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The Impact of Stock Price Crash Risk on Bank Dividend Payouts

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Abstract: In this study, we examine whether and how banks employ dividend payout policies in response to the risk of stock price crashes. Using a sample of U.S. banks, we find that banks increase their dividend payouts when faced with a higher risk of stock price crashes. In addition, we find that well-capitalized banks tend to pay more dividends when the risk of a stock price crash is elevated. This aligns with the regulatory pressure theory that banks distribute dividends when they have sufficient capital that meets or exceeds the regulatory standards. This is also in line with the signaling theory that dividend payments reflect a bank's confidence in its financial health. Furthermore, we find that financially opaque banks tend to make more dividend payments when they are at a higher risk of stock price crashes. This supports the agency cost theory, suggesting that dividends counterbalance the need to monitor bank managers in less transparent reporting environments.

Keywords: stock price crash risk; dividend payouts; bank capitalization; bank opacity

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1. Introduction

Dividend payouts in financial institutions have attracted significant academic attention. Unlike their industrial counterparts, banks exhibit unique payout patterns. For example, Floyd et al. (2015) compared dividend payouts between U.S. industrials and banks, reporting that unlike industrials, the banking industry does not show a decreasing propensity to pay dividends. They found that dividend payments have remained consistent for most U.S. banks over the past several decades. Similarly, Acharya et al. (2017) noted that while some banks reduce dividend payments during a financial crisis, others, even those experiencing financial distress, continue to pay dividends deep into the crisis. This suggests that banks may have stronger incentives to maintain dividend payments compared to businesses in industrial sectors.

In this paper, we aim to provide further evidence on the importance of dividends in the banking industry. Specifically, we investigate the role of stock price crash risk as an important factor influencing bank dividends. Real-world examples indicate that banks might use dividend payouts as a strategic response to elevated stock price crash risk. For instance, Goldman Sachs and Morgan Stanley, after transitioning into bank holding companies (BHCs) amidst the 2008 financial crisis, were under significant scrutiny and faced potential risks associated with broader market perceptions and regulatory changes (Sorkin and Bajaj 2008). Despite these challenges, both BHCs managed to maintain relatively stable dividend policies post-crisis, aiming to signal their return to stability and sound risk management.

In another case, Wells Fargo was embroiled in a scandal involving the creation of over 2 million unauthorized accounts in 2016 (Tayan 2019). The scandal led to significant stock price pressure and potential crash risk due to hefty penalties and reputational damage. Nevertheless, Wells Fargo continued to maintain and even slightly increased its dividends (from $0.375 per share in late 2015 to $0.38 per share in late 2016 and $0.39 in late 2017).

This move was likely intended to reassure investors of its long-term value and stability, despite the short-term crises (Wells Fargo 2024).

Stock price crash risk represents instances of extreme negative returns (i.e., negative skewness) in the distribution of stock returns (Kim et al. 2014). Previous research has identified the hoarding of bad news as a primary cause of stock price crash risk (Chang et al. 2017). Kothari et al. (2009) proposed that managers may withhold or delay the disclosure of bad news to maximize their compensation, secure their employment, and minimize litigation risk. However, when the accumulation of bad news exceeds a certain threshold, it is suddenly released to the market, resulting in a substantial drop in stock price (Chang et al. 2017). On one hand, stock price crashes can negatively impact both the investors' financial well-being and banks' future performance. On the other hand, dividend payouts influence the investors' wealth and the funds banks retain for future investments. Therefore, understanding how stock price crash risk affects bank dividend payouts is of considerable interest to both investors and bank managers.

In our research, we develop and test three hypotheses. Our first hypothesis suggests that as the risk of stock price crashes increases, banks will raise their dividend payouts. This is because investors are likely to demand higher returns to compensate for the increased risk. Our second hypothesis predicts a stronger relationship between stock price crash risk and dividends for well-capitalized banks. These banks have more freedom to distribute dividends, which can signal financial health while maintaining their regulatory capital. Lastly, our third hypothesis anticipates that the effect of stock price crash risk on dividend payments is more pronounced for the banks that are financially opaque. These banks typically face higher agency costs, and dividend payouts can act as a monitoring mechanism, reducing the cash available to managers and thereby limiting their ability to conceal negative information.

To test these hypotheses, we collect bank accounting data from the Compustat Bank database and stock return data from the Center for Research in Security Prices (CRSP) database. Our final sample includes 5141 bank-year observations for 684 individual U.S. banks spanning from 2004 to 2018. The U.S. regulatory landscape for bank dividends underwent significant changes during our sample period, largely due to the 2007–2009 financial crisis. Prior to the crisis, bank dividend policies were relatively flexible, with banks generally able to pay dividends as long as they maintained minimum regulatory capital levels and the dividend payments did not exceed their earnings.

However, the financial crisis severely impacted bank capital, prompting the Federal Reserve (Fed) to enforce stricter regulations on bank dividend policies. In 2009, the Fed introduced the Supervisory Capital Assessment Program (SCAP), which evaluated whether large domestic banks had adequate capital to absorb losses and continue operations (Baudino et al. 2018). In 2010, the Dodd–Frank Act was enacted, marking a comprehensive reform in the financial regulatory framework. The Act aimed to prevent the recurrence of a financial crisis by fortifying the financial system through increased regulatory scrutiny and stricter capital requirements. Building on SCAP, the Fed initiated the Comprehensive Capital Analysis and Review (CCAR), which assessed a bank's capital adequacy, capital planning process, and planned capital distributions, such as common stock repurchases and dividend payments (Clark and Ryu 2013). Additionally, as a part of the Dodd–Frank requirements, stress testing was implemented as a forward-looking quantitative evaluation of the impact of stressful economic and financial market conditions on banks' capital (Lessambo and Lessambo 2020).

Starting from 2013, new international banking regulations, such as the Basel III guidelines, began to be implemented in a phased manner. These regulations enhanced the quality and quantity of the capital buffer that banks were required to hold. For instance, Basel III tightened the minimum tier 1 capital ratio, both by narrowing what banks could count toward tier 1 capital and by increasing the existing minimum tier 1 capital–risk-weighted asset ratio from 4 percent to 6 percent. Failure to meet the required buffer levels resulted in restrictions on payouts, such as dividends and bonuses (Siedlarek 2024). We exclude the years of the COVID-19 pandemic from our sample due to the Federal Reserve's restrictions on banks' share buybacks and dividend payouts during that period.

Our findings indicate that stock price crash risk, as evidenced by negative skewness and asymmetric volatility in stock returns, is linked to increased common and cash dividend payouts during our sample period. This aligns with our first hypothesis. Furthermore, we observe that higher capitalization (represented by tier 1 capital ratio and combined risk-adjusted capital ratio) and increased opacity (characterized by higher levels of discretionary loan loss provisions and lower audit fees) significantly enhance the relationship between stock price crash risk and bank dividend payouts. This supports our second and third hypotheses.

Our paper provides several key contributions. Firstly, it establishes a positive relationship between stock price crash risk and bank dividend payouts, thereby enriching the limited empirical evidence on the repercussions of stock price crash risk. Habib et al. (2018) highlight in their literature review the scarcity of research on the consequences of stock price crash risk. Therefore, understanding firms' responses to "mitigate future crash risk and to further protect shareholders' value" is crucial. We believe our research takes an initial step in shedding light on the implications of stock price crash risk for banks.

Secondly, while previous studies indicate that dividend payouts can be influenced by various factors such as firm size, profitability, ownership, investment opportunities, and growth opportunities (Abreu and Gulamhussen 2013; Dickens et al. 2002; Fama and French 2001), our study enhances the bank dividend literature by introducing stock price crash risk as an additional determinant. This finding could be particularly intriguing to the investors who favor dividends over capital gains as their returns, enabling them to adjust their investment portfolios accordingly.

Thirdly, we demonstrate that the impact of stock price crash risk on dividend payments varies with bank capitalization and bank opacity. This finding not only provides new evidence supporting regulatory pressure theory, signaling theory, and agency cost theory, but also holds significance for regulators who could leverage our finding to assess the implications of capital adequacy and financial reporting quality for banks.

The remainder of this paper is structured as follows: Section 2 presents the literature review and hypothesis development. Section 3 outlines our research design, sample, and data. Section 4 discusses our empirical results and findings. Section 5 provides additional robustness checks. Section 6 concludes the paper.

2. Literature Review and Hypothesis Development

2.1. Relevant Literature

Our research intersects with two main areas of the literature. The first pertains to the risk of stock price crashes. Bank managers, who typically possess more private information about their banks than external stakeholders, may strategically withhold bad news due to various managerial incentives. These incentives can include career concerns (Baginski et al. 2018; Kothari et al. 2009), the likelihood of litigation (Rogers and van Buskirk 2009), and the desire for equity-based compensation (Baker et al. 2003; Kim et al. 2011a). This withholding of bad news can lead to a stockpile of negative information (Bao et al. 2019), creating a bubble in the stock market (Hutton et al. 2009). When the accumulated bad news reaches a certain threshold, the bubble bursts, leading to a crash in the bank's stock price.

Plenty of research has identified various factors that can contribute to the risk of stock price crashes. For instance, Chang et al. (2017) found that stock liquidity increases the risk of stock price crashes, while Kim et al. (2019) reported that less readable 10-K reports are associated with a higher risk of stock price crashes. Other studies have found links between stock price crash risk and factors such as tax avoidance (Kim et al. 2011b), transient institutional ownership (Andreou et al. 2016), and delayed expected loss recognition (Jung et al. 2019). The economic consequences of stock price crash risk, however, have been less extensively studied. Wu (2013) found that current-period crash risk is positively associated with CEO turnover in the subsequent year, while Hackenbrack et al. (2014) found that stock price crash risk is linked to an increase in clients' audit fees. An et al. (2015) found a negative relationship between high crash-risk exposure and the speed of adjustment towards the targets of financial leverages.

The second area of the literature our research connects with is bank dividend policy. There are three main theories that explain why banks tend to pay dividends. Firstly, the regulatory pressure theory posits that well-capitalized banks have more freedom than undercapitalized banks to make dividend payments from retained earnings (Abreu and Gulamhussen 2013; Theis and Dutta 2009). Secondly, the signaling theory posits that dividends are used as the indicators of bank solvency (Floyd et al. 2015). Thirdly, the agency cost theory posits that dividends counterbalance the need for monitoring management (Abreu and Gulamhussen 2013). In line with these theories, various studies have found relationships between bank dividend payouts and other factors. For instance, Boldin and Leggett (1995) documented a positive relationship between bank dividend payouts and bank quality ratings. Dickens et al. (2002) found that dividend yields have a negative relationship with market–book ratio, insider ownership, and earnings volatility, but a positive relationship with size and past dividends. Theis and Dutta (2009) demonstrated the positive impact of capital on dividends. Additionally, Abreu and Gulamhussen (2013) reported that larger, more profitable, and lower-growth banks tend to make more dividend payments. These findings provide valuable insights into the factors influencing bank dividend policies.

2.2. Hypothesis Development

We expect stock price crash risk to be associated with greater bank dividend payouts. Prior research has suggested that stock price crash risk occurs when a large amount of negative information previously withheld by the management is suddenly released to the stock market (Hutton et al. 2009; Kim et al. 2011b). Following Chang et al. (2017), we argue that high stock crash risk should be associated with more unfavorable scenarios for banks, such as a greater likelihood of bad news attributable to either managerial underperformance or negative shocks, or more bad news hoarding by the management once bad news arises, or stronger market response to bad news announcement. Given the exposure to these adverse scenarios, investors would demand higher returns, such as more dividend payouts, on their stocks to compensate for the high risk they entail. Based on these arguments, we formulate our first hypothesis:

H1: *There is a positive relationship between stock price crash risk and bank dividend payouts.*

We then investigate whether the hypothesized relationship between stock price crash risk and bank dividend payouts displays any cross-bank variations. We focus on two types of bank characteristics: capitalization and financial opacity.

Banks are required by regulators to operate with a certain level of capital above the minimum regulatory ratios[1] and to conserve the capital buffer to protect debtors against potential losses. If a bank's capital conservation buffer falls below that amount, its maximum payout amount for capital distributions and discretionary payouts will decline to a set percentage of eligible retained earnings based on the size of the bank's buffer: When the common equity tier 1 capital–risk-weighted assets ratio (i.e., capital conservation buffer) is less than or equal to 0.625%, no payout is allowed. When the capital conservation buffer is less than or equal to 1.25% and greater than 0.625%, about 20% of the eligible retained earnings is allowed to be paid out at maximum. When the capital conservation buffer is less than or equal to 1.875% and greater than 1.25%, the maximum payout ratio is 40% of the retained earnings. When the capital conservation buffer is less than or equal to 2.5% and greater than 1.875%, the maximum payout ratio is 60% of the retained earnings. The only time when there are no restrictions on dividend payouts is when the capital conservation buffer is greater than 2.5% (FDIC 2019). Thus, the FDIC regulations validate the regulatory pressure theory that undercapitalized banks are more likely to retain earnings than to pay dividends (Abreu and Gulamhussen 2013). We therefore argue that in response to stock price crash risk, the banks with higher capitalization have greater freedom to make dividend payouts.

High capitalization improves a bank's survival probability and bank performance. Prior studies find that high capital ratios are negatively related to the probability of bank failure (e.g., Estrella et al. 2000; Jin et al. 2011). High capitalization gives banks a bigger cushion to write off delinquent loans in the future (Berger et al. 1995). In addition, high-capital banks are less subject to debt overhang problems (Myers 1977) and more flexible in their response to adverse shocks (Beltratti and Stulz 2012). Demirguc-Kunt et al. (2013) reported that banks with a stronger capital position demonstrate better stock market performance during financial crises. Furthermore, Mehran and Thakor (2011) associated bank capital with a higher bank value. This is because higher equity capital strengthens a bank's incentives to monitor its borrowers, thereby reducing the probability of loan default and increasing the surplus generated by the bank–borrower relation (Berger and Bouwman 2013; Bhat and Desai 2020).

According to signaling theory, banks with a strong financial position are expected to pay more dividends to signal their solvency, thereby attracting debt and equity financing when necessary (Abreu and Gulamhussen 2013; Bessler and Nohel 1996). Given that high capitalization is associated with a stronger bank financial position, we expect well-capitalized banks to pay dividends to signal their financial health when faced with stock prices that are skewed high. Based on the regulatory pressure theory and signal theory of dividend payments in relation to bank capitalization, we formulate our second hypothesis:

H2: *Bank capitalization has a positive impact on the relationship between stock price crash risk and bank dividend payouts.*

Bank opacity may also alter the relationship between stock price crash risk and bank dividend payouts. Information asymmetry between managers and external stakeholders gives rise to an agency problem where the managers have incentives to exploit corporate resources for personal benefits at the expense of outsiders (Jensen and Meckling 1976). Banks use dividends as a method to alleviate the agency conflict, as dividend payments limit free cash flows and the private benefits of control available to the managers (Pinkowitz et al. 2006). In addition, to the extent that dividend-paying banks need to raise capital more frequently than nonpayers, bank managers are more subject to scrutiny from external shareholders (Rozeff 1982).

The prior literature shows that the quality of financial reporting is negatively associated with information asymmetry, as financial reporting is an important way for the management to communicate corporate performance and governance to outsiders (Healy and Palepu 2001). Given that bank opacity increases the information asymmetry between bank managers and external stakeholders, the managers in opaque banks will have more chances to withhold bad news from the public, potentially creating additional crash risk. Therefore, greater dividends would be in place as a substitute to reduce agency costs and deter opportunistic bank behaviors (Abreu and Gulamhussen 2013). Thus, our third hypothesis is as follows:

H3: *Bank opacity has a positive impact on the relationship between stock price crash risk and bank dividend payouts.*

3. Research Design and Sample

3.1. Measures

Following the prior literature (Chen et al. 2001; Kim et al. 2019; Li et al. 2017b), we employ two measures to capture bank-specific stock price crash risk: the negative skewness of weekly stock returns in a fiscal year (*NCSKEW*) and the down-to-up volatility of bank-specific weekly returns in a fiscal year (*DUVOL*). To construct these two crash risk measures, we first calculate bank-specific weekly returns ($W_{i\tau}$) by estimating the following expanded market model for each bank and fiscal year:

$$R_{i\tau} = \alpha_i + \beta_{1i} R_{m(\tau-2)} + \beta_{2i} R_{m(\tau-1)} + \beta_{3i} R_{m\tau} + \beta_{4i} R_{m(\tau+1)} + \beta_{5i} R_{m(\tau+2)} + \varepsilon_{i\tau} \quad (1)$$

where $R_{i\tau}$ is the return on stock i in week τ, and $R_{m\tau}$ is the return on the CRSP value-weighted market return in week τ. The lead and lag terms of market returns are included to control for nonsynchronous trading (Dimson 1979). Following Kim and Zhang (2016) and Chang et al. (2017), we define bank-specific weekly returns ($W_{i\tau}$) as the natural logarithm of 1 plus the residual return from the regression model (1): $W_{i\tau} = ln(1 + \varepsilon_{i\tau})$. Specifically, *NCSKEW* is calculated as the negative skewness of bank-specific weekly returns ($W_{i\tau}$) for a given bank in a fiscal year (Kim et al. 2019). *DUVOL* is defined as the natural logarithm of the ratio of the standard deviation of $W_{i\tau}$ for down weeks to the standard deviation of $W_{i\tau}$ for up weeks, where the up (down) weeks are defined as those with $W_{i\tau}$ above (below) the mean return for a given bank in a fiscal year (Kim et al. 2019).

To measure bank dividend payouts, we follow Ahmed et al. (2002) and Chance et al. (2000) to use the ratio of cash dividends divided by total assets (*CASHDV*) and follow Li et al. (2017a) and Masulis et al. (2020) to use the ratio of common dividends divided by total assets (*COMDV*). Cash dividends can reduce the free cash flow available to bank managers, thus alleviating the agency problem of resource misuse. Meanwhile, common dividends include stock dividends in addition to cash dividends, thereby subjecting bank managers more to common shareholders' monitoring upon the banks' issuance of additional common shares. Nevertheless, dividends represent the reward of a bank to its shareholders regardless of their type.

Bank capitalization (*CAP*) represents the banks' ability to withhold adverse economic shocks and absorb losses. Bank capitalization is measured by the tier 1 risk-adjusted capital ratio (*TIER1*) and total risk-adjusted capital ratio (*RACR*). *TIER1* is calculated as tier 1 capital (i.e., common equity, perpetual preferred stocks, and disclosed reserves including retained earnings) divided by risk-weighted assets. *RACR* is calculated as the total amount of bank regulatory capital (including common equity, perpetual preferred stock, loan loss reserves, hybrid capital instruments, and some types of subordinated debt) divided by risk-weighted assets. Both measures closely follow the regulatory definition of capital and are used by the FDIC to set minimum capital requirements (FDIC 2019). These requirements aim to ensure that banks remain solvent and can meet their financial obligations, particularly during economic downturns.

Our primary measure of bank opacity (*OPACITY*) is the magnitude of discretionary loan loss provisions (*ADLLP*), similar to Jiang et al. (2016). Loan loss provisions are bank managers' estimates of future loan losses and are the largest accruals in banks (Beatty and Liao 2014). *ADLLP* thus captures the extent to which bank managers deviate from the normal level of loan loss estimates, and a large number of provisions is generally regarded as an indication of the manipulation of loan loss estimates by bank managers for meeting earnings and/or capital targets (Ahmed et al. 1999; Kanagaretnam et al. 2003; Morris et al. 2016; Tran et al. 2019). The opportunistic use of provisions is also evidenced by Beatty and Liao (2014), who reported that discretionary provisions are associated with more bank earning restatements and SEC comment letters. Following Beatty and Liao (2014), we measure *ADLLP* as the absolute value of the residual term from the regression model (2):

$$\begin{aligned} LLP_{it} = {} & \alpha_0 + \alpha_1 \Delta NPL_{i(t+1)} + \alpha_2 \Delta NPL_{it} + \alpha_3 \Delta NPL_{i(t-1)} + \alpha_4 \Delta NPL_{i(t-2)} + \alpha_5 SIZE_{i(t-1)} + \alpha_6 \Delta LOAN_{it} \\ & + \alpha_7 \Delta GDP_{it} + \alpha_8 \Delta UNEMP_{it} + \alpha_9 \Delta HPI_{it} + ST_i + YR_t + \varepsilon_{it} \end{aligned} \quad (2)$$

where *LLP* is the ratio of loan loss provisions to beginning total loans; ΔNPL is the ratio of change in non-performing assets to beginning total loans; *SIZE* is the natural logarithm of total assets; *LOAN* is the ratio of change in total loans to beginning total assets; ΔGDP is the change in the per capita GDP of the state where the bank's headquarters are located;

$\Delta UNEMP$ is the change in the unemployment rate of the state where the bank's headquarters are located; ΔHPI is the change in the house price index of the state where the bank's headquarters are located. We also control for state fixed effects (*ST*) and year fixed effects (*YR*). A distinctive feature of the regression model (2) is that it considers changes in non-performing loans in four consecutive periods, as banks may use past, current, and future information on non-performing loans to estimate loan losses. We also follow the model proposed by Kanagaretnam et al. (2010) to estimate *ADLLP* and obtain very similar results.

Our second measure of bank opacity is the natural logarithm of bank audit fees (*AUDIT*). Audit fees are generally used as an input-side proxy for audit quality, and high audit quality gives greater insurance of financial reporting quality, thus reducing opacity (DeFond and Zhang 2014). Srinidhi and Gul (2007) argued that audit fees are expected to reflect auditor effort because the audit market is closely regulated with limited opportunities to earn rent. Prior research has related higher audit fees with more audit hours, a higher auditor industry specialization, greater board independence, diligence, and expertise, as well as improved corporate financial disclosures (Bae et al. 2016; Carcello et al. 2011; Davis et al. 1993; Yang et al. 2018). In addition, Kanagaretnam et al. (2010) found that audit fees enhance the relative informativeness of the discretionary component of the loan loss allowance, indicating that audit fees improve the market assessment of bank accounting information. Collectively, bank opacity can be categorized by the high magnitudes of *ADLLP* and low levels of *AUDIT*.

3.2. Model Specifications

We test H1 on the relationship between stock price crash risk and dividend payouts by estimating the regression model (3):

$$CASHDV_{it}\ (or\ COMDV_{it}) = \alpha_0 + \alpha_1 CRASH_{it} + \sum_k \alpha_k CONTROLS_{it} + BK_i + YR_t + \varepsilon_{it} \tag{3}$$

where bank dividend measures include the ratio of cash dividends to total assets (*CASHDV*) and the ratio of common dividends to total assets (*COMDV*). *CRASH* represents stock price crash risk measures, including the negative skewness of weekly stock returns over a fiscal year (*NCSKEW*) and the down-to-up volatility of bank-specific weekly returns over a fiscal year (*DUVOL*). Control variables ($\sum_k CONTROLS_{it}$) include bank-level variables, such as bank size (*SIZE*), market–book ratio (*MTB*), return on assets (*ROA*), tier 1 risk-adjusted capital ratio (*TIER1*), deposit ratio (*DEPOSIT*), loan charge-off ratio (*CHO*), asset growth rate (ΔAST), as well as the state-level per-capita GDP growth rate (ΔGDP). The detailed definitions of all variables used are provided in Appendix A. The choice of control variables is based on the prior literature: *SIZE* is included to account for large banks' tendency to raise capital in the equity market and have higher dividend payments (Abreu and Gulamhussen 2013; Theis and Dutta 2009; Forti and Schiozer 2015). *MTB* indicates the future growth opportunities of the banks that may use dividends to signal their high future prospects (Theis and Dutta 2009; Abreu and Gulamhussen 2013). *ROA* measures the profitability of the banks that are prone to pay more dividends when earnings are higher (Abreu and Gulamhussen 2013; Alhalabi et al. 2023). *TIER1* measures bank capitalization, with stronger capitalization leading to higher dividend payments (Abreu and Gulamhussen 2013; Theis and Dutta 2009). *DEPOSIT* captures bank deposit funding and a greater *DEPOSIT* indicates a lower reliance on equity financing and thus, less dividend payment (Alhalabi et al. 2023). *CHO* measures bank loan risk, which may have a negative influence on dividends since high-risk banks need to keep retained earnings to increase their capital buffers (Forti and Schiozer 2015; Johari et al. 2020). ΔAST captures bank historical growth. Fast-growing banks may plowback their earnings to avoid costly equity and debt financing (Abreu and Gulamhussen 2013). ΔGDP is included to control for the impact of the macroeconomic climate on bank dividend policies (Kanas 2014). Finally, we include bank fixed (*BK*) and year fixed effects (*YR*) to control for unobservable bank characteristics and time variations. Since H1 predicts that stock price crash risk is associated with greater bank dividend payouts, we expect α_1, the coefficient on *NCSKEW* and *DUVOL*, to be significantly positive.

To test H2 on the moderating effect of bank capitalization on the relationship between crash risk and dividend payments, we extend model (3) by including the interaction term *CRASH*CAP* and estimate the regression model (4):

$$CASHDV_{it}\ (or\ COMDV_{it}) = \alpha_0 + \alpha_1 CRASH_{it} + \alpha_2 CAP_{it} + \alpha_3 CRASH_{it} * CAP_{it} + \sum_k \alpha_k CONTROLS_{it} + BK_i + YR_t + \varepsilon_{it} \quad (4)$$

where *CAP* represents bank capitalization proxied by either *TIER1* or *RACR*. $\sum_k CONTROLS_{it}$ include *SIZE*, *MTB*, *ROA*, *DEPOSIT*, *CHO*, ΔAST, and ΔGDP. Our primary variable of interest is the interaction term *CRASH*CAP*. Since we expect capitalization to have a positive impact on the relationship between stock price crash risk and cash tax avoidance, we predict that α_3, the coefficient on *CRASH*TIER1* and *CRASH*RACR*, should be positive and significant.

Finally, to assess H3 on whether bank opacity moderates the crash risk–dividend relationship, we expand model (3) by adding the interaction term between *CRASH* and *OPACITY* and estimating the regression model (5):

$$CASHDV_{it}\ (or\ COMDV_{it}) = \alpha_0 + \alpha_1 CRASH_{it} + \alpha_2 OPACITY_{it} + \alpha_3 CRASH_{it} * OPACITY_{it} + \sum_k \alpha_k CONTROLS_{it} + BK_i + YR_t + \varepsilon_{it} \quad (5)$$

where *OPACITY* represents bank opacity and is proxied by the high magnitudes of discretionary loan loss provisions (*ADLLP*) and low audit fees (*AUDIT*). $\sum_k CONTROLS_{it}$ include *SIZE*, *MTB*, *ROA*, *TIER1*, *DEPOSIT*, *CHO*, ΔAST, and ΔGDP. Given H3 that bank opacity positively affects the relationship between crash risk and dividend payments, we predict that the coefficient on *CRASH*ADLLP* should be significantly positive while the coefficient on *CRASH*AUDIT* should be significantly negative.

3.3. Sample and Data

We collected bank financial information from the Compustat Bank database to construct our dividend ratio and bank-level accounting variables. We obtained stock price information from the Center for Research in Security Prices (CRSP) database to construct the stock price crash risk variables. GDP data came from the U.S. Bureau of Economic Analysis, unemployment rates from the U.S. Bureau of Labor Statistics, and house price index from the Federal Housing Finance Agency. Our sample period covers the years 2004–2018. The years of the COVID-19 pandemic are excluded from our sample because the Fed placed restrictions on banks' share buybacks and dividend payouts during the pandemic. After deleting observations with insufficient information to perform empirical tests, we ended up with 5141 bank-year observations, with 684 individual banks in our final sample. We winsorized all bank-level variables at the top and bottom 1 percentile to mitigate the effect that extreme values may have on our results.

4. Empirical Results

Table 1 shows the descriptive statistics for variables used in our main regressions. The mean values of *CASHDV* and *COMDV* are 0.003, indicating that cash and common dividend payments are approximately 0.3% of the banks' total assets. The mean (median) values of *NCSKEW* are −0.109 and −0.104 while the mean (median) values of *DUVOL* are −0.060 and −0.061, suggesting that the banks' weekly stock returns are negatively skewed. These crash risk statistics generally correspond to those reported in prior research (e.g., Callen and Fang 2013; Chen et al. 2001; Jung et al. 2019). For control variables, the market value of equity is about 125.8% of the book equity, the return on assets is around 0.9%, the tier 1 risk-adjusted capital ratio (*TIER1*) is 12.3%, the deposit ratio is 76.4%, and about 0.6% of the loans are charged off due to delinquency or defaults. During the sample period, the per capita GDP experienced a 0.7% annual growth rate.

Table 1. Descriptive statistics.

	N	**Mean**	**Median**	**Q1**	**Q3**	**Std. Dev.**
CASHDV	5141	0.003	0.003	0.001	0.004	0.002
COMDV	5141	0.003	0.002	0.001	0.004	0.002
NCSKEW	5141	−0.109	−0.104	−0.448	0.248	0.616
DUVOL	5141	−0.060	−0.061	−0.257	0.142	0.306
SIZE	5141	7.723	7.395	6.639	8.503	1.510
MTB	5141	1.258	1.177	0.871	1.562	0.586
ROA	5141	0.009	0.011	0.006	0.016	0.013
TIER1	5141	0.123	0.119	0.101	0.139	0.032
DEPOSIT	5141	0.764	0.780	0.718	0.824	0.083
CHO	5141	0.006	0.002	0.001	0.006	0.009
ΔAST	5141	0.086	0.053	0.007	0.124	0.146
RACR	5141	0.150	0.141	0.125	0.163	0.041
ADLLP	5141	0.004	0.003	0.001	0.005	0.006
AUDIT	5141	12.772	12.608	11.983	13.406	1.118
ΔGDP	5141	0.007	0.011	−0.003	0.020	0.022

Table 1 presents the descriptive statistics. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. All variables are defined in Appendix A.

We present the Pearson correlation matrix of the variables in Table 2. *CASHDV* and *COMDV* have a correlation coefficient of 0.97, which is significant at the 1% level, meaning that cash dividends and common dividends are positively and significantly correlated. Likewise, the correlation coefficient between *NCSKEW* and *DUVOL* is 0.96, comparable to that reported in previous studies (e.g., Callen and Fang 2013; Chen et al. 2001), suggesting that *NCSKEW* and *DUVOL* capture much of the same crash risk information. It is noteworthy that *NCSKEW* and *DUVOL* have a significant and positive correlation with *CASHDV* and *COMDV*, respectively. The correlation coefficients stand at either 0.11 or 0.10, statistically significant at the 1% level. This lends preliminary support to our hypothesis that banks with a greater crash risk make more dividend payments. Furthermore, our findings indicate that *CASHDV* and *COMDV* have a significantly positive correlation with *SIZE*, *MTB*, *ROA*, *TIER1*, *RACR*, *AUDIT*, and Δ*GDP*. Conversely, they exhibit a significantly negative correlation with *DEPOSIT*, *CHO*, Δ*AST*, and *ADLLP*.

Table 2. Pearson correlation matrix.

		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	*CASHDV*	**1.00**														
2	*COMDV*	**0.97**	**1.00**													
3	*NCSKEW*	**0.11**	**0.11**	**1.00**												
4	*DUVOL*	**0.10**	**0.10**	**0.96**	**1.00**											
5	*SIZE*	**0.25**	**0.22**	**0.14**	**0.11**	**1.00**										
6	*MTB*	**0.36**	**0.41**	**0.04**	**0.03**	**0.22**	**1.00**									
7	*ROA*	**0.34**	**0.38**	0.03	0.02	**0.19**	**0.54**	**1.00**								
8	*TIER1*	**0.10**	**0.09**	0.00	0.00	**−0.12**	−0.02	**0.15**	**1.00**							
9	*DEPOSIT*	**−0.17**	**−0.17**	**−0.03**	−0.03	**−0.23**	**0.06**	**−0.03**	**0.04**	**1.00**						
10	*CHO*	**−0.21**	**−0.26**	0.01	0.02	**0.04**	**−0.35**	**−0.65**	**−0.07**	**0.06**	**1.00**					
11	*ΔAST*	**−0.07**	**−0.04**	0.00	0.00	**0.08**	**0.18**	**0.29**	**−0.08**	0.01	**−0.25**	**1.00**				
12	*RACR*	**0.06**	**0.06**	−0.02	−0.02	**−0.14**	**−0.12**	**0.07**	**0.72**	**−0.21**	**−0.06**	**−0.14**	**1.00**			
13	*ADLLP*	**−0.13**	**−0.16**	0.02	0.02	−0.02	**−0.27**	**−0.58**	**−0.06**	−0.02	**0.69**	**−0.14**	−0.01	**1.00**		
14	*AUDIT*	**0.19**	**0.17**	**0.12**	**0.10**	**0.93**	**0.19**	**0.13**	**−0.09**	**−0.20**	**0.09**	**0.05**	**−0.11**	0.02	**1.00**	
15	*ΔGDP*	**0.06**	**0.09**	0.02	0.01	**0.06**	**0.29**	**0.37**	**0.07**	**0.06**	**−0.28**	**0.07**	**0.05**	**−0.27**	**0.07**	**1.00**

Table 2 presents the Pearson correlation matrix. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. The bold numbers are significant at the 5% level, based on a two-tailed test. All variables are defined in Appendix A.

Table 3 shows the differences in the mean and median values of the dividend measures *CASHDV* and *COMDV* between the banks with high and low *NCSKEW* and *DUVOL*. High and low *NCSKEW* and *DUVOL* are determined based on the respective sample median for a specific year. We find that the mean (median) values of *CASHDV* and *COMDV* are

0.0030 (0.0028) and 0.0029 (0.0027) for the high *NCSKEW* banks, higher than the values of 0.0027 (0.0023) and 0.0025 (0.0020) for the low *NCSKEW* banks. The difference is statistically significant at the 1% level. Similarly, the mean (median) values of *CASHDV* and *COMDV* are also significantly higher for the banks with high *DUVOL* than those with low *DUVOL*. Collectively, these findings indicate that banks with a higher stock price crash risk pay higher dividends.

Table 3. Univariate tests.

Panel A: Difference in Dividend Payments between Low and High *NCSKEW* Banks				
	Low *NCSKEW* Bank-Years	**High *NCSKEW* Bank-Years**	**Difference**	**Test of Difference (*t*-Statistic)**
Mean *CASHDV*	0.0027	0.0030	0.0003	5.43 ***
Mean *COMDV*	0.0025	0.0029	0.0004	5.61 ***
Median *CASHDV*	0.0023	0.0028	0.0005	6.05 ***
Median *COMDV*	0.0020	0.0027	0.0007	6.28 ***
Panel B: Difference in Dividend Payments between Low and High *DUVOL* Banks				
	Low *DUVOL* Bank-Years	**High *DUVOL* Bank-Years**	**Difference**	**Test of Difference (*t*-Statistic)**
Mean *CASHDV*	0.0023	0.0028	0.0003	5.23 ***
Mean *COMDV*	0.0020	0.0027	0.0004	5.44 ***
Median *CASHDV*	0.0023	0.0028	0.0005	5.63 ***
Median *COMDV*	0.0020	0.0027	0.0007	5.89 ***

Table 3 presents the differences in the mean and median values of *CASHDV*/*COMDV* between the low and high *NCSKEW*/*DUVOL* banks. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. All variables are defined in Appendix A.

Before turning attention to multivariate regressions, we need to ensure the stationarity of the variables to avoid spurious regression results. To address this concern, we conduct the Fisher-type unit root tests, based on the augmented Dickey–Fuller (ADF) tests, on all variables used in regression models (3), (4), and (5). The outcomes of these unit root tests are presented in Table 4. All the Fisher-type test results display *p*-values of 0.00. Consequently, the null hypothesis that "all panels contain unit roots" is rejected, confirming that all variables are stationary at the 1% significance level. These findings mitigate the risk of spurious regression results.

We present the OLS regression results for H1 in Table 5. Across all four columns, the coefficients on *NCSKEW* and *DUVOL* are significantly positive at the 1% level (*t*-statistics = 2.64, 2.62, 3.36, and 3.10), supporting our H1 that stock price crash risk has a positive impact on bank dividend payments. The impact is also economically significant: one standard deviation increase in *NCSKEW* (*DUVOL*) corresponds to 2.1% (2.0%) and 2.1% (2.0%) increases in *CASHDV* and *COMDV*, respectively[2]. These results indicate that banks pay significantly more dividends to investors to compensate for their exposure to crash risk. On the one hand, the regression results on the control variables are generally consistent with the prior literature (e.g., Abreu and Gulamhussen 2013). *SIZE*, *MTB*, *ROA*, and *TIER1* are significantly and positively associated with *CASHDV* and *COMDV*, suggesting that the banks of larger size, with greater future growth potential, high profitability, and stronger capitalization, tend to make more dividend payments. On the other hand, *DEPOSIT*, *CHO*, and ΔAST are significantly and negatively related to *CASHDV* and *COMDV*, in line with the prediction that banks with greater reliance on deposit liabilities, higher loan risk, and greater past growth tend to make fewer dividend payouts.

Table 4. Unit root tests.

	Inverse Chi^2 P (p-Value)	Inverse Normal Z (p-Value)	Inverse Logit t L* (p-Value)	Modified Inv. Chi^2 Pm (p-Value)
CASHDV	1571.424 (0.00)	−22.240 (0.00)	−24.672 (0.00)	32.603 (0.00)
COMDV	1652.744 (0.00)	−22.950 (0.00)	−27.088 (0.00)	37.423 (0.00)
NCSKEW	1317.013 (0.00)	−21.062 (0.00)	−20.855 (0.00)	24.280 (0.00)
DUVOL	1351.155 (0.00)	−21.439 (0.00)	−21.338 (0.00)	25.331 (0.00)
SIZE	727.047 (0.00)	−3.395 (0.00)	−3.589 (0.00)	6.125 (0.00)
MTB	1271.265 (0.00)	−19.126 (0.00)	−19.223 (0.00)	22.872 (0.00)
ROA	1528.699 (0.00)	−23.165 (0.00)	−24.401 (0.00)	30.794 (0.00)
TIER1	1419.145 (0.00)	−21.539 (0.00)	−22.062 (0.00)	27.423 (0.00)
DEPOSIT	1537.776 (0.00)	−22.848 (0.00)	−24.189 (0.00)	31.074 (0.00)
CHO	1327.371 (0.00)	−21.136 (0.00)	−21.048 (0.00)	24.599 (0.00)
ΔAST	1297.830 (0.00)	−19.661 (0.00)	−19.907 (0.00)	23.690 (0.00)
RACR	1404.700 (0.00)	−21.059 (0.00)	−21.530 (0.00)	26.979 (0.00)
ADLLP	1275.420 (0.00)	−20.164 (0.00)	−20.087 (0.00)	23.000 (0.00)
AUDIT	830.071 (0.00)	−8.545 (0.00)	−8.465 (0.00)	9.296 (0.00)
ΔGDP	1476.429 (0.00)	−23.614 (0.00)	−23.899 (0.00)	29.186 (0.00)

Table 4 presents the results of Fisher-type unit root tests based on augmented Dickey–Fuller tests. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *p*-values are reported in parentheses. All variables are defined in Appendix A.

Table 5. Multivariate tests on the relationship between stock price crash risk and dividend payments.

	Dependent Variable = $CASHDV_{it}$ (1)	Dependent Variable = $CASHDV_{it}$ (2)	Dependent Variable = $COMDV_{it}$ (3)	Dependent Variable = $COMDV_{it}$ (4)
Variable	**Coefficient (t-Statistic)**	**Coefficient (t-Statistic)**	**Coefficient (t-Statistic)**	**Coefficient (t-Statistic)**
Intercept	−0.003 * (−1.90)	−0.003 * (−1.88)	−0.003 (−1.59)	−0.003 (−1.57)
$NCSKEW_{it}$	0.0001 *** (2.64)		0.0001 *** (3.36)	
$DUVOL_{it}$		0.0002 *** (2.62)		0.0002 *** (3.10)
$SIZE_{it}$	0.001 *** (4.98)	0.001 *** (4.98)	0.001 *** (4.47)	0.001 *** (4.48)
MTB_{it}	0.001 *** (5.03)	0.001 *** (5.03)	0.001 *** (6.20)	0.001 *** (6.20)
ROA_{it}	0.014 *** (4.36)	0.014 *** (4.33)	0.015 *** (4.87)	0.015 *** (4.84)

Table 5. *Cont.*

	Dependent Variable = $CASHDV_{it}$ (1)	Dependent Variable = $CASHDV_{it}$ (2)	Dependent Variable = $COMDV_{it}$ (3)	Dependent Variable = $COMDV_{it}$ (4)
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
$TIER1_{it}$	0.005 *** (2.63)	0.005 *** (2.62)	0.002 (1.09)	0.002 (1.09)
$DEPOSIT_{it}$	−0.002 ** (−2.54)	−0.002 ** (−2.55)	−0.002 ** (−2.28)	−0.002 ** (−2.28)
CHO_{it}	−0.013 *** (−3.02)	−0.013 *** (−3.03)	−0.016 *** (−3.59)	−0.016 *** (−3.60)
ΔAST_{it}	−0.001 *** (−7.40)	−0.001 *** (−7.41)	−0.001 *** (−6.19)	−0.001 *** (−6.20)
ΔGDP_{it}	−0.003 * (−1.93)	−0.003 * (−1.92)	−0.003 ** (−2.09)	−0.003 ** (−2.08)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	14.64	14.65	20.60	20.55
Adj. R^2	0.219	0.219	0.300	0.300

Table 5 provides the multivariate regression results for the relationship between *NCSKEW/DUVOL* and *CASHDV/COMDV*. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

We provide the regression results for H2 in Table 6. Panel A shows that the coefficients on the interaction terms *NCSKEW*TIER1* and *DUVOL*TIER1* are significant and positive (*t*-statistic = 3.39, 3.37, 3.80, and 3.85) across all four regression columns, supporting H2 that banks with high capital ratio pay more dividends in response to greater stock price crash risk. Similarly, Panel B shows that the coefficients on the interaction terms *NCSKEW*RACR* and *DUVOL*RACR* are significant and positive (*t*-statistic = 3.37, 3.61, 4.13, and 4.23), lending further support to H2. These results are in consonance with the signaling theory that financially healthy banks have greater incentives to use dividend payments as a signaling mechanism to convey their favorable economic condition. They also support the regulatory pressure theory that banks with a higher capital ratio are less concerned about the regulatory minimum, thus having greater freedom to make dividend payments when necessary.

Table 7 exhibits the regression results for H3. In Panel A, we find that the magnitude of discretionary accruals (*ADLLP*) is significantly and positively associated with the bank dividend measures across all four columns, suggesting that the financially opaque banks pay more dividends. Moreover, we find that the coefficients on the interaction terms *NCSKEW*ADLLP* and *DUVOL*ADLLP* are also significantly positive (*t*-statistic = 2.93, 2.73, 2.45, and 2.25), supporting H3 that bank opacity increases the impact of stock price crash risk on dividend payments. In Panel B, we find that the audit fee variable (*AUDIT*) is negatively associated with *CASHDV* and *COMDV* (but not significant at conventional levels). More importantly, we find that the coefficients on the interaction terms *NCSKEW*AUDIT* and *DUVOL*AUDIT* are significantly negative (*t*-statistic = −3.24, −3.97, −3.12, and −3.75), indicating that audit quality (bank opacity) decreases (increases) the impact of stock price crash risk on dividend payments. These findings are in line with dividends as a substitute for financial transparency to reduce agency costs.

Table 6. Multivariate tests on the impact of bank capitalization on the relationship between stock price crash risk and dividend payments.

Panel A: The Impact of Tier 1 Risk-Adjusted Capital Ratio				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−0.003 ** (−2.04)	−0.003 ** (−2.01)	−0.003 * (−1.74)	−0.003 * (−1.72)
$NCSKEW_{it}$	−0.0004 *** (−2.86)		−0.0004 *** (−3.09)	
$DUVOL_{it}$		−0.001 *** (−2.88)		−0.001 *** (−3.23)
$TIER1_{it}$	0.005 *** (2.96)	0.006 *** (2.99)	0.003 (1.46)	0.003 (1.51)
$NCSKEW_{it} * TIER1_{it}$	0.004 *** (3.39)		0.005 *** (3.80)	
$DUVOL_{it} * TIER1_{it}$		0.010 *** (3.37)		0.011 *** (3.85)
$SIZE_{it}$	0.001 *** (5.07)	0.001 *** (5.06)	0.001 *** (4.57)	0.001 *** (4.57)
MTB_{it}	0.001 *** (5.01)	0.001 *** (5.00)	0.001 *** (6.20)	0.001 *** (6.19)
ROA_{it}	0.014 *** (4.35)	0.014 *** (4.31)	0.015 *** (4.86)	0.015 *** (4.80)
$DEPOSIT_{it}$	−0.002 ** (−2.53)	−0.002 ** (−2.55)	−0.002 ** (−2.26)	−0.002 ** (−2.28)
CHO_{it}	−0.013 *** (−3.15)	−0.013 *** (−3.20)	−0.016 *** (−3.74)	−0.016 *** (−3.79)
ΔAST_{it}	−0.001 *** (−7.35)	−0.001 *** (−7.38)	−0.001 *** (−6.13)	−0.001 *** (−6.16)
ΔGDP_{it}	−0.002 * (−1.91)	−0.002 * (−1.89)	−0.003 ** (−2.08)	−0.003 ** (−2.05)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	14.13	14.14	20.11	20.09
Adj. R^2	0.223	0.224	0.304	0.305
Panel B: The Impact of Total Risk-Adjusted Capital Ratio				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−0.003 * (−1.77)	−0.003 * (−1.77)	−0.003 (−1.57)	−0.003 (−1.57)
$NCSKEW_{it}$	−0.0004 *** (−2.72)		−0.0004 *** (−3.25)	
$DUVOL_{it}$		−0.001 *** (−3.04)		−0.001 *** (−3.51)
$RACR_{it}$	0.004 * (1.89)	0.004 ** (1.98)	0.002 (0.93)	0.002 (1.02)
$NCSKEW_{it} * RACR_{it}$	0.003 *** (3.37)		0.004 *** (4.13)	
$DUVOL_{it} * RACR_{it}$		0.008 *** (3.61)		0.009 *** (4.23)
$SIZE_{it}$	0.001 *** (4.85)	0.001 *** (4.86)	0.001 *** (4.42)	0.001 *** (4.44)

Table 6. *Cont.*

Panel B: The Impact of Total Risk-Adjusted Capital Ratio				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
MTB_{it}	0.001 *** (4.96)	0.001 *** (4.95)	0.001 *** (6.17)	0.001 *** (6.17)
ROA_{it}	0.014 *** (4.39)	0.014 *** (4.35)	0.015 *** (4.79)	0.015 *** (4.74)
$DEPOSIT_{it}$	−0.002 *** (−2.64)	−0.002 *** (−2.66)	−0.002 ** (−2.35)	−0.002 ** (−2.37)
CHO_{it}	−0.014 *** (−3.33)	−0.014 *** (−3.37)	−0.017 *** (−3.91)	−0.017 *** (−3.95)
ΔAST_{it}	−0.001 *** (−7.34)	−0.001 *** (−7.36)	−0.001 *** (−6.12)	−0.001 *** (−6.15)
ΔGDP_{it}	−0.002 * (−1.86)	−0.002 * (−1.82)	−0.003 ** (−2.01)	−0.003 * (−1.96)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	13.99	13.96	19.92	19.87
Adj. R^2	0.221	0.222	0.303	0.305

Table 6 presents the multivariate regression results for the impact of *TIER1/RACR* on the relationship between *NCSKEW/DUVOL* and *CASHDV/COMDV*. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

Table 7. Multivariate tests on the impact of bank opacity on the relationship between stock price crash risk and dividend payments.

Panel A: The Impact of the Magnitude of Discretionary Loan Loss Provisions				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Intercept	−0.003 ** (−1.98)	−0.003 * (−1.95)	−0.003 * (−1.66)	−0.003 (−1.64)
$NCSKEW_{it}$	0.00001 (0.31)		0.0001 (1.30)	
$DUVOL_{it}$		0.00003 (0.35)		0.00001 (1.15)
$ADLLP_{it}$	0.027 *** (4.37)	0.026 *** (4.37)	0.029 *** (5.09)	0.029 *** (5.09)
$NCSKEW_{it} * ADLLP_{it}$	0.015 *** (2.93)		0.011 ** (2.45)	
$DUVOL_{it} * ADLLP_{it}$		0.032 *** (2.72)		0.025 ** (2.25)
$SIZE_{it}$	0.001 *** (5.07)	0.001 *** (5.06)	0.001 *** (4.55)	0.001 *** (4.56)
MTB_{it}	0.001 *** (4.85)	0.001 *** (4.83)	0.001 *** (6.02)	0.001 *** (6.02)
ROA_{it}	0.018 *** (5.05)	0.018 *** (5.02)	0.019 *** (5.74)	0.019 *** (5.70)
$TIER1_{it}$	0.005 *** (2.66)	0.005 *** (2.65)	0.002 (1.11)	0.002 (1.10)

Table 7. *Cont.*

Panel A: The Impact of the Magnitude of Discretionary Loan Loss Provisions				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
$DEPOSIT_{it}$	−0.002 ** (−2.54)	−0.002 ** (−2.56)	−0.002 ** (−2.26)	−0.002 ** (−2.28)
CHO_{it}	−0.021 *** (−4.53)	−0.021 *** (−4.46)	−0.025 *** (−5.23)	−0.025 *** (−5.18)
ΔAST_{it}	−0.002 *** (−7.74)	−0.002 *** (−7.76)	−0.001 *** (−6.65)	−0.001 *** (−6.66)
ΔGDP_{it}	−0.003 ** (−2.06)	−0.003 ** (−2.03)	−0.003 ** (−2.25)	−0.003 ** (−2.22)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	13.75	13.83	19.60	19.63
Adj. R^2	0.225	0.225	0.306	0.306
Panel B: The Impact of Audit Fees				
	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Intercept	−0.003 (−1.47)	−0.003 (−1.41)	−0.002 (−0.92)	−0.002 (−0.87)
$NCSKEW_{it}$	0.001 *** (3.51)		0.001 *** (3.48)	
$DUVOL_{it}$		0.003 *** (4.24)		0.003 *** (4.09)
$AUDIT_{it}$	−0.00004 (−0.32)	−0.00004 (−0.36)	−0.0001 (−0.73)	−0.0001 (−0.77)
$NCSKEW_{it} * AUDIT_{it}$	−0.0001 *** (−3.24)		−0.0001 *** (−3.12)	
$DUVOL_{it} * AUDIT_{it}$		−0.0002 *** (−3.97)		−0.0002 *** (−3.75)
$SIZE_{it}$	0.001 *** (4.59)	0.001 *** (4.60)	0.001 *** (4.50)	0.001 *** (4.51)
MTB_{it}	0.001 *** (4.97)	0.001 *** (4.96)	0.001 *** (6.15)	0.001 *** (6.15)
ROA_{it}	0.014 *** (4.43)	0.014 *** (4.47)	0.015 *** (4.88)	0.015 *** (4.91)
$TIER1_{it}$	0.005 *** (2.63)	0.005 *** (2.61)	0.002 (1.13)	0.002 (1.11)
$DEPOSIT_{it}$	−0.002 ** (−2.53)	−0.002 ** (−2.54)	−0.002 ** (−2.24)	−0.002 ** (−2.26)
CHO_{it}	−0.013 *** (−3.04)	−0.013 *** (−3.02)	−0.016 *** (−3.59)	−0.016 *** (−3.58)
ΔAST_{it}	−0.001 *** (−7.42)	−0.001 *** (−7.44)	−0.001 *** (−6.23)	−0.001 *** (−6.24)
ΔGDP_{it}	−0.002 * (−1.84)	−0.002 * (−1.80)	−0.003 ** (−2.01)	−0.002 ** (−1.97)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	13.63	13.71	18.88	18.88
Adj. R^2	0.221	0.223	0.302	0.303

Table 7 presents the multivariate regression results for the impact of *ADLLP/AUDIT* on the relationship between *NCSKEW/DUVOL* and *CASHDV/COMDV*. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

5. Additional Analyses

Our main regression results may suffer from endogeneity problems due to reverse causality or omitted variables. To mitigate the concern of endogeneity, we employed the change model as a robustness check to the level models used in the previous sections. In particular, we predicted that firms make incremental dividend payments after the risk of stock price crash increases. To test this prediction, we estimated the OLS regression between change in crash risk ($\Delta NCSKEW$ and $\Delta DUVOL$) and change in dividend payments ($\Delta CASHDV$ and $\Delta COMDV$). We provide the regression results in Table 8, where we find that the change in crash risk is significantly and positively associated with the change in dividend payouts during the sample period.

Table 8. Multivariate tests on the relationship between change in stock price crash risk and change in dividend payments.

	Dependent Variable = $\Delta CASHDV_{it}$ (1)	**Dependent Variable = $\Delta CASHDV_{it}$ (2)**	**Dependent Variable = $\Delta COMDV_{it}$ (3)**	**Dependent Variable = $\Delta COMDV_{it}$ (4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	0.000 (1.16)	0.000 (1.16)	0.000 (0.57)	0.000 (0.91)
$\Delta NCSKEW_{it}$	0.0001 *** (3.70)		0.0001 *** (4.26)	
$\Delta DUVOL_{it}$		0.0001 *** (3.69)		0.0001 *** (3.76)
$\Delta SIZE_{it}$	0.001 (1.00)	0.001 (1.01)	0.003 ** (2.15)	0.003 ** (2.17)
ΔMTB_{it}	0.0002 (0.54)	0.0002 (0.56)	0.0001 ** (2.51)	0.0001 ** (2.54)
ΔROA_{it}	0.001 (0.29)	0.001 (0.27)	0.002 (0.81)	0.002 (0.78)
$\Delta TIER1_{it}$	0.003 *** (2.68)	0.003 *** (2.69)	0.002 * (1.92)	0.002 * (1.94)
$\Delta DEPOSIT_{it}$	−0.001 (−1.37)	−0.001 (−1.39)	−0.001 (−1.55)	−0.001 (−1.58)
ΔCHO_{it}	−0.011 *** (−3.74)	−0.011 *** (−3.73)	−0.011 *** (−4.09)	−0.011 *** (−4.07)
ΔAST_{it}	−0.002 * (−1.91)	−0.002 * (−1.92)	−0.003 *** (−3.06)	−0.003 *** (−3.08)
ΔGDP_{it}	0.003 *** (3.11)	0.003 *** (3.11)	0.003 *** (3.85)	0.003 *** (3.86)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	19.06	19.17	35.07	46.90
Adj. R^2	0.106	0.106	0.188	0.188

Table 8 provides the multivariate regression results for the relationship between $\Delta NCSKEW$/$\Delta DUVOL$ and $\Delta CASHDV$/$\Delta COMDV$. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

To shed light on the causal relationship between banks' stock price crash risk and their dividend payments, we re-estimated the OLS regression model by examining how one-year-lagged stock price crash risk ($NCSKEW_{i(t-1)}$ and $DUVOL_{i(t-1)}$) affects current-period dividend payments ($CASHDV_{it}$ and $COMDV_{it}$). Table 9 presents the results of using lagged crash risk and current dividend payments. Our results still hold: the coefficients of $NCSKEW_{i(t-1)}$ and $DUVOL_{i(t-1)}$ are all significantly positive as expected, with

t-statistic = 2.71, 2.25, 2.49, and 2.24. These results indicate that past stock price crashes have strong implications for current bank dividend policies.

Table 9. Multivariate tests on the relationship between lagged stock price crash risk and dividend payments.

	Dependent Variable = $CASHDV_{it}$ **(1)**	**Dependent Variable =** $CASHDV_{it}$ **(2)**	**Dependent Variable =** $COMDV_{it}$ **(3)**	**Dependent Variable =** $COMDV_{it}$ **(4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−0.003 * (−1.89)	−0.003 * (−1.91)	−0.003 (−1.61)	−0.003 (−1.62)
$NCSKEW_{i(t-1)}$	0.0001 *** (2.71)		0.0001 ** (2.49)	
$DUVOL_{i(t-1)}$		0.0002 ** (2.25)		0.0002 ** (2.24)
$SIZE_{it}$	0.001 *** (4.99)	0.001 *** (5.01)	0.001 *** (4.51)	0.001 *** (4.53)
MTB_{it}	0.001 *** (5.10)	0.001 *** (5.09)	0.001 *** (6.27)	0.001 *** (6.26)
ROA_{it}	0.014 *** (4.34)	0.014 *** (4.34)	0.015 *** (4.84)	0.015 *** (4.84)
$TIER1_{it}$	0.005 *** (2.68)	0.005 *** (2.68)	0.002 (1.16)	0.002 (1.16)
$DEPOSIT_{it}$	−0.002 ** (−2.58)	−0.002 ** (−2.57)	−0.002 ** (−2.31)	−0.002 ** (−2.31)
CHO_{it}	−0.013 *** (−3.00)	−0.013 *** (−3.03)	−0.016 *** (−3.58)	−0.016 *** (−3.59)
ΔAST_{it}	−0.001 *** (−7.34)	−0.001 *** (−7.34)	−0.001 *** (−6.14)	−0.001 *** (−6.13)
ΔGDP_{it}	−0.003 * (−1.93)	−0.003 * (−1.92)	−0.003 ** (−2.10)	−0.003 ** (−2.09)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	5141	5141	5141	5141
F-Statistic	14.59	14.58	20.35	20.38
Adj. R^2	0.219	0.219	0.299	0.299

Table 9 provides the multivariate regression results for the relationship between lagged *NCSKEW/DUVOL* and *CASHDV/COMDV*. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. t-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

We concurrently examine the potential for a reverse causal relationship between crash risk and dividends by investigating whether dividend payments can alleviate subsequent stock price crash risk. Our regression results are presented in Table 10. The coefficients for *CASHDV* in both the *NCSKEW* and *DUVOL* regressions (columns 1 and 3) are negative, suggesting that an increase in cash dividends correlates with a decrease in future stock price crash risk. This implies that cash dividend payments could potentially mitigate stock price crashes. However, the t-statistics for these coefficients are −0.86 and −0.35, respectively, indicating that these findings are not statistically significant at conventional levels.

Focusing on common dividends, the coefficient for *COMDV* is −1.059 in column 2 and 1.005 in column 4. This introduces a degree of uncertainty regarding the relationship between common dividends and future down-to-up stock return volatility. Similar to *CASHDV*, the t-statistics here are also low (−0.13 and 0.23, respectively), suggesting that these results are not statistically significant. In summary, the results presented in Table 10 suggest that banks may experience a decline in stock price crash risk following dividend payments. However, due to the lack of statistical significance in the coefficients, we cannot make strong inferences about the relationship between dividends and future stock price crash risk.

Table 10. Multivariate tests on the relationship between dividend payments and forward stock price crash risk.

	Dependent Variable = $NCSKEW_{i(t+1)}$ (1)	Dependent Variable = $NCSKEW_{i(t+1)}$ (2)	Dependent Variable = $DUVOL_{i(t+1)}$ (3)	Dependent Variable = $DUVOL_{i(t+1)}$ (4)
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−1.430 *** (−2.69)	−1.400 *** (−2.64)	−0.714 ** (−2.46)	−0.702 ** (−2.42)
$CASHDV_{it}$	−7.140 (−0.86)		−1.517 (−0.35)	
$COMDV_{it}$		−1.059 (−0.13)		1.005 (0.23)
$SIZE_{it}$	0.165 *** (3.41)	0.158 *** (3.25)	0.085 *** (3.48)	0.082 *** (3.36)
MTB_{it}	0.056 (1.49)	0.052 (1.38)	0.029 * (1.66)	0.028 (1.56)
ROA_{it}	5.688 *** (3.50)	5.608 *** (3.45)	2.788 *** (3.50)	2.754 *** (3.45)
$TIER1_{it}$	0.207 (0.38)	0.168 (0.31)	0.271 (1.06)	0.258 (1.02)
$DEPOSIT_{it}$	−0.039 (−0.13)	−0.025 (−0.08)	−0.088 (−0.59)	−0.082 (−0.55)
CHO_{it}	1.285 (0.56)	1.380 (0.60)	1.152 (1.05)	1.195 (1.09)
ΔAST_{it}	0.135 * (1.84)	0.145 ** (1.97)	0.077 ** (2.13)	0.081 ** (2.22)
ΔGDP_{it}	−0.407 (−0.68)	−0.396 (−0.66)	−0.271 (−0.93)	−0.266 (−0.92)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	4453	4453	4453	4453
F-Statistic	11.48	11.53	11.88	11.91
Adj. R^2	0.050	0.050	0.052	0.052

Table 10 provides the multivariate regression results for the relationship between *CASHDV/COMDV* and forward *NCSKEW/DUVOL*. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

To evaluate the predictive validity of our regression models, we performed an out-of-sample analysis and back-testing procedure. We divided our dataset into an in-sample training dataset (2000–2014) and an out-of-sample test dataset (2015–2018). The former was used to estimate the model parameters, and the latter to assess the predictive performance. Table 11 presents the results validating our primary regression model (3). Panel A indicates that a higher stock price crash risk (*NCSKEW* and *DUVOL*) correlates with higher dividend payouts (*CASHDV* and *COMDV*), significantly at either 1% or 5% level, among banks during the in-sample test period (2004–2014). All control variables, such as *SIZE*, *MTB*, *ROA*, *TIER1*, *DEPOSIT*, *CHO*, ΔAST, and ΔGDP, exhibit their anticipated relationship as observed in the full-sample analysis (2004–2018). Notably, the in-sample root mean square deviation ($RMSE_{IS}$) is approximately 0.001, while the in-sample R-squared (R^2_{IS}) ranges from 0.265 to 0.353.

Table 11. Multivariate in-sample and out-of-sample tests on the relationship between stock price crash risk and dividend payments.

Panel A: In-Sample (IS) Test for 2004–2014				
	Dependent Variable = $CASHDV_{it}$ **(1)**	**Dependent Variable =** $CASHDV_{it}$ **(2)**	**Dependent Variable =** $COMDV_{it}$ **(3)**	**Dependent Variable =** $COMDV_{it}$ **(4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−0.001 (−0.89)	−0.001 (−0.88)	−0.000 (−0.21)	−0.000 (−0.21)
$NCSKEW_{it}$	0.0001 *** (2.68)		0.0001 *** (2.76)	
$DUVOL_{it}$		0.0002 ** (2.44)		0.0002 ** (2.48)
$SIZE_{it}$	0.001 *** (5.97)	0.001 *** (5.98)	0.001 *** (5.69)	0.001 *** (5.70)
MTB_{it}	0.001 *** (4.83)	0.001 *** (4.84)	0.001 *** (5.87)	0.001 *** (5.88)
ROA_{it}	0.010 *** (3.05)	0.010 *** (3.03)	0.011 *** (3.47)	0.011 *** (3.45)
$TIER1_{it}$	0.005 *** (2.64)	0.005 *** (2.63)	0.002 (1.05)	0.002 (1.04)
$DEPOSIT_{it}$	−0.003 *** (−2.96)	−0.003 *** (−2.96)	−0.003 *** (−2.76)	−0.003 *** (−2.77)
CHO_{it}	−0.014 *** (−3.32)	−0.014 *** (−3.32)	−0.017 *** (−3.93)	−0.017 *** (−3.94)
ΔAST_{it}	−0.002 *** (−6.03)	−0.002 *** (−6.03)	−0.001 *** (−5.02)	−0.001 *** (−5.02)
ΔGDP_{it}	−0.003 ** (−2.28)	−0.003 ** (−2.27)	−0.003 ** (−2.29)	−0.003 ** (−2.28)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	3995	3995	3995	3995
F-Statistic	15.36	15.37	23.05	23.01
$RMSE_{IS}$	0.001	0.001	0.001	0.001
Adj. R^2_{IS}	0.265	0.265	0.353	0.353
Panel B: Out-of-Sample (OOS) Test for 2015–2018				
	$RMSE_{OOS}$ $CASHDV_{it}$	$RMSE_{OOS}$ $COMDV_{it}$	R^2_{OOS} $CASHDV_{it}$	R^2_{OOS} $COMDV_{it}$
$NCSKEW_{it}$	0.001	0.001	0.107	0.090
$DUVOL_{it}$	0.001	0.001	0.107	0.090

Table 11 provides the multivariate regression results for the relationship between *NCSKEW/DUVOL* and *CASHDV/COMDV* for in-sample and out-of-sample tests. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

During the out-of-sample validation period (2015–2018), the models continue to maintain a low root mean squared error: $RMSE_{OOS}$ remains at 0.001 for both cash dividend prediction and common dividend prediction, indicating a fit as close as using the in-sample data points. The out-of-sample R-squared values R^2_{OOS} (0.107 for *CASHDV* and 0.090 for *COMDV*) also show that the models retain significant explanatory power even when applied to new, unseen data from subsequent years. Overall, the findings robustly support the hypothesis that banks strategically adjust their dividend payouts in response to changes in stock price crash risk. This behavior is consistent across different dividend types and persists in out-of-sample validations, underscoring the model's reliability and the importance of crash risk considerations in dividend policy decisions. Untabulated results also confirm the predictive power of the other used models.

The residuals in our main regression models may exhibit heavy distributional tails and volatility clustering, which could affect the interpretation of the factor loadings. To alleviate this concern, we employed the Box–Cox transformation, a statistical method that transforms variables into a shape that more closely resembles a normal distribution (Box and Cox 1964). We tabulate our main regression results using the Box–Cox transformation in Table 12, which shows that the stock price crash risk variables (*NCSKEW* and *DUVOL*) are positively associated with the bank dividend payments (*CASHDV* and *COMDV*) at the 1% significance level. Our statistical inferences do not change with respect to other regression models (untabulated) using the Box–Cox transformation. Additionally, we clustered the standard errors at the bank level (or at the bank-year level) to account for potential heteroscedasticity and autocorrelation within banks. Once again, statistical significance remains across all regressions. The results indicate that our factor loadings are robust and not unduly sensitive to the distributional characteristics of the residuals.

Table 12. Multivariate tests on the relationship between stock price crash risk and dividend payments using the Box–Cox transformation.

	Dependent Variable = $CASHDV_{it}$ (1)	**Dependent Variable = $CASHDV_{it}$ (2)**	**Dependent Variable = $COMDV_{it}$ (3)**	**Dependent Variable = $COMDV_{it}$ (4)**
Variable	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**	**Coefficient (*t*-Statistic)**
Intercept	−2.008 *** (−59.78)	−2.008 *** (−59.84)	−2.036 *** (−54.66)	−2.035 *** (−54.64)
$NCSKEW_{it}$	0.003 *** (3.65)		0.004 *** (4.41)	
$DUVOL_{it}$		0.005 *** (3.54)		0.007 *** (4.16)
$SIZE_{it}$	0.013 *** (3.52)	0.013 *** (3.53)	0.013 *** (3.05)	0.013 *** (3.05)
MTB_{it}	0.011 *** (4.61)	0.011 *** (4.62)	0.016 *** (6.59)	0.016 *** (6.60)
ROA_{it}	0.256 *** (3.39)	0.253 *** (3.35)	0.343 *** (4.10)	0.338 *** (4.05)
$TIER1_{it}$	0.110 *** (3.46)	0.110 *** (3.46)	0.067 * (1.85)	0.066 * (1.84)
$DEPOSIT_{it}$	−0.047 ** (−2.57)	−0.047 ** (−2.57)	−0.037 * (−1.90)	−0.037 * (−1.89)
CHO_{it}	−0.418 *** (−3.57)	−0.422 *** (−3.59)	−0.829 *** (−5.27)	−0.836 *** (−5.31)
ΔAST_{it}	−0.027 *** (−6.41)	−0.027 *** (−6.42)	−0.019 *** (−4.49)	−0.019 *** (−4.50)
ΔGDP_{it}	−0.016 (−0.63)	−0.015 (−0.60)	−0.043 (−1.44)	−0.042 (−1.42)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	4412	4412	4086	4086
F-Statistic	16.95	16.95	25.27	25.21
Adj. R^2	0.222	0.221	0.346	0.346

Table 12 provides the multivariate regression results for the relationship between *NCSKEW/DUVOL* and *CASHDV/COMDV* using the Box–Cox transformation. The continuous variables at the bank level are winsorized at the top and bottom 1% for each fiscal year. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on a two-tailed test. *t*-statistics are reported in parentheses, with the standard errors clustered at the bank level. All variables are defined in Appendix A.

Finally, the 2008 financial crisis hit the banking industry hard. To alleviate the concern that our results are not driven by the crisis, we eliminated the observations for the years 2007–2009. Untabulated results show that our main regression results still hold, suggesting that our findings are not sensitive to the financial crisis.

6. Conclusions

In this paper, we investigate whether and how stock price crash risk impacts bank dividend payments. We expect banks with greater stock price crash risk to pay significantly more dividends to compensate investors for their exposure to the high risk. In line with this expectation, we find that stock price crash risk, measured by the negative conditional skewness of weekly stock returns and the down-to-up volatility of weekly stock returns, is significantly and positively associated with bank cash dividend and common dividend payments. In addition, our results show that bank capitalization has a positive impact on the relationship between stock price crash risk and bank dividend payouts. These results are consistent with the regulatory pressure theory that banks with a higher capital ratio are less concerned with the regulatory minimum, thus enjoying greater freedom to make dividend payments. They are also consistent with the signaling theory that financially strong banks have greater incentives to use dividend payments as a signaling mechanism to convey their favorable economic condition. Finally, we find that bank opacity has a positive effect on the association between stock price crash risk and bank dividend payouts. As bank opacity facilitates the hoarding of bad news and intensifies stock price crash risk, financially opaque banks would pay more dividends as risk premia.

We believe our research makes several important contributions to the literature. First, our study constitutes one of the first steps to provide evidence on the implications of crash risk for banks. Second, our results offer useful guidance to investors who have different preferences over dividends versus capital gains. Given that stock price crash risk could reduce capital gains but is customarily associated with greater dividend payouts, interested investors could modify their investment strategies to suit their needs. Third, our findings should be of interest to the academia, as they provide new support for regulatory pressure theory, signaling theory, and agency cost theory. Regulators would also be informed by our study, which could help them better evaluate the implications of capital adequacy and financial reporting quality for the banking sector.

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Appendix A. Variable Definitions

Dependent Variables	
CASHDV	The ratio of cash dividends (Compustat DV) to total assets (Compustat AT).
COMDV	The ratio of common dividends (Compustat DVC) to total assets. (Compustat AT).
Main Variables of Interest	
NCSKEW	The negative skewness of CRSP weekly stock returns (W) in a fiscal year.
DUVOL	The natural logarithm of the ratio of the standard deviations of the down week to up week CRSP bank-specific weekly returns (W) in a fiscal year.

W	Bank-specific weekly return, calculated as the natural logarithm of 1 plus the residual return from the regression model: $R_{i\tau} = \alpha_i + \beta_{1i} R_{m(\tau-2)} + \beta_{2i} R_{m(\tau-1)} + \beta_{3i} R_{m\tau} + \beta_{4i} R_{m(\tau+1)} + \beta_{5i} R_{m(\tau+2)} + \varepsilon_{i\tau}$, where $R_{i\tau}$ is the return on stock *i* in week τ and $R_{m\tau}$ is the return on CRSP value-weighted market return in week τ.
Moderating Variables	
TIER1	Tier 1 risk-adjusted capital ratio (Compustat CAPR1/100).
RACR	Risk-adjusted capital ratio (Compustat CAPR3/100).
CAP	Bank capitalization represented by either *TIER1* or *RACR* as defined above.
ADLLP	The magnitude of discretionary loan loss provisions, calculated as the residual of the regression: $LLP_{it} = \alpha_0 + \alpha_1 \Delta NPL_{i(t+1)} + \alpha_2 \Delta NPL_{it} + \alpha_3 \Delta NPL_{i(t-1)} + \alpha_4 \Delta NPL_{i(t-2)} + \alpha_5 SIZE_{i(t-1)} + \alpha_6 \Delta LOAN_{it} + \alpha_7 \Delta GDP_{it} + \alpha_8 \Delta UNEMP_{it} + \alpha_9 \Delta HPI_{it} + ST_i + YR_t + \varepsilon_{it}$, where *LLP* is the ratio of loan loss provisions (Compustat PLL) to beginning total loans (Compustat LNTAL); Δ*NPL* is the ratio of change in non-performing assets (Compustat NPAT) to beginning total loans (Compustat LNTAL); *SIZE* is the natural logarithm of total assets (Compustat AT); *LOAN* is the ratio of change in total loans (Compustat LNTAL) to beginning total assets (Compustat AT); Δ*GDP* is the change in the per capita GDP of the state where the bank's headquarters are located (Bureau of Economic Analysis); Δ*UNEMP* is the change in the unemployment rate of the state where the bank's headquarters are located (Bureau of Labor Statistics); Δ*HPL* is the change in the house price index of the state where the bank's headquarters are located (Federal Housing Finance Agency).
AUDIT	The natural logarithm of total audit fees (Audit Analytics MATCHFY_SUM_AUDFEES).
OPACITY	Bank opacity represented by either *ADLLP* or *AUDIT* as defined above.
Other Control Variables	
SIZE	The natural logarithm of total assets (Compustat AT).
MTB	The ratio of the CRSP market value of equity to the book value of equity (Compustat CEQ)
ROA	The ratio of pre-tax income (Compustat PI) to beginning total assets (Compustat AT).
DEPOSIT	The ratio of total deposits (Compustat DPTC) to total assets (Compustat AT).
CHO	The ratio of loan charge-offs (Compustat NCO*(−1)) to beginning total loans (Compustat LNTAL).
Δ*AST*	The growth rate of total assets (Compustat AT).
Δ*GDP*	The growth rate of state-level per capita GDP (Bureau of Economic Analysis).
BK	Indicator variables for bank fixed effects.
ST	Indicator variables for state fixed effects.
YR	Indicator variables for year fixed effects.

Notes

1. FDIC-supervised institutions must maintain the minimum capital ratios: common equity tier 1 capital–total risk-weighted assets ratio of 4.5%, tier 1 capital–total risk-weighted assets ratio of 6%, total capital–total risk-weighted assets ratio of 8%, and tier 1 leverage ratio of 4% (FDIC 2019).
2. For example, the effect of a one standard deviation increase in *NCSKEW* on *CASHDV* is computed as 0.0001 (the coefficient on *NCSKEW* in Table 5) × 0.616 (the sample standard deviation of *NCSKEW* in Table 1) ÷ 0.003 (the sample mean of *CASHDV* in Table 1) = 2.1%.

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