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Crash risk and conservatism: Evidence from Borsa Istanbul

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ABSTRACT

This study assesses the relationship between the likelihood of future stock price crashes and conservatism—an accounting characteristic that leads to the undervaluation of accounting net assets relative to economic net assets. This undervaluation is achieved by less stringent verification criteria in acknowledging losses compared with gains, resulting in more timely recognition of economic losses. Utilizing a sample of firms traded on Borsa Istanbul from 2009 to 2019, this study reveals that firms with a greater degree of conservatism witness a significant reduction in crash risk after accounting for firm-specific determinants of crash risk along with firm and year fixed effects. This result corroborates the findings in the literature on conservatism, revealing that conservatism diminishes the ability of managers to withhold unfavorable information. In addition, the results are economically meaningful and hold after a set of tests to assess robustness. The findings are particularly relevant for underperforming firms, indicating that an increase in adverse information enhances the motivation for firms to obscure and delay sharing the information. Further analysis demonstrates that accounting conservatism offers advantages by mitigating future crash risk, especially for firms with high intangible intensity.

1. Introduction

Prior literature (Bleck & Liu, 2007; Hutton et al., 2009; Jin & Myers, 2006; Kim et al., 2011; Kim et al., 2019; Kim & Zhang, 2014; Piotroski & Wong, 2015; Zhu, 2016; Dou et al., 2020) has indicated that companies normally have motivations to postpone the announcement of negative news for prolonged periods to mask their true performance. When the quantity of accumulated bad news surpasses a particular limit, managers give up hiding the bad news and release it to the market instantly, which leads to a sharp decline in stock price (referred to as stock price crash by prior literature). The financial crisis experienced in 2007–2008 reignited enthusiasm for research that delves into firm-specific characteristics capable of predicting the risk of stock price crashes. Chen et al. (2001) pointed out the substantial losses for investors caused by stock price crashes, making it valuable to comprehend the factors behind such severe adverse outcomes in the context of portfolio management and risk allocation decisions.

In the field of accounting, conservatism is one of the most ancient foundational concepts. Numerous definitions of conservatism have been presented in the literature. One of them refers to the intentional selection of accounting methods or practices that lead to undervaluation of assets or overvaluation of liabilities (Wolk et al., 1989). Another influential study by Basu (1997) describes conservatism as requiring accountants to seek more substantial evidence before recognizing positive events as profits, in contrast to recognizing negative events as losses. This definition involves an unequal treatment of gains and losses, leading to more prompt recognition of losses and potential liabilities than recognition of gains and potential assets.

Prior literature (Watts, 2003; Kothari et al., 2010) has argued that conservatism has the potential to mitigate issues related to agency problems resulting from the inclination of managers to obscure unfavorable information and expedite the recognition of positive ones. Conservatism can prevent companies from overstating their performance by incorporating only positive developments into earnings even when these developments are hard to confirm. In addition, it reduces the risk of concealing negative news by promptly informing users of financial statements about it, leading to a decrease in stock price volatility (Suijs, 2008). Thus, conservatism ensures that negative information is neither concealed nor amassed over time, thereby diminishing the chances of a sudden release of a substantial volume of negative news to the market. Moreover, conservatism imposes verifiability on alternative information sources generated by managers as verifiable data in financial statements allow external users to assess the reliability of alternative ones (LaFond & Watts, 2008). This disciplining mechanism of conservatism on alternative information sources lowers the chances of artificially inflating stock prices by preventing either the accumulation of unfavorable news or the expedited release of positive news that cannot

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Abbreviations

FASB	Financial Accounting Standards Board
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
NPV	Net present values
ROA	Return on assets

be verified. There is a substantial body of empirical evidence on how conservatism influences actual operating choices, including investment decisions (Ahmed & Duellman, 2011; Francis & Martin, 2010). Conservatism motivates managers to discontinue projects with negative net present values (NPVs) and serves as an effective tool in averting the hoarding of adverse news.

Kim, Luo, and Xie (2018) studied the impact of conservatism, which is expected to decrease the chances of concealing negative company-specific information, on stock price crash risk using an extensive dataset of US companies from 1964 to 2007. In this study, I aim to enhance our understanding of the relationship between crash risk and conservatism by providing recent empirical evidence from a significant emerging market. To examine this relationship, I employ 1862 firm–year observations of companies listed on the Borsa Istanbul from 2009 to 2019.

The primary test involves regression of stock price crash risk for each firm on one year lagged measures of firm-level conservatism and control variables. Following prior crash risk literature, *NCSKEW*, which is defined as the negative conditional skewness of firm-specific weekly returns, and *DUVOL*, which is defined as the down-to-up volatility of firm-specific weekly returns, are the dependent variables. The firm-level measure of conservatism employed in this study is based on the study by Khan and Watts (2009), which regresses current year earnings before extraordinary items on annual returns, size, market to book, leverage, and their interactions. I show that there is a significantly negative relationship between conservatism and future stock price crash risk. This implies that conservatism is an effective mechanism that attenuates both the motivation and capacity of managers to stockpile bad news until it becomes impossible to conceal it any longer. This result also remains valid after I tested for sensitivity in multiple ways, such as utilizing different conservatism and crash risk measures and using changes in the variables.

Next, I investigate various potential factors that might influence the relationship between conservatism and the risk of stock price crashes. When a firm's performance is weak, the tendency to conceal and accumulate a greater amount of negative news is expected to be higher. To test this expectation, I split the sample into two subsamples based on performance and using return on assets (ROA) and sales growth as proxies. The findings from the subsamples reveal that only underperforming firms experience a decline in stock price crash risk in the following year when they engage in more conservative accounting practices.

Finally, I test whether intangible intensive companies are more prone to stock price crashes as measuring the profitability of intangible assets can be quite challenging and involves a significant degree of managerial discretion (Wu & Lai, 2020; Barth et al., 2001; Holthausen & Watts, 2001; Gu & Wang, 2005; Dahmash et al., 2009). The results reveal that the impact of conservatism on reducing future stock price crash risk is only significant for firms with high intangible asset intensity.

This study contributes to the existing literature in several ways. To the best of my knowledge, this is the first study to investigate this relationship with a sample of companies listed on Borsa Istanbul from 2009 to 2019. Although conservatism holds significant importance in influencing the way financial reporting is conducted and has implications for different users of financial reports, such as investors, creditors, regulators, and management, it remains a topic of debate and there is an absence of substantive empirical analysis regarding this subject in the Turkish context (Gokmen, 2013). This study fills this void by extending our understanding of the implications of conservatism in the Turkish stock market, which is "a large and internationally connected stock market (among the largest 20 stock markets in terms of market capitalization for the last couple of decades)" (*p.25 of* Karahan & Özsöylev, 2023). Second, this study amplifies our depth of understanding of the existing literature by documenting the relationship between crash risk and conservatism as a function of intangible intensity and firm performance. Finally, the findings advance our comprehension of the economic outcomes of conservatism and contribute to the discussion on the removal of conservatism from *"The Conceptual Framework of the Financial Accounting Standards Board"*[1] by documenting the positive impact of conservatism on investors who have significant concerns about stock price crash risk. Comprehending how financial statements are affected by conservatism in diverse ways prior to considering its removal may yield beneficial results for all market participants (Watts, 2003).

The remainder of the study is organized as follows: Section 2 reviews the related literature on crash risk along with conservatism and discusses the hypotheses development. Section 3 explains the data and research design. The results are presented in Section 4, and the conclusions are in Section 5.

2. Literature review and hypotheses development

The literature review is based on two streams of literature, which are discussed below.

2.1. Stock price crash risk

Kothari et al. (2009) examine the asymmetry in management's disclosures of good and bad news and find that managers conceal bad news from investors until its release becomes unavoidable. Jin and Myers (2006) provide a model and empirical evidence using country-level data from 1990 to 2001, revealing that when firms are more opaque to outside investors, both R^2 and the frequency of crashes are higher. Using firm-level data, Hutton et al. (2009) corroborate the findings of Jin and Myers (2006). They find that crash risk and R^2 increase as the opacity of a firm increases, but this relationship is attenuated in the post-Sarbanes–Oxley Act years. In addition, the model provided by Bleck and Liu (2007) suggests that market transparency is positively related to asset price crashes under historic cost accounting. They the mechanism that produces this relationship as follows: in more opaque markets, shareholders cannot distinguish bad projects from good projects at an early stage. This failure enables firms to preserve these bad projects; however, the accumulation of the poor performance of these projects over time will ultimately be revealed to investors and result in an unexpected decline in stock price.

According to Kim et al. (2011a), Kim et al. (2011b) an increase in future crash risk correlates with chief finance officers' option incentives. Meanwhile Kim et al. (2011b) posit and document that one year ahead crash risk increases with tax avoidance activities employed by firms to obfuscate adverse news. Furthermore, Defond et al. (2015) illustrate that the adoption of International Financial Reporting Standards, which enhances financial reporting transparency, mitigates the probability of stock price crashes for nonfinancial entities, although financial institutions do not experience a similar effect. Kim and Zhang (2016) analyze a sample of US firms and provide evidence consistent with the proposition that a higher degree of conservatism diminishes crash risk.

[1] In 2010, conservatism was removed from "The Conceptual Framework of the Financial Accounting Standards Board."

Further, Kim, Wang, and Zhang (2016) contribute to this body of literature by demonstrating that dividend disbursements not only alleviate the hoarding of adverse news but also curb overinvestment, subsequently reducing future stock price crashes. Instead of focusing on a specific company attribute, another study by Kim, Wang, and Zhang (2016) explore how the personal characteristics of managers influence crash risk. They discern that firms led by overconfident chief executive officers exhibit greater susceptibility to crashes compared with those led by nonoverconfident ones. A more recent study by Cui et al. (2022), which is based on a sample of Chinese firms, finds that when retail investor interest grows, it tends to coincide with a rise in investor sentiment and heightened trading activity, increasing future crash risk.

2.2. Conservatism

Many studies in the accounting literature have explored the impacts of accounting conservatism. On the one hand, prior research has provided substantial evidence to support the benefits of conservatism to stakeholders reliant on a company's financial reports. These studies indicate that conservatism serves as an effective contractual and governance tool, mitigating information asymmetries and addressing agency issues. LaFond and Watts (2008) endorse the perspective that conservatism alleviates agency problems by constraining managerial incentives and capabilities against engaging in opportunistic behaviors. They argue that conservatism effectively reduces information asymmetries between shareholders and a company. Additionally, several studies have suggested that conservatism curtails the managerial drive to pursue investments with negative NPV (Watts, 2003; Ball & Shivakumar, 2005). Ahmed and Duellman (2011) build upon these findings, reporting higher future profitability for firms adhering to more conservative accounting practices. Francis and Martin (2010) link conservatism to more profitable acquisition decisions. More recently, Kravet (2014) contributes to this literature by identifying a negative relationship between conservatism and risky investments. Furthermore, prior literature has also demonstrated that conservatism significantly reduces the cost of debt and capital (Ahmed et al., 2002; Zhang, 2008; Garcia et al., 2011).

However, some studies have presented evidence in support of the negative effects of conservatism, such as its potential to result in value-destructive quality of earnings (Penman & Zhang, 2002), as well as generating inefficiencies in information dissemination, debt contracts, and earnings forecasts (Gigler et al., 2009; Guay & Verrecchia, 2006; Helbok & Walker, 2004; Pae & Thornton, 2010). Moreover, the Financial Accounting Standards Board's (FASB) Conceptual Framework, issued in 2010 (Financial Accounting Standards Board, 2010), no longer includes conservatism due to its conflict with neutrality. The International Accounting Standards Board (IASB, 2010), which excluded the notion of prudence as part of a joint project with the FASB in 2010, reintroduced this notion in the revised Conceptual Framework published in 2018. According to the framework, "Neutrality is supported by the exercise of prudence. Prudence is the exercise of caution when making judgments under conditions of uncertainty. The exercise of prudence means that assets and income are not overstated, and liabilities and expenses are not understated. Equally, the exercise of prudence does not allow for the understatement of assets or income or the overstatement of liabilities or expenses. Such misstatements can lead to the overstatement or understatement of income or expenses in future periods. The exercise of prudence does not imply a need for asymmetry …" (IASB, 2018, paragraphs 2.16 and 2.17).

2.3. Hypotheses development

The conflicts of interest between managers and other stakeholders stem from the divergence between ownership and control in companies. As these conflicts cannot be fully resolved through contracts due to the significant costs and practical obstacles in creating comprehensive ones, various corporate governance mechanisms have emerged to mitigate them (Ahmed & Duellman, 2011). Accounting for conservatism involves applying stricter criteria to verify economic gains than losses, resulting in an understatement of assets due to the more prompt recognition of losses (Basu, 1997; Watts, 2003). In essence, this asymmetry in accounting recognition of gains and losses expedites the acknowledgment of negative news as losses, while delaying the recognition of unverifiable positive news as gains in financial reports.

Managers' desire to prevent dismissal before completing their tenure motivates them to conceal losses if they can delay acknowledging them through aggressive accounting practices. Some studies (Watts, 2003; LaFond & Watts, 2008; Kim and Zhang; 2016) have suggested that conservatism functions as a disciplinary tool for accounting information, counteracting managers' tendency to conceal negative news from the market while hastening the disclosure of positive news. As such, conservatism diminishes the opportunity to conceal and accumulate unfavorable information over an extended period, until its eventual release is inevitable. This mitigates the risk of future stock price crashes.

Moreover, prior studies (LaFond & Watts, 2008; Watts, 2003; Ball and Shivakumar, 2005; Francis & Martin, 2010) have examined the effect of conservatism on real investment decisions. By promptly recognizing losses and deferring the recognition of gains, conservatism reveals the results of poor investment decisions in financial statements at an earlier stage. Therefore, timely recognition of losses discourages managers from investing in projects with negative NPV and encourages the prompt discontinuation of underperforming projects.

In summary, these studies suggest that conservatism reduces the likelihood of future stock price crashes by hindering managerial concealment and accumulation of negative news from poor investments for an extended period. Thus, I propose the first hypothesis as follows:

H1. Conservatism is negatively related to future stock price crash risk.

Previous studies (Hutton et al., 2009; Kim et al., 2011a; 2011b; Kothari et al., 2009) have revealed a negative relationship between proxies of firm performance and the occurrence of future stock price crashes. This finding implies that companies facing poor performance are more vulnerable to future stock price crashes. As highlighted by Hutton et al. (2009), well-performing firms have no incentive to conceal positive news, leading to more consistent reflection of positive developments in their stock returns over time. Building on this premise, I posit that the impact of conservatism on stock price crash risk changes based on accounting performance. Specifically, firms with weak performance would experience the influence of accounting conservatism in reducing crash risk more prominently as they may have more negative information to conceal and accumulate. Therefore, the second hypothesis is proposed as follows:

H2. The negative relationship between conservatism and future stock price crash risk is more pronounced when a firm's accounting performance is lower.

The conflict of interest between managers and outsiders is more severe in firms with high information asymmetry. Thus, information asymmetry amplifies managers' motivation and capability to conceal negative news to enhance their self-benefits, thereby enhancing the risk of stock price crashes. Moreover, Jin and Myers (2006) argue that the heightened risk of stock price crashes stems from the lack of sufficient information for investors to monitor operating cash flow and income, which are essential for evaluating a company's value.

Another body of literature (Barth et al., 2001; Francis et al., 1996; Gu & Wang, 2005; Holthausen & Watts, 2001; Kim and Zhang; 2016; Ramanna, 2008; Wu & Lai, 2020) has suggested that both the valuation and impairment of intangible assets are susceptible to measurement error and discretion, exacerbating the information asymmetry between managers and outsiders by reducing transparency in financial reporting. Shaping a favorable perception of a company's future among investors plays a role in decisions regarding the write-down and impairment of

intangibles (Beatty & Weber, 2006). Furthermore, Wu and Lai (2020) provide empirical evidence regarding how the information asymmetry related to intangible assets can negatively affect shareholder value. These results underscore the importance of conservatism in preventing managers from concealing unfavorable information for firms with high intangible intensity. In such cases, conservatism is likely to have a greater impact on mitigating the risk of sudden market crashes. Therefore, the third hypothesis in the alternative form is formulated as follows:

H3. The negative relationship between conservatism and future stock price crash risk is more pronounced among firms with high intangible intensity.

3. Data, measures of main variables, and research design

3.1. Data

This study focuses on all nonfinancial and nonutility public firms[2] listed on Borsa Istanbul with a fiscal year ending on December 31 from 2009 to 2019. I follow the sample period approach of Sezgin Alp et al. (2022) and Canbaloglu et al. (2022) to avoid the effects of the 2008 Global Financial Crisis and the COVID-19 pandemic. Following Khurana et al. (2018), Kim, Luo, and Xie (2018), Khan and Watts (2009), Kim et al. (2018), Kim et al. (2019), and Kim, Wang, and Zhang (2016), this study defines a fiscal year as "12-month period ending 3 months after fiscal year end," during which a fiscal year's financial statements would be available to the users of financial statements. I extract financial statements and stock return and volume information from the Equity RT database. Following Kim et al. (2018), if a firm has less than 26 weeks of stock return data in a year and lacks data for the research variables employed in this study, the observations are omitted. In line with prior literature (Khan & Watts, 2009; Kim, Li, et al., 2016), the total assets and equity book values of each company must surpass zero. Finally, all firms traded on the Watchlist Market of Borsa Istanbul are excluded[3] as they are "under special surveillance and investigation due to extraordinary situations with respect to stock transactions" (Borsa Istanbul for Investors, 2024, p. 10). These sample selection criteria leave this study with a sample of 1862 firm–year observations of 208 firms. To minimize the influence of outliers, nondiscrete variables are winsorized at the 1% level by fiscal year.

3.2. Measure of conservatism

I follow Khan and Watts (2009) [4] to calculate the firm–year conservatism measure by estimating the subsequent model cross-sectionally for each year.

$$X_i = \alpha_1 + \alpha_2 D_i + R_i (\beta_{1i} + \beta_2 Size_i + \beta_3 M/B_i + \beta_4 Lev_i) + D_i R_i (\mu_1 + \mu_2 Size_i + \mu_3 M/B_i + \mu_4 Lev_i) + (\lambda_1 Size_i + \lambda_2 M/B_i + \lambda_3 Lev_i + \lambda_4 D_i Size_i + \lambda_5 D_i M/B_i + \lambda_6 D_i Lev_i) + \varepsilon_{jt} \quad (1)$$

The variables are defined as follows:

X_i:	annual income before extraordinary items divided by the market value of equity at the end of fiscal year i-1
D_i:	indicator variable that is equal to one when the annual return in year i is negative.
R_i:	compounded annual stock return ending three months after the end of fiscal year i.
Lev_i:	total liabilities scaled by the market value of equity at the end of fiscal year i.

(continued on next column)

(continued)

$Size_i$:	natural logarithm of the market value of equity at the end of fiscal year i.
M/B_i:	ratio of the market value of equity to the book value of equity at the end of fiscal year i.

I apply the estimates of the above equation to ($\mu_1 + \mu_2 Size_i + \mu_3 M/B_i + \mu_4 Lev_i$) to obtain the C-score developed by Khan and Watts (2009) that gauges the incremental timeliness of bad news. To prevent spurious inference, the rank of C-score (RANK_CS) is used as the conservatism measure (Hong et al., 2019; Kim et al., 2013; Roychowdhury & Watts, 2007; Zhang, 2008; García Lara et al., 2016), where higher ranks correspond to a higher level of conservatism.

3.3. Measures of crash risk

This study utilizes two frequently employed crash risk measures. As described by Chen et al. (2001), Hutton et al. (2009), and Kim et al. (2011a; 2011b), the initial step involves calculating firm-specific weekly returns by employing an extended market model for each fiscal year.

$$r_{i\tau} = \alpha_j + \beta_{1j} r_{m\tau-2} + \beta_{2j} r_{m\tau\text{-}1} + \beta_{3j} r_{m\tau} + \beta_{5j} r_{m\tau+1} + \beta_{6j} r_{m\tau+2} + \varepsilon_{j\tau} \quad (2)$$

where $r_{i\tau}$ is the returns on stock i in week τ, and $r_{m\tau}$ is the value-weighted market index from week $\tau-1$ to $\tau+2$. $W_{i\tau}$ is the natural logarithm of one added to the residual return as calculated in the previous equation results in the weekly return specific to each firm in week τ.

NCSKEW, the negative conditional return skewness, is the first measure of crash risk. For each firm, I divide the negative of the third moment of firm-specific weekly returns throughout the fiscal year by the standard deviation of those returns raised to the third power. It is calculated as follows:

$$NCSKEW_{it} = -[n(n-1)^{3/2}\sum W_{i\tau}^3]/[(n-1)(n-2)(\sum W_{i\tau}^2)^{3/2}] \quad (3)$$

The second measure of crash risk is *DUVOL*, which is the asymmetric volatility of firm-specific weekly returns (Chen et al., 2001; Jin & Myers, 2006). Weeks with firm-specific weekly returns below the annual mean for the fiscal period are referred to as "down" weeks, while those with returns above the mean are termed "up" weeks. *DUVOL* is computed as the log of the standard deviations of firm-specific weekly returns in down weeks divided by those in up weeks.

3.4. Research design

To assess conservatism's influence on the likelihood of future crashes, I conduct regression analysis in which both *NCSKEW* and *DUVOL* are considered as crash risk proxies of the measure of conservatism (*RANK_CS* discussed in the previous section) in year *t-1*, in which control variables are introduced. Specifically, I estimate the following model using ordinary least squares:

$$NCSKEW_{it}\ (DUVOL_{it}) = \beta_1 + \beta_2 RANK_CS_{it\text{-}1} + \sum \beta_i Control_i + \nu_{jt} \quad (4)$$

In all regressions, year and company-specific fixed effects are integrated. In addition, I apply robust standard errors with clustering at the firm-level. Following Hutton et al. (2009), Chen et al. (2001), and several others, I include a set of control variables, all of which, except *ROA*, are lagged by one year. The control variables, along with their definitions, are presented below:

Variables	Definitions
ROA_{it}	Ratio of net income before extraordinary items to total assets
$SIZE_{it-1}$	Natural logarithm of total assets
$DTURN_{it-1}$	Difference between the average monthly share turnover during year *t-1* and the average monthly share turnover during year *t-2*. Monthly share turnover is calculated by dividing the monthly trading volume by the total number of shares outstanding at the end of the respective month

(continued on next page)

[2] Following the literature on financial reporting opacity and crash risk, financial and utility firms are not included in the sample.

[3] I thank the anonymous referee for this suggestion.

[4] Please refer to Khan and Watts (2009) for more information on the estimation of firm–year conservatism measure as I follow their exact procedure.

(*continued*)

Variables	Definitions
RET_{it-1}	Mean of firm-specific weekly returns throughout the fiscal year multiplied by 100
LEV_{it-1}	Proportion of total liabilities relative to total assets
$SIGMA_{it-1}$	Standard deviation of firm-specific weekly returns over the fiscal year
MB_{it-1}	Market value of equity divided by the book value of equity
$ABSDACC_{it-1}$	Absolute value of discretionary accruals calculated using the modified Jones model
$NCSKEW_{it-1}$	Negative coefficient of skewness of firm-specific weekly return in the prior year

4. Results

4.1. Descriptive statistics

Table 1 presents descriptive statistics of the variables used in this study. The mean (median) values of *NCSKEW* and *DUVOL* are −0.432 (−0.411) and −0.268 (−0.279), respectively, which are comparable to what has been documented by Canbaloglu et al., 2022, who also analyze Turkish firms. However, these values are much smaller than those reported by studies that examine US firms, implying that firms in this study are less crash-prone. *RANK_CS* has a mean of 4.541 and a median of 5.000, corresponding to the statistics provided by Aier et al., 2014.

4.2. Relationship between conservatism and crash risk

Table 2 displays the results of the primary empirical examinations utilizing two different stock price crash risk measures. In Columns 1 and 2, the dependent variables are *NCSKEW* and *DUVOL*. As expected, *RANK_CS*'s coefficients are significantly negative at the 1% level for both *NCSKEW* and *DUVOL*. These results imply that the likelihood of future stock price crashes is mitigated by accounting conservatism. On average, a standard deviation increase in *RANK_CS* leads to a reduction of approximately 0.023 in both *NCSKEW* and *DUVOL* in the following year, demonstrating notable economic significance in the relationship between conservatism and crash risk. In addition, the relationship between the control variables and future crash risk generally aligns with the results of earlier research. I find significantly positive coefficients of *MB*, *RET*, *SIGMA*, and *ABSDACC* and a negative coefficient of *LEV*. The coefficient of *SIZE*[5] is significant and positive in only Column 2, where crash risk is proxied by *DUVOL*.

In summary, the results presented in Table 2 indicate that after considering other factors influencing crash risk and accounting for firm and year fixed effects, companies with greater accounting conservatism tend to have a reduced probability of experiencing crashes in the following year. These findings support the notion that conservatism diminishes the opportunities and abilities to conceal or delay bad news disclosure, leading to lower crash risk.

4.3. Robustness tests

In this section, I assess the robustness of the findings by employing commonly utilized alternative measures for conservatism and crash risk and change analysis.

4.3.1. Alternative measure of crash risk

As an alternative proxy for crash risk, several studies (Andreou et al., 2017; Bradshaw et al., 2010; Hasan et al., 2022; Hong et al., 2017; Kim et al., 2020) utilize EXTRASIGMA. It is calculated as the negative of the worst deviation of firm-specific weekly returns ($W_{i\tau}$) from the average firm-specific weekly return ($\overline{W}$) divided by the standard deviation of firm-specific weekly returns (σ_τ) for firm i in fiscal year t.

It is measured as follows:

$$\text{EXTRASIGMA_(it)} = \text{-MIN}\left[\frac{W_{i\tau} - \overline{W}}{\sigma_\tau}\right] \quad (5)$$

This measure employs the negative of the minimum to make larger values imply a higher risk of future crashes similar to the other two primary crash risk measures. Table 3 displays the results of the regression analysis, where the dependent variable is EXTRASIGMA. A significantly negative coefficient of RANK_CS indicates that the main finding of this study remains valid even after employing an alternative measure for the likelihood of future crashes.

4.3.2. Alternative measures of conservatism

As a robustness check, I construct two alternative measures of conservatism based on accruals that do not rely on stock returns (Ahmed & Duellman, 2013; Ahmed et al., 2002; Givoly & Hayn, 2000; Goh & Li, 2011; Hansen et al., 2018; Hong et al., 2019; Kravett, 2014; Lara et al., 2014; García Lara et al., 2016; Lobo & Zhou, 2006; Louis et al., 2012; Mensah et al., 2004; Zhang, 2008). These measures are total accruals (net income plus depreciation minus operating cash flow) deflated by total assets (*TOTALACC*) and nonoperating accruals (total accruals minus operating accruals) (*NONOPACC*) deflated by total assets. Following prior literature, I calculate operating accruals as changes in account receivable plus changes in inventory plus changes in prepaid expenses minus changes in accounts payable minus changes in taxes payable. These two conservatism measures are initially multiplied by −1 to ensure that larger values represent higher conservatism. Similar to the approach used for *RANK_CS* in the main model, they are then converted into ranks to mitigate potential bias from extreme observations. I reran my primary regression model using each of the alternative conservatism measures (*RANK_TOTALACC* and *RANK_NONOPACC)*. The first two columns of Table 4 (and the last two columns) display the results obtained from the model, with the dependent variable being *NCSKEW* (*DUVOL*) and the proxies for conservatism being *RANK_TOTALACC* in Columns 1 and 3 and *RANK_NONOPACC* in Columns 2 and 4. In Table 4, all columns exhibit significant negative coefficients of *RANK_TOTALACC* and *RANK_NONOPACC*, indicating that the findings remain robust after employing different conservatism measures.

4.3.3. Change specification

While my primary model incorporates numerous control variables and fixed effects, there could still be concern that the relationship between conservatism and future crash risk might stem from unaccounted-for, time-invariant firm characteristics. To mitigate the endogeneity concern, I employ change analysis. Specifically, I regress the change in the following year crash risk on changes in conservatism and other determinants of crash risk with firm and year fixed effects. The significantly negative coefficients of *CHANGE_RANK_CS* in Table 5, when *CHANGE_NCSKEW* or *CHANGE_DUVOL* is employed as the crash risk variable, imply that the primary findings of this study are unlikely to be the result of variables that were not included.

4.4. Role of firm performance

The results in Section 4.2 have demonstrated that conservatism, which limits the concealment of unfavorable information, mitigates crash risk. When firms' performance is weak, there is likely to be a greater accumulation of negative news that needs concealment. H2 suggests that the influence of accounting conservatism on reducing crash risk should be more pronounced for firms with weak performance.

[5] This study uses total assets as a proxy for firm size to minimize multicollinearity problem as market value is used in the estimation of C-Score. In addition, *MB* and *LEV* are included in the estimation of C-SCORE. Excluding them from the model does not affect the results (untabulated).

Table 1
Descriptive statistics of the variables used in the study.

Variables	N	Mean	Std Dev	Q1	Median	Q3
$NCSKEW_{it}$	1862	−0.43205	0.895466	−0.92433	−0.41065	0.052424
$DUVOL_{it}$	1862	−0.26814	0.38396	−0.52913	−0.27877	−0.01714
$RANK_CS_{it-1}$	1862	4.541353	2.762526	2	5	7
$NCSKEW_{it-1}$	1862	−0.39879	0.924251	−0.88701	−0.38024	0.086878
MB_{it-1}	1862	2.154436	2.22934	0.934285	1.47201	2.404375
LEV_{it-1}	1862	0.477141	0.232544	0.288393	0.486104	0.658024
$SIZE_{it-1}$	1862	19.7911	1.768982	18.55319	19.63217	20.90227
$SIGMA_{it-1}$	1862	0.049178	0.023671	0.032518	0.043764	0.059251
RET_{it-1}	1862	−0.14808	0.166109	−0.17357	−0.09474	−0.05211
$DTURN_{it-1}$	1862	−0.06189	1.800957	0.22627	−0.00337	0.225645
ROA_{it}	1862	0.046434	0.086955	0.002567	0.039219	0.087618
$ABSDACC_{it-1}$	1862	0.101412	0.442821	0.016294	0.041474	0.091759

Table 2
Impact of Conservatism on stock price crash risk.

	$NCSKEW_{it}$	$DUVOL_{it}$
	(1)	(2)
$RANK_CS_{it-1}$	−0.02	−0.01
	−2.83***	−2.92***
$NCSKEW_{it-1}$	−0.104	−0.0381
	−4.64***	−3.90***
MB_{it-1}	0.0764	0.0359
	4.04***	4.44***
LEV_{it-1}	−0.528	−0.251
	−1.89*	−2.18**
$SIZE_{it-1}$	0.104	0.0605
	1.55	2.11**
$SIGMA_{it-1}$	13.09	5.179
	2.74***	2.81***
RET_{it-1}	1.798	0.71
	2.51**	2.64***
$DTURN_{it-1}$	0.0129	0.00377
	1.19	0.92
ROA_{it}	−0.0546	−0.0948
	−0.14	−0.59
$ABSDACC_{it-1}$	0.054	0.0218
	2.44**	2.07**
Constant	−2.917	−1.618
	−2.21**	−2.88***
Year FE	Yes	Yes
Firm FE	Yes	Yes
Observations	1862	1862
Adjusted R^2	0.057	0.087

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 3
Alternative dependent variable.

	$EXTRASIGMA_{it}$
	(1)
$RANK_CS_{it-1}$	−0.01
	−2.29**
$NCSKEW_{it-1}$	−0.0893
	−4.84***
MB_{it-1}	0.0526
	3.72***
LEV_{it-1}	−0.342
	−1.57
$SIZE_{it-1}$	0.0374
	0.69
$SIGMA_{it-1}$	2.847
	0.86
RET_{it-1}	0.375
	0.77
$DTURN_{it-1}$	0.00615
	0.53
ROA_{it}	−0.44
	−1.44
$ABSDACC_{it-1}$	0.0111
	0.37
Constant	1.577
	1.51
Year FE	Yes
Firm FE	Yes
Observations	1862
Adjusted R^2	0.062

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

To examine whether the relationship between conservatism and crash risk varies based on firm performance, I employ *ROA* and sales growth[6] (*SALES_GROWTH*) as proxies for performance, following Lev et al. (2005) and Li et al. (2022). Panel A of Table 6 defines high performance as having a positive *ROA* ($ROA > 0$) whereas low performance is having a negative *ROA* ($ROA < 0$). I estimate my main model for each of these subsamples and employ seemingly unrelated regressions to test whether the coefficient of *RANK_CS* is statistically different across the two subsamples. The first and second pair of columns present the results obtained by using *NCSKEW* and *DUVOL,* respectively. The coefficients of *RANK_CS* are significantly negative (at the 1% level) only in the subsample with negative *ROA*, defined as low *ROA*, as observed in Columns 2 and 4 of the regression results for both dependent variables. Moreover, the differences in the coefficients of *RANK_CS* between the two subsamples are statistically significant at the 5% level, as indicated by the Chi-squared test in both pairs of columns where *NCSKEW* and *DUVOL* are the dependent variables. Therefore, the results presented in Panel A of Table 6 align with the expected outcome of a more negative relationship between conservatism and future crash risk for low performing firms as they have more adverse information to conceal.

Panel B of Table 6 divides the sample into groups using the median values of sales growth (*SALES_GROWTH*). The first and second columns in each pair, where *NCSKEW* and *DUVOL* are used, respectively, present the results using a subsample with above median *SALES_GROWTH* referred to as *High SALES_GROWTH* (below median *SALES_GROWTH* referred to as *Low SALES_GROWTH*). The coefficient of *RANK_CS* is significantly negative only in the subsample with *Low SALES_GROWTH* for both *NCKEW* and *DUVOL* as the dependent variables, mirroring the results in Panel A of Table 6. The Chi-squared test statistics presented at the bottom of the table also reveal that there is a significant difference in the coefficients of *RANK_CS* between the two subsamples for both dependent variables.

In summary, the findings in Table 6 support H2, indicating that accounting conservatism is beneficial to firms in terms of impeding future

[6] Sales growth is measured as year-over-year percentage change in sales deflated by total assets, following Lee et al. (2020).

Table 4
Alternative conservatism variables.

	$NCSKEW_{it}$	$NCSKEW_{it}$	$DUVOL_{it}$	$DUVOL_{it}$
	(1)	(2)	(3)	(4)
$RANK_TOTALACC_{it-1}$	−0.0268		−0.0113	
	−3.16***		−3.18***	
$RANK_NONOPACC_{it-1}$		−0.02		−0.01
		−2.10**		−2.41**
$NCSKEW_{it-1}$	−0.106	−0.106	−0.04	−0.0392
	−4.78***	−4.74***	−4.02***	−4.01***
MB_{it-1}	0.0733	0.0733	0.0345	0.0344
	3.88***	3.90***	4.29***	4.30***
LEV_{it-1}	−0.382	−0.385	−0.189	−0.184
	−1.33	−1.34	−1.61	−1.56
$SIZE_{it-1}$	0.0823	0.105	0.0514	0.061
	1.25	1.58	1.81*	2.13**
$SIGMA_{it-1}$	13.12	13.57	5.191	5.399
	2.70***	2.81***	2.76***	2.90***
RET_{it-1}	1.797	1.856	0.709	0.736
	2.44**	2.56**	2.57**	2.70***
$DTURN_{it-1}$	0.016	0.0135	0.00508	0.00407
	1.41	1.21	1.21	0.99
ROA_{it}	−0.066	−0.028	−0.0996	−0.0814
	−0.17	−0.07	−0.61	−0.49
$ABSDACC_{it-1}$	0.0506	0.0486	0.0204	0.0195
	2.31**	2.31**	2.29**	1.98**
Constant	−2.559	−3.043	−1.467	−1.667
	−1.98**	−2.31**	−2.64***	−2.96***
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	1862	1862	1862	1862
Adjusted R^2	0.059	0.056	0.089	0.086

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5
Change specification.

	CHANGE_NCSKEWit	$CHANGE_DUVOL_{it}$
	(1)	(2)
$CHANGE_RANK_CS_{it-1}$	−0.02	−0.01
	−2.95***	−2.90***
$CHANGE_NCSKEW_{it-1}$	−0.504	−0.196
	−26.61***	−21.16***
$CHANGE_MB_{it-1}$	0.0861	0.0419
	3.40***	3.61***
$CHANGE_LEV_{it-1}$	−0.838	−0.455
	−1.62	−2.35**
$CHANGE_SIZE_{it-1}$	0.121	0.107
	0.78	1.71*
$CHANGE_SIGMA_{it-1}$	9.083	4.626
	2.18**	2.77***
$CHANGE_RET_{it-1}$	1.209	0.552
	2.09**	2.49**
$CHANGE_DTURN_{it-1}$	0.0222	0.00755
	1.78*	1.51
$CHANGE_ROA_{it}$	−0.475	−0.219
	−1.07	−1.05
$CHANGE_ABSDACC_{it-1}$	0.0821	0.0262
	3.11***	2.12**
Constant	0.251	0.0997
	2.17**	2.14**
Year FE	Yes	Yes
Firm FE	Yes	Yes
Observations	1601	1601
Adjusted R^2	0.294	0.275

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

crash risk only when they are experiencing low performance.

4.5. Role of intangible intensity

Prior literature documents that intangible assets are positively related to information asymmetry between managers and investors as there is a considerable degree of discretion in the accounting of these assets, and obtaining reliable information regarding their values seems to be challenging (Wu & Lai, 2020). Thus, H3 posits that conservatism benefits intangible intensive firms more by decreasing crash risk. To examine this hypothesis, the level of intangibles is estimated as the sum of intangible assets, goodwill, and research and development expenses, following Brown and Kimbrough (2011). I divide the level of intangibles by sales to measure intangible intensity. Similar to Bradshaw et al., 2004; Covrig et al., 2007, I divide the sample into two subsets by using the top quartile value of intangible intensity as the cutoff point due to the very skewed distribution of intangible intensity to maintain meaningful differences between the two subsets. The results of this analysis are displayed in Panel A of Table 7, where the sample is split into high intangible intensity (the subsample with above top quartile intangible intensity) and low intangible intensity (the subsample with below top quartile intangible intensity). The first pair of columns presents the results of regressions for these subsamples, where the dependent variable is *NCSKEW*. *RANK_CS* is significantly and negatively related to future crash risk at the 1% level in the high intangible intensity subsample, while this relationship is insignificant in the low intangible intensity subsample. Moreover, the difference in the coefficient of *RANK_CS* across the two subsamples is significant at the 1% level as indicated by the Chi^2 statistic value of 6.98. In the second pair of columns of Panel A of Table 7, where *DUVOL* is the dependent variable, the coefficient of *RANK_CS* is significantly negative only in the high intangible intensity sample. In addition, the Chi statistic value of 8.03 reveals that the coefficient of *RANK_CS* is significantly different across these subsamples at the 1% level. These results suggest that conservatism is an effective mechanism in alleviating crash risk in high intangible intensive firms. To assess the robustness of this analysis, high (low) intangible intensive firms are defined as those above (below) the sample median. The results of this subset analysis for both *NCSKEW* and *DUVOL* as the dependent variables are displayed in the first and second pair of columns of Panel B of Table 7, respectively. These findings mirror those in Panel A. Overall, the results imply that conservatism's impact on reducing future crash risk is heightened within intangible intensive firms, where there is a higher potential for managers to conceal confidential information.

5. Conclusion

This study explores the influence of conservatism on the likelihood of future stock price crashes among companies listed on Borsa Istanbul from 2009 to 2019. The primary findings reveal that firms employing more conservative accounting policies are less susceptible to future stock price crashes—a conclusion supported by robustness checks. Further analysis reveals that accounting conservatism mitigates future crash risk, particularly for underperforming firms. Moreover, the effect of conservatism on diminishing future crash risk is accentuated in companies with high intangible asset intensity.

Conservatism plays a pivotal role in shaping financial reporting practices, sparking an ongoing debate. Some studies emphasize its benefits in enhancing financial statement credibility and reducing information asymmetry between management and stakeholders. However, concerns persist regarding conservatism potentially compromising earnings quality and fostering inefficiencies in information, debt contracts, and earnings forecasts. This study contributes to this discourse by extending the examination of conservatism's impact to an emerging market context, shedding light on its role in reducing crash risk—a critical concern for investors.

The study's findings underscore the importance of considering the

Table 6
Impact of firm performance on the relationship between conservatism and crash risk.

Panel A				
	$NCSKEW_{it}$		$DUVOL_{it}$	
	High ROA	*Low ROA*	*High ROA*	*Low ROA*
$RANK_CS_{it-1}$	−0.01	−0.05	0.00	−0.02
	−1.19	−3.03***	−1.27	−2.83***
$NCSKEW_{it-1}$	−0.13	−0.0302	−0.0485	−0.011
	−4.46***	−0.65	−4.19***	−0.58
MB_{it-1}	0.103	0.0518	0.0514	0.0216
	4.21***	1.45	4.74***	1.62
LEV_{it-1}	−0.343	−0.485	−0.194	−0.245
	−1.05	−0.9	−1.48	−1.08
$SIZE_{it-1}$	0.0834	0.0884	0.064	0.0516
	0.89	0.74	1.6	0.96
$SIGMA_{it-1}$	14.12	13.76	5.365	6.75
	3.38***	1.41	2.99***	1.78*
RET_{it-1}	2.359	1.488	0.934	0.699
	3.80***	1.13	3.45***	1.4
$DTURN_{it-1}$	0.0134	0.0136	0.00685	0.0000918
	0.9	0.47	1.31	0.01
ROA_{it}	−0.451	0.411	−0.234	0.0818
	−1.06	0.46	−1.25	0.25
$ABSDACC_{it-1}$	0.0653	−0.375	0.026	−0.121
	3.60***	−1.42	2.31**	−1.13
Constant	−2.498	−2.736	−1.677	−1.557
	−1.35	−1.2	−2.15**	−1.53
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	1410	452	1410	452
Adjusted R^2	0.074	0.053	0.106	0.080
Difference in RANK_CS (Chi^2)	5.00**		3.83**	

Panel B				
	$NCSKEW_{it}$		$DUVOL_{it}$	
	High	*Low*	*High*	*Low*
	SALES_GROWTH	*SALES_GROWTH*	*SALES_GROWTH*	*SALES_GROWTH*
$RANK_CS_{it-1}$	−0.01	−0.03	0.00	−0.01
	−0.65	−3.03***	−0.42	−3.40***
$NCSKEW_{it-1}$	−0.124	−0.127	−0.0485	−0.0473
	−3.60***	−3.75***	−3.24***	−3.45***
MB_{it-1}	0.0687	0.078	0.0349	0.0313
	2.62***	2.78***	3.04***	2.90***
LEV_{it-1}	−0.841	−0.559	−0.326	−0.265
	−2.89***	−1.57	−2.62***	−1.87*
$SIZE_{it-1}$	0.252	0.0146	0.125	0.0208
	2.74***	0.16	2.79***	0.6
$SIGMA_{it-1}$	8.031	17.85	1.989	7.192
	1.32	2.58**	0.77	2.72***
RET_{it-1}	1.111	2.37	0.238	0.945
	1.25	2.48**	0.63	2.66***
$DTURN_{it-1}$	−0.0107	0.0256	−0.000775	0.00466
	−0.57	1.36	−0.09	0.62
ROA_{it}	0.261	−0.102	0.0999	−0.17
	0.46	−0.17	0.39	−0.72
$ABSDACC_{it-1}$	−0.0756	0.0855	−0.0252	0.0289
	−0.68	3.30***	−0.46	2.36**
Constant	−5.312	−1.408	−2.682	−0.932
	−2.95***	−0.83	−3.09***	−1.42
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	931	931	931	931
Adjusted R^2	0.072	0.064	0.091	0.089
Difference in RANK_CS (Chi^2)	3.20*		3.86**	

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at the 10%, 5%, and 1% levels, respectively.

various effects of conservatism on financial statements before considering its elimination, offering valuable insights for standard-setting agencies when formulating standards. Additionally, this study breaks new ground by investigating the impact of firm performance and intangible intensity on the relationship between crash risk and conservatism.

Data availability

Data are available from the public sources cited in the text.

Table 7
Impact of asset intensity on the relationship between conservatism and crash risk.

Panel A				
	$NCSKEW_{it}$		$DUVOL_{it}$	
	High	Low	High	Low
$RANK_CS_{it-1}$	−0.06	−0.01	−0.02	0.00
	−3.40***	−1.07	−3.65***	−1.16
$NCSKEW_{it-1}$	−0.125	−0.125	−0.047	−0.0464
	−2.59**	−4.77***	−2.49**	−3.99***
MB_{it-1}	0.098	0.0704	0.042	0.0347
	2.69***	2.72***	3.06***	3.19***
LEV_{it-1}	−0.739	−0.488	−0.254	−0.281
	−0.91	−1.75*	−0.76	−2.45**
$SIZE_{it-1}$	0.282	0.154	0.119	0.0899
	1.92*	1.86*	1.93*	2.60**
$SIGMA_{it-1}$	7.712	14.55	2.665	5.908
	0.99	2.61***	0.85	2.78***
RET_{it-1}	1.576	1.801	0.57	0.726
	1.59	2.13**	1.42	2.32**
$DTURN_{it-1}$	−0.0195	0.0191	−0.00693	0.00594
	−0.7	1.62	−0.56	1.39
ROA_{it}	−0.712	−0.12	−0.364	−0.118
	−0.92	−0.28	−1.13	−0.62
$ABSDACC_{it-1}$	0.305	0.0368	0.172	0.0119
	1.22	1.59	1.46	1.15
Constant	−5.862	−4.055	−2.574	−2.238
	−2.07**	−2.53**	−2.19**	−3.38***
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	465	1397	465	1397
Adjusted R^2	0.084	0.064	0.116	0.095
Difference in *RANK_CS* (Chi^2)	6.98***	8.03***		

Panel B: Alternative Intangible Intensity Definition				
	$NCSKEW_{it}$		$DUVOL_{it}$	
	High (Intangibles ≥ Median)	Low (Intangibles < Median)	High (Intangibles ≥ Median)	Low (Intangibles < Median)
$RANK_CS_{it-1}$	−0.04	−0.01	−0.02	0.00
	−3.58***	−1.02	−3.74***	−1.01
$NCSKEW_{it-1}$	−0.11	−0.12	−0.04	−0.05
	−3.96***	−3.38***	−3.15***	−3.26***
MB_{it-1}	0.08	0.10	0.04	0.05
	3.69***	2.23**	4.04***	2.77***
LEV_{it-1}	−0.25	−0.77	−0.15	−0.37
	−0.56	−2.01**	−0.77	−2.34**
$SIZE_{it-1}$	0.17	0.09	0.08	0.06
	1.36	0.92	1.55	1.40
$SIGMA_{it-1}$	8.39	14.99	2.03	7.21
	1.55	1.85*	0.91	2.32**
RET_{it-1}	1.47	1.89	0.49	0.88
	2.17**	1.48	1.76*	1.84*
$DTURN_{it-1}$	0.01	0.02	0.00	0.00
	0.53	1.21	0.59	0.89
ROA_{it}	0.33	−0.59	0.02	−0.22
	0.61	−1.10	0.11	−0.99
$ABSDACC_{it-1}$	0.04	0.04	0.04	0.02
	0.19	2.17**	0.46	1.93*
Constant	−3.88	−2.80	−1.86	−1.73
	−1.60	−1.54	−1.81*	−2.12**
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Observations	931	931	931	931
Adjusted R^2	0.050	0.066	0.075	0.107
Difference in *RANK_CS* (Chi^2)	3.57*		4.32**	

Notes: i.) Robust standard errors are clustered by firm.
ii.) *, **, and *** denote two-tailed statistical significance at 10%, 5%, and 1% levels, respectively.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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