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Institutional investor stability and crash risk: Monitoring versus short-termism?

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ABSTRACT

This study tests two opposing views of institutional investors—monitoring versus short-termism. We present evidence that institutional investor stability is negatively associated with 1-year-ahead stock price crash risk, consistent with the monitoring theory of institutional investors but not the short-termism theory. Our findings are shown to be robust to alternative empirical specifications, estimation methods and endogeneity concerns. In addition, we find that institutional ownership by public pension funds (bank trusts, investment companies, and independent investment advisors) is significantly negatively (positively) associated with future crash risk, consistent with findings that pension funds more actively monitor management than other types of institutions.

1. Introduction

One of the important issues emerging from the recent financial crisis is the alleged negative role played by institutional investors leading up to and during the crisis period. Some observers maintain that institutional investors exacerbated the crisis by pressuring financial service entities for short-term profits and increasing the latter's risk-taking behavior.[1] Della Croce et al. (2011) assert that "…long-term institutional investors are also recurrently being labeled as "short-termist", of feeding asset price bubbles with a herd-like mentality." Others claim that the demand for relatively safe debt assets by institutional investors helped drive the excessive US credit and securitization expansion in 2003–2006, ostensibly a primary cause of the crisis.[2] In a recent study, Manconi et al. (2012) provide evidence that contagion spread from securitized bonds to corporate bonds during the crisis thanks to trades by liquidity constrained institutional investors with portfolios exposed to securitized bonds. The European Union has gone so far as to state that the recent financial crisis has undermined the assumption of institutional investors as responsible shareholders (European Parliament, 2010).

The literature provides two essentially opposing views of institutional investors which, for lack of better terminology, we call monitoring and short-termism. Characterizing the monitoring view of institutional investors, Shleifer and Vishny (1986, 1997) argue that institutional shareholders, by virtue of their large shareholdings, have the incentive to collect information and monitor management because they reap greater benefits than smaller investors from monitoring the organization. Similarly, Dobrzynski (1993) and Monks and Minow (1995) argue that sophisticated institutions with large shareholdings tend to monitor and discipline managers to ensure that the firm's investment strategy is consistent with the objective of maximizing long-term value, rather than meeting short term earnings goals. Consistent with this monitoring view of institutional investors, empirical studies provide evidence on a variety of benefits from institutional ownership as it affects firm growth, R&D investment, executive compensation, management (earnings forecast) disclosures, CEO turnover, anti-takeover amendments, and corporate governance generally.[3] The monitoring view is also consistent with some evidence that institutional shareholder activism affects corporate events and enhances

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[1] See Cheng et al. (2010), for example.

[2] See Holmstrom (2008), for example.

[3] See Jarrell and Poulsen (1987), Brickley et al. (1988), Agrawal and Mandelker (1990, 1992), McConnell and Servaes (1990), Bushee (1998), Wahal and McConnell (2000), Hartzell and Starks (2003), Parrino et al. (2003), Ajinkya et al. (2005), Bushee et al. (2008), Janakiraman et al. (2010), Aggarwal et al. (2010, 2011) and Chung and Zhang (2011).

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corporate value (Gillan and Starks, 2000, 2007; McCahery et al., 2008; Brav et al., 2008a,b; Klein and Zur, 2009; Helwege et al., 2012).

Nevertheless, there are several reasons to expect that institutional investors behave less benignly as the crisis experience seems to imply. First, if monitoring is costly and/or time consuming, institutional investors may just sell off their stocks and bonds in response to unfavourable performance rather than influencing corrective action (Coffee, 1991; Manconi et al., 2012). Second, the strategy of many institutional investors in US equity markets (e.g., Vanguard) is to invest in a large number of different equities in order to diversify risk and maintain liquidity. The latter are likely indifferent regarding the governance of individual corporations. In fact, the activism literature cited above also provides some evidence that institutional investors are indifferent to and "walk away" from influencing corporate activities. Third, and more crucially, many critics claim that, by acting as traders, institutional investors themselves place excessive emphasis on short-term performance, causing management to be overly concerned that near-term earnings disappointments will induce heavy stock selling by institutional investors and the undervaluation of stock price (Graves and Waddock, 1990; Jacobs, 1991; Porter, 1992; Bushee, 1998, 2001).[4] Indeed, prior research provides empirical evidence of this "short-termism" view. This evidence suggests that institutional investors trade heavily based on current earnings news, place excessive emphasis on short-term performance, and fail to serve as monitors in correcting CEO overcompensation. (Graves and Waddock, 1990; Jacobs, 1991; Porter, 1992; Lang and McNichols, 1997; Bushee, 1998, 2001; Yan and Zhang, 2009; Yudan, 2010; Cheng et al., 2010; Cella et al., 2011; Manconi et al., 2012).

The purpose of this study is to evaluate the monitoring versus short-termism views of institutional investors by reference to stock price crash risk. Recent studies maintain that managers withhold bad news from investors because of career and short-term compensation concerns and that when a sufficiently long-run of bad news accumulates and reaches a critical threshold level, managers tend to give up. At that point, all of the negative firm-specific shocks become public at once leading to a crash—a large negative outlier in the distribution of returns (Jin and Myers, 2006; Kothari et al., 2009; Hutton et al., 2009). The empirical evidence supports the hypothesis that managerial bad news hoarding behavior results in stock crashes by showing that financial reporting opaqueness, corporate tax avoidance, and CFO's equity incentives act to increase future firm-specific crash risk (Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a, 2011b).

We test these two views of institutional investors by examining the role of institutional investor stability on future stock price crash risk. Prior studies document empirical evidence linking institutional investor stability to various economic outcomes, including R&D investments, domestic and foreign acquisition decisions and debt financing costs (Bushee, 1998; Gaspar et al., 2005; Callen et al., 2005; Chen et al., 2007; Elyasiani et al., 2010). In this study, we hypothesize that if institutional investors act as monitors then more stable institutional investor holdings should reduce future stock price crash risk by curbing managerial bad news hoarding activities. Contrariwise, if institutional investors are fixated on current performance (short-termism), then more stable institutional investors will increase future stock price crash risk by exacerbating the tendency of managers to engage in bad news hoarding in order to satisfy their stable institutional investor base.

Using a large sample of US public firms for the years 1981–2008, we provide evidence that institutional investor stability is significantly negatively associated with 1-year-ahead stock price crash risk. The effect is economically as well as statistically significant. These results are consistent with the theory that institutional investors act to monitor management and reject the theory that institutional investors induce short-termism. These results are shown to be robust to potential endogeneity of institutional holdings and alternative model specifications and estimation techniques. Our findings also show that institutional investor stability can forecast crash risk as far as 3 years ahead and that (first and second) differences in institutional investor stability also help to predict future crash risk.

Hutton et al. (2009) find that firms with opaque financial reporting are more prone to stock price crashes, suggesting that opaque financial reporting facilitates managerial bad news hoarding activities. We further examine whether this result depends upon institutional investor stability. Monitoring by more stable institutional investors should mitigate the impact of opacity on future crash risk by reducing opportunities for managers to engage in bad news hoarding activities. We find that transient institutional holdings, one of our instability measures, is strongly positively related to future stock price crash risk and the relation increases significantly with financial statement opacity. Opacity alone is no longer significant. These results do not obtain when institutional instability is measured by the other two metrics in that the interaction effect is not significant, although the separate instability and opacity effects are significant and consistent with monitoring by institutional investors.

We further divide our institutional investors into functional-legal categories. We find that institutional ownership by public pension funds (bank trusts, investment companies, and independent investment advisors) is significantly negatively (positively) associated with future stock price crash risk. This is consistent with the findings in Brickley et al. (1988) and Bushee (2001) that pension funds tend to invest for the long-term and monitor management actively relative to other types of institutions.

Our study contributes to the literature in several ways. First, to our knowledge, this is the first study to assess the relation between institutional investor stability and future price crash risk. By focusing on a unique perspective—the extreme moment of the stock return distribution—this study provides new firm-level evidence concerning the economic consequences of institutional investing. In particular, our findings contribute to the ongoing debate about the monitoring versus short-termism roles of institutional investors. Do stable institutional investors monitor and mitigate firm agency costs or do they exacerbate these costs? In particular, our findings identify significant benefits (costs) that stable (unstable) institutional investing brings to firms and their shareholders. Xing et al. (2010) and Yan (2011) suggest that extreme outcomes in the equity market have a material impact on the welfare of investors and that investors are concerned about the occurrence of these extreme outcomes. Thus, our empirical evidence is useful for understanding the role that institutional investor stability plays in influencing both corporate behavior and overall shareholder welfare.

Second, this study extends research on the bad news hoarding theory of stock price crash risk. In particular, the implication of institutional investor stability for future crash risk yields valuable insights into the external-governance role of institutional investors in mitigating managerial manipulation of information. Recent studies on crash risk find that managerial bad new hoarding activities are related to corporate financial opacity, tax avoidance and CFO's equity incentives (Hutton et al., 2009; Kim et al., 2011a, 2011b).[5] How-

[4] Short-termism has theoretical support as well. Bolton et al. (2006) present a multi-period agency model showing that incumbent investors use compensation contracts as an incentive to induce managers to engage in short term behavior which increase the short-term speculative component of the share price. In particular, they show that long-term-oriented shareholders may encourage managers to pursue some short-termism strategies in order to reduce the firm's cost of capital.

[5] Kim et al. (2011a) examine the association between corporate tax avoidance and future stock price crash risk. They further condition this association on external monitoring mechanisms, e.g., institutional shareholding. However, their study does not address the issue of institutional investor *stability* which the focus of this study.

ever, the role that external governance factors play in influencing managerial behavior to conceal bad news is unclear. Our study fills a void in this literature by providing empirical evidence that stable institutional investors act as an external monitoring mechanism to reduce future crash risk, implying as a consequence that stable institutional investors help to monitor managerial bad news hoarding activities.

Finally, the results of this study inform investors about one strategy to help predict and eschew future stock price crash risk in their portfolio investment decisions. In particular, our analysis suggests that investors would be well served investing in corporations with large holdings by stable institutional investors and especially avoiding corporations with large holdings by unstable institutional investors.

The paper proceeds as follows: Section 2 reviews prior literature and further develops our hypotheses. Section 3 describes the sample data and presents descriptive statistics. Section 4 presents the main empirical tests. Section 5 briefly concludes.

2. Literature review and hypotheses development

2.1. Stable institutional investors-empirical evidence

Chen et al. (2007) argue that more stable institutional investors have better knowledge of the firm and larger influence on management and, thus, are more likely to engage in monitoring efforts than other institutions. They find empirically that monitoring of acquisitions is facilitated by long-term investing institutions and dedicated (and quasi-indexer) institutions with concentrated holdings. In a similar vein, Gaspar et al. (2005) argue that the investment horizon of shareholders affects managerial behavior in corporate control transactions, and weak monitoring by short-term investors allows managers to trade off shareholder interests for personal benefits, including job security and empire building, at the expense of shareholder returns. Consistent with their argument, Gaspar et al. (2005) provide evidence of firms held by institutions with high portfolio turnover (i.e., unstable investors) being associated with poorer equity performance in merger and acquisition activities. Bushee (1998) documents that firms dominated by institutional investors with high portfolio turnover and engaging in momentum trading are more likely to cut long-term R&D projects to meet short-term earnings targets. Bushee (2001) further provides evidence that high levels of ownership by institutions with short-term horizons are associated with overweighting of near-term expected earnings and underweighting of long-term expected earnings, raising the concern that institutional investors might pressure managers into having a short-term focus. Callen et al. (2005) provide evidence that earnings from foreign investments are less opaque for firms with long-term institutional investors but no such relation holds for transient institutional ownership. Koh (2007) finds that long-term institutional investors constrain aggressive earnings (accruals) management among firms that manage earnings to meet/beat earnings benchmarks but no such relation holds for transient institutional ownership. Yan and Zhang (2009) show that short-term institutional investors are better informed than long-term institutional investors and that they actively trade to exploit their informational advantage. Elyasiani and Jia (2008) and Elyasiani et al. (2010) argue that stable institutional investors are better motivated and possess better ability to monitor effectively, so that they play an important role in mitigating agency conflicts and reducing information risk in the firm. Consistent with this view, Elyasiani and Jia (2008) find a significant positive relation between institutional ownership stability and bank holding company performance. Elyasiani et al. (2010) find a significant negative relation between institutional ownership stability and firms' cost of debt. Cella et al. (2011) provide evidence showing that investors with short horizons amplify the effects of market-wide negative shocks by demanding liquidity at times when other potential buyers' capital is scarce.

Overall, the evidence above suggests that stable institutional investors act as monitors in influencing managerial behavior, whereas unstable institutions appear to focus on short-term trading profits.

2.2. Crash risk

This paper extends prior research by examining the relation between institutional investor stability and future stock price crash risk which is based on the idea that managers withhold bad news as long as possible (bad news hoarding) from investors because of career and short-term compensation concerns.[6] Consistent with this idea, Graham et al.'s (2005) survey finds that managers with bad news tend to delay disclosure more than those with good news. Focusing on dividend changes and management earnings forecasts, Kothari et al. (2009) provide empirical evidence consistent with the view that managers, on average, delay the release of bad news to investors.

Anecdotal evidence during the past two decades also highlights the issue of bad news hoarding in public firms. *Enron* set up off-balance-sheet *Special Purpose Vehicles* to hide assets that were losing money until accumulated losses were no longer sustainable. (*Report of Investigation by the Special Investigative Committee of the Board of Directors of Enron Corp.*, February 2002). Similarly, WorldCom used fraudulent accounting methods to mask a declining earnings trend until the accounting data were no longer deemed realistic. (*Report of Investigation by the Special Investigative Committee of the Board of Directors of WorldCom Inc.*, March 2003). New Century failed to disclose dramatic increases in early default rates, loan repurchases and pending loan repurchase requests until this was no longer sustainable with the collapse of the subprime mortgage business (Schapiro, M.L. Testimony Concerning the State of the Financial Crisis before the Financial Crisis Inquiry Commission, 2010, SEC).

Jin and Myers (2006) provide a theoretical analysis linking bad news hoarding to stock price crash risk. They maintain that managers control the disclosure of information about the firm to the public, and that a threshold level exists at which managers will stop withholding bad news. They argue that lack of full transparency concerning managers' investment and operating decisions and firm performance allows managers to capture a portion of cash flows in ways not perceived by outside investors. Managers are willing to personally absorb limited downside risk and losses related to temporary bad performance by hiding firm-specific bad news. However, if a sufficiently long run of bad news accumulates to a critical threshold level, managers choose to give up, and all of the negative firm-specific shocks become public at once. This disclosure brings about a corresponding crash—a large negative outlier in the distribution of returns, generating long left tails in the distribution of stock returns. The empirical evidence supports the bad news hoarding theory. Jin and Myers's (2006) cross-country evidence indicates that firms in more opaque countries are more

[6] Basu (1997) claims that managers often possess valuable inside information about firm operations and asset values, and that if their compensation is linked to earnings performance, then they are inclined to hide any information that will negatively affect earnings and, hence, their compensation. Ball (2009) argues that empire building and maintaining the esteem of one's peers motivate managers to conceal bad news. Kothari et al. (2009) argue that managers will leak or reveal good news immediately to investors but they will act strategically with bad news by considering the costs and benefits of disclosing bad news, e.g., litigation risk, career concern, compensation plan, and other considerations. Kim et al. (2011b) argue that the linking of compensation to equity incentives (e.g., stock holdings and option holdings) induces managers to hide poor performance from investors in order to maintain equity prices.

likely to experience stock crashes (i.e., large negative returns). Hutton et al. (2009) find a positive relation between firm-level financial reporting opacity and crash risk.[7] Kim et al. (2011a, 2011b) show that corporate tax avoidance and CFO's equity incentives are positively related to firm-specific stock price crash risk.[8]

2.3. Hypotheses

We test the two opposing views of institutional investors—monitoring versus short-termism–by investigating whether stability of institutional investor holdings is related to future firm-specific stock price crash risk. If institutional investors act as monitors then more stable institutional investor holdings should reduce future stock price crash risk by curbing managerial bad news hoarding activities. This follows because stable institutional investors, who by definition maintain their investment in the firm over the long-run, are much more likely to benefit from monitoring management activities in order to mitigate managerial short-termism and other agency conflicts than would institutional investors who are not "in" for the long run. Contrariwise, if institutional investors induce short-termism, then more stable institutional investor should increase future stock price crash risk by exacerbating the tendency of managers to engage in bad news hoarding. This follows because stable institutional investors are likely to have an inordinate influential impact on management's short term focus precisely because they are going to be around for the long haul.

Presupposing that institutional investors monitor the organization leads to our hypothesis regarding the relation between institutional investor stability and future stock crash risk (expressed in the alternative):

Hypothesis 1A. Institutional investor stability is negatively related to future stock crash risk.

Rejection of this hypothesis would lead us to reject the maintained assumption that institutional investors monitor the organization.

Empirically, the hypothesis above has the following predictions when we measure institutional investor stability by dedicated institutional ownership (*DED*), and institutional investor instability by institutional holdings volatility (*StdI*) and transient institutional ownership (*TRA*):

1. *StdI* is positively related to future stock crash risk.
2. *DED* is negatively related to future stock crash risk.
3. *TRA* is positively related to future stock crash risk.

Contrariwise, presupposing that institutional investor stability induces short-termism and, hence, stock crash risk, leads to the directly opposite hypothesis (expressed in the alternative):

Hypothesis 1B. Institutional investor stability is positively related to future stock crash risk.

Rejection of this hypothesis would lead us to reject the maintained assumption that institutional investor stability induces short-termism.

[7] The prior literature also documents that future stock price crash risk is associated with divergence of investor opinion (Chen et al., 2001); and political incentives in state-controlled Chinese firms (Piotroski et al., 2010).

[8] Kothari et al. (2009) use stock market responses to voluntary disclosure of specific information to infer bad news hoarding. In contrast, the crash risk literature uses firm-specific return distributions to detect bad news hoarding. We would argue that crash risk measures are better at capturing bad news hoarding because concealed bad news is revealed through a variety of information channels over the time, not just firm specific voluntary disclosure at a specific point in time.

3. Sample, variables, and descriptive statistics

3.1. Sample

The sample comprises firm-year observations obtained from the *Thompson-Reuters Institutional Holdings Database*—formerly known as the *CDA/Spectrum* database. The overall sample period is from 1981 to 2008.[9] Year-end and quarter-end institutional holdings data are obtained from this database. Other data sources include: (1) CRSP daily stock files to estimate firm-specific crash risk; (2) *Compustat* annual files for accounting data; and (3) I/B/E/S for financial analyst data. Our final sample size varies with the specific future stock price crash risk metric and the institutional stability measure.

3.2. Measurement of institutional investor stability

We measure institutional investor stability using three metrics. Our first metric of institutional investor stability (*StdI*) is a volatility-type measure developed by Elyasiani et al. (2010).[10] More specifically, *StdI* is defined as the average standard deviation of institutional shareholding proportions across all investors in the firm over a 5-year period including the sample year and the 4 years preceding (i.e., 20 quarters). Formally,

$$StdI_i = \sum_{j=1}^{J_i} Std(p_{i,t}^j)/J_i, \tag{1}$$

where $p_{i,t}^j$ is the proportion of firm i held by investor j at quarter t ($t = 1,2,\ldots,20$), and J_i is the number of institutional investors in firm i. The larger is *StdI*, the less stable are institutional investor holdings. Being a volatility measure, we expect that *StdI* provides information about institutional investor stability complementary to the other two stability measures, *DED* or *TRA*.

The other two metrics, *DED* and *TRA*, are interrelated and obtain from Bushee's (1998) breakdown of institutional investors into dedicated, quasi-indexer and transient types–based on factors such as portfolio turnover, diversification, and momentum trading. Dedicated investors focus on the long term and provide stable ownership to firms. Dedicated investors hold large stakes in a limited number of firms. Such ownership creates incentives to invest in monitoring management and to rely on information beyond current earnings to assess managers' performance (Gaspar et al., 2005; Chen et al., 2007). *DED* is defined as the percentage of stock ownership in the firm by dedicated institutional investors relative to the total shares outstanding.[11] The higher is *DED*, the higher is institutional investor stability.

Transient institutions have high portfolio turnover and highly diversified portfolio holdings. They focus on the short term and invest based on the likelihood of short-term trading profits (Bushee, 1998, 2001). *TRA* is measured as the percentage of stock ownership in the firm of transient institutional investors relative to the total shares outstanding. The higher is *TRA*, the lower is institutional investor stability.

Quasi-indexers generally follow indexing and buy-and-hold strategies, and are characterized by high diversification. Monks and Minow (1995) argue that because indexing strategies do not encourage selling, quasi-indexers are motivated to monitor management to ensure their long-term interests in the firm. In contrast, Porter (1992) claims that the passive and fragmented ownership of quasi-indexers pro-

[9] For one of institutional stability metrics, *StdI*, the required data only begin in 1984.

[10] See also Elyasiani and Jia (2008) and Cheng et al. (2011).

[11] Bushee provides the data classifying institutional investors into transient, dedicated, and quasi-indexer groups, starting from year 1981 at http://acct3.wharton.upenn.edu/faculty/bushee/.

vides them little incentive to collect information to monitor managers. Bushee (1998) further maintains that quasi-indexers in effect give up their influence over managers to other active institutions that push managers to engage in short-term focused behavior.

Given the conflicting views about quasi-indexers, we measure stability of investor holdings by *DED* and instability of investor holdings by *TRA*. To the extent that quasi-indexers act like dedicated investors, *TRA* is the preferred metric because *DED* potentially understates monitoring by institutional investors.

3.3. Measurement of firm-specific crash risk

Following the previous literature (Chen et al., 2001; Jin and Myers, 2006; Hutton et al., 2009), we construct three firm-specific measures of stock price crash risk for each firm-year observation: (1) the negative coefficient of skewness of firm-specific daily returns (*NCSKEW*); (2) the down-to-up volatility of firm-specific daily returns (*DUVOL*); and (3) the difference between the number of days with negative extreme firm-specific daily returns and those with positive extreme firm-specific daily returns (*COUNT*).[12]

To calculate firm-specific measures of stock price crash risk, we first estimate firm-specific daily returns from an expanded market and industry index model regression for each firm and year (Hutton et al., 2009):

$$r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{i,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{i,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{i,t+1} + \varepsilon_{j,t}, \tag{2}$$

where $r_{j,t}$ is the return on stock j in day t, $r_{m,t}$ is the return on the CRSP value-weighted market index in day t, and $r_{i,t}$ is the return on the value-weighted industry index based on two-digit SIC codes. We correct for non-synchronous trading by including the lead and lag terms for the value-weighted market and industry indexes (Dimson, 1979).

We denote $R_{j,t}$ as the firm-specific daily return defined as the natural log of one plus the residual return from Eq. (2). We log transform the raw residual returns to reduce the positive skew in the return distribution and help ensure symmetry (Chen et al., 2001). We also estimate the measures of crash risk based on raw residual returns, and obtain robust (untabulated) results.

The *NCSKEW* stock price crash measure is defined as the negative of the third moment of each stock's firm-specific daily returns:

$$NCSKEW_{j,T} = -\left(n(n-1)^{\frac{3}{2}} \sum R_{j,t}^3\right) \Big/ \left((n-1)(n-2)\left(\sum R_{j,t}^2\right)^{\frac{3}{2}}\right) \tag{3}$$

where n is the number of observations of firm j-specific daily returns during the fiscal year T. The denominator is a normalization factor (Greene, 1993). This study adopts the convention that an increase in *NCSKEW* corresponds to a stock being more "crash prone," i.e., having a more left-skewed distribution, hence, the first minus sign in Eq. (3).

The *DUVOL* stock price crash measure is calculated as:

$$DUVOL_{j,T} = \log\left\{(n_u - 1)\sum_{DOWN} R_{j,t}^2 \Big/ (n_d - 1)\sum_{UP} R_{j,t}^2\right\} \tag{4}$$

where n_u and n_d are the number of up and down days over the fiscal year T, respectively. More specifically, for each stock j over a 1-year period, we separate all days with firm-specific daily returns above (below) the mean of the period and call this an "up" ("down") sample. We further calculate the standard deviation for the "up" and "down" samples and then compute the (log) ratio of the standard deviation of the "down" sample to the standard deviation of the "up" sample. A higher value for *DUVOL* corresponds to a stock being more "crash prone." This alternative measure does not involve the third moment and, hence, is less likely to be excessively affected by a small number of extreme returns.

The third stock price crash measure, *COUNT*, is based on the number of firm-specific daily returns exceeding 3.09 standard deviations above and below the mean firm-specific daily return over the fiscal year, with 3.09 chosen to generate frequencies of 0.1% in the normal distribution (Hutton et al., 2009). *COUNT* is the downside frequencies minus the upside frequencies. A higher value of *COUNT* corresponds to a higher frequency of crashes. Like Hutton et al. (2009) and Kim et al. (2011a), we use the 0.1% cut-off of the normal distribution as a convenient way of obtaining reasonable benchmarks for extreme firm-specific daily returns to calculate the crash risk measure of *COUNT*.

In Section 4, where we describe our empirical tests, we employ 1-year-ahead *NCSKEW* ($NCSKEW_{T+1}$), *DUVOL* ($DUVOL_{T+1}$), and *COUNT* ($COUNT_{T+1}$) as dependent variables.

3.4. Control variables

Following the prior literature (e.g., Chen et al., 2001; Jin and Myers, 2006; Hutton et al., 2009), we include the following control variables in our regression analysis: $NCSKEW_T$ is defined as the negative skewness of firm-specific daily returns in fiscal year *T*. The latter variable controls for persistence of the dependent variable. Chen et al. (2001) find that firm with high return skewness in year *T* are likely to have high return skewness in year *T* + 1. Following Jin and Myers (2006), we control for KUR_T, defined as the kurtosis of firm-specific daily returns in fiscal year *T*. Jin and Myers (2006) argue that long tails in the distribution is associated with stock price crash risk. RET_T is defined as the cumulative firm-specific daily returns in fiscal year *T*. Chen et al. (2001) argue and find that crash risk is most pronounced in stocks that have experienced high past returns. MB_T is defined as the market-to-book ratio at the end of fiscal year *T*. Harvey and Siddique (2000) and Chen et al. (2001) show that glamour stocks, those with low ratios of book value to market value, are more prone to stock price crashes. Financial leverage, LEV_T, is defined as the book value of total liabilities divided by the total assets at the end of fiscal year *T* and return on equity, ROE_T, is defined as income before extraordinary items divided by the book value of equity at the end of fiscal year *T*. Hutton et al. (2009) show that financial leverage and operating performance are both negatively related to crash risk. $LNSIZE_T$ is the log of market value of equity at the end of fiscal year *T*. Chen et al. (2001) and Hutton et al. (2009) document a positive relation between firm size and crash risk. $DTURN_T$ is computed as the average monthly share turnover over fiscal year *T* minus the average monthly share turnover over the previous year *T*-1, where monthly share turnover is calculated as the monthly share trading volume divided by the number of shares outstanding over the month. Chen et al. (2001) use $DTURN_T$ to proxy for the intensity of disagreement among investors, and find that firms that experience larger increases in turnover relative to the trend are more likely to crash.

Following Hutton et al. (2009), we further incorporate a measure of financial reporting opaqueness, $OPAQUE_T$, into our regressions. As defined initially by Kothari et al. (2005), $OPAQUE_T$ is the 3-year moving sum of the absolute value of annual performance-adjusted discretionary accruals from fiscal years $T-2$ to *T*. Hutton et al. (2009) argue and find that opaque firms are more likely to experience future stock price crashes. We also control for the number of analysts fol-

[12] We also measure firm-specific crash risk by an indicator variable equal to one for a firm-year if the firm experiences one or more firm-specific daily returns falling 3.09 standard deviations below the mean value for that year, and zero otherwise. Our results remain robust.

lowing the firm (ANA_T) in order to capture the firm-specific information environment. Chen et al. (2001) find that firms with more analysts following have more crashes in the future. Finally, we control for industry-level litigation risk ($LITIG_T$). $LITIG_T$ is set equal to 1 when the firm *j* is in the biotechnology (4-digit SIC codes 2833–2836 and 8731–8734), computer (4-digit SIC codes 3570–3577 and 7370–7374), electronics (4-digit SIC codes 3600–3674), or retail (4-digit SIC codes 5200–5961) industries, and 0 otherwise (Francis et al., 1994). Fang et al. (2009) find firms in high litigation industries are associated with fewer future stock price crashes.

Appendix A summarizes the variable definitions used in this study.

3.5. Descriptive statistics

Table 1 Panel A presents descriptive statistics for the variables used in our main regression models. The mean values of future crash risk measures, $NCSKEW_{T+1}$, $DUVOL_{T+1}$, and $COUNT_{T+1}$, are −0.067, −0.145, and −0.459, respectively. The mean and standard deviation of $DUVOL_{T+1}$ are very similar to the estimates by Chen et al. (2001) using daily market-adjusted returns. The mean values of $StdI_T$, DED_T, and TRA_T are 0.003, 0.076, and 0.108, respectively, which are roughly comparable to the statistics reported in prior studies (e.g., Bushee, 2001; Dikolli et al., 2009; Elyasiani et al., 2010).

Fig. 1 highlights the means of *NCSKEW*, *DUVOL*, and *COUNT* across the sample years 1981 to 2008. We observe a slow and upward trend of *NCSKEW*, *DUVOL*, and *COUNT* for most of the period. From 1999 to 2002, mean firm-specific crash risk experienced a steep rise falling dramatically afterwards, consistent with the findings of Fang et al. (2009) that SOX (Sarbanes-Oxley Act of 2002) resulted in less withholding of bad news. Not surprisingly, Fig. 1 shows that mean firm-specific crash risk started to increase again in 2007 and 2008, the period of the current financial crisis.

Panel B presents a Pearson correlation matrix for the variables used in our main regression models. The future stock price crash risk dependent variables, $NCSKEW_{T+1}$, $DUVOL_{T+1}$, and $COUNT_{T+1}$, are highly significantly correlated with each other at the 1% significance level, suggesting that they pick up much the same information. The correlation coefficient between $NCSKEW_{T+1}$ and $DUVOL_{T+1}$ of 0.91 is comparable to that reported by Chen et al. (2001). In addition, TRA_T is positively correlated with these crash risk measures (0.12–0.15) at the 1% significance level (two-tailed), consistent with monitoring view that stable institutional holdings effectively curb managerial bad news

Table 1
Descriptive statistics and correlation matrix.

Variables	*N*	Mean	Std. dev.	5th Pctl.	25th Pctl.	Median	75th Pctl.	95th Pctl.
Panel A. Descriptive statistics								
Crash risk								
$NCSKEW_{T+1}$	66,727	−0.067	1.240	−1.462	−0.540	−0.164	0.209	1.873
$DUVOL_{T+1}$	66,727	−0.145	0.556	−0.973	−0.469	−0.168	0.139	0.803
$COUNT_{T+1}$	66,730	−0.459	1.672	−3.000	−2.000	0.000	1.000	2.000
Institutional stability								
$StdI_T$ (%)	61,154	0.279	0.188	0.041	0.141	0.249	0.373	0.633
DED_T	55,433	0.076	0.076	0.001	0.016	0.054	0.112	0.229
TRA_T	61,708	0.108	0.102	0.002	0.029	0.079	0.159	0.321
Controls								
$NCSKEW_T$	66,730	−0.066	1.036	−1.378	−0.536	−0.171	0.191	1.807
KUR_T	66,730	5.413	8.582	0.371	1.333	2.585	5.407	20.869
RET_T	66,730	−0.141	0.179	−0.491	−0.169	−0.078	−0.038	−0.015
MB_T	66,730	2.697	3.309	0.496	1.195	1.892	3.188	8.124
LEV_T	66,730	0.497	0.224	0.137	0.333	0.505	0.643	0.850
ROE_T	66,730	0.010	0.484	−0.641	0.008	0.100	0.159	0.307
$LNSIZE_T$	66,730	19.630	1.869	16.688	18.255	19.549	20.908	22.931
$DTURN_T$	66,730	0.006	0.075	−0.101	−0.016	0.002	0.024	0.126
$OPAQUE_T$	66,730	0.183	0.146	0.035	0.082	0.140	0.236	0.490
ANA_T	66,730	1.748	0.809	0.693	1.099	1.609	2.398	3.135
$LITIG_T$	66,730	0.072	0.259	0.000	0.000	0.000	0.000	1.000

		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**	**P**
Panel B. Correlation matrix																	
$NCSKEW_{T+1}$	**A**	**1.00**															
$DUVOL_{T+1}$	**B**	**0.91**	**1.00**														
$COUNT_{T+1}$	**C**	**0.50**	**0.69**	**1.00**													
$StdI_T$	**D**	−0.01	**−0.02**	**−0.05**	**1.00**												
DED_T	**E**	**0.01**	**0.02**	0.00	**0.14**	**1.00**											
TRA_T	**F**	**0.14**	**0.15**	**0.12**	**0.13**	**0.14**	**1.00**										
$NCSKEW_T$	**G**	**0.04**	**0.05**	**0.03**	0.00	**0.04**	**0.02**	**1.00**									
KUR_T	**H**	**0.03**	0.01	−0.01	**0.03**	**0.06**	**0.07**	**0.52**	**1.00**								
RET_T	**I**	**0.02**	**0.05**	**0.06**	**−0.30**	**0.06**	**0.05**	**−0.07**	**−0.17**	**1.00**							
MB_T	**J**	**0.08**	**0.08**	**0.06**	**−0.09**	**0.01**	**0.17**	**−0.06**	−0.01	**−0.01**	**1.00**						
LEV_T	**K**	**−0.04**	**−0.04**	**−0.02**	**−0.16**	**0.02**	**−0.07**	**−0.02**	−0.01	**0.09**	**−0.08**	**1.00**					
ROE_T	**L**	**0.03**	**0.06**	**0.06**	**−0.11**	0.01	**0.05**	**−0.02**	**−0.05**	**0.31**	**−0.05**	**0.01**	**1.00**				
$LNSIZE_T$	**M**	**0.09**	**0.12**	**0.12**	**−0.67**	**0.08**	**0.23**	0.01	−0.01	**0.43**	**0.25**	**0.12**	**0.20**	**1.00**			
$DTURN_T$	**N**	**0.04**	**0.05**	**0.04**	**0.02**	−0.01	**0.18**	**0.06**	**0.11**	**−0.12**	**0.10**	−0.01	**0.05**	**0.06**	**1.00**		
$OPAQUE_T$	**O**	**0.03**	0.01	0.00	**0.26**	**−0.06**	**0.05**	0.01	**0.03**	**−0.31**	**0.09**	**−0.09**	**−0.11**	**−0.26**	**0.04**	**1.00**	
ANA_T	**P**	**0.07**	**0.08**	**0.09**	**−0.44**	**0.08**	**0.22**	**0.07**	**−0.02**	**0.33**	**0.11**	**0.08**	**0.14**	**0.68**	0.01	**−0.18**	**1.00**
$LITIG_T$	**Q**	**0.03**	**0.02**	0.00	**0.07**	0.00	**0.09**	**0.03**	**0.06**	**−0.17**	**0.10**	**−0.14**	**−0.05**	**−0.04**	**−0.01**	**0.13**	−0.01

This table presents descriptive statistics and a correlation matrix of key variables of interest for the sample of firms included in our study. The sample covers firm-year observations in the *Thompson-Reuters Institutional Holdings Database* with non-missing values for all control variables for the period 1981 to 2008. Panel A presents descriptive statistics. Panel B presents a Pearson correlation matrix. Bold values indicate statistical significance at the 1% level. All variables are defined in Appendix A.

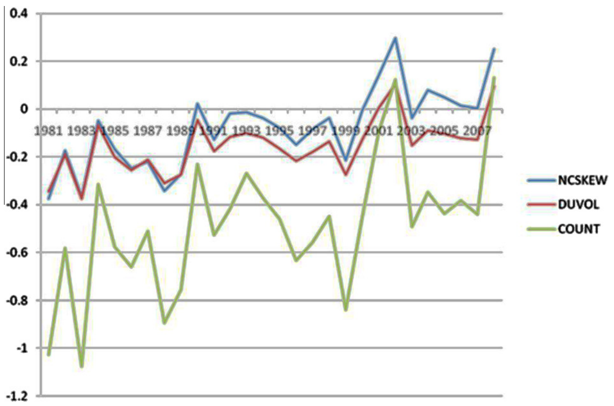

Fig. 1. Mean values of crash risk measures (*NCSKEW*, *DUVOL*, and *COUNT*) across the sample years 1981–2008.

hoarding activities.[13] The correlations of the other stability measures with future stock price crash risk do not appear to be economically significant. Consistent with prior literature, all future stock price crash risk measures are significantly positively correlated with $NCSKEW_T$, RET_T, MB_T, $LNSIZE_T$, $DTURN_T$, and ANA_T. The panel also indicates that several of the independent variables are highly correlated. In particular, the correlations between $LNSIZE_T$ and ANA_T and between $LNSIZE_T$ and $StdI_T$ are 0.68 and −0.67, respectively.

4. Empirical tests

4.1. Primary specification

Based on prior studies (i.e., Chen et al., 2001; Jin and Myers, 2006; Hutton et al., 2009; Kim et al., 2011a, 2011b), we estimate the following regression equation to investigate the relation between institutional investor stability and future firm-specific stock price crash risk:

$$CrashRisk_{j,T+1} = \alpha_0 + \alpha_1 StdI_{j,T}(DED_{j,T} or TRA_{j,T}) + \sum_k \alpha_k Controls^k_{j,T} + (YearDummies) + (IndustryDummies) + \varepsilon_{j,T} \quad (5)$$

where $CrashRisk_{j,T+1}$ is measured by one of $NCSKEW_{j,T+1}$, $DUVOL_{j,T+1}$, or $COUNT_{j,T+1}$. To help ensure that the impact of institutional ownership stability on future stock price crash risk is not driven by other factors, we control for a number of firm characteristics as discussed in Section 3.4. Our use of current *StdI*, *DED* and *TRA* to predict 1-year-ahead future stock price crash risk in the primary regression analyses helps to alleviate the concern of reverse causality. We also conduct more tests in order to make stronger causality inferences as described in the robustness section of the paper below. All regressions include industry (two-digit SIC codes) and year dummies to control for industry- and year-fixed effects. Regression equations are estimated initially using pooled ordinary least squares (OLS) with White standard errors corrected for firm clustering. Our primary focus is the effect of institutional investor stability on future crash risk as measured by the coefficient α_1.[14]

To assess for potential multicollinearity in the regressions that follow, we compute variance inflation factors (*VIF*). A *VIF* greater than 10 indicates a multicollinearity problem (Kennedy, 1992). All of the *VIFs* are below 4 so that multicollinearity does not appear to be an issue.[15]

Table 2 Panel A presents the estimated coefficients for Eq. (5), using 1-year-ahead *NCSKEW* as the dependent variable. Sample sizes and adjusted R^2 values for the regressions are reported in the last two rows. Columns (1)–(3) present the regression results for each of *StdI*, *DED* and *TRA*, respectively. The coefficients for *StdI* and *TRA* are significantly positive at less than a 1% significance level (*t*-statistics = 12.04 and 18.89). The coefficient for *DED* is significantly negative at less than a 5% significance level (*t*-statistics = −2.08). These findings imply that future crash risk is mitigated by institutional investor stability, consistent with the monitoring view of institutional investors that stable institutional holdings effectively curb managerial bad news hoarding activities. Columns (4)–(6) combine different combinations of the stability metrics in one regression. The results are consistent with those of Columns (1)–(3). For example, the regression combining all three metrics in column (6) yields positive coefficients for *StdI* and *TRA* and negative coefficient for *DED* at less than the 1% significance level (*t*-statistics = 4.72, 14.85, and −4.35). The adjusted R^2 are comparable to those documented in the prior literature.[16]

To further examine the economic significance of the results, we followed Hutton et al. (2009) by setting *StdI* at the 25th and 75th percentile values and then comparing crash risk at these two percentile values in column (6) while holding all other variables at their mean values. On average, we find that a shift from the 25th to the 75th percentile of the distribution of *StdI* is associated with an estimated 5.3% increase in 1-year-ahead crash risk measure as measured by $NCSKEW_{T+1}$. The economic magnitudes are significant for *DED* and *TRA* as well with magnitudes of -3.6% and 14.9%, respectively. Comparing these results to evidence provided further below indicates that the estimated impact of institutional investor stability on firm specific crash risk is similar in economic significance to, or larger than, the impact of opacity on crash risk.

Cornett et al. (2008) find a negative relation between institutional investor holdings and earnings quality measured by the absolute value of discretionary accruals and Hutton et al. (2009) find that firms with opaque financial reporting are more likely to experience future stock price crashes. Thus, we explicitly control for *OPAQUE* to make sure that the relation between institutional investor stability and future crash risk is not simply driven by opaqueness of corporate financial reporting. Unreported robustness results show that even if we exclude *OPAQUE* from the regression equation, the regression results on all the metrics of institutional investor stability are very similar, suggesting that financial reporting opaqueness is only one of multiple ways to affect managerial bad news hoarding behavior. Consistent with Hutton et al. (2009), the coefficients on *OPAQUE* is significantly positive across all the columns. We also calculate the change in $NCSKEW_{T+1}$ in column (6) corresponding to a shift from the 25th to the 75th percentile of the distribution of *OPAQUE*, while holding all other variables at their mean values. The resulting estimate of the economic impact of *OPAQUE* on $NCSKEW_{T+1}$ is 5.0%.

[13] All significance levels in this paper are two-tailed.

[14] To control for potential outliers, we winsorized the top and bottom 1% regressor outliers–but not the dependent variables following Jin and Myers (2006) and Hutton et al. (2009). However, the results remain essentially unchanged without winsorizing.

[15] Prior literature on crash risk (e.g., Kim et al., 2011a,b) controls for firm-specific stock return volatility, in addition to *RET*. Due to the very high correlation between firm-specific stock return volatility and *RET* (−0.95), we exclude firm-specific stock return volatility from our regressions. Furthermore, we also dropped each of *LNSIZE*, *RET*, *ANA* and *StdI* from the regressions one at a time. The results (untabulated) remain qualitatively similar in terms of coefficient magnitudes and their significance levels.

[16] The adjusted R^2 in Table 2, Panels A through C, range from 3.9% to 7.7% similar to the results of other crash risk papers when reported. Jin and Myers (2006) and Hutton et al. (2009) do not report R^2 values in their regression results. The adjusted R^2 values in Chen et al. (2001) and Kim et al. (2011a, 2011b) are 2.4–8.2%, 3.2–9.9% and 3.0–5.6%, respectively. These results are not surprising because metrics of stock price crash risk are a function of (noisy) stock returns and stock return regressions tend to yield low R^2 values.

Table 2
Institutional investor stability and crash risk.

Institutional stability	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent variable (future stock price crash risk): $NCSKEW_{T+1}$						
$StdI_T*100$	0.4148***			0.4952***	0.1658***	0.2292***
	(12.04)			(11.22)	(4.14)	(4.72)
DED_T		−0.1647**		−0.3819***		−0.3731***
		(−2.08)		(−4.51)		(−4.35)
TRA_T			1.2840***		1.2097***	1.1443***
			(18.89)		(16.62)	(14.85)
Control variables						
$NCSKEW_T$	0.0373***	0.0267***	0.0370***	0.0251***	0.0359***	0.0273***
	(5.25)	(3.44)	(5.14)	(3.13)	(4.87)	(3.35)
KUR_T	−0.0008	0.0004	−0.0002	0.0005	−0.0002	0.0008
	(−0.86)	(0.42)	(−0.23)	(0.50)	(−0.21)	(0.76)
RET_T	0.2573***	0.3695***	0.3193***	0.3482***	0.3093***	0.3806***
	(6.94)	(7.49)	(7.68)	(6.98)	(7.33)	(7.07)
MB_T	0.0152***	0.0170***	0.0138***	0.0157***	0.0136***	0.0134***
	(8.30)	(8.04)	(7.45)	(7.37)	(7.26)	(6.24)
LEV_T	−0.1123***	−0.1672***	−0.1277***	−0.1462***	−0.1225***	−0.1561***
	(−4.21)	(−5.62)	(−4.72)	(−4.80)	(−4.42)	(−5.05)
ROE_T	0.0583***	0.0594***	0.0504***	0.0540***	0.0506***	0.0474***
	(4.75)	(3.93)	(3.91)	(3.52)	(3.88)	(3.02)
$LNSIZE_T$	0.0590***	0.0172***	0.0283***	0.0529***	0.0404***	0.0351***
	(10.26)	(3.00)	(5.53)	(7.71)	(6.74)	(5.04)
$DTURN_T$	0.5370***	0.5722***	0.3561***	0.5178***	0.3502***	0.3281***
	(7.25)	(6.86)	(4.71)	(6.13)	(4.58)	(3.81)
$OPAQUE_T$	0.3194***	0.3937***	0.3097***	0.3492***	0.3088***	0.3262***
	(7.96)	(8.59)	(7.58)	(7.37)	(7.32)	(6.69)
ANA_T	0.0679***	0.0884***	0.0313***	0.0804***	0.0288***	0.0434***
	(6.67)	(8.13)	(3.02)	(7.05)	(2.66)	(3.63)
$LITIG_T$	−0.0189	0.0289	−0.0322	0.0292	−0.0282	0.0039
	(−0.43)	(0.61)	(−0.72)	(0.60)	(−0.61)	(0.08)
Intercept	−1.6498***	−0.7346***	−0.9315***	−1.4582***	−1.1149***	−1.0150***
	(−15.53)	(−7.23)	(−10.26)	(−11.36)	(−9.93)	(−7.70)
No. of observations	61,151	55,431	61,705	51,864	57,874	50,435
Adj. *R*-squared	0.0426	0.0391	0.0483	0.0407	0.0487	0.0465
Panel B. Dependent variable (future stock price crash risk): $DUVOL_{T+1}$						
$StdI_T*100$	0.2069***			0.2471***	0.1107***	0.1399***
	(12.50)			(11.85)	(5.84)	(6.12)
DED_T		−0.0616*		−0.1684***		−0.1709***
		(−1.76)		(−4.59)		(−4.62)
TRA_T			0.5478***		0.4975***	0.4669***
			(19.20)		(16.40)	(14.66)
Control variables						
$NCSKEW_T$	0.0294***	0.0246***	0.0290***	0.0237***	0.0284***	0.0244***
	(10.07)	(7.79)	(9.90)	(7.33)	(9.49)	(7.47)
KUR_T	−0.0023***	−0.0018***	−0.0020***	−0.0017***	−0.0020***	−0.0016***
	(−6.24)	(−4.55)	(−5.52)	(−4.27)	(−5.35)	(−3.81)
RET_T	0.1401***	0.2118***	0.1872***	0.2025***	0.1813***	0.2318***
	(7.61)	(9.02)	(9.19)	(8.53)	(8.79)	(9.18)
MB_T	0.0073***	0.0082***	0.0065***	0.0077***	0.0065***	0.0066***
	(9.50)	(9.38)	(8.44)	(8.69)	(8.29)	(7.45)
LEV_T	−0.0521***	−0.0847***	−0.0647***	−0.0718***	−0.0591***	−0.0787***
	(−4.44)	(−6.63)	(−5.47)	(−5.52)	(−4.90)	(−5.98)
ROE_T	0.0467***	0.0519***	0.0449***	0.0488***	0.0443***	0.0456***
	(8.67)	(8.03)	(8.00)	(7.43)	(7.81)	(6.85)
$LNSIZE_T$	0.0311***	0.0115***	0.0170***	0.0290***	0.0248***	0.0228***
	(11.56)	(4.40)	(7.17)	(9.25)	(8.91)	(7.20)
$DTURN_T$	0.2597***	0.2693***	0.1876***	0.2418***	0.1839***	0.1654***
	(8.29)	(7.75)	(5.89)	(6.89)	(5.71)	(4.64)
$OPAQUE_T$	0.1297***	0.1760***	0.1310***	0.1487***	0.1244***	0.1402***
	(7.25)	(8.73)	(7.22)	(7.20)	(6.71)	(6.62)
ANA_T	0.0222***	0.0341***	0.0104**	0.0272***	0.0059	0.0119**
	(4.77)	(6.91)	(2.20)	(5.31)	(1.21)	(2.24)
$LITIG_T$	−0.0316*	−0.0079	−0.0359*	−0.0071	−0.0337*	−0.0162
	(−1.65)	(−0.39)	(−1.82)	(−0.34)	(−1.68)	(−0.75)
Intercept	−0.9491***	−0.5696***	−0.6706***	−0.8540***	−0.7355***	−0.8314***
	(−18.90)	(−12.16)	(−15.80)	(−14.45)	(−13.95)	(−13.52)
No. of observations	61,151	55,431	61,705	51,864	57,874	50,435
Adj. *R*-squared	0.0693	0.0667	0.0770	0.0678	0.0769	0.0744

Table 2 (*continued*)

Institutional stability	(1)	(2)	(3)	(4)	(5)	(6)
Panel C. Dependent variable (future stock price crash risk): $COUNT_{T+1}$						
$StdI_T * 100$	0.4819***			0.5513***	0.2613***	0.2961***
	(9.55)			(8.80)	(4.53)	(4.28)
DED_T		−0.2632**		−0.5088***		−0.5044***
		(−2.49)		(−4.69)		(−4.62)
TRA_T			1.2380***		1.1362***	1.0871***
			(15.47)		(13.40)	(12.23)
Control variables						
$NCSKEW_T$	0.0728***	0.0592***	0.0704***	0.0564***	0.0686***	0.0574***
	(9.26)	(7.10)	(8.92)	(6.64)	(8.55)	(6.66)
KUR_T	−0.0073***	−0.0061***	−0.0067***	−0.0058***	−0.0065***	−0.0053***
	(−7.79)	(−6.05)	(−7.07)	(−5.70)	(−6.80)	(−5.14)
RET_T	0.2376***	0.3508***	0.3107***	0.3388***	0.2970***	0.3876***
	(4.32)	(5.05)	(5.10)	(4.84)	(4.84)	(5.16)
MB_T	0.0194***	0.0212***	0.0169***	0.0201***	0.0169***	0.0174***
	(8.48)	(8.40)	(7.32)	(7.95)	(7.26)	(6.87)
LEV_T	−0.1084***	−0.1677***	−0.1463***	−0.1332***	−0.1310***	−0.1462***
	(−3.19)	(−4.55)	(−4.24)	(−3.57)	(−3.75)	(−3.85)
ROE_T	0.1295***	0.1527***	0.1317***	0.1419***	0.1277***	0.1341***
	(8.32)	(8.18)	(8.10)	(7.54)	(7.81)	(7.00)
$LNSIZE_T$	0.0989***	0.0549***	0.0690***	0.0923***	0.0870***	0.0793***
	(12.51)	(7.13)	(9.68)	(10.23)	(10.58)	(8.63)
$DTURN_T$	0.7222***	0.7112***	0.5679***	0.6465***	0.5536***	0.4637***
	(8.05)	(7.22)	(6.19)	(6.52)	(6.01)	(4.59)
$OPAQUE_T$	0.2497***	0.3845***	0.2647***	0.3101***	0.2369***	0.2876***
	(4.67)	(6.53)	(4.91)	(5.15)	(4.31)	(4.69)
ANA_T	0.0625***	0.0924***	0.0402***	0.0734***	0.0242*	0.0363**
	(4.57)	(6.42)	(2.87)	(4.98)	(1.70)	(2.37)
$LITIG_T$	−0.0397	−0.0117	−0.0591	0.0072	−0.0419	−0.0023
	(−0.69)	(−0.18)	(−0.97)	(0.11)	(−0.69)	(−0.04)
Intercept	−2.8217***	−2.0634***	−2.3132***	−2.5577***	−2.3873***	−2.6425***
	(−18.71)	(−14.62)	(−17.67)	(−14.76)	(−15.08)	(−14.65)
No. of observations	61,154	55,433	61,708	51,866	57,877	50,437
Adj. *R*-squared	0.0537	0.0503	0.0579	0.0508	0.0581	0.0548

This table estimates the cross-sectional relation between institutional monitoring stability and future stock price crash risk. *t*-Statistics are reported in parentheses and are based on White standard errors corrected for clustering by firm. Year and industry fixed effects are included. All variables are defined in Appendix A.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Turning to the other control variables, we find that with the exceptions of KUR_T and $LITIG_T$ whose coefficients are insignificant, the estimated coefficients are highly significant and take on the signs hypothesized by the literature. More specifically, following Blanchard and Watson (1982) and Chen et al. (2001), the coefficients on *RET* are significantly positive across all the five columns, implying that stock-price bubbles increase future crash risk. Also, in consonance with the findings of Chen et al. (2001), the coefficients on *LNSIZE*, *NCSKEW*, and *DTURN* are significantly positive across all the columns. The positive coefficients on firm size are consistent with their conjecture that small companies face less scrutiny from equity analysts and have more scope for hiding bad news from the public. This in turn allows bad news to dribble out slowly and imparts a more positive skewness to returns. This discretionary-disclosure conjecture in turn yields the further prediction that positive skewness ought to be more pronounced in stocks with fewer analysts, which is clearly supported in our data by the consistently positive signs on *ANA*. The positive coefficients on *NCSKEW* indicate that crash price risk is persistent. The predicted positive signs on the coefficient of *DTURN* are in line with the explanation of stock price crash in Chen et al. (2001) that when disagreement among investors (and hence trading volume) is large, bearish investors are more likely to sit out the market with their private information incompletely incorporated in prices. This in turn sets the stage for negative skewness in subsequent rounds of trade. Consistent with the finding by Harvey and Siddique (2000) and Chen et al. (2001) that growth stocks are more likely to crash, the coefficients on *MB* are significantly positive across all the columns. In addition, we observe significantly negative coefficients on *LEV* across all the columns, consistent with the findings in Hutton et al. (2009). This result suggests that high level of debt holdings increases monitoring of managerial bad news hoarding by debt holders.

Panels B and C of Table 2 reports the results of the OLS regression estimation of Eq. (5) with 1-year-ahead crash risk measured by *DUVOL* and *COUNT*, respectively. These panels show that down-to-up volatility and crash net counts in year $t + 1$ are positively related to *StdI* and *TRA* in year *t*, and negatively related to *DED* in year *t*. The latter results are in line with those reported in Panel A, lending further support for the monitoring view of institutional investors that firms with stable institutional holdings are less prone to stock price crashes. The economic magnitudes are also significant. On average, holding all other variables at their mean values, a shift from the 25th to the 75th percentile of the distribution of *StdI* and *TRA* is associated with an estimated 3.2% (6.9%) and 6.1% (14.1%) increase in 1-year-ahead stock price crash risk as measured by $DUVOL_{T+1}$ ($COUNT_{T+1}$), respectively. By contrast, *DED* decreases by −1.6% (−4.8%).[17]

In short, the findings in Table 2 uniformly support hypothesis *H1A* that institutional investor stability is negatively related to future stock price crash risk. These findings are consistent with the monitoring view of institutional investors that stable institutional

[17] We also calculated the change in $DUVOL_{T+1}$ ($COUNT_{T+1}$) corresponding to a shift from the 25th to the 75th percentile of the distribution of *OPAQUE*, while holding all other variables at their mean values. The economic impact of *OPAQUE* on $DUVOL_{T+1}$ ($COUNT_{T+1}$) is 2.1% (4.4%).

Table 3
Institutional investor stability using instrumental variables.

	Dependent variable: $NCSKEW_{T+1}$					
Institutional stability	(1)	(2)	(3)	(4)	(5)	(6)
Instrument for $StdI_T * 100$	2.1303***			1.9300***	1.7317***	1.7097***
	(14.03)			(12.10)	(10.15)	(9.96)
Instrument for DED_T		−8.9897***		−4.0566***		−2.0417
		(−9.01)		(−3.05)		(−1.39)
Instrument for TRA_T			2.7180***		1.4042***	1.1719***
			(11.24)		(4.20)	(3.19)
Control variables						
$NCSKEW_T$	0.0333***	0.0366***	0.0456***	0.0366***	0.0371***	0.0380***
	(3.84)	(4.91)	(6.55)	(4.18)	(4.25)	(4.33)
KUR_T	0.0006	−0.0001	−0.0008	0.0006	0.0006	0.0006
	(0.53)	(−0.12)	(−0.89)	(0.58)	(0.51)	(0.50)
RET_T	0.1305**	0.4027***	0.5227***	0.1657***	0.2247***	0.2247***
	(2.32)	(8.16)	(11.89)	(2.96)	(3.86)	(3.86)
MB_T	0.0079***	0.0143***	0.0138***	0.0078***	0.0080***	0.0078***
	(3.04)	(6.65)	(7.21)	(2.96)	(3.05)	(2.98)
LEV_T	−0.0149	−0.0521	−0.0890***	0.0245	−0.0115	0.0068
	(−0.40)	(−1.62)	(−3.26)	(0.62)	(−0.31)	(0.17)
ROE_T	0.0206	0.0593***	0.0443***	0.0235	0.0195	0.0202
	(1.18)	(3.88)	(3.35)	(1.34)	(1.11)	(1.15)
$LNSIZE_T$	0.1403***	0.0343***	−0.0168**	0.1362***	0.0990***	0.1043***
	(13.35)	(5.89)	(−2.66)	(12.95)	(7.06)	(7.26)
$DTURN_T$	0.3983***	0.4967***	0.2325***	0.3763***	0.2455**	0.2637**
	(3.86)	(6.08)	(2.93)	(3.67)	(2.28)	(2.43)
$OPAQUE_T$	0.1445**	0.3676***	0.2989***	0.1553**	0.1481**	0.1471**
	(2.34)	(8.01)	(7.17)	(2.50)	(2.38)	(2.37)
ANA_T	0.1003***	0.0955***	0.0778***	0.1052***	0.0934***	0.0972***
	(7.79)	(8.83)	(7.72)	(8.10)	(7.19)	(7.37)
$LITIG_T$	0.0045	0.0256	−0.0311	0.0042	−0.0046	−0.0043
	(0.07)	(0.54)	(−0.69)	(0.07)	(−0.07)	(−0.07)
Intercept	−4.0280***	−0.6714***	−0.0691	−3.5891***	−3.0706***	−3.0618***
	(−16.86)	(−6.64)	(−0.64)	(−14.15)	(−10.26)	(−10.22)
No. of observations	39,010	54,904	61,032	38,898	38,898	38,898
Adj. *R*-squared	0.0446	0.0413	0.0443	0.0452	0.0454	0.0455

This table estimates the cross-sectional regression of future stock price crash risk ($NCSKEW_{T+1}$) on fitted values of *StdI* (*DED* or *TRA*) estimated from a first-stage regression of *StdI* (*DED* or *TRA*) on instrumental variables based on Bushee (2001). *t*-Statistics reported in parentheses are based on White standard errors corrected for clustering by firm. Year and industry fixed effects are included. All variables are defined in Appendix A.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

holdings effectively curb managerial bad news hoarding activities. The results are robust to the use of multiple proxies for institutional investor stability and multiple measures of firm-specific crash risk, after controlling for a variety of determinants of crash risk (e.g., financial reporting opaqueness, investor disagreement, firm size).

4.2. Robustness checks

4.2.1. Non-overlapping sample regression

Our measure of *StdI* is computed based on institutional ownership information over a 5-year rolling window. The overlapping nature of the sample possibly inflates the statistical significance of the coefficient. To address this issue, we follow Elyasiani et al. (2010) and pool observations for years 1984, 1989, 1994, 1999 and 2004, so that *StdI* is computed based on five non-overlapping windows, 1980–1984, 1985–1989, 1990–1994, 1995–1999 and 2000–2004, respectively. The findings are consistent with our primary results (untabulated). Using 1-year-ahead *NCSKEW*, *DUVOL*, and *COUNT* as the dependent variable, the coefficient estimates of *StdI* in regression Eq. (5) are positive and significant at the 1%, 1% and 10% levels, respectively.

4.2.2. Sub-period analysis

Firm-specific stock price crashes during the 2000s, especially those of high profile companies (e.g., *Enron* and *Lehman*), are related to bad news hoarding activities by management (Powers et al., 2002; Valukas, 2010). Are the institutional investment factors that affect firm-specific stock price crash risk homogeneous across time periods or are they specific to certain time periods? To investigate this issue, we separate our sample into two sub-periods, 1984–1995 and 1996–2008. We replicate our analyses of Eq. (5) for each sub-period. The results are highly significant and consistent with monitoring by stable institutional investors in both sub-periods (untabulated). Using 1-year-ahead *NCSKEW* as the dependent variable, the coefficients for *StdI*, *DED*, and *TRA* are 0.163 (0.314), −0.506 (−0.360), and 0.746 (1.248), respectively, significant at less than a 1% level for the 1984–1995 (1996–2008) period.[18] Similar results obtain when the regression is estimated over the entire sample period with the two sub-periods characterized by a dummy variable regressor. Further, the interaction of the sub-period dummy variable with the institutional stability metrics indicates that the monitoring effect of dedicated institutions on stock price crash risk was significantly weaker in the second period relative to the first period. In contrast, the adverse impact of transient institutions on stock price crash risk strengthened significantly over the two periods. These results are consistent with corporate governance failure contributing to the two US financial crises of the early 21st century.

[18] The regression analyses using one-year-ahead *DUVOL* and *COUNT* (untabulated) show similar results.

Table 4
Regressions for longer-run window.

	Dependent variable: $NCSKEW_{T+1}$					
Institutional stability	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. One-year lagged plus differences regression model						
$StdI_{T-1} * 100$	0.2743***			0.4241***	0.1289***	0.2504***
	(8.06)			(8.69)	(2.93)	(4.13)
$\Delta StdI_T * 100$	0.1809***			0.2050***	0.0402	0.0431
	(4.13)			(3.02)	(0.80)	(0.49)
DED_{T-1}		−0.1936**		−0.3981***		−0.4230***
		(−2.33)		(−4.43)		(−4.60)
ΔDED_T		−0.0911		−0.1611		−0.1199
		(−0.77)		(−1.30)		(−0.96)
TRA_{T-1}			1.2129***		1.1512***	1.0538***
			(16.23)		(14.01)	(11.67)
ΔTRA_T			1.1872***		1.1569***	1.0210***
			(13.86)		(13.01)	(10.31)
Control variables						
$NCSKEW_T$	0.0367***	0.0249***	0.0337***	0.0211**	0.0321***	0.0225**
	(5.04)	(3.00)	(4.49)	(2.47)	(4.15)	(2.55)
KUR_T	−0.0009	0.0006	0.0001	0.0008	0.0001	0.0011
	(−0.97)	(0.54)	(0.12)	(0.69)	(0.07)	(0.98)
RET_T	0.2791***	0.3583***	0.3301***	0.3497***	0.3186***	0.3780***
	(7.42)	(6.67)	(7.53)	(6.39)	(7.13)	(6.30)
MB_T	0.0150***	0.0173***	0.0140***	0.0155***	0.0135***	0.0135***
	(8.06)	(7.64)	(7.33)	(6.81)	(6.91)	(5.79)
LEV_T	−0.1283***	−0.1850***	−0.1432***	−0.1741***	−0.1463***	−0.1822***
	(−4.69)	(−5.77)	(−5.10)	(−5.24)	(−5.04)	(−5.36)
ROE_T	0.0571***	0.0540***	0.0516***	0.0453***	0.0480***	0.0382**
	(4.52)	(3.34)	(3.89)	(2.72)	(3.51)	(2.21)
$LNSIZE_T$	0.0496***	0.0163***	0.0271***	0.0469***	0.0372***	0.0347***
	(8.56)	(2.66)	(5.01)	(6.35)	(5.87)	(4.45)
$DTURN_T$	0.5669***	0.5749***	0.3708***	0.5433***	0.3668***	0.3518***
	(7.51)	(6.37)	(4.74)	(5.92)	(4.59)	(3.71)
$OPAQUE_T$	0.3115***	0.4047***	0.3195***	0.3567***	0.3067***	0.3257***
	(7.50)	(8.11)	(7.43)	(6.82)	(6.81)	(5.96)
ANA_T	0.0728***	0.0872***	0.0382***	0.0826***	0.0364***	0.0505***
	(6.99)	(7.44)	(3.48)	(6.70)	(3.16)	(3.80)
$LITIG_T$	−0.0261	0.0270	−0.0283	0.0210	−0.0294	−0.0108
	(−0.57)	(0.54)	(−0.60)	(0.40)	(−0.60)	(−0.20)
Intercept	−1.4303***	−0.5151***	−0.8979***	−1.4516***	−1.1965***	−1.1562***
	(−13.42)	(−4.72)	(−9.36)	(−10.29)	(−10.02)	(−7.66)
No. of observations	58,740	50,752	58,366	46,835	54,077	45,122
Adj. *R*-squared	0.0419	0.0388	0.0478	0.0401	0.0481	0.0457
Panel B. Two-year lagged plus differences regression model						
$StdI_{T-2} * 100$	0.3892***			0.5658***	0.1844***	0.3011***
	(8.72)			(9.44)	(3.01)	(4.36)
$\Delta StdI_{T-1} * 100$	0.4008***			0.5649***	0.2639***	0.3460***
	(6.77)			(6.32)	(3.12)	(3.11)
$\Delta StdI_T * 100$	0.2404***			0.4054***	0.1003	0.2444*
	(3.50)			(4.12)	(1.01)	(1.93)
DED_{T-2}		−0.2847***		−0.5067***		−0.5172***
		(−2.93)		(−4.81)		(−4.82)
ΔDED_{T-1}		−0.2129		−0.3995***		−0.3172**
		(−1.57)		(−2.82)		(−2.18)
ΔDED_T		−0.1362		−0.2189		−0.1575
		(−1.06)		(−1.61)		(−1.13)
TRA_{T-2}			1.1888***		1.0844***	1.0330***
			(13.73)		(11.12)	(9.73)
ΔTRA_{T-1}			1.2899***		1.2359***	1.1846***
			(12.88)		(11.54)	(9.80)
ΔTRA_T			1.1388***		1.1005***	0.9949***
			(11.86)		(10.91)	(8.70)
Control variables						
$NCSKEW_T$	0.0281***	0.0237***	0.0290***	0.0156*	0.0231***	0.0171*
	(3.68)	(2.74)	(3.65)	(1.73)	(2.80)	(1.84)
KUR_T	−0.0002	0.0006	0.0006	0.0011	0.0009	0.0014
	(−0.16)	(0.49)	(0.56)	(0.93)	(0.85)	(1.14)
RET_T	0.2546***	0.3364***	0.3312***	0.3291***	0.3189***	0.3643***
	(5.97)	(5.43)	(6.65)	(5.15)	(6.20)	(5.16)
MB_T	0.0149***	0.0171***	0.0140***	0.0150***	0.0131***	0.0132***
	(7.08)	(6.83)	(6.42)	(5.91)	(5.87)	(5.08)

(continued on next page)

Table 4 (*continued*)

Institutional stability	Dependent variable: $NCSKEW_{T+1}$ (1)	(2)	(3)	(4)	(5)	(6)
LEV_T	−0.1166***	−0.1596***	−0.1270***	−0.1512***	−0.1275***	−0.1596***
	(−3.86)	(−4.44)	(−4.08)	(−4.04)	(−3.92)	(−4.15)
ROE_T	0.0539***	0.0465**	0.0386***	0.0436**	0.0418***	0.0372*
	(3.87)	(2.54)	(2.60)	(2.33)	(2.72)	(1.93)
$LNSIZE_T$	0.0577***	0.0168**	0.0276***	0.0578***	0.0419***	0.0413***
	(8.75)	(2.46)	(4.63)	(6.80)	(5.56)	(4.67)
$DTURN_T$	0.5545***	0.5403***	0.3499***	0.5088***	0.3418***	0.3027***
	(6.54)	(5.12)	(3.81)	(4.77)	(3.65)	(2.68)
$OPAQUE_T$	0.3111***	0.4300***	0.3015***	0.3743***	0.2954***	0.3305***
	(6.36)	(7.10)	(5.83)	(5.85)	(5.42)	(4.92)
ANA_T	0.0742***	0.0845***	0.0407***	0.0804***	0.0431***	0.0508***
	(6.49)	(6.54)	(3.36)	(5.81)	(3.34)	(3.39)
$LITIG_T$	−0.0027	0.0690	0.0019	0.0528	−0.0025	0.0241
	(−0.05)	(1.24)	(0.04)	(0.90)	(−0.05)	(0.39)
Intercept	−1.6230***	−0.5689***	−0.7628***	−1.6962***	−1.2832***	−1.3074***
	(−13.13)	(−4.62)	(−7.11)	(−10.52)	(−8.77)	(−7.69)
No. of observations	50,453	42,721	49,797	39,184	45,883	37,697
Adj. R-squared	0.0420	0.0392	0.0471	0.0406	0.0471	0.0461

This table estimates the cross-sectional relation among lagged values (and differences) of institutional investor stability and future stock price crash risk ($NCSKEW_{T+1}$). t-Statistics reported in parentheses are based on White standard errors corrected for clustering by firm. All variables are defined in Appendix A.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

4.2.3. Endogeneity

4.2.3.1. Firm fixed-effects regressions. Our arguments presuppose that institutional ownership stability influences stock price crash risk. However, it is possible that institutional stability and stock price crash risk are simultaneously determined by other exogenous variables. In particular, endogeneity concerns may arise because of omitted unobservable firm characteristics that could lead to spurious correlations between future stock price crash risk and institutional investor stability. Hence, we implement firm fixed-effect regressions for Eq. (5) to address the concern that omitted time-invariant firm characteristics may be driving the results. The findings are in line with the primary results, and further confirm the robustness of our results (untabulated).

4.2.3.2. Instrumental variable approach. Institutional investment may be based upon a clientele preference. Stable institutional investors may choose to invest in firms focusing on long-term strategy and avoid firms that exhibit short-termist behavior (e.g., bad news hoarding), thereby inducing an association between institutional stability and stock price crash risk. Thus, our regressions could be subject to potential simultaneity bias. We employ an instrumental variable two-stage least squares (2*SLS*) approach to deal with the potential endogeneity of institutional stability. The instruments are based on Bushee (2001). Specifically, the (log of) firm size (*LNSIZE)* controls for the fact that some institutions prefer or are constrained to invest in large firms. Share turnover *DTURNOVER* controls for liquidity preferences. Dividend yield (*DYLD*) controls for institutional preferences for firms that issue dividends. An indicator variable (*SP*500) controls for institutional preference for firms that are included in the S&P 500 index. Firm's average sales growth (*SGR*) over the prior 3 years controls for institutional preferences for growth firms.[19] To capture firm performance, we incorporate market-adjusted returns for the year (*MAR*) and an indicator variable (*DPOS*) equal to 1 if earnings are positive and 0 otherwise. We also include three measures of firm risk as instrumental variables: a market model beta (*BETA*) estimated with up to 36 prior monthly returns; a measure of unsystematic risk (*IRISK*) proxied by the standard deviation of daily market-model residuals over the prior year; and leverage (*LEV*) measured as the debt-to-assets ratio.

In the first stage, we separately regress each of the institutional stability variables of *StdI*, *DED* and *TRA* on the above instruments inclusive of industry- and year-fixed effects controls.[20] In the second stage, we re-estimate the regressions in our main analyses after replacing *StdI*, *DED* and *TRA* by their fitted values from the first-stage regression. The results (untabulated) for the first-stage regressions show that most of the estimated coefficients for the regression equations are highly significant and the adjusted R^2s and F-statistics are reasonably high, suggesting that the model does not suffer from the issue of weak instruments.[21]

To assess the endogeneity of the first-stage model, we apply the Hausman test (Hausman, 1978) by regressing future stock price crash risk on *StdI* (*DED* and *TRA*) as well as on the residuals from the first-stage regressions. If the institutional stability variables are truly exogenous to the set of instruments, the coefficients on the residuals will be equal to zero. The results reject the exogeneity of *StdI* and *TRA* at the 5% level and *DED* at the 1% level.

Table 3 provides the estimates from the second-stage regressions with $NCSKEW_{T+1}$ as the dependent variable. Results for the other crash risk metrics (untabulated) are similar. Consistent with the primary results, the coefficients on the fitted values of *StdI*, *DED* and *TRA* are significant with expected sign across all columns, except that the coefficient on the fitted values of *DED* in column (6) is negative but not significant (t-*stats* = −1.39).[22]

4.2.3.3. Regressions for longer-run windows. Thus far we examined the impact of institutional investor stability on future stock price crash risk for a 1-year-ahead forecast window. In this sub-section,

[19] Bushee (2001) also includes Standard & Poor's stock rating, a proxy for the prudence of the investment, and the firm's R&D intensity as instruments. Including these two variables in the first-stage regression reduces our sample size by at least 40% and, thus, we elected to omit them from the tabulated regressions in order to keep the sample size as close to the one used in the main regression analyses. Nevertheless, including them does not weaken the significance of the instruments for *StdI*, *DED* and *TRA* in the second-stage regressions (untabulated).

[20] Since *StdI* is measured over the past five-year window, we follow Elyasiani et al. (2010) and use the instruments in year T to fit *StdI* in year $T+3$. The results (untabulated) are similar when we use contemporaneous *StdI* as the dependent variable.

[21] The adjusted R^2s (*F-statistics*) for the first-stage regressions with *StdI*, *DED* and *TRA* as dependent variables are 38.95% (378.37), 8.15% (164.28), and 29.08% (705.40), respectively.

[22] The reduced significance on the fitted values of *DED* in column (6) likely reflect the high correlation (0.54) between the fitted values of *DED* and *TRA*.

we further test whether the predictive ability of *StdI*, *DED* and *TRA* regarding future stock price crash risk spans more than 1 year. In particular, we extend the forecast window of future crash risk to 2-year and 3-year ahead windows. Regressions for longer-run windows can further help mitigate potential simultaneity issues and shed the light on the direction of the association between institutional investor stability and stock price crash risk. If *TRA* and *StdI* (*DED*) are positively (negatively) related to the subsequent stock price crash risk in two- and 3-years, it is more likely that stable institutional ownership reduces crash risk than that firms with lower crash risk attract stable institutional investors. Specifically, we decompose current-period stability measures into 1-year lagged and difference variables and re-estimate the regression Eq. (5) in the form:

$$CrashRisk_{j,T+1} = \beta_0 + \beta_1 StdI_{j,T-1}(DED_{j,T-1} or TRA_{j,T-1}) + \beta_2 \Delta StdI_{j,T}(\Delta DED_{j,T} or \Delta TRA_{j,T}) + \sum_k \beta_k Controls^k_{j,T} + (YearDummies) + (IndustryDummies) + \varepsilon_{j,T} \quad (6)$$

In Eq. (6), we focus on the effect of institutional investor stability on 2-year-ahead crash risk as measured by the coefficient β_1. In a similar vein, we further decompose 1-year lagged stability measures of Eq. (6) into 2-year lagged and difference variables to extend the forecast window to 3-years ahead.

Panel A of Table 4 provides the regression results for Eq. (6) with $NCSKEW_{T+1}$ as the dependent variable. Results for the other crash risk metrics are similar (untabulated). The coefficients for TRA_{T-1}, $StdI_{T-1}$ (DED_{T-1}) are significantly positive (negative) across all the columns. Similar results hold for the coefficients ΔTRA_T, $\Delta StdI_T$ (ΔDED_T) except that ΔDED_T is not significant. The evidence indicates that the measures of institutional investor stability have a long-run (i.e., 2-year) predictive power for stock price crash risk as do changes in institutional stability. In Panel B of Table 4, we present the results with 2-year lagged stability variables and differences variables. The coefficients on TRA_{T-2} and $StdI_{T-2}$ (DED_{T-2}) are significantly positive (negative) across all the columns. Similar results hold for 2-year lagged and differences variables except that again the differences variable for *DED*, ΔDED_T, is not significant (at the two-tailed level). These results show that measures of institutional investor stability can forecast crash risk as far as 3 years in the future lending further support to the conclusion that institutional investor stability affects stock price crash risk rather than the reverse. The evidence that first and second differences

Table 5
Opaque financial reporting and institutional investor stability.

	Dependent variable: $NCSKEW_{T+1}$					
Institutional stability	(1)	(2)	(3)	(4)	(5)	(6)
$StdI_T * 100$	0.4363***			0.4968***	0.1063*	0.1489**
	(8.04)			(7.75)	(1.74)	(2.15)
$StdI_T * 100 * OPAQUE_T$	−0.0931			−0.0118	0.2232	0.3310
	(−0.52)			(−0.05)	(1.10)	(1.40)
DED_T		−0.2523**		−0.4265***		−0.3481***
		(−2.06)		(−3.33)		(−2.71)
$DED_T * OPAQUE_T$		0.4902		0.2497		−0.0767
		(0.90)		(0.45)		(−0.14)
TRA_T			0.9478***		0.8983***	0.8605***
			(9.65)		(8.73)	(7.95)
$TRA_T * OPAQUE_T$			1.6326***		1.5637***	1.4722***
			(4.56)		(4.28)	(3.82)
$OPAQUE_T$	0.3501***	0.3592***	0.1199**	0.3352***	0.0508	0.0280
	(4.76)	(6.31)	(2.37)	(3.61)	(0.61)	(0.28)
Control variables						
$NCSKEW_T$	0.0374***	0.0266***	0.0366***	0.0251***	0.0354***	0.0268***
	(5.25)	(3.43)	(5.09)	(3.13)	(4.81)	(3.29)
KUR_T	−0.0008	0.0004	−0.0001	0.0005	−0.0001	0.0009
	(−0.87)	(0.42)	(−0.13)	(0.50)	(−0.10)	(0.85)
RET_T	0.2566***	0.3688***	0.3128***	0.3478***	0.3047***	0.3743***
	(6.91)	(7.48)	(7.53)	(6.97)	(7.23)	(6.95)
MB_T	0.0152***	0.0170***	0.0137***	0.0157***	0.0136***	0.0134***
	(8.26)	(8.05)	(7.41)	(7.35)	(7.27)	(6.24)
LEV_T	−0.1120***	−0.1672***	−0.1226***	−0.1462***	−0.1184***	−0.1528***
	(−4.19)	(−5.62)	(−4.54)	(−4.79)	(−4.28)	(−4.94)
ROE_T	0.0583***	0.0594***	0.0495***	0.0540***	0.0498***	0.0467***
	(4.75)	(3.93)	(3.84)	(3.52)	(3.82)	(2.97)
$LNSIZE_T$	0.0595***	0.0172***	0.0267***	0.0528***	0.0371***	0.0315***
	(10.18)	(3.00)	(5.20)	(7.62)	(6.08)	(4.48)
$DTURN_T$	0.5366***	0.5726***	0.3357***	0.5181***	0.3303***	0.3074***
	(7.24)	(6.86)	(4.44)	(6.13)	(4.31)	(3.56)
ANA_T	0.0678***	0.0886***	0.0336***	0.0806***	0.0309***	0.0450***
	(6.65)	(8.13)	(3.23)	(7.04)	(2.85)	(3.75)
$LITIG_T$	−0.0190	0.0289	−0.0359	0.0293	−0.0318	−0.0004
	(−0.43)	(0.61)	(−0.80)	(0.60)	(−0.68)	(−0.01)
Intercept	−1.6651***	−0.7288***	−0.8728***	−1.4551***	−1.0062***	−1.1191***
	(−15.03)	(−7.14)	(−9.54)	(−10.93)	(−8.52)	(−8.08)
No. of observations	61,151	55,431	61,705	51,864	57,874	50,435
Adj. *R*-squared	0.0426	0.0391	0.0488	0.0407	0.0492	0.0470

This table estimates the cross-sectional relation between institutional monitoring stability, opaque financial reporting, and future stock price crash risk ($NCSKEW_{T+1}$). *t*-Statistics reported in parentheses are based on White standard errors corrected for clustering by firm. Year and industry fixed effects are included. All variables are defined in Appendix A.

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

in stability metrics help to predict future crash risk suggests that not only the level but also the change in institutional investor stability affects managerial bad news hoarding.

4.3. Opaque financial reporting and institutional stability

Hutton et al. (2009) find that firms with opaque financial reporting are more prone to stock price crashes, implying that opaque financial reporting facilitates managerial bad news hoarding activities. Motivated by their study, and consistent with the monitoring model, we further conjecture that institutional investor stability acts to reduce the association of opacity with future crash risk by helping to reduce bad news hoarding activities by managers. To test this conjecture, we re-estimate Eq. (5) after including the interaction-terms *StdI* ∗ *OPAQUE*, *DED* ∗ *OPAQUE* and *TRA* ∗ *OPAQUE*.

Table 5 presents the regression results, using 1-year-ahead *NCSKEW* as the dependent variable. The other crash risk metrics yield similar results (untabulated). Consistent with our overall findings, the coefficients of the main effect variables (*StdI, DED* and *TRA*) remain significant with expected signs across all the columns. The coefficient estimates for *TRA* ∗ *OPAQUE* are significantly positive in columns (3), (5) and (6). After controlling for *TRA* ∗ *OPAQUE*, the coefficient of the main effect variable, *OPAQUE*, is insignificant in the latter columns. These findings imply that the impact of *OPAQUE* on future stock price crash risk is highly dependent on monitoring or the lack thereof by transient institutional investors. These results do not obtain when stability is mea-

Table 6
Legal institutional investor types.

Institutions	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Dependent variable (future stock price crash risk): $NCSKEW_{T+1}$							
BNK_T	0.3674***						0.2534*
	(3.90)						(1.85)
INS_T		0.2219					0.0495
		(1.55)					(0.24)
INV_T			0.7082***				0.3088**
			(6.82)				(2.33)
IIA_T				0.5793***			0.4947***
				(13.96)			(7.18)
CPS_T					−0.2608		−0.1768
					(−1.01)		(−0.51)
PPS_T						−0.5685**	−1.2151***
						(−2.45)	(−3.94)
Controls	Included	Included	Included	Included	Included	Included	Included
No. of observations	64,282	55,089	54,175	64,905	36,893	47,576	31,809
Adj. *R*-squared	0.0409	0.0402	0.0399	0.0445	0.0422	0.0387	0.0425
Panel B. Dependent variable (future stock price crash risk): $NCSKEW_{T+1}$.							
BNK_{T-1}	0.1499						0.2006
	(1.49)						(1.36)
ΔBNK_T	0.9465***						0.7993***
	(5.86)						(3.42)
INS_{T-1}		0.0094					−0.0970
		(0.06)					(−0.42)
ΔINS_T		0.6984***					0.3917
		(3.16)					(1.19)
INV_{T-1}			0.5751***				0.3231*
			(4.84)				(1.95)
ΔINV_T			0.8610***				0.7197***
			(5.68)				(3.29)
IIA_{T-1}				0.5489***			0.4542***
				(12.41)			(5.28)
ΔIIA_T				0.6546***			0.4234***
				(10.21)			(3.65)
CPS_{T-1}					−0.3174		−0.1396
					(−1.01)		(−0.37)
ΔCPS_T					0.1817		−0.1730
					(0.29)		(−0.23)
PPS_{T-1}						−0.7805***	−1.0638***
						(−2.85)	(−2.59)
ΔPPS_T						−0.0887	0.0730
						(−0.26)	(0.15)
Controls	Included	Included	Included	Included	Included	Included	Included
No. of observations	61,882	50,326	49,295	62,943	30,597	41,904	25,812
Adj. *R*-squared	0.0413	0.0409	0.0393	0.0447	0.0439	0.0379	0.0439

BNK is the percentage of shares outstanding held by bank trusts at the end of the year.
INS is the percentage of shares outstanding held by insurance companies at the end of the year.
INV is the percentage of shares outstanding held by investment companies at the end of the year.
IIA is the percentage of shares outstanding held by independent investment advisors at the end of the year.
CPS is the percentage of shares outstanding held by corporate (private) pension funds at the end of the year.
PPS is the percentage of shares outstanding held by public pension funds at the end of the year.
This table estimates the cross-sectional relation between institutional ownership and future stock price crash risk for legal institutional investor types. To economize on space, all the control variables (see Table 2) are suppressed. *t*-Statistics reported in parentheses are based on White standard errors corrected for clustering by firm. Year and industry fixed effects are included. All variables are defined in Appendix A.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

sured by the other two metrics in that the interaction coefficients are not significant, although the separate stability and opacity effects are significant, consistent with monitoring by institutional investors.

4.4. Legal institutional investor types

Brickley et al. (1988) maintain that public pension funds, mutual funds, endowments and foundations are less susceptible to management pressure and, therefore, monitor managers more actively than institutions such as banks and insurance companies that have a business relationship with the firm. Their evidence also suggests that the former institutions are more likely to oppose management than the latter. Bushee (2001) argues that banks and pension funds face strict fiduciary responsibilities, which motivate them to be more near-term focused than other institutions (i.e., insurance companies, investment companies, and investment advisors). He finds empirically that banks exhibit a significant preference for near-term earnings over long-term earnings. In contrast, he finds a significant association between the percentage of pension ownership and long-term firm future value, possibly due to the long-term investment horizon of pension funds. Almazan et al. (2005) argue that the intensity of institutional investor monitoring is attenuated by a variety of factors including the liquidity of portfolio holdings (Bhide, 1994), fiduciary duties (Murphy and Van Nuys, 1994), possible future business relationships (Brickley et al., 1988), and free-rider problems associated with the private cost of monitoring (Shleifer and Vishny, 1986). Almazan et al. (2005) find that relative to passive institutions (bank trusts and insurance companies), active institutions (independent investment advisors and investment companies) influence executive compensation to a greater extent, consistent with the overall low cost of monitoring that they face. Thus, we would expect the cost of monitoring and the short- or long-term focus of the investment horizon to differ across types of institutional investors, with concomitant implications for stock price crash risk.

To test the impact of different types of institutional investors on future firm-specific crash risk, we estimate the following regression equation:

$$CrashRisk_{j,T+1} = \delta_0 + \delta_1 INST\_TYPE_{j,T} + \sum_k \delta_k Controls^k_{j,T} + (YearDummies) + (IndustryDummies) + \varepsilon_{j,T} \quad (7)$$

where *INST_TYPE* denotes the percentage of institutional holdings by bank trusts (*BNK*), insurance companies (*INS*), investment companies (*INV*), independent investment advisors (*IIA*), corporate pension funds (*CPS*), and public pension funds (*PPS*). We examine how each of these different types of institutional investors separately is associated with future stock price crash risk as well as all institutional investor types simultaneously.[23]

Table 6 Panel A presents the regression results with 1-year-ahead *NCSKEW* as the dependent variable.[24] Columns (1)–(7) indicate that institutional ownership by public pension funds (bank trusts, investment companies, and independent investment advisors) is (are) significantly negatively (positively) associated with future stock price crash risk. This is consistent with the finding in Brickley et al. (1988) and Bushee (2001) that, relative to other types of institutions, pension funds tend to invest for the long-term and monitor management actively. The evidence suggests that, on average, the short-term focus of other institutions pressures managers to engage in bad news hoarding activities, leading to increased crash risk.

Table 6 Panel B further decomposes the current ownership of different types of institutions into 1-year lagged ownership and change in ownership. We observe similar evidence: lagged institutional ownership of public pension funds (lagged and change in institutional ownership of bank trusts, investment companies, and independent investment advisors) is (are) negatively (positively) associated with future crash risk.

5. Conclusion

Incidents of stock price crashes during the 2000s, especially by high profile companies (e.g., *Enron* and *Lehman*) caused severe damage to investor confidence in corporate financial disclosures and exerted immense pressure on regulators to intervene. Our study sheds light on the extent to which institutional investor stability affects stock price crash risk.

We present two competing views regarding the impact of institutional investor holdings on managerial short-termism behavior as reflected in bad news hoarding activities. Our evidence suggests that stable institutional groups play a monitoring role in reducing future stock price crash risk through pre-empting bad news hoarding activities by management. Our results also imply that transient institutional investor ownership has an adverse impact on public firms, ultimately increasing the risk of future stock price crash. Thus, our results cast strong doubt on any strategy that aims to attract institutional investors without considering the investment focus and preferences of these institutions. This study can also aid investors who focus on predicting stock crash risk based on information about specific institutional investors.

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Appendix A.

A.1. Variable definitions

A.1.1. Crash risk measures

NCSKEW is the negative coefficient of skewness of firm-specific daily returns over the fiscal year.

DUVOL is the log of the ratio of the standard deviation of firm-specific daily returns for the "down-day" sample to the standard deviation of firm-specific daily returns for the "up-day" sample over the fiscal year.

COUNT is the number of firm-specific daily returns exceeding 3.09 standard deviations below the mean firm-specific daily return over the fiscal year, minus the number of firm-specific daily returns exceeding 3.09 standard deviations above the mean firm-specific daily return over the fiscal year.

We estimate firm-specific daily returns from an expanded market and industry index model regression for each firm and year (Hutton et al., 2009):

$$r_{j,t} = \alpha_j + \beta_{1,j} r_{m,t-1} + \beta_{2,j} r_{i,t-1} + \beta_{3,j} r_{m,t} + \beta_{4,j} r_{i,t} + \beta_{5,j} r_{m,t+1} + \beta_{6,j} r_{i,t+1} + \varepsilon_{j,t},$$

where $r_{j,t}$ is the return on stock j in day t, $r_{m,t}$ is the return on the CRSP value-weighted market index in day t, and $r_{i,t}$ is the return

[23] We use Bushee's website: http://acct3.wharton.upenn.edu/faculty/bushee/IIvars.html#typ to obtain information about institutional investor types. We do not include university and foundation endowments due to their relatively small sample size.

[24] The regression analyses (untabulated) using one-year-ahead *DUVOL* and *COUNT* show similar results.

on the value-weighted industry index based on the two-digit SIC code. The firm-specific daily return is the natural log of one plus the residual return from the regression model.

A.1.2. Institutional measures

StdI is the average standard deviation of institutional shareholding proportions across all investors in a firm over a 5-year period including sample year and the 4 years preceding it (i.e., 20 quarters) (Elyasiani et al., 2010). The measure is calculated as:

$$StdI_i = \sum_{j=1}^{J_i} Std(p^j_{i,t})/J_i$$

where $p^j_{i,t}$ is the proportion of firm i held by investor j at quarter t ($t = 1,2,\ldots,20$), and J_i is the number of institutional investors in firm i.

DED is the percentage of shares outstanding held by dedicated institutions at the end of the year.
TRA is the percentage of shares outstanding held by transient institutions at the end of the year.
BNK is the percentage of shares outstanding held by bank trusts at the end of the year.
INS is the percentage of shares outstanding held by insurance companies at the end of the year.
INV is the percentage of shares outstanding held by investment companies at the end of the year.
IIA is the percentage of shares outstanding held by independent investment advisors at the end of the year.
CPS is the percentage of shares outstanding held by corporate (private) pension funds at the end of the year.
PPS is the percentage of shares outstanding held by public pension funds at the end of the year.

A.1.3. Other variables

KUR is the kurtosis of firm-specific daily returns over the fiscal year.
RET is the cumulative firm-specific daily returns over the fiscal year.
MB is the ratio of the market value of equity to the book value of equity measured at the end of the fiscal year.
LEV is the book value of all liabilities divided by total assets at the end of the fiscal year.
ROE is the income before extraordinary items divided by the book value of equity at the end of the fiscal year.
LNSIZE is the log value of market capitalization at the end of the fiscal year.
DTURN is the average monthly share turnover over the current fiscal year, minus the average monthly share turnover over the previous year, where monthly share turnover is calculated as the monthly share trading volume divided by the number of shares outstanding over the month.
OPAQUE is the 3-year moving sum of the absolute value of annual performance-adjusted discretionary accruals developed by Kothari et al. (2005).
ANA is the log value of one plus the number of analysts that issue earnings forecasts for a given firm during the fiscal year.
LITIG is equal to 1 for all firms in the biotechnology (4-digit SIC codes 2833–2836 and 8731–8734), computer (4-digit SIC codes 3570–3577 and 7370–7374), electronics (4-digit SIC codes 3600–3674), and retail (4-digit SIC codes 5200–5961) industries, and zero otherwise (Francis et al., 1994).

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