996. Appendix Table A5 shows the summary statistics.

EDGAR motivates managerial bad news hoarding during the implementation period. Although the sample in this period is different from our main sample because EDGAR attention measures are not available then, these findings lend support to our main hypothesis because the introduction of EDGAR attracts more investors to focus on firms' SEC filings, thus triggering EDGAR attention.

5.2 *Shareholder distraction*

Next, we focus on the attention from institutional investors, an important type of sophisticated market participants as well as EDGAR users, and conduct an IV estimation in a plausible natural experiment based on Kempf, Manconi, and Spalt's (2017) measure of shareholder distraction. This measure captures exogenous stock return shocks from unrelated industries based on the argument that institutional investors allocate attention across firms subject to a limited constraint as attention is a scarce resource (Fich, Harford, and Tran 2015, Kahneman and Tversky 1979).²³ This measure is valid in our analysis for the following reasons. First, this IV satisfies the exogeneity assumption because managerial behaviors are less likely to be affected by stock price shocks from unrelated industries. Second, this IV satisfies the relevance assumption because: (1) shareholders facing shocks from other industries they invest in are more likely to spend less time and energy checking SEC filings of firms without shocks; and (2) institutional investor is an important part of sophisticated market participants and EDGAR users. Third, since the shocks from unrelated industries can only affect focal firms through investors' attention, this IV satisfies the exclusion restriction assumption. In an instrumental variable approach, we examine the causality of how shareholder attention affects firms' bad news hoarding.²⁴ In the two-stage least squares (2SLS) regressions, we use the year-average shareholder distraction (*DISTRACTION*) as the instrumental

²³ In prior works, shareholder distraction is documented to increase managerial opportunism (Kempf, Manconi, and Spalt 2017), decrease board members' engagement (Liu et al. 2020), and decrease firms' engagement in social responsibility (Chen, Dong, and Lin 2020).

²⁴ The shareholder distraction data is from Elisabeth Kempf's website: <https://sites.google.com/site/elikempf/research>.

variable.

[Insert Table 12 about here]

From Column (1) of Table 12, we first observe a negative and significant relation between the shareholder distraction measure (*DISTRACTION*) and EDGAR attention measured by *ESV_RYANS*, which is consistent with our prediction that shareholder distraction decreases EDGAR attention. Together with the results from the Kleibergen-Paap Weak Identification Test, this evidence suggests that the distraction measure is less likely to be a weak instrumental variable, which supports the relevance assumption of this IV approach. In the second stage regressions reported in Columns (2)-(5), we find that the coefficients on predicted EDGAR attention are all positive and significant across different dependent variables. This evidence suggests the causal effect of attention through EDGAR on managerial bad news hoarding.

5.3 Mandatory XBRL adoption

Finally, we use the staggered mandatory XBRL adoption as another identification strategy. As an interactive and standard markup language, the eXtensible Business Reporting Language (XBRL) facilitates the download and analysis of financial statement information (SEC 2009), thus decreasing the cost of information processing (e.g., Chen and Zhou 2018, Kim, Li, and Liu 2019). During 2009-2011, the SEC mandated firms to provide financial statements in the form of XBRL over three phase-in periods.²⁵ Using the staggered mandatory adoption of XBRL as a plausible natural experiment provides us with several benefits. First, this policy is decided by U.S. SEC and is less likely to be affected by individual managers, which provides us with an exogenous shock to managers' decisions (e.g., Cheng et al. 2021, Dong et al. 2016). Second, since XBRL decreases

²⁵ The first period (Tier 1 XBRL) started in 2009 for firms with a public float higher than \$5 billion. The second period (Tier 2 XBRL) begins in 2010 for firms with a public float higher than \$700 million. In the last period (Tier 3 XBRL), an extensive adoption of XBRL is implemented in 2011 when all the firms are mandated to adopt XBRL.

the cost of information processing and facilitates investors' information acquisition, the mandatory adoption of XBRL increases investors' attention via EDGAR (Chen and Zhou 2018, Kim, Li, and Liu 2019), which makes the relevance assumption valid. Third, since the mandatory adoption of XBRL only affects firms through increased attention instead of other mechanisms, using this setting guarantees the exclusion restriction assumption.

Based on the mandatory of XBRL, we examine the effect of EDGAR attention on managerial bad news hoarding under the two-stage least squares (2SLS) regressions. In this analysis, two measures are applied as instrumental variables. The first instrument variable, *MANDATORY_XBRL*, is an indicator that equals one if the firm upload XBRL filings under the requirement of U.S. SEC and zero otherwise. The second instrument variable, *LN_NUM_XBRL*, is the logarithm of one plus the number of XBRL filings under the requirement of the U.S. SEC. Firms submitting XBRL filings before the mandatory adoption of XBRL are excluded from the sample. The sample period is from 2 years before Tier 1 XBRL to 2 years after Tier 3 XBRL.²⁶

[Insert Table 13 about here]

From Columns (1) and (6) of Table 13, we first observe a positive and significant association between measures on mandatory XBRL adoption (*MANDATORY_XBRL*, *LN_NUM_XBRL*) and EDGAR attention measured by *ESV_RYANS*. Together with the results from the Kleibergen-Paap Weak Identification Test, this evidence suggests that both instrumental variables are less likely to be weak instruments, which is consistent with prior arguments that XBRL facilitates information acquisition and satisfies the relevance assumption of this IV analysis. In the second stage regressions presented in Columns (2)-(5) and (7)-(10), we find that the coefficients on predicted EDGAR attention are all positive and significant across different dependent variables (*NCSKEW*,

²⁶ Information on firms' XBRL adoption comes from the XBRL Index of EDGAR Dissemination Feed.

DUVOL, *CRASH*, and *COUNT*), which further supports that the impact of attention through EDGAR on managerial bad news hoarding is likely to be causal.

Collectively, from the consistent results in three plausible natural experiments based on EDGAR implementation, shareholder distraction, and the mandatory adoption of XBRL, we establish a causal link between attention through EDGAR and managerial bad news hoarding.

6 Conclusion

Using a large sample of U.S. firms during 2003-2015, we first find that greater attention through EDGAR pushes managers to hide bad news, thus increasing future stock price crash risk. This finding is robust to different sets of fixed effects and alternative measures of crash risk and EDGAR attention. Consistent with our cost-increasing hypothesis, this evidence suggests that managers are more likely to hide bad news under greater attention through EDGAR in order to minimize the cost of bad news disclosure, which can not be explained by attention through general information platforms, information supply, and media coverage. By decomposing EDGAR attention into different parts, we find that attention to non-financial information and abnormal attention drive the impact of EDGAR attention on managerial bad news hoarding. When the ex-ante cost of bad news disclosure is higher due to greater external pressure and higher information transparency, managers under greater attention through EDGAR are more likely to hide bad news. From additional evidence on managerial bad news hoarding, firms with greater attention are observed to experience an increase in ex-ante crash risk measured by option implied volatility smirk, release fewer bad news in management guidance, have lower financial reporting quality, and are more conservative in recognizing bad news, which further corroborates our main hypothesis. Evidence from three plausible natural experiments based on EDGAR implementation, shareholder distraction, and the mandatory adoption of XBRL establish a causal link between

attention through EDGAR and managerial bad news hoarding. In a cost-benefit framework, we provide systematic evidence on the impact of attention through EDGAR on managers' strategic bad news disclosure. By showing the motivating role of EDGAR attention on managerial bad news hoarding, our study also sheds light on the pressure effect of modern information technologies in reshaping managerial behaviors, which is largely underexplored in prior literature.

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Table 1
Summary Statistics

This table reports summary statistics and pairwise correlations. The data used in our regression analysis come from multiple sources. Firm-level financial data come from COMPUSTAT database. Stock price and return data come from Center for Research in Security Prices (CRSP). Institutional holdings data come from Thomson Reuters Institutional Holdings (13f). Analyst coverage data come from Institutional Brokers Estimate System (I/B/E/S). The EDGAR search volume data come from James Ryans' EDGAR Log File Data. We include observations that satisfy the following criteria: (1) Book equity is positive; (2) Year-end stock price is above 1 U.S. dollar; (3) At least 26 observations are available in CRSP weekly data for each firm-year; (4) Variables used in our research are available; (5) Each firm should at least have 2-year consecutive observations. Firms in financial industries (SIC codes 6000-6999) and utility industries (SIC codes 4900-4999) are excluded from our sample. All continuous variables are winsorized at 1st and 99th percentiles to alleviate the potential disturbance from outliers. The final sample consists of 21,617 observations in 2003-2015. Panel A of this table shows the summary statistics of variables. Panel B shows the univariate comparison between groups with high and low EDGAR search volume measured by *ESV_RYANS* in Ryans (2017). Panel C of this table presents the Pearson pairwise correlation matrix of dependent and independent variables. Observations are sorted into halves according to the median of *ESV_RYANS* over the years. *** shows significance at the 1% level.

Panel A: Summary statistics

	N	Mean	St.Dev	p25	Median	p75
<i>DUVOL</i>	21,617	0.0029	0.3566	-0.2285	0.0028	0.2349
<i>NCSKEW</i>	21,617	0.1061	0.7666	-0.3205	0.0858	0.4979
<i>COUNT</i>	21,617	0.0414	1.3937	0.0000	0.0000	0.0000
<i>CRASH</i>	21,617	0.2495	0.4327	0.0000	0.0000	0.0000
<i>ESV_RYANS</i>	21,617	7.8797	1.0894	7.1148	7.8962	8.6406
<i>ESV_DRT</i>	21,617	8.0162	1.1227	7.2240	8.0110	8.7936
<i>ESV_LM</i>	21,617	7.7398	1.0687	7.0085	7.7489	8.4665
<i>SIZE</i>	21,617	6.2381	2.0075	4.8335	6.1558	7.5854
<i>TOBINQ</i>	21,617	1.9138	1.2252	1.1243	1.5279	2.2689
<i>CASH FLOW</i>	21,617	0.0392	0.1865	0.0255	0.0795	0.1257
<i>BLEV</i>	21,617	0.1961	0.1952	0.0055	0.1565	0.3155
<i>CAPX</i>	21,617	0.0536	0.0615	0.0166	0.0331	0.0654
<i>GSALE</i>	21,617	0.1330	0.4208	-0.0223	0.0766	0.2009
<i>NAN</i>	21,617	1.3408	1.0995	0.0000	1.3863	2.3026
<i>IO</i>	21,617	0.4963	0.3620	0.0893	0.5647	0.8319
<i>RET</i>	21,617	-0.1784	0.2504	-0.2083	-0.0972	-0.0427
<i>SIGMA</i>	21,617	0.0509	0.0319	0.0295	0.0445	0.0653
<i>DTURN</i>	21,617	0.0256	1.0371	-0.3263	0.0049	0.3532
<i>OPAQUE</i>	21,617	0.0741	0.0623	0.0348	0.0571	0.0922

Panel B: Univariate comparison based on EDGAR search volume (*ESV_RYANS*)

	Low ESV		High ESV		High-Low Differences	p-value
	N	Mean	N	Mean		
<i>DUVOL</i>	10,806	-0.030	10,811	0.036	0.067***	[0.000]
<i>NCSKEW</i>	10,806	0.049	10,811	0.164	0.116***	[0.000]
<i>COUNT</i>	10,806	-0.044	10,811	0.127	0.172***	[0.000]
<i>CRASH</i>	10,806	0.240	10,811	0.259	0.019***	[0.002]
<i>ESV_RYANS</i>	10,806	7.280	10,811	8.479	1.199***	[0.000]
<i>ESV_DRT</i>	10,806	7.415	10,811	8.617	1.203***	[0.000]
<i>ESV_LM</i>	10,806	7.136	10,811	8.343	1.207***	[0.000]
<i>SIZE</i>	10,806	5.274	10,811	7.201	1.927***	[0.000]
<i>TOBINQ</i>	10,806	1.819	10,811	2.009	0.190***	[0.000]
<i>CASH FLOW</i>	10,806	0.025	10,811	0.053	0.029***	[0.000]
<i>BLEV</i>	10,806	0.158	10,811	0.235	0.077***	[0.000]
<i>CAPX</i>	10,806	0.052	10,811	0.056	0.004***	[0.000]
<i>GSALE</i>	10,806	0.123	10,811	0.143	0.020***	[0.001]
<i>NAN</i>	10,806	0.787	10,811	1.894	1.107***	[0.000]
<i>IO</i>	10,806	0.375	10,811	0.618	0.242***	[0.000]
<i>RET</i>	10,806	-0.214	10,811	-0.143	0.072***	[0.000]
<i>SIGMA</i>	10,806	0.058	10,811	0.044	-0.013***	[0.000]
<i>DTURN</i>	10,806	-0.018	10,811	0.069	0.086***	[0.000]
<i>OPAQUE</i>	10,806	0.022	10,811	0.008	-0.014***	[0.000]

Panel C: Pairwise correlations of dependent and independent variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) <i>DUVOL</i>	1.000						
(2) <i>NCSKEW</i>	0.958***	1.000					
(3) <i>COUNT</i>	0.718***	0.768***	1.000				
(4) <i>CRASH</i>	0.558***	0.614***	0.756***	1.000			
(5) <i>ESV_RYANS</i>	0.091***	0.068***	0.050***	0.028***	1.000		
(6) <i>ESV_DRT</i>	0.085***	0.063***	0.046***	0.027***	0.996***	1.000	
(7) <i>ESV_LM</i>	0.086***	0.064***	0.047***	0.026***	0.989***	0.986***	1.000

Table 2
EDGAR Attention and the Cost and Timing of Bad News Disclosure:
Evidence from Earnings Announcements

This table presents the cost and timing of bad news disclosure by the level of EDGAR search volume in earnings announcements. Earnings announcements are separated into two groups based on whether the total EDGAR search volume in the announcement week is higher than its median value in the year. Panels A-C show the cumulative abnormal return (in percentage points) of the announcing firm from 1 day before to 1 day after the earnings announcement by the EDGAR search volume (*ESV_RYANS*, *ESV_LM*, *ESV_DRT*) in the announcement week. In these tests, earnings announcements are further separated by whether earnings reported are negative. *Loss* is an indicator that equals 1 if the reported earnings are negative and 0 otherwise. The cumulative abnormal return (CAR) is calculated based on Fama-French 3 factor model with an estimation window [-160,-11]. Panel D shows the likelihood of reporting bad news by the level of EDGAR search volume in the announcement week. The likelihood of reporting bad news is measured as the number of loss reports divided by the total number of earnings management in the week. Information on earnings announcements comes from I/B/E/S database. The EDGAR search volume data come from James Ryans' EDGAR Log File Data. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard deviations are shown in the parentheses.

Panel A: Earnings announcement return by the level of EDGAR search volume of announcement weeks (*ESV_RYANS*)

<i>ESV=ESV_RYANS</i>	% Earnings Announcement CAR[-1,1]		Diff.: High-Low
	High ESV week	Low ESV week	
<i>Loss=1</i>	-1.7850*** (0.1134)	-1.3429*** (0.0836)	-0.4421*** (0.1380)
<i>Loss=0</i>	0.5593*** (0.0382)	0.5748*** (0.0811)	-0.0156 (0.0886)

Panel B: Earnings announcement return by the level of EDGAR search volume of announcement weeks (*ESV_LM*)

<i>ESV=ESV_LM</i>	% Earnings Announcement CAR[-1,1]		Diff.: High-Low
	High ESV week	Low ESV week	
<i>Loss=1</i>	-1.7981*** (0.1145)	-1.3242*** (0.0819)	-0.4739*** (0.1377)
<i>Loss=0</i>	0.5559*** (0.0388)	0.5782*** (0.0804)	-0.0224 (0.0886)

Panel C: Earnings announcement return by the level of EDGAR search volume of announcement weeks (*ESV_DRT*)

<i>ESV=ESV_DRT</i>	% Earnings Announcement CAR[-1,1]		Diff.: High-Low
	High ESV week	Low ESV week	
<i>Loss=1</i>	-1.7669*** (0.1142)	-1.3555*** (0.0828)	-0.4115*** (0.1379)
<i>Loss=0</i>	0.5526*** (0.0382)	0.5818*** (0.0811)	-0.0293 (0.0886)

Panel D: Likelihood of reporting bad news by the level of EDGAR search volume of announcement weeks

	Likelihood of reporting bad news		Diff.: High-Low
	High ESV week	Low ESV week	
<i>ESV_RYANS</i>	0.1998*** (0.0004)	0.2095*** (0.0004)	-0.0098*** (0.0005)
<i>ESV_LM</i>	0.2019*** (0.0004)	0.2075*** (0.0004)	-0.0056*** (0.0005)
<i>ESV_DRT</i>	0.2007*** (0.0004)	0.2087*** (0.0004)	-0.0080*** (0.0005)

Table 3
Baseline Regressions

This table presents regression results for the relation between attention through EDGAR and stock price crash risk. Equation (2) shows the baseline regression:

$$CrashVar_{i,t+1} = \alpha + \beta_1 ESV_{i,t} + \gamma Controls_{i,t} + FE + \varepsilon_{i,t+1} \quad (2)$$

where *CrashVar* denotes the proxies of stock market crash risk (*DUVOL*, *NCSKEW*); *ESV* denotes the measures of EDGAR search volume (*ESV_RYANS*, *ESV_LM*, *ESV_DRT*). Control variables are shown in Appendix Table A1. Industries are classified by Fama-French 48 industries. Standard errors are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors are shown in the parentheses.

	Dependent Variable=			
	(1)	(2)	(3)	(4)
	<i>DUVOL</i>		<i>NCSKEW</i>	
<i>ESV_RYANS</i>	0.0250** (0.0099)	0.0262*** (0.0099)	0.0670*** (0.0210)	0.0691*** (0.0212)
<i>SIZE</i>	0.0940*** (0.0099)	0.0980*** (0.0101)	0.1886*** (0.0220)	0.1965*** (0.0226)
<i>TOBINQ</i>	0.0557*** (0.0040)	0.0562*** (0.0041)	0.1135*** (0.0091)	0.1162*** (0.0092)
<i>CASH_FLOW</i>	0.0954*** (0.0237)	0.0739*** (0.0245)	0.1378*** (0.0531)	0.0993* (0.0551)
<i>BLEV</i>	-0.0514* (0.0301)	-0.0594* (0.0305)	-0.0637 (0.0666)	-0.0829 (0.0681)
<i>CAPX</i>	0.1242* (0.0733)	0.1166 (0.0748)	0.1851 (0.1589)	0.1637 (0.1615)
<i>GSALE</i>	-0.0022 (0.0077)	-0.0015 (0.0081)	-0.0002 (0.0171)	0.0022 (0.0179)
<i>NAN</i>	0.0296*** (0.0081)	0.0309*** (0.0083)	0.0543*** (0.0178)	0.0587*** (0.0185)
<i>IO</i>	0.0622*** (0.0228)	0.0654*** (0.0231)	0.1104** (0.0505)	0.1137** (0.0513)
<i>RET</i>	0.0779** (0.0394)	0.0897** (0.0400)	0.1767** (0.0856)	0.1937** (0.0868)
<i>SIGMA</i>	-0.1127 (0.3952)	-0.0034 (0.4064)	0.1933 (0.8606)	0.3538 (0.8819)
<i>DTURN</i>	0.0090*** (0.0026)	0.0104*** (0.0026)	0.0181*** (0.0055)	0.0209*** (0.0056)
<i>NCSKEW</i>	-0.0530*** (0.0036)	-0.0558*** (0.0037)	-0.1191*** (0.0080)	-0.1258*** (0.0082)
<i>OPAQUE</i>	0.0490 (0.0687)	0.0708 (0.0706)	0.1302 (0.1535)	0.1565 (0.1576)
Constant	-0.9366*** (0.0847)	-0.9773*** (0.0858)	-1.9219*** (0.1852)	-2.0014*** (0.1883)
Year FE	Yes	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes
Industry×Year FE	No	Yes	No	Yes
Observations	21,617	21,617	21,617	21,617
R-squared	0.2258	0.2560	0.2174	0.2452

Table 4
Robustness Tests

This table presents the results of robustness tests. Panel A shows the results using alternative measures of stock price crash risk. Two other widely used measures of stock market crash risk, *COUNT* and *CRASH*, are used in these tests. The definitions of these variables are listed in Appendix Table A1. *COUNT* is further decomposed into *COUNT_UP* and *COUNT_DOWN* in order to test the asymmetric effect of EDGAR attention. In all the regressions, *ESV_RYANS* is used as the independent variable. Panel B shows the results when independent variables are constructed based on alternative methods mentioned in prior studies. *ESV_LM* is the logarithm of 1 plus the search volume from non-robust page viewers counted by the method from Loughran and McDonald (2017) in a fiscal year. *ESV_DRT* is the logarithm of 1 plus the search volume from non-robust page viewers counted by the method from Drake et al. (2015) on a yearly basis. *ESV_FCOMP* is the first principal component score of *ESV_RYANS*, *ESV_DRT*, and *ESV_LM* in a principal component analysis. Dependent variables are *DUVOL* and *NCSKEW*. Firm and industry×year fixed effects are used to control for firm-, year-, and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Standard errors are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors are shown in the parentheses.

Panel A: Alternative dependent variables

	Dependent Variable=			
	(1) <i>COUNT</i>	(2) <i>COUNT_UP</i>	(3) <i>COUNT_DOWN</i>	(4) <i>CRASH</i>
<i>ESV_RYANS</i>	0.1139*** (0.0384)	-0.0430* (0.0237)	0.0707*** (0.0257)	0.0347*** (0.0117)
Constant	-2.6790*** (0.3346)	1.7878*** (0.2112)	-0.8930*** (0.2184)	-0.4723*** (0.0999)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617
R-squared	0.2145	0.2329	0.2144	0.2079

Panel B: Alternative measures of attention through EDGAR

	Dependent Variable=					
	(1) <i>DUVOL</i>	(2) <i>NCSKEW</i>	(3) <i>DUVOL</i>	(4) <i>NCSKEW</i>	(5) <i>DUVOL</i>	(6) <i>NCSKEW</i>
<i>ESV_LM</i>	0.0266*** (0.0092)	0.0721*** (0.0197)				
<i>ESV_DRT</i>			0.0241*** (0.0093)	0.0624*** (0.0199)		
<i>ESV_FCOMP</i>					0.0170*** (0.0061)	0.0450*** (0.0131)
Constant	-0.9728*** (0.0807)	-2.0000*** (0.1782)	-0.9691*** (0.0842)	-1.9720*** (0.1851)	-0.7690*** (0.0666)	-1.4508*** (0.1483)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617	21,617	21,617
R-squared	0.1083	0.0954	0.1082	0.0952	0.1082	0.0954

Table 5
Alternative Explanations

This table shows the regression results for alternative explanations. Panel A reports regression results when Google search volume index (*GOOGLE_SVI*) is included as the control variable. Google search volume index data come from Google Trends. *GOOGLE_SVI* is calculated as the average searching index of all months in a fiscal year, scaled by 100. Panel B shows the results after controlling for information supply. We include the logarithm form of the total number of filings (*LN_TOTAL_FILINGS*) to control for the total information content that firms submit to SEC and the number of voluntary 8-K filings (*LN_VOL_8K*) identified as Lerman and Livnat (2010) to control for the effect of firms' voluntary disclosure. Panel C shows the robustness test after controlling for media coverage. Following Drake et al. (2015), we use *BUSINESS PRESS*, the logarithm of one plus the number of business press news wires and articles disseminated in the firm-year, as a measure of media coverage. The information of media coverage comes from RavenPack. Control variables are the same as those in the baseline regressions. Firm and industry×year fixed effects are used to control for firm-, year-, and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Standard errors are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors are shown in the parentheses.

Panel A: Google search volume

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>DUVOL</i>			<i>NCSKEW</i>		
<i>ESV_RYANS</i>	0.0262*** (0.0099)			0.0693*** (0.0212)		
<i>ESV_LM</i>		0.0267*** (0.0092)			0.0723*** (0.0198)	
<i>ESV_DRT</i>			0.0242*** (0.0093)			0.0625*** (0.0199)
<i>GOOGLE_SVI</i>	-0.0055 (0.0333)	-0.0064 (0.0333)	-0.0047 (0.0333)	-0.0158 (0.0720)	-0.0186 (0.0720)	-0.0135 (0.0719)
Constant	-0.9779*** (0.0857)	-0.9734*** (0.0806)	-0.9696*** (0.0841)	-2.0032*** (0.1881)	-2.0020*** (0.1779)	-1.9733*** (0.1848)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617	21,617	21,617
R-squared	0.2560	0.2560	0.2560	0.2452	0.2453	0.2452

Panel B: Information supply

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>DUVOL</i>			<i>NCSKEW</i>		
<i>ESV_RYANS</i>	0.0263*** (0.0099)	0.0252** (0.0099)	0.0254** (0.0099)	0.0694*** (0.0212)	0.0660*** (0.0212)	0.0664*** (0.0212)
<i>LN_TOTAL_FILINGS</i>	0.0222 (0.0398)		0.0218 (0.0398)	0.0616 (0.0837)		0.0601 (0.0836)
<i>LN_VOL_8K</i>		0.0178 (0.0179)	0.0178 (0.0179)		0.0598 (0.0389)	0.0596 (0.0389)
Constant	-0.9929*** (0.0907)	-0.9830*** (0.0863)	-0.9984*** (0.0912)	-2.0449*** (0.1979)	-2.0208*** (0.1895)	-2.0631*** (0.1991)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617	21,617	21,617
R-squared	0.2560	0.2560	0.2560	0.2452	0.2453	0.2453

Panel C: Media coverage

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>DUVOL</i>			<i>NCSKEW</i>		
<i>ESV_RYANS</i>	0.0262*** (0.0099)			0.0691*** (0.0212)		
<i>ESV_LM</i>		0.0267*** (0.0092)			0.0721*** (0.0197)	
<i>ESV_DRT</i>			0.0242*** (0.0093)			0.0624*** (0.0199)
<i>BUSINESS PRESS</i>	0.0012 (0.0021)	0.0012 (0.0021)	0.0011 (0.0021)	0.0000 (0.0046)	0.0002 (0.0046)	-0.0000 (0.0046)
Constant	-0.9807*** (0.0859)	-0.9766*** (0.0809)	-0.9724*** (0.0843)	-2.0015*** (0.1888)	-2.0007*** (0.1788)	-1.9719*** (0.1855)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617	21,617	21,617
R-squared	0.2560	0.2561	0.2560	0.2452	0.2453	0.2452

Table 6
Decomposition of EDGAR Search Volume

This table shows the effects of different types of sophisticated attention. Panel A shows the results when EDGAR search volume is decomposed by attention to different types of filings. Following prior works (e.g., Iliev et al. 2021), we separate SEC filings into financial and non-financial filings. Financial filings include 10-K and 10-Q filings. Other filings are identified as non-financial filings. Panel B shows the results when EDGAR search volume is decomposed into normal and abnormal parts. Following prior works (e.g., Drake et al. 2015, Li and Sun 2018, Iliev et al. 2021), we measure normal (abnormal) EDGAR search volume as the (fitted value) residual from Equation (3):

$$ESV_{i,t} = \delta_0 + \delta_1 SIZE_{i,t} + \delta_2 TOBINQ_{i,t} + \delta_3 Leverage + \delta_4 DTURN + \delta_5 NAN_{i,t} + \delta_6 IO_{i,t} + \delta_7 Ret_{i,t} + \delta_8 BusinessPress_{i,t} + IndustryFE + Year FE + \varepsilon_{i,t} \quad (3)$$

where *ESV* refers to EDGAR search volume measures (*ESV_RYANS*, *ESV_LM*, and *ESV_DRT*). Control variables are the same as those used in the baseline model. Firm and industry×year fixed effects are used to control for firm-, year-, and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Attention to different types of filings

Filing Type	Dependent Variable=			
	(1) Financial	(2) Non-Financial	(3) Financial	(4) Non-Financial
	<i>DUVOL</i>		<i>NCSKEW</i>	
<i>ESV_RYANS</i>	0.0088 (0.0065)	0.0225*** (0.0083)	0.0201 (0.0139)	0.0587*** (0.0180)
Constant	-0.8607*** (0.0697)	-0.9405*** (0.0766)	-1.6792*** (0.1561)	-1.8997*** (0.1697)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617
R-squared	0.2557	0.2560	0.2448	0.2452

Panel B: Normal and abnormal EDGAR search volume

	Dependent Variable=					
	(1) <i>DUVOL</i>	(2) <i>NCSKEW</i>	(3) <i>DUVOL</i>	(4) <i>NCSKEW</i>	(5) <i>DUVOL</i>	(6) <i>NCSKEW</i>
<i>NORMAL ESV_RYANS</i>	0.0573 (0.0581)	0.0702 (0.1265)				
<i>ABNORMAL ESV_RYANS</i>	0.0262*** (0.0099)	0.0691*** (0.0212)				
<i>NORMAL ESV_LM</i>			0.0602 (0.0591)	0.0785 (0.1286)		
<i>ABNORMAL ESV_LM</i>			0.0267*** (0.0092)	0.0721*** (0.0197)		
<i>NORMAL ESV_DRT</i>					0.0531 (0.0552)	0.0617 (0.1201)
<i>ABNORMAL ESV_DRT</i>					0.0242*** (0.0093)	0.0624*** (0.0199)
Constant	-1.1660*** (0.3569)	-2.0084*** (0.7781)	-1.1697*** (0.3512)	-2.0377*** (0.7658)	-1.1491*** (0.3478)	-1.9680*** (0.7585)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	21,617	21,617	21,617	21,617	21,617
R-squared	0.2560	0.2452	0.2561	0.2453	0.2560	0.2452

Table 7
Heterogeneous Effects across the Cost of Bad News Disclosure: External Pressure

This table presents the heterogeneous effects of market attention on stock price crash risk across the ex-ante cost of bad news disclosure from external pressure. Panel A shows the results of subsample tests by whether the firm meets or beats earnings benchmarks. The earnings benchmark is measured by analysts' expected EPS consensus for annual reports. Panel B shows the results of subsample tests by financial constraint level. Financial constraint level is measured by WW-index (Whited and Wu 2006). In Panel A, a firm is included in Meet/Beat (Not-beat) group if its EPS is higher (lower) than analysts' consensus EPS. In Panel B, a firm is included in the High (Low) group if its value of the measure is higher (lower) than its median over the fiscal year. Control variables are the same as those in baseline regressions. Firm and industry×year fixed effects are used to control for firm-, year-, and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Beating earnings benchmark

	Dependent Variable=			
	(1)	(2)	(3)	(4)
	Meet/Beat	Not Meet	Meet/Beat	Not Meet
	<i>DUVOL</i>		<i>NCSKEW</i>	
<i>ESV_RYANS</i>	0.0028 (0.0173)	0.0491*** (0.0165)	0.0220 (0.0366)	0.1201*** (0.0351)
Constant	-0.8525*** (0.1491)	-1.1769*** (0.1517)	-1.8850*** (0.3213)	-2.3425*** (0.3320)
Controls	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Equality Test "High=Low"		-0.046*** [0.00]		-0.098*** [0.00]
Observations	7,483	9,168	7,483	9,168
R-squared	0.3930	0.3237	0.3935	0.3165

Panel B: Financial constraint

	Dependent Variable=			
	(1)	(2)	(3)	(4)
	High	Low	High	Low
	<i>DUVOL</i>		<i>NCSKEW</i>	
<i>ESV_RYANS</i>	0.0553*** (0.0154)	0.0054 (0.0132)	0.1139*** (0.0338)	0.0373 (0.0269)
Constant	-1.1775*** (0.1159)	-0.8172*** (0.1441)	-2.2658*** (0.2560)	-1.8689*** (0.3013)
Controls	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Equality Test "High=Low"		0.049*** [0.00]		0.076*** [0.00]
Observations	10,405	10,447	10,405	10,447
R-squared	0.3245	0.2687	0.3095	0.2692

Table 8
Heterogeneous Effects across the Cost of Bad News Disclosure: Information Transparency

This table presents the heterogeneous effects of market attention on stock price crash risk across the ex-ante cost of bad news disclosure from information transparency. Panel A shows the results of subsample tests by analyst coverage. Analyst coverage is measured by the logarithm of 1 plus the number of following analysts. Panel B shows the results of subsample tests by the increase in trading volume. A firm is included in the High (Low) group if the measure is higher (lower) than its median value over the fiscal year. Control variables are the same as those in baseline regressions. Firm and industry×year fixed effects are used to control for firm-, year-, and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Analyst coverage

	Dependent Variable=			
	(1)	(2)	(3)	(4)
	High	Low	High	Low
<i>ESV_RYANS</i>	0.0449*** (0.0156)	0.0003 (0.0137)	0.1124*** (0.0335)	0.0135 (0.0296)
Constant	-1.2128*** (0.1425)	-0.6979*** (0.1135)	-2.5139*** (0.3173)	-1.3879*** (0.2470)
Controls	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Equality Test “High=Low”		0.0446*** [0.00]		0.0989*** [0.00]
Observations	11,513	9,648	11,513	9,648
R-squared	0.2507	0.3309	0.2498	0.3187

Panel B: Increase in trading volume

	Dependent Variable=			
	(1)	(2)	(3)	(4)
	High	Low	High	Low
<i>ESV_RYANS</i>	0.0445*** (0.0143)	0.0112 (0.0159)	0.1174*** (0.0306)	0.0261 (0.0342)
Constant	-0.9535*** (0.1186)	-0.9931*** (0.1328)	-1.9442*** (0.2589)	-2.0025*** (0.2918)
Controls	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Equality Test “High=Low”		0.0333*** [0.00]		0.0913*** [0.00]
Observations	10,299	10,270	10,299	10,270
R-squared	0.3739	0.3581	0.3641	0.3475

Table 9
EDGAR Attention and Ex-ante Crash Risk: Evidence from the Option Market

This table shows the association between sophisticated attention and ex-ante crash risk. We apply the regression as follows:

$$Ex\text{-}ante\ CrashRisk_{i,t} = \alpha + \beta_1 ESV_{i,t} + \gamma Controls_{i,t} + FE + \varepsilon_{i,t} \quad (4)$$

where *Ex-ante crash risk* is measured by firms' implied volatility smirk used in Kim et al. (2019). The option data come from Ivy DB OptionMetrics. Control variables are the same as those in baseline regressions. Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>IV_SKEW</i>					
<i>ESV_RYANS</i>	0.0058*** (0.0012)	0.0052*** (0.0012)				
<i>ESV_DRT</i>			0.0049*** (0.0011)	0.0045*** (0.0011)		
<i>ESV_LM</i>					0.0055*** (0.0011)	0.0050*** (0.0011)
<i>SIZE</i>	0.0060*** (0.0012)	0.0071*** (0.0013)	0.0062*** (0.0012)	0.0073*** (0.0013)	0.0059*** (0.0012)	0.0070*** (0.0013)
<i>TOBINQ</i>	0.0048*** (0.0005)	0.0047*** (0.0004)	0.0049*** (0.0005)	0.0047*** (0.0004)	0.0048*** (0.0005)	0.0047*** (0.0004)
<i>CASH_FLOW</i>	0.0109*** (0.0029)	0.0110*** (0.0029)	0.0108*** (0.0029)	0.0109*** (0.0029)	0.0109*** (0.0029)	0.0110*** (0.0029)
<i>BLEV</i>	0.0016 (0.0035)	0.0024 (0.0033)	0.0018 (0.0035)	0.0026 (0.0033)	0.0016 (0.0035)	0.0025 (0.0033)
<i>CAPX</i>	0.0395*** (0.0106)	0.0356*** (0.0106)	0.0394*** (0.0107)	0.0355*** (0.0107)	0.0398*** (0.0107)	0.0357*** (0.0107)
<i>GSALE</i>	0.0000 (0.0008)	-0.0002 (0.0008)	0.0000 (0.0008)	-0.0002 (0.0008)	0.0001 (0.0008)	-0.0002 (0.0008)
<i>NAN</i>	0.0026*** (0.0009)	0.0021** (0.0009)	0.0026*** (0.0009)	0.0021** (0.0009)	0.0027*** (0.0009)	0.0021** (0.0009)
<i>IO</i>	0.0177*** (0.0036)	0.0177*** (0.0037)	0.0179*** (0.0036)	0.0178*** (0.0037)	0.0180*** (0.0036)	0.0179*** (0.0037)
<i>RET</i>	0.0289*** (0.0069)	0.0262*** (0.0072)	0.0292*** (0.0069)	0.0265*** (0.0072)	0.0287*** (0.0069)	0.0261*** (0.0072)
<i>SIGMA</i>	0.3116*** (0.0626)	0.2629*** (0.0657)	0.3154*** (0.0627)	0.2659*** (0.0657)	0.3071*** (0.0627)	0.2594*** (0.0657)
<i>DTURN</i>	0.0014*** (0.0003)	0.0015*** (0.0003)	0.0014*** (0.0003)	0.0015*** (0.0003)	0.0013*** (0.0003)	0.0014*** (0.0003)
<i>NCSKEW</i>	-0.0007** (0.0003)	-0.0005* (0.0003)	-0.0007** (0.0003)	-0.0005* (0.0003)	-0.0007** (0.0003)	-0.0005* (0.0003)
<i>OPAQUE_MJONES</i>	0.0076 (0.0081)	0.0072 (0.0081)	0.0076 (0.0081)	0.0073 (0.0082)	0.0076 (0.0081)	0.0072 (0.0082)
Constant	-0.1046*** (0.0118)	-0.1042*** (0.0118)	-0.1004*** (0.0113)	-0.1007*** (0.0114)	-0.1012*** (0.0114)	-0.1010*** (0.0114)
Year FE	Yes	No	Yes	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	No	Yes	No	Yes	No	Yes
Observations	10,752	10,716	10,752	10,716	10,752	10,716
R-squared	0.5658	0.6016	0.5655	0.6013	0.5659	0.6016

Table 10
Additional Evidence on Managerial Bad News Hoarding

This table reports additional evidence on managerial bad news hoarding under greater attention through EDGAR. Panel A presents the relation between attention through EDGAR and managerial disclosure of bad news in management guidance. The dependent variable, *FREQ_BAD_MG*, is the number of bad-news management guidance in each firm-year, where bad news is defined as management guidance lower than the most recent consensus analyst forecast. Information on management guidance and analyst forecast comes from I/B/E/S Database. Panel B shows the relation between attention through EDGAR and accounting practices. *|DA_MJONES|* denotes the absolute value of discretionary accruals based on Kothari, Leone, and Wasley (2005). *|RM|* denotes the absolute value of real earnings management based on Zang (2012). *AQ_DD* denotes the standard deviation of firm-level residual in Dechow and Dichev's (2002) model. *AQ_MDD* denotes the standard deviation of firm-level residual in modified Dechow and Dichev's (2002) model proposed by McNichols (2002). *SPI* denotes 100 times the special item scaled by total assets. *C-SCORE* denotes the accounting conservatism measure calculated as Khan and Watts (2009). Since *OPAQUE* is measured by the three-year rolling average of *|DA_MJONES|*, we excluded *OPAQUE* from control variables when the dependent variable is *|DA_MJONES|*. Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Evidence from management guidance

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i>FREQ_BAD_MG</i>					
<i>ESV_RYANS</i>	-0.8304*** (0.2885)	-0.8996*** (0.2675)				
<i>ESV_DRT</i>			-0.7933*** (0.2737)	-0.8971*** (0.2553)		
<i>ESV_LM</i>					-0.8868*** (0.2621)	-0.9222*** (0.2463)
Constant	2.2425 (2.5574)	3.1246 (2.4426)	2.1632 (2.5564)	3.2753 (2.4583)	2.3556 (2.4092)	3.0457 (2.3003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	Yes	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	No	Yes	No	Yes	No
Observations	5,366	5,366	5,366	5,366	5,366	5,366
R-squared	0.7323	0.7027	0.7323	0.7028	0.7326	0.7030

Panel B: Evidence from accounting practices

	Dependent Variable=					
	(1)	(2)	(3)	(4)	(5)	(6)
	<i> DA_MJONES </i>	<i> RM </i>	<i>AQ_DD</i>	<i>AQ_MDD</i>	<i>SPI</i>	<i>C-SCORE</i>
<i>ESV_RYANS</i>	0.0117*** (0.0021)	0.0186*** (0.0054)	0.0125*** (0.0038)	0.0166*** (0.0040)	-0.0105*** (0.0033)	-0.0030*** (0.0008)
Constant	-0.0213 (0.0219)	0.1749*** (0.0483)	0.2052*** (0.0343)	0.1937*** (0.0373)	0.0674** (0.0263)	0.2243*** (0.0073)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,617	13,815	21,212	21,212	21,353	21,617
R-squared	0.3786	0.7091	0.5707	0.5183	0.3576	0.4621

Table 11
Natural Experiment based on Staggered EDGAR Implementation: A Difference-in-Differences Approach

This table shows the results of a difference-in-differences analysis based on the staggered implementation of EDGAR. On February 23, 1993, the SEC required firms to submit electronic filings to EDGAR by the group order. Public firms are assigned into 10 groups (Group CF-01 to Group CF-10) and are required to commence mandated electronic filing to EDGAR at different times during 1993-1996. Following prior works (Gao and Huang 2020, Goldstein, Yang, and Zuo 2020), we estimate the introduction of EDGAR attention by a difference-in-differences model as follows:

$$CrashVar_{i,t} = \alpha + \beta POST-EDGAR_IMPLEMENT + \gamma Controls_{i,t} + FE + \varepsilon_{i,t} \quad (5)$$

The independent variable, *POST-EDGAR_IMPLEMENT*, is an indicator that equals 1 if the firm-year is subject to the mandatory filing on EDGAR, and 0 otherwise. The dependent variables are measures of stock price crash risk (*NCSKEW*, *DUVOL*, *CRASH*, *COUNT*). Control variables are the same as those in baseline regressions. Year and firm effects are used to control for the effect of year- and firm-invariant factors. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by the implementation group. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=			
	(1) <i>DUVOL</i>	(2) <i>NCSKEW</i>	(3) <i>CRASH</i>	(4) <i>COUNT</i>
<i>POST-EDGAR_IMPLEMENT</i>	0.0383*** (0.0147)	0.0965*** (0.0312)	0.0015** (0.0006)	0.0344** (0.0169)
<i>SIZE</i>	0.1276*** (0.0205)	0.2603*** (0.0437)	0.0036*** (0.0008)	0.0911*** (0.0236)
<i>TOBINQ</i>	0.0466*** (0.0076)	0.0858*** (0.0163)	0.0011*** (0.0003)	0.0291*** (0.0085)
<i>CASH_FLOW</i>	0.0837** (0.0404)	0.1769** (0.0872)	-0.0002 (0.0017)	-0.0228 (0.0458)
<i>BLEV</i>	-0.1100* (0.0590)	-0.1574 (0.1299)	-0.0071*** (0.0024)	-0.1533** (0.0669)
<i>CAPX</i>	0.1745* (0.1052)	0.3556 (0.2264)	0.0062 (0.0043)	-0.0452 (0.1148)
<i>GSALE</i>	-0.0054 (0.0111)	-0.0055 (0.0227)	-0.0007 (0.0004)	-0.0041 (0.0106)
<i>NAN</i>	0.0052 (0.0144)	0.0652** (0.0313)	0.0001 (0.0006)	0.0113 (0.0168)
<i>IO</i>	0.1472** (0.0622)	0.2375* (0.1382)	0.0022 (0.0025)	0.1011 (0.0709)
<i>RET</i>	0.1227* (0.0715)	0.0729 (0.1572)	0.0031 (0.0033)	0.0065 (0.0820)
<i>SIGMA</i>	0.9365 (0.7548)	-0.2691 (1.6406)	0.0362 (0.0336)	-0.6233 (0.8788)
<i>DTURN</i>	0.0124** (0.0062)	0.0279** (0.0133)	0.0000 (0.0003)	0.0084 (0.0074)
<i>NCSKEW</i>	-0.1093*** (0.0064)	-0.2529*** (0.0138)	-0.0030*** (0.0003)	-0.0552*** (0.0078)
<i>OPAQUE</i>	0.1030 (0.1158)	-0.0313 (0.2492)	0.0053 (0.0049)	0.0508 (0.1331)
Constant	-0.9174*** (0.1042)	-1.6936*** (0.2235)	-0.0244*** (0.0043)	-0.3355*** (0.1194)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	7,131	7,131	7,131	7,131
R-squared	0.4112	0.4271	0.3616	0.3366

Table 12
Natural Experiment based on Shareholder Distraction: An Instrumental Variable Approach

This table shows the results of two-stage least squares (2SLS) regressions using shareholder distraction measure as the instrumental variable (IV). We use the year-average shareholder distraction (*DISTRACTION*) based on Kempf, Manconi, and Spalt (2017) as the instrumental variable. The dependent variables are measures of stock price crash risk (*NCSKEW*, *DUVOL*, *CRASH*, *COUNT*). Control variables are the same as those in baseline regressions. Year and industry effects are used to control for the effect of year- and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Column (1) shows the result of the first stage regression. Columns (2)-(5) report results of second stage regressions for *NCSKEW*, *DUVOL*, *CRASH*, and *COUNT*, respectively. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable=	First Stage	Second Stage			
	(1) <i>ESV_RYANS</i>	(2) <i>DUVOL</i>	(3) <i>NCSKEW</i>	(4) <i>CRASH</i>	(5) <i>COUNT</i>
<i>Predicted ESV_RYANS</i>		0.1809** (0.0751)	0.4034*** (0.1490)	0.2152** (0.0897)	0.5050* (0.2804)
<i>DISTRACTION</i>	-1.7942*** (0.2506)				
<i>SIZE</i>	0.3128*** (0.0129)	-0.0551** (0.0234)	-0.1288*** (0.0465)	-0.0820*** (0.0280)	-0.1572* (0.0874)
<i>TOBINQ</i>	0.0754*** (0.0116)	-0.0098 (0.0071)	-0.0235 (0.0146)	-0.0189** (0.0091)	-0.0304 (0.0272)
<i>CASH_FLOW</i>	-0.5041*** (0.1027)	0.1802*** (0.0601)	0.3308** (0.1293)	0.0719 (0.0772)	0.3161 (0.2415)
<i>BLEV</i>	0.1821** (0.0811)	-0.0247 (0.0297)	-0.0311 (0.0633)	-0.0765** (0.0370)	-0.0845 (0.1105)
<i>CAPX</i>	-0.2569 (0.2453)	-0.0278 (0.0802)	0.0246 (0.1649)	-0.1164 (0.1047)	-0.4285 (0.3067)
<i>GSALE</i>	0.0327 (0.0295)	0.0053 (0.0146)	0.0113 (0.0320)	-0.0099 (0.0184)	0.0004 (0.0540)
<i>NAN</i>	0.3327*** (0.0172)	-0.0527** (0.0259)	-0.1209** (0.0517)	-0.0716** (0.0310)	-0.1588 (0.0973)
<i>IO</i>	0.1666*** (0.0493)	-0.0446** (0.0194)	-0.0919** (0.0406)	-0.0325 (0.0257)	-0.1145 (0.0736)
<i>RET</i>	-0.9650*** (0.2187)	0.2256** (0.1106)	0.4441* (0.2344)	0.0510 (0.1445)	0.7896* (0.4665)
<i>SIGMA</i>	-0.3461 (1.4923)	-0.1811 (0.5133)	0.2972 (1.1081)	-0.9127 (0.7076)	0.5013 (2.1383)
<i>DTURN</i>	0.0117 (0.0075)	0.0082** (0.0041)	0.0135 (0.0087)	0.0101* (0.0057)	0.0283* (0.0166)
<i>NCSKEW</i>	0.0077 (0.0107)	-0.0024 (0.0067)	-0.0055 (0.0147)	-0.0017 (0.0084)	-0.0276 (0.0262)
<i>OPAQUE</i>	0.9612*** (0.2172)	0.0158 (0.1158)	0.0455 (0.2395)	-0.0739 (0.1475)	-0.0659 (0.4621)
Constant	4.7889*** (0.1340)	-0.7943** (0.3408)	-1.6895** (0.6769)	-0.5794 (0.4083)	-2.1227* (1.2718)
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	6,608	6,608	6,608	6,608	6,608
R-squared	0.7014	0.0295	0.0263	0.0386	0.0197
F-statistics (Kleibergen-Paap)	56.697	--	--	--	--

Table 13
Natural Experiment based on Mandatory XBRL Adoption: An Instrumental Variable Approach

This table shows the results of two-stage least squares (2SLS) regressions based on mandatory XBRL adoption. During 2009–2011, the SEC mandated firms to provide financial statements in the form of XBRL over three phase-in periods. The first period (Tier 1 XBRL) started in 2009 for firms with a public float higher than \$5 billion. The second period (Tier 2 XBRL) begins in 2010 for firms with a public float higher than \$700 million. In the last period (Tier 3 XBRL), the extensive adoption of XBRL was implemented in 2011 when all the firms were mandated to adopt XBRL. Two instrument variables are used in this analysis. The first instrument variable, *MANDATORY_XBRL*, is an indicator that equals one if the firm upload XBRL filings under the requirement of U.S. SEC and zero otherwise. The second instrument variable, *LN_NUM_XBRL*, is the logarithm of one plus the number of XBRL filings under the requirement of the U.S. SEC. Firms submitting XBRL filings before the mandatory adoption of XBRL are excluded from the sample. The sample period is from 2 years before Tier 1 XBRL to 2 years after Tier 3 XBRL. The information on firms' XBRL adoption comes from the XBRL Index of EDGAR Dissemination Feed. The dependent variables are measures of stock price crash risk (*NCSKEW*, *DUVOL*, *CRASH*, *COUNT*). Control variables are the same as those in baseline regressions. Year and industry effects are used to control for the effect of year- and industry-invariant factors. Industries are classified by Fama-French 48 Industries. Columns (1) and (6) show the results of the first stage regression. Columns (2)–(5) and (7)–(10) report results of second stage regressions for *NCSKEW*, *DUVOL*, *CRASH*, and *COUNT*, respectively. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable=	First Stage	Second Stage				First Stage	Second Stage			
	(1) <i>ESV_RYANS</i>	(2) <i>DUVOL</i>	(3) <i>NCSKEW</i>	(4) <i>CRASH</i>	(5) <i>COUNT</i>	(6) <i>ESV_RYANS</i>	(7) <i>DUVOL</i>	(8) <i>NCSKEW</i>	(9) <i>CRASH</i>	(10) <i>COUNT</i>
<i>Predicted ESV_RYANS</i>		0.0850** (0.0361)	0.1673** (0.0778)	0.0954** (0.0450)	0.3173** (0.1462)		0.0963*** (0.0348)	0.1868** (0.0755)	0.0973** (0.0428)	0.3115** (0.1408)
<i>MANDATORY_XBRL</i>	0.2710*** (0.0232)									
<i>LN_NUM_XBRL</i>						0.1909*** (0.0161)				
<i>SIZE</i>	0.2403*** (0.0079)	-0.0004 (0.0085)	-0.0042 (0.0184)	-0.0252** (0.0106)	-0.0263 (0.0341)	0.2409*** (0.0079)	-0.0029 (0.0082)	-0.0087 (0.0179)	-0.0257** (0.0101)	-0.0250 (0.0329)
<i>TOBINQ</i>	0.0338*** (0.0066)	0.0206*** (0.0031)	0.0408*** (0.0069)	0.0092** (0.0038)	0.0509*** (0.0121)	0.0336*** (0.0066)	0.0202*** (0.0031)	0.0402*** (0.0069)	0.0092** (0.0038)	0.0511*** (0.0121)
<i>CASH_FLOW</i>	-0.4515*** (0.0350)	0.1008*** (0.0248)	0.1375** (0.0551)	0.0480 (0.0300)	0.1966* (0.1026)	-0.4497*** (0.0350)	0.1059*** (0.0244)	0.1462*** (0.0545)	0.0489* (0.0294)	0.1940* (0.1015)
<i>BLEV</i>	0.0880* (0.0470)	-0.0414** (0.0175)	-0.0705* (0.0382)	-0.0333 (0.0208)	-0.1069 (0.0665)	0.0836* (0.0470)	-0.0427** (0.0175)	-0.0728* (0.0382)	-0.0336 (0.0208)	-0.1062 (0.0664)
<i>CAPX</i>	-0.3156** (0.1445)	0.0569 (0.0527)	0.1574 (0.1122)	0.0368 (0.0660)	0.1133 (0.2080)	-0.3172** (0.1444)	0.0610 (0.0527)	0.1645 (0.1124)	0.0375 (0.0658)	0.1112 (0.2075)
<i>GSALE</i>	0.0078 (0.0115)	0.0168** (0.0081)	0.0442** (0.0183)	0.0077 (0.0090)	0.0626** (0.0301)	0.0067 (0.0115)	0.0167** (0.0081)	0.0440** (0.0183)	0.0076 (0.0090)	0.0626** (0.0301)
<i>NAN</i>	0.2135*** (0.0125)	-0.0149 (0.0099)	-0.0301 (0.0213)	-0.0207* (0.0122)	-0.0777** (0.0394)	0.2099*** (0.0125)	-0.0178* (0.0096)	-0.0351* (0.0207)	-0.0212* (0.0117)	-0.0763*** (0.0381)
<i>IO</i>	0.0440 (0.0321)	0.0383*** (0.0110)	0.0774*** (0.0242)	0.0257** (0.0131)	0.0973** (0.0408)	0.0423 (0.0322)	0.0375*** (0.0110)	0.0761*** (0.0242)	0.0256* (0.0131)	0.0977** (0.0407)
<i>RET</i>	-0.0211 (0.0725)	0.1508*** (0.0339)	0.3710*** (0.0738)	0.0901** (0.0379)	0.4491*** (0.1368)	-0.0112 (0.0725)	0.1518*** (0.0339)	0.3727*** (0.0738)	0.0902** (0.0379)	0.4486*** (0.1367)
<i>SIGMA</i>	2.9515*** (0.7160)	0.2334 (0.2911)	1.6783*** (0.6237)	0.3219 (0.3527)	0.3212 (1.1446)	3.0318*** (0.7164)	0.2083 (0.2901)	1.6350*** (0.6217)	0.3176 (0.3511)	0.3341 (1.1425)
<i>DTURN</i>	0.0135*** (0.0037)	0.0077*** (0.0028)	0.0138** (0.0060)	0.0021 (0.0035)	0.0285** (0.0113)	0.0138*** (0.0037)	0.0075*** (0.0028)	0.0135** (0.0060)	0.0020 (0.0035)	0.0286** (0.0113)

<i>NCSKEW</i>	0.0076 (0.0057)	0.0044 (0.0041)	0.0134 (0.0089)	0.0050 (0.0049)	0.0126 (0.0162)	0.0072 (0.0056)	0.0043 (0.0041)	0.0132 (0.0089)	0.0050 (0.0049)	0.0127 (0.0162)
<i>OPAQUE</i>	0.9636*** (0.1084)	0.0127 (0.0664)	0.0377 (0.1482)	-0.0275 (0.0794)	-0.1596 (0.2661)	0.9633*** (0.1085)	0.0017 (0.0661)	0.0188 (0.1471)	-0.0294 (0.0780)	-0.1540 (0.2634)
Constant	5.9389*** (0.0606)	-0.6998*** (0.2208)	-1.3126*** (0.4754)	-0.3636 (0.2750)	-2.3267*** (0.8989)	5.9319*** (0.0606)	-0.7691*** (0.2132)	-1.4317*** (0.4614)	-0.3755 (0.2616)	-2.2914*** (0.8656)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,923	15,923	15,923	15,923	15,923	15,923	15,923	15,923	15,923	15,923
R-squared	0.7643	0.0561	0.0410	0.0227	0.0277	0.7651	0.0562	0.0411	0.0228	0.0277
F-statistics (Kleibergen-Paap)	140.506	--	--	--	--	136.722	--	--	--	--

Appendix Table A1
Variable Definitions and Data Sources

Variable	Definition	Source
Dependent variables		
<i>DUVOL</i>	<p>Down-to-up volatility, which calculates the logarithm of the ratio of standard deviation in weeks with negative returns to the standard deviation in weeks with positive returns in a year.</p> $DUVOL = \ln \left[\left(\frac{1}{(n_d - 1)} \sum_{Down} W_{it}^2 \right) / \left(\frac{1}{(n_u - 1)} \sum_{Up} W_{it}^2 \right) \right]$ <p>where n_d and n_u are the number of weeks with negative returns and weeks with positive returns, respectively. $W_{i,t}$ is the firm-specific return under Equation (1).</p>	CRSP
<i>NCSKEW</i>	<p>The negative of the ratio of the third momentum of firm-specific return to its standard deviation raised to the third power, as shown below:</p> $NCSKEW = - \frac{n(n-1)^{3/2} \sum W_{i,t}^3}{(n-1)(n-2)(\sum W_{i,t}^2)^{3/2}}$ <p>where $W_{i,t}$ is the firm-specific return under Equation (1).</p>	CRSP
<i>COUNT</i>	<p>The balance of extremely negative and positive returns. Following Jin and Myers (2006), <i>COUNT</i> is calculated as the difference between the frequency of firm-specific returns falling 3 times of its standard deviation or more below the average return within the fiscal year (<i>COUNT_DOWN</i>) and the frequency of firm-specific returns rising 3 times of its standard deviation or more above the average return within the fiscal year (<i>COUNT_UP</i>).</p>	CRSP
<i>CRASH</i>	<p>A dummy variable indicating the extreme losses in a firm-year. The value of <i>CRASH</i> equals 1 if the firm experiences a firm-specific return falling 3 times or more of its standard deviation below the average return over the years and equals 0 otherwise.</p>	CRSP
<i>IV_SKEW</i>	<p>The difference between the implied volatility of the out-of-the-money put option (<i>IV_OTM_PUT</i>) and implied volatility of the at-the-money call option (<i>IV_ATM_CALL</i>).</p>	Ivy DB OptionMetrics
<i>FREQ_BAD_MG</i>	<p>The number of bad-news management guidance in each firm-year, where bad-news is defined as management guidance lower than the most recent consensus analyst forecast.</p>	I/B/E/S
Independent variables		
<i>ESV_RYANS</i>	<p>The logarithm of 1 plus <i>ryans</i>, namely $ESV_RYANS = \ln(1 + RYANS)$, where <i>RYANS</i> is the number of page views according to Ryans (2017) on year basis.</p>	EDGAR Log File
<i>ESV_DRT</i>	<p>The logarithm of 1 plus <i>drt</i>, namely $ESV_DRT = \ln(1 + DRT)$, where <i>DRT</i> is the number of page views according to Drake et al. (2015) on year basis.</p>	EDGAR Log File
<i>ESV_LM</i>	<p>The logarithm of 1 plus <i>lm</i>, namely $ESV_LM = \ln(1 + LM)$, where <i>LM</i> is the number of page views according to Loughran and McDonald (2014) on year basis.</p>	EDGAR Log File

<i>ESV_FCOMP</i>	The first principal component score of <i>ESV_RYANS</i> , <i>ESV_DRT</i> , and <i>ESV_LM</i> in a principal component analysis.	EDGAR Log File
<i>Instrumental variables</i>		
<i>DISTRACTION</i>	A firm-level measure of monitoring intensity that follows Kempf et al. (2017). First, we use exogenous shocks to the unrelated industries held by a given firm's institutional shareholders to identify time periods during which shareholders are likely to be distracted and shift their attention away from the focal firm. We define an industry shock if the industry has the highest or lowest return across all 12 Fama-French industries in a given quarter. Then we construct firm-level distraction measures by aggregating distraction measures across all of the institutional investors for each firm. Finally, we calculate an average to get an annual measure for each firm.	Kempf et al. (2017)
<i>MANDATORY_XBRL</i>	An indicator that equals one if the firm upload XBRL filings under the requirement of U.S. SEC and zero otherwise.	The XBRL Index of EDGAR Dissemination Feed
<i>LN_XBRL_NUM</i>	The logarithm of one plus the number of XBRL filings uploaded to EDGAR under the requirement of U.S. SEC.	The XBRL Index of EDGAR Dissemination Feed
<i>Control variables</i>		
<i>SIZE</i>	The logarithm form of the book value of total assets (<i>#AT</i>).	COMPUSTAT
<i>TOBINQ</i>	The ratio of market value to book value (<i>#AT</i>), where market value is defined as total assets (<i>#AT</i>) minus common equity (<i>#CEQ</i>) and deferred taxes (<i>#TXDB</i>) plus the market equity ($\#PRCC_F \times \#CSHO$).	COMPUSTAT
<i>CASH FLOW</i>	The sum of income before extraordinary items (<i>#IB</i>) and depreciation and amortization (<i>#DP</i>) scaled by the book value of total assets (<i>#AT</i>).	COMPUSTAT
<i>BLEV</i>	Long-term debt (<i>#DLTT</i>) and debt in current liabilities (<i>#DLC</i>) scaled by the book value of total assets (<i>#AT</i>).	COMPUSTAT
<i>CAPX</i>	Capital Expenditures (<i>#CAPX</i>) scaled by the book value of total assets (<i>#AT</i>).	COMPUSTAT
<i>GSALE</i>	The increase in sales (<i>#SALE</i>) scaled by the book value of total assets (<i>#AT</i>).	COMPUSTAT
<i>NAN</i>	The logarithm of 1 plus the arithmetic mean of the 12 monthly numbers of analysts following a firm in a fiscal year.	I/B/E/S
<i>IO</i>	Institutional ownership measured by the percent of share held by institutional investors. (<i>INSTOWN_PERC</i> in WRDS Thomson Reuters Institutional (13f) Holdings Stock Ownership Summary File).	Thomson Reuters Institutional (13f) Holdings
<i>RET</i>	The mean of weekly firm-specific return over the years times 100.	CRSP
<i>SIGMA</i>	The standard deviation of weekly firm-specific returns over the years.	CRSP
<i>DTURN</i>	The average change in monthly share turnover over the years, where turnover is defined as the monthly trading volume scaled by the total number of shares outstanding.	CRSP

<i>OPAQUE</i>	The 3-year moving average in the prior 3 years of the absolute value of discretionary accruals based on modified Jones model (<i>/DA_MJONES</i>).	COMPUSTAT
<i>Other variables</i>		
<i>WW-INDEX</i>	Financial constraint status measured by Whited and Wu (2006).	COMPUSTAT
<i>LN_TOTAL_FILINGS</i>	The logarithm form of total number of filings.	EDGAR
<i>LN_VOL_8K</i>	The logarithm form of the number of voluntary 8-K filings identified as Lerman and Livnat (2010).	EDGAR
<i>/DA_MJONES/</i>	Absolute value of discretionary accruals based on modified Jones model (Dechow et al. 1995).	COMPUSTAT
<i>/RM/</i>	Absolute value of real earnings management based on Zang (2012).	COMPUSTAT
<i>C-SCORE</i>	Khan and Watt's (2009) firm-year accounting conservatism measure.	COMPUSTAT/CRSP
<i>AQ_DD</i>	The standard deviation of firm-level residual from Dechow and Dichev's (2002) model.	COMPUSTAT
<i>AQ_MDD</i>	The standard deviation of firm-level residual from modified Dechow and Dichev's (2002) model proposed by McNichols (2002).	COMPUSTAT
<i>SPI</i>	100 times the special item (<i>#SPI</i>) scaled by total assets (<i>#AT</i>).	COMPUSTAT
<i>GOOGLE_SVI</i>	The average searching index of all months in a fiscal year, scaled by 100.	Google Trend
<i>BUSINESS PRESS</i>	The logarithm of one plus the number of business press news wires and articles disseminated in the firm-year.	RavenPack

Appendix Table A2
Two-way Distributions among Measures of EDGAR Search Volume

This table presents the two-way comparison among measures of EDGAR search volume. There are three measures used in this study: (1) *LM* from Loughran and MacDonald (2017); (1) *DRT* from Drake et al. (2015); (3) and *RYANS* from Ryans (2017). Loughran and MacDonald (2017) identify non-robust page viewers under the assumption that human does not download more than 50 items in a day. Furthermore, Drake et al. (2015) require that human does not download more than five items per minute. Similar to these criteria, Ryans (2019) looses the two above-mentioned criteria to 500 items/day and 25 items/minute and introduces another restriction that human does not search more than 3 firms in a minute. In order to eliminate the skewness of counting variables, we use the logarithm form of these counting variables as our proxies of sophisticated attention and have *ESV_LM*, *ESV_DRT*, *ESV_RYANS*. In this table, these variables are first sorted into ten groups according to ascending order over the years. We then calculate the number of observations in each two-way group. Panel A shows the distribution of *ESV_RYANS* and *ESV_LM*; Panel B shows the distribution of *ESV_RYANS* and *ESV_DRT*; Panel C shows the distribution of *ESV_LM* and *ESV_DRT*.

Panel A: *ESV_RYANS* and *ESV_LM*

		<i>ESV_RYANS</i>										
		Low	2	3	4	5	6	7	8	9	High	Total
<i>ESV_LM</i>	Low	1,869	281	6	0	0	0	0	0	0	0	2,156
	2	272	1,441	413	35	2	0	0	0	0	0	2,163
	3	9	390	1,220	485	57	2	0	0	0	0	2,163
	4	6	36	466	1,103	479	70	4	0	0	0	2,164
	5	0	6	35	470	1,091	492	60	5	1	0	2,160
	6	0	6	16	41	453	1,066	527	54	1	0	2,164
	7	0	3	5	18	55	467	1,143	452	22	0	2,165
	8	0	0	2	11	16	52	399	1,326	355	1	2,162
	9	0	0	0	1	6	15	31	322	1,582	207	2,164
	High	0	0	0	0	1	0	1	3	203	1,948	2,156
Total	2,156	2,163	2,163	2,164	2,160	2,164	2,165	2,162	2,164	2,156	21,617	

Panel B: *ESV_RYANS* and *ESV_DRT*

		<i>ESV_RYANS</i>										
		Low	2	3	4	5	6	7	8	9	High	Total
<i>ESV_DRT</i>	Low	2,007	148	1	0	0	0	0	0	0	0	2,156
	2	148	1,778	230	7	0	0	0	0	0	0	2,163
	3	1	235	1,628	281	15	3	0	0	0	0	2,163
	4	0	2	303	1,557	274	21	4	2	0	1	2,164
	5	0	0	1	312	1,553	274	17	2	0	1	2,160
	6	0	0	0	6	316	1,522	292	28	0	0	2,164
	7	0	0	0	0	1	337	1,560	250	15	2	2,165
	8	0	0	0	0	1	6	289	1,640	224	2	2,162
	9	0	0	0	1	0	1	3	240	1,784	135	2,164
	High	0	0	0	0	0	0	0	0	141	2,015	2,156
Total	2,156	2,163	2,163	2,164	2,160	2,164	2,165	2,162	2,164	2,156	21,617	

Panel C: *ESV_DRT* and *ESV_LM*

		<i>ESV_LM</i>										
		Low	2	3	4	5	6	7	8	9	High	Total
<i>ESV_DRT</i>	Low	1,894	236	12	4	2	5	2	1	0	0	2,156
	2	260	1,544	304	30	7	4	7	6	1	0	2,163
	3	2	364	1,384	355	22	10	8	14	4	0	2,163
	4	0	19	431	1,257	383	31	13	16	14	0	2,164
	5	0	0	31	482	1,213	352	36	22	21	3	2,160
	6	0	0	1	35	486	1,232	338	30	40	2	2,164
	7	0	0	0	0	45	490	1,291	284	43	12	2,165
	8	0	0	0	1	2	39	449	1,426	230	15	2,162
	9	0	0	0	0	0	1	20	363	1,608	172	2,164
	High	0	0	0	0	0	0	1	0	203	1,952	2,156
Total	2,156	2,163	2,163	2,164	2,160	2,164	2,165	2,162	2,164	2,156	21,617	

Appendix Table A3
Decomposition of EDGAR Search Volume: Normal and Abnormal Attention

Following prior works (e.g., Drake et al. 2015, Li and Sun 2018, Iliev et al. 2021), we measure normal (abnormal) EDGAR search volume as the fitted value (residual) from Equation (3):

$$ESV_{i,t} = \delta_0 + \delta_1 SIZE_{i,t} + \delta_2 TOBINQ_{i,t} + \delta_3 Leverage + \delta_4 DTURN + \delta_5 NAN_{i,t} + \delta_6 IO_{i,t} + \delta_7 Ret_{i,t} + \delta_8 BusinessPress_{i,t} + IndustryFE + Year FE + \varepsilon_{i,t} \quad (3)$$

where *ESV* refers to EDGAR search volume measures (*ESV_RYANS*, *ESV_LM*, *ESV_DRT*). Industries are classified by Fama-French 48 Industries. Standard errors, shown in the parentheses, are adjusted for heteroskedasticity and clustered by firm. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable=		
	(1) <i>ESV_RYANS</i>	(2) <i>ESV_DRT</i>	(3) <i>ESV_LM</i>
<i>SIZE</i>	0.2075*** (0.0024)	0.2232*** (0.0026)	0.2081*** (0.0025)
<i>TOBINQ</i>	0.0392*** (0.0032)	0.0462*** (0.0035)	0.0377*** (0.0033)
<i>BLEV</i>	0.1866*** (0.0206)	0.1366*** (0.0222)	0.1425*** (0.0212)
<i>DTURN</i>	0.0013 (0.0035)	0.0022 (0.0038)	0.0000 (0.0036)
<i>NAN</i>	0.2600*** (0.0045)	0.2446*** (0.0049)	0.2585*** (0.0047)
<i>BUSINESS PRESS</i>	0.0370*** (0.0016)	0.0364*** (0.0018)	0.0389*** (0.0017)
<i>IO</i>	-0.1309*** (0.0144)	-0.2036*** (0.0155)	-0.1530*** (0.0149)
<i>RET</i>	-0.4918*** (0.0172)	-0.5574*** (0.0185)	-0.5052*** (0.0177)
Constant	5.9596*** (0.0171)	5.7658*** (0.0184)	6.1076*** (0.0176)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Observations	21,617	21,617	21,617
R-squared	0.7841	0.7395	0.7834

Appendix Table A4
Timetable for Staggered EDGAR Implementation

This table reports the timetable for implementation of EDGAR division of corporation finance filings. On February 23, 1993, the SEC required firms to submit electronic filings to EDGAR by the group order. Public firms are assigned into 10 groups (Group CF-01 to Group CF-10) and are required to commence mandated electronic filing to EDGAR at different times in 1993-1996. The Appendix B of SEC Release No. 33-6977 (pp. 14690-14848) provides the list of firms on the phase-in schedule for EDGAR implementation. The group number and implementation date recorded in the list are reported in this table.

Group Number	Implementation Date
Group CF-01	Apr-1993
Group CF-02	Jul-1993
Group CF-03	Oct-1993
Group CF-04	Dec-1993
Group CF-05	Aug-1994
Group CF-06	Nov-1994
Group CF-07	May-1995
Group CF-08	Aug-1995
Group CF-09	Nov-1995
Group CF-10	May-1996

Appendix Table A5
Staggered EDGAR Implementation: Summary Statistics

This table reports summary statistics of the sample used the plausible natural experiment based on the staggered implementation of EDGAR. On February 23, 1993, the SEC required firms to submit electronic filings to EDGAR by the group order. Public firms are assigned into 10 groups (Group CF-01 to Group CF-10) and are required to commence mandated electronic filing to EDGAR at different times during 1993-1996. We include observations that satisfy the following criteria: (1) Book equity is positive; (2) Year-end stock price is above 1 U.S. dollar; (3) At least 26 observations are available in CRSP weekly data for each firm-year; (4) Variables used in our research are available; (5) Each firm should at least have 2-year consecutive observations. Firms in financial industry (SIC codes 6000-6999) and utility industry (SIC codes 4900-4999) are excluded from our sample. All continuous variables are winsorized at 1st and 99th percentiles to alleviate the potential disturbance from outliers. The final sample consists of 7,131 observations during 1993-1996.

	N	Mean	St.Dev	p25	Median	p75
<i>DUVOL</i>	7,131	-0.1069	0.3228	-0.3147	-0.1273	0.1006
<i>NCSKEW</i>	7,131	-0.0940	0.6836	-0.4807	-0.1018	0.2773
<i>COUNT</i>	7,131	-0.0022	0.0126	0.0000	0.0000	0.0000
<i>CRASH</i>	7,131	0.1524	0.3595	0.0000	0.0000	0.0000
<i>SIZE</i>	7,131	4.9886	1.9526	3.5837	4.7793	6.1385
<i>TOBINQ</i>	7,131	1.8274	1.2108	1.0776	1.4301	2.0996
<i>CASH FLOW</i>	7,131	0.0436	0.1906	0.0314	0.0863	0.1323
<i>BLEV</i>	7,131	0.2089	0.1819	0.0403	0.1858	0.3269
<i>CAPX</i>	7,131	0.0706	0.0679	0.0277	0.0508	0.0878
<i>GSALE</i>	7,131	0.1842	0.4582	0.0051	0.1024	0.2477
<i>NAN</i>	7,131	1.2172	1.0523	0.0000	1.0986	2.0794
<i>IO</i>	7,131	0.2550	0.2547	0.0000	0.1894	0.4587
<i>RET</i>	7,131	-0.2528	0.3085	-0.3212	-0.1528	-0.0616
<i>SIGMA</i>	7,131	0.0617	0.0360	0.0354	0.0558	0.0807
<i>DTURN</i>	7,131	0.0549	0.7021	-0.1486	0.0066	0.1929
<i>OPAQUE</i>	7,131	0.0833	0.0741	0.0361	0.0610	0.1046