Every Cloud Has a Silver Lining: Analysis of Negative Book Value Firms

Abstract

Negative book value firms have become more prevalent in recent years, ranging from 0.41% of all Compustat firms in 1961 to 12.47% in 2016 with highest representations in the healthcare, telecommunication, and computer electronic industries. To examine why these negative book value firms are not liquidated, we investigate firms' 1) current accounting practices, 2) future investment opportunities, and 3) narrative investment disclosures. We first document that negative book value firms adopting a more conservative accounting practice in the current period are less likely to be liquidated. Next, we find that the liquidation likelihood is lower for negative book value firms with higher levels of future intangible investments. Furthermore, we employ a machine-learning-based latent Dirichlet allocation (LDA) approach to measure investment-oriented firm disclosures and find a lower liquidation likelihood for negative book value firms disclosing more future investment narratives. Our evidence is robust to including reorganization firms and extending the length of the liquidation window. Overall, our study sheds light on why negative book value firms are not liquidated by providing evidence on firms' current accounting practices and future investment opportunities.

1. Introduction

A firm with a negative book value of equity (NEG-BV) is one whose total liabilities exceed its total assets. We find that 35.3% of all Compustat firms (1961–2016) have had a negative book value at some point in their existence. This figure is significantly higher than Hayn's (1995) observation that 25% of firms have had accounting losses. We also document that the prevalence of NEG-BV firms is increasing over time, reaching 15% of all Compustat firms in recent years. However, unlike many accounting studies that seek to understand the economic nature of negative income (e.g., Hayn 1995; Joos and Plesko 2005; Klein and Marquardt 2006), research on negative book values is very limited. Indeed, due to the difficulty in interpreting such firms, many extant studies explicitly delete or ignore negative book value firms from their empirical investigation altogether (e.g., Fama and French 1992; Fama and French 1993; Burgstahler and Dichev 1997; Collins, Pincus, and Xie 1999; Zhang 2000; Nissim and Penman 2003; Fama and French 2015). However, given the increasing importance of the balance-sheet approach over the income-statement approach in financial reporting (Watts 2006; Dichev 2017), it is vital to examine the nature and consequence of the NEG-BV status, a unique feature revealed through the balance sheet rather than the income statement.

In this study, we examine possible reasons why a firm may exhibit a NEG-BV status without being liquidated. The NEG-BV status indicates that the book value of a firm's total obligations exceeds the book value of its total resources, suggesting that creditors will not receive the full value of their claims. However, because creditors possess the ability to force a firm into liquidation before it enters into the NEG-BV status, the mere presence of a negative book value firm suggests that creditors may prefer the existence and continuation of the NEG-BV status in lieu of liquidation. Managers may also prefer the NEG-BV status relative to liquidation because they are likely to bear non-trivial costs, both financially and reputationally, upon liquidation.

In this paper, we examine the liquidation likelihood of negative book value firms conditional on their current accounting practices, future investment opportunities, and disclosure narratives. First, we hypothesize that NEG-BV firms adopting a more conservative accounting practice in the current period are less likely to be liquidated. Accounting conservatism implies a higher verification threshold for gains compared with losses (Basu 1997; Khan and Watts 2009). Over time, firms with high levels of accounting conservatism may build up accumulative understatement of book values through slower revenue recognition, faster expense recognition, lower asset valuation, and higher liability valuation (Wolk, Dodd, and Rozycki 1989; Davidson, Stickney, and Weil 1985; Stickney and Weil 1994; Givoly and Hayn 2000; Watts 2003). Therefore, NEG-BV in these firms may simply reflect the conservative accounting practice rather than declining businesses and financial difficulty. As a result, these firms may continue to operate without being liquidated.

Next, we examine whether NEG-BV firms possessing higher levels of future investment opportunities are less likely to be liquidated. Prior studies suggest that creditors pay special attention to future investment opportunities of financially-distressed borrowers to realize long-term payoffs from these borrowers (Armstrong, Kepler, Kim, and Tsui 2021). NEG-BV firms with more future investment opportunities may realize higher benefits in the future, thus increasing the likelihood of paying off interests and principal to creditors. As a result, we expect that NEG-BV firms with higher levels of future investment opportunities are less likely to be liquidated.

In addition to quantitative measures of future investment opportunities, qualitative disclosures of these opportunities may also affect creditors' liquidation decisions of NEG-BV firms. Prior studies document that creditors rely heavily on borrowers' disclosures to assess their financial status and credibility (Donelson, Jennings, and Mcinnis 2017; Demerjian, Donovan, and Jennings 2020). Narrative disclosures about a firm's investment opportunities

are especially important to creditors, because they provide qualitative information about the firm's product development, technology adoption, and future growth prospect (Glassman 2003; Merkley 2014; Cao, Ma, Tucker, and Wan 2018; Cheng, De Franco, Jiang, and Lin 2019). For example, when a negative book value firm discloses more contents about investment opportunities, it signals to outsiders that the firm may experience future sales growth and generate future cash flows from these investment opportunities (Basu, Ma, and Briscoe-Tran 2022). Upon observing this signal, creditors may delay the liquidation process by allowing the NEG-BV to turn around. Therefore, we expect a lower liquidation likelihood for NEG-BV firms disclosing more future investment-related narratives.

We first document that the frequency of negative book value firms is increasing over time. It ranges from 0.41% of all Compustat firms in 1961 to 12.47% in 2016, reaching the highest level of 15.15% in 2002. NEG-BV firm-years are also more prevalent in technology-intensive industries, such as the telephone and television transmission industry (18.10%), the healthcare, medical equipment, and drugs industry (16.01%), and the computers, software, and electronic equipment industry (12.96%).

Next, we find a kink around zero book value in the distribution of the number of firms with positive and negative book values. This evidence suggests that firms try to avoid entering into NEG-BV status as negative book value firms are more likely to be liquidated than positive book value (POS-BV) firms.[1]

We further show that the NEG-BV status is positively associated with firm characteristics including Tobin's Q, loss, capital expenditure, and age while negatively associated with cash flow, liquidation value, and R&D. In addition, we find a positive relation between firms' NEG-BV status and proxies for accounting conservatism, intangible

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[1] Our empirical finding indeed suggests that NEG-BV firms are more likely to be liquidated than POS-BV firms. We present this finding in Section 4.4.

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investments, and investment narratives. Our evidence indicates that NEG-BV status may stem from the accumulated understatement of book value due to differential verification thresholds for gains versus losses and future investment opportunities that are not recognized as assets on the balance sheet.

To examine why NEG-BV firms may continue without being liquidated, we first investigate whether the liquidation likelihood of NEG-BV firms is affected by firms' current accounting practice. Following prior literature, we measure the current levels of accounting conservatism using C-Score (Basu 1997; Khan and Watts 2009) and the average non-operating accruals over the prior five years (multiplied by negative one) (Givoly and Hayn 2000; Beatty, Weber, and Yu 2008). Using both measures, we find that NEG-BV firms exhibiting higher current levels of accounting conservatism are less likely to be liquidated.

Next, we examine whether NEG-BV firms with higher levels of future investment opportunities are less likely to be liquidated. A typical measure of investment opportunities is the market-to-book ratio (Smith and Watts 1992), which is not well-defined for NEG-BV firms. To resolve this issue, we use the future intangible asset value generated by selling, general, and administrative expense to measure the future investment opportunities possessed by a firm, because prior studies document that current SG&A expenditure creates long-term intangible asset value that varies systematically across firms and industries (Banker, Huang, and Natarajan 2011; Chen, Lu, and Sougiannis 2012; Huson, Tian, Wiedman, and Wier 2012; Banker, Huang, Natarajan, and Zhao 2019). Consistent with our expectation, we find that NEG-BV firms exhibiting higher SG&A futures are less likely to be liquidated, suggesting that NEG-BV firms with higher levels of future investment opportunities are less likely to experience a liquidation.

We also investigate whether narrative disclosures about future investment opportunities affect NEG-BV firms' liquidation likelihood. We use the LDA method to measure the

disclosed contents of future investment opportunities due to the following reasons. First, the LDA method provides the relative weights on various investment-related topics, which essentially captures the *attention* a firm dedicates to these topics. While the scope of topics discussed in the annual report is subject to regulatory requirements (Dyer, Lang, and Stice-Lawrence 2017), the attention allocated to each topic may reflect a firm's discretionary disclosure choices. These discretionary choices over the breadth and depth of investment-related narratives enable the firm to signal future investment prospect. Second, the relative weights or attention on investment-related topics calculated using the LDA method reflect firms' disclosure incentives more accurately compared to other linguistic features such as tone positivity, because they are less likely to be influenced by outsiders' incentives (Douglas and Sutton 2003; Brown, Crowley, and Elliott 2020). Specifically, we measure the relative weights of investment-related topics discussed in Item 1—Business (Item 7—Management's Discussion and Analysis) of 10-K filings for non-financial firms during the period of 2010 to 2016, using the number of words discussing high-frequency investment-related topics extracted from Wall Street Journals divided by total word count for Item 1 (Item 7). Consistent with our expectation, we find that negative book value firms disclosing more future-investment-related narratives are less likely to be liquidated.

Finally, we perform a few additional analyses. First, we examine the possibility that a small positive book value (Small-POS-BV), rather than zero book value, serves as the threshold of liquidation decision. We find that the liquidation likelihood of NEG-BV firms is much larger than that of Small-POS-BV firms. This evidence suggests that a small positive book value is unlikely to be the threshold for liquidation. Second, we expand our liquidation sample by including firms that have experienced a reorganization in the subsequent year. Prior studies suggest that creditors may recover some of their claim rights under certain arrangement of bankruptcy-related reorganization. Our results are qualitatively the same after we include these

reorganization cases. Third, we extend the length of the liquidation window from the subsequent year to the subsequent two years to accommodate the possibility that it may take NEG-BV firms longer time to be liquidated. Using this longer window, we continue to find that NEG-BV firms are less likely to be liquidated if they exhibit higher current levels of accounting conservatism, possess higher levels of future intangible investments, and disclose more future-investment-related narratives.

Our study contributes to the literature in the following ways. First, we document the high frequency of NEG-BV firms in recent years and among high-tech industries. Prior empirical studies tend to remove NEG-BV firms from the sample due to the difficulty in interpreting them (e.g., Fama and French 1992; Fama and French 1993; Burgstahler and Dichev 1997; Collins et al. 1999; Zhang 2000; Nissim and Penman 2003; Fama and French 2015). Our evidence suggests that these firms represent a substantial portion of the public firms and warrant a careful empirical investigation. Furthermore, given the recent shift from the income-statement-approach to the balance-sheet approach of accounting standards (Watts 2006; Dichev 2017), our study highlights the importance of investigating the balance-sheet-oriented NEG-BV firms in addition to the income-statement-oriented loss firms.

Second, we show that there is a kink in the number of firms around zero book value. Prior studies have documented a kink around various earnings benchmarks, suggesting that firms try to meet or beat these income-statement-based benchmarks. Our evidence suggests that the same phenomenon exists for the balance-sheet-based benchmark, i.e., zero book value. This finding suggests that firms try to avoid entering into the NEG-BV status to avoid being liquidated.

Third, we contribute to the accounting conservatism literature by showing that conservatism plays a vital role in a firm's liquidation decision. Prior studies document that accounting conservatism affects a firm's market valuation, debt contracting, and compensation

contracting. We extend this line of literature by showing that the level of accounting conservatism affects the liquidation likelihood of NEG-BV firms.

Fourth, we contribute to the intangible investment literature by documenting that NEG-BV firms with higher levels of future intangible investments are less likely to be liquidated. Although prior literature has examined the effect of future intangible investments on market valuation and compensation contracting, very few studies investigate whether future value created by current intangible investments may affect a firm's liquidation likelihood.

Fifth, we contribute to the disclosure narrative literature by employing the machine-learning-based LDA method to capture future-investment-related disclosure contents. To our best knowledge, this study is the first that constructs investment narratives using the topic modeling method. We show that NEG-BV firms with more future-investment-related narrative disclosures are less likely to be liquidated. These results suggest that disclosure content about investment opportunities affects the liquidation likelihood of NEG-BV firms.

Finally, our study deepens the understanding of the increasingly important new economy firms. We show that NEG-BV firms are pervasive in technology-intensive industries. These firms tend to exhibit high levels of conservatism, intangible investments, and investment narratives. Although prior literature shows that new economy firms tend to use equity financing to fund their operations and investments, we adopt a different perspective by demonstrating that creditors also consider the current accounting conservatism and future investment opportunities of these firms when making liquidation decisions.

The remainder of this paper is structured as follows. Section 2 develops our hypotheses. Section 3 describes data, sample, and research design. Section 4 discusses empirical results. Section 5 provides additional analyses. Finally, Section 6 presents concluding remarks.

2. Hypothesis Development

Book value of equity is defined as a firm's total assets less its total liabilities. Book value of equity represents the residual interest or ownership in the assets of the firm. In the extant literature, researchers use book value to proxy for a firm's adaptation value (Hayn 1995; Berger, Ofek, and Swary 1996; Burgstahler and Dichev 1997; Zhang 2013).[2] Adaptation value exists whenever a firm's resources can be redeployed to alternative uses. A firm can engage in several types of adaptation, including: abandonment, mergers and acquisitions, changes in CEO, and various other changes to its infrastructure (e.g., restructurings, spin-offs, divestitures). Adaptation value therefore represents the lower bound on firm value because it is the value of the firm's resources independent of its current business technology.

Around one-third of all Compustat firms have had a negative book value (or NEG-BV) at some point in their existence. NEG-BV occurs when total liabilities exceed total assets. Alternatively, NEG-BV occurs when the sum of a firm's retained earnings (accumulated deficit), treasury stock, and accumulated comprehensive income become sufficiently negative that they exceed the firm's contributed capital. NEG-BV makes the interpretation of several proxies difficult. For instance, when a firm's book value proxies for its adaptation value, expected future earnings, fundamental value, or firm size, NEG-BVs are difficult to interpret. Similarly, when using market-to-book ratios as a proxy for distress or default risk (e.g., Fama and French 1992; Fama and French 2015), NEG-BVs make this commonly-used ratio difficult to interpret. Perhaps because of these difficulties, many studies ignore this aspect of a firm's existence. For instance, Zhang (2000) models how conservatism impacts equity valuation, and imposes a regularity condition in his analytic model to disallow NEG-BV. Some empirical studies delete NEG-BV firms from the sample. For example, Collins et al. (1999) examine the

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[2] Alternatively, book value can proxy for expected future normal earnings (e.g., Penman 1992) and can also control for scale differences (e.g., Collins et al. 1999).

role of book value on the relation between equity valuation and negative earnings, but eliminate NEG-BV firms because they "have no economic meaning" in the context of their study.

Debtholders have asymmetric payoff structures whose returns are particularly sensitive to negative exit values (e.g., Jensen and Meckling 1976; Fama and Jensen 1983). Because of this asymmetric payoff structure, debtholders often impose debt covenants, which serve as an effective bonding mechanism against ex post agency costs of suboptimal actions that expropriate wealth from debtholders to equity holders (e.g., asset substitution, Jensen and Meckling 1976; debt overhang, Myers 1977). A violation of a debt covenant serves as an early red flag for bad performance, acting as a trip wire to provide debtholders with the option to step in and take actions (e.g., require immediate full payment, early transfer of decision rights). However, because of the competition among banks for good loans, a demand for full payment is rare, since it would result in a loss of business (e.g., Chen and Wei 1993; Smith 1993). Lenders therefore balance the benefits of setting tight debt covenants (i.e., need to identify losers to maximize recovery of funds) with the costs of prematurely exercising their rights to further action (i.e., potential loss of customers). Consistent with this, Dichev and Skinner (2002) find that debt covenant violations are quite common, and are then reset to a lower bar. Gopalakrishnan and Parkash (1995) find that 90% of lenders indicate a zero or low probability of serious consequences (i.e., termination or immediate payment) from covenant violators.

In the context of the current study, given (i) the asymmetric payoffs of debtholders, (ii) the existence of tight debt covenants based upon tangible net worth, and (iii) the power that debtholders/creditors have in being able to liquidate the firm upon violation of debt covenants, the strong presence of debtholders should be a particularly potent deterrent against firms marching steadily towards crossing the NEG-BV threshold.

Why do debtholders/creditors not attempt to liquidate debtor-firms before they enter into negative book value status (i.e., cross the NEG-BV threshold)? Firms that are close to

crossing the NEG-BV threshold are likely to be already experiencing financial distress, defaulting on debt service payments and other obligations. One interpretation is that, at the point of default, because debtholders and creditors possess the significant (albeit imperfect) ability to force a firm into liquidation before it crosses the NEG-BV threshold, the presence of firms that have crossed the NEG-BV threshold suggests that debtholders may prefer this crossing of the threshold in lieu of liquidation.[3] If this is the case, then NEG-BV firms are arguably the result of a preferred choice by debtholders (e.g., Betker 1995; Anderson and Sundaresan 1996). In addition, managers also prefer crossing the NEG-BV threshold relative to liquidation because they suffer serious consequence both financially and reputationally upon liquidation.

We examine what determines the likelihood of a firm crossing the NEG-BV threshold without being liquidated along three dimensions: 1) current accounting practices, 2) future investment opportunities, and 3) disclosure narratives. First, we expect that negative book value firms exhibiting higher accounting conservatism are less likely to be liquidated. Accounting conservatism is an important financial reporting practice representing "a prudent reaction to uncertainty to try to ensure that uncertainty and risks inherent in business situations are adequately considered" (FASB Statement of Concepts No. 2). It requires the exercise of caution in the recognition and measurement of income and assets (Wolk et al. 1989; Davidson et al. 1985; Stickney and Weil 1994; Givoly and Hayn 2000). Specifically, accounting conservatism implies the asymmetric verification threshold for gains versus losses in which the verification threshold for gains is higher (Basu 1997; Khan and Watts 2009).

The differential verification of gains and losses results in asymmetric earnings timeliness. Over time it may build up accumulative understatement of book value, which in

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[3] An alternative interpretation is that debtholders do not necessarily prefer this crossing of the NEG-BV threshold, but merely face more obstacles in liquidating certain types of firms, and the NEG-BV threshold is therefore crossed because of delays in liquidation efforts.

turn may lead to a negative book value. If a firm's negative book value results from a high level of conservatism, such as slower revenue recognition, faster expense recognition, lower asset valuation, and higher liability valuation (Wolk et al. 1989; Davidson et al. 1985; Stickney and Weil 1994; Givoly and Hayn 2000; Watts 2003), it may not convey a negative signal about the firm's future performance compared to a firm with a low level of conservatism. As a result, NEG-BV firms with high levels of conservatism are more likely to cross the NEG-BV threshold without being liquidated. Therefore, we present the following hypothesis:

H1: Negative book value firms with higher accounting conservatism are less likely to be liquidated.

Next, we investigate whether higher levels of future investment opportunities possessed by NEG-BV firms reduce their liquidation likelihood. Prior studies suggest that creditors tend to focus on investment opportunities of financially-distressed borrowers (Armstrong et al. 2021). These borrowers may dismiss managers at a faster rate, thus discouraging managers from undertaking long-term investments that may realize payoffs and benefit creditors. Furthermore, these borrowers may forgo risky but profitable investments, which in turn undermines creditors' future claim (Rauh 2009; Gormley and Matsa 2016). Therefore, creditors of distressed borrowers pay special attention to these borrowers' investment opportunities to mitigate the underinvestment problem and realize long-term payoff.

A typical measure of investment opportunities is the market-to-book ratio, which is not well-defined when a firm exhibits a negative book value (Smith and Watts 1992). In fact, negative book value firms require special treatment when being assessed for future investment opportunities. Prior studies suggest that investments in intangible assets are not fully recognized on the balance sheet due to the full expensing accounting rule (Banker et al. 2011; Banker et al. 2019). As a result, NEG-BV firms with higher investments in intangible assets may undergo a temporary depressing of book values.

However, these firms may have the potential of generating long-term benefits in the future. These future benefits can be realized through investments in various activities such as product promotion, brand development, information technology upgrade, human capital enhancement, customer relationship improvement, etc. (Hauser, Simester, and Wernerfelt 1994; Cleland and Bruno 1996; Ittner and Larcker 1998; Banker, Potter, and Srinivasan 2000; Brynjolfsson and Hitt 2000) As a result, NEG-BV firms possessing higher levels of such investments are able to realize larger profits in the subsequent periods, enabling them to repay their principal and interests in the future. Therefore, creditors may be more lenient towards NEG-BV firms with higher levels of future investment opportunities, reducing the liquidation likelihood of these firms. We present the following hypothesis:

H2: Negative book value firms possessing higher levels of future investment opportunities are less likely to be liquidated.

Finally, we investigate the narrative disclosure content provided by NEG-BV firms, since creditors may not be able to accurately evaluate the investment opportunities of NEG-BV firms solely based on quantitative financial numbers. As a result, creditors may need to rely on alternative information sources disclosed by NEG-BV borrowers to evaluate their investment opportunities. One of these information sources may be narratives about investment opportunities disclosed in firms' financial statements.

Prior studies suggest that firms may improve its information environments by disclosing narrative contents about investment opportunities. For example, Glassman (2003) indicates that managers use narratives in the MD&A disclosure to inform outsiders about the company's future plans. Similarly, Merkley (2014) documents that managers use narrative R&D disclosure to help investors interpret earnings performance. Furthermore, Cheng et al. (2019) show that firms provide narrative information in 8-K filings about their blockchain-related investments. These narrative disclosures will lead to an enhanced information

environment, which in turn may help firms attract more capital to finance high-risk and high-return investment projects (Bushman and Smith 2001). Consistent with this notion, prior studies show that firms disclosing more R&D narratives are valued positively by the stock market. Similarly, firms disclosing more investment opportunities tend to experience future sales growth and generate future cash flows in the near term (Basu et al. 2022). Furthermore, better information environments allow creditors to process firms' information more accurately (Donelson et al. 2017; Demerjian et al. 2020), thus providing a better evaluation of the nature and sources of negative book values. Therefore, when a negative book value firm provides more narrative disclosure about investment opportunities, creditors may expect that these firms will improve their performance in the near future. As a result, these firms are less likely to be liquidated. We present the following hypothesis:

H3: Negative book value firms disclosing more investment-related contents in 10-K filings are less likely to be liquidated.

3. Empirical Design

3.1 Empirical Models and Variable Measurement

3.1.1 Empirical Models

We employ the following logistic models to test our three hypotheses:

$$Liquidation_{i,t+1} = \beta_0 + \beta_1 \, Negative \, BV_{i,t} + \beta_2 \, Negative \, BV_{i,t} \times Accounting \, Conservatism_{i,t}$$
$$+ \beta_3 \, Accounting \, Conservatism_{i,t} + \gamma \, Controls_{i,t} + \mu_j + \delta_t + \varepsilon_{i,t} \qquad (1)$$

$$Liquidation_{i,t+1} = \beta_0 + \beta_1 \, Negative \, BV_{i,t} + \beta_2 \, Negative \, BV_{i,t} \times Intangible \, Investments_{i,t}$$
$$+ \beta_3 \, Intangible \, Investments_{i,t} + \gamma \, Controls_{i,t} + \mu_j + \delta_t + \varepsilon_{i,t} \qquad (2)$$

$$Liquidation_{i,t+1} = \beta_0 + \beta_1 \, Negative \, BV_{i,t} + \beta_2 \, Negative \, BV_{i,t} \times Investment \, Narratives_{i,t}$$
$$+ \beta_3 \, Investment \, Narratives_{i,t} + \gamma \, Controls_{i,t} + \mu_j + \delta_t + \varepsilon_{i,t} \qquad (3)$$

Our dependent variable *Liquidation* is an indicator variable that equals one if the firm files for liquidation-related delisting or bankruptcy within 12 months following the fiscal year end of year *t*, and zero otherwise. We identify liquidation-related delisting or bankruptcy as those marked with CRSP delisting code 400–499, 572, or 574, and/or Capital IQ bankruptcy filing (liquidation related). Liquidation date is defined as the CRSP delisting date or Capital IQ bankruptcy filing date, whichever is earlier. Since liquidation may be filed after a firm disappears from the Compustat database, we track the firm for five years after its last observation in Compustat to identify the subsequent liquidation filings. For firms that file for liquidation in the subsequent five years, we set *Liquidation* to one in the year of the last observation in Compustat (Danis and Gamba 2018).

In Equation (1), our variable of interest is the interaction term between *Negative BV* and *Accounting Conservatism*. We define *Negative BV* as an indicator variable that equals one if a firm's book value of common equity is negative, and zero otherwise. Consistent with *H1*, we expect a negative coefficient on this interaction term, suggesting that NEG-BV firms with higher accounting conservatism are less likely to be liquidated.

Similarly, in Equation (2) we predict a negative coefficient on the interaction term between *Negative BV* and *Intangible Investments*, indicating a lower liquidation likelihood for NEG-BV firms possessing more future investment opportunities (*H2*). Finally, in Equation (3), we expect that the coefficient on the interaction term between *Negative BV* and *Investment Narratives* is negative, suggesting a lower liquidation likelihood for NEG-BV firms disclosing more investment-related narratives in their 10-K filings (*H3*).

3.1.2 Measurement of Accounting Conservatism

We measure the firm-level accounting conservatism using three proxies. Our first proxy *C_Score* is based on Basu (1997) and Khan and Watts (2009), measured as the cross-sectional

sensitivity of earnings to bad news relative to good news. Specifically, we run the following cross-sectional regression for each fiscal year t:

$$Earn_i = \alpha_0 + R_i(\mu_1 + \mu_2 MVE_i + \mu_3 MTB_i + \mu_4 Lev_i) + D_i R_i(\lambda_1 + \lambda_2 MVE_i + \lambda_3 MTB_i + \lambda_4 Lev_i) \qquad (4)$$

$$+ (\delta_1 MVE_i + \delta_2 MTB_i + \delta_3 Lev_i + \delta_4 D_i MVE_i + \delta_5 D_i MTB_i + \delta_6 D_i Lev_i) + \varepsilon_i ,$$

where $Earn_i$ is the income before extraordinary items divided by market capitalization at the end of fiscal year t-1, R_i is the annual stock return over the period from the second quarter of fiscal year t to the first quarter of fiscal year t+1, and D_i is an indicator variable that equals one for negative returns, and zero otherwise. Additionally, MVE is the natural logarithm of the market capitalization, MTB is the market-to-book ratio, and Lev is the ratio of total debt to market capitalization. After obtaining the coefficients $\lambda_{1,t}$, $\lambda_{2,t}$, $\lambda_{3,t}$, and $\lambda_{4,t}$, we calculate C_Score for each firm-year using the following equation:

$$C\_Score_{i,t} = \lambda_{1,t} + \lambda_{2,t} MVE_{i,t} + \lambda_{3,t} MTB_{i,t} + \lambda_{4,t} Lev_{i,t} \qquad (5)$$

Following Givoly and Hayn (2000) and Beatty et al. (2008), our second and third measures of conservatism are constructed using negative non-operating accruals. We calculate non-operating accruals as [income before extraordinary items + depreciation and amortization - net cash flow from operating activities - change in receivables - change in inventories - change in prepaid expenses + change in accounts payable + change in income taxes payable] / total assets, and use negative non-operating accruals averaged over the prior five-year period ($Conservatism_{accrual1}$) and negative non-operating accruals at fiscal year-end ($Conservatism_{accrual2}$) to capture the level of accounting conservatism.

3.1.3 Measurement of Intangible Investments

Prior studies use the market-to-book ratio to measure a firm's investment opportunities (Smith and Watts 1992), constraining the book value to be positive. Since this variable is not well-defined for NEG-BV firms, we employ the future value generated by selling, general, and

administrative expense to measure firm-specific intangible investments, as prior studies document that current SG&A expenditure creates long-term asset value that varies systematically across firms and industries (Banker et al. 2011; Chen et al. 2012; Huson et al. 2012; Banker et al. 2019).

Following Banker et al. (2019), we measure SG&A future value by estimating the cumulative effect of current SG&A expenditure on the firm's future performance using the following equation:

$$\left(\frac{OI}{TA}\right)_{i,t} = \alpha_0 + \alpha_1 \left(\frac{1}{TA}\right)_{i,t-k} + \sum_{k=0}^{n} \alpha_{2,k}\left(\frac{SG\&A}{TA}\right)_{i,t-k} + \alpha_{3,k}\left(\frac{R\&D}{TA}\right)_{i,t} + \alpha_4\left(\frac{ADV}{TA}\right)_{i,t} + \varepsilon_{i,t}, \qquad (6)$$

where *OI* is operating income before depreciation and total SG&A expenditure (OIBDP+XSGA), *SG&A* is total SG&A expenditure other than R&D and advertising expenditures, *R&D* and *ADV* are R&D expenditure and advertising expenditure, respectively. We scale all variables by total assets (*TA*) to mitigate heteroskedasticity.

As in Banker et al. (2019), we first determine the optimal lag structure of SG&A by estimating Equation (6) for each firm. Next, we fix the lag structure for each firm based on the optimal lag structure and re-estimate Equation (6) on a firm-by-firm basis using a rolling window of time-series data. Finally, we calculate the sum of discounted coefficients on the lags of SG&A, multiplied by the current level of SG&A, $\sum_{k=1}^{3} \frac{\alpha_{2,k}}{(1.1)^k} \times SG\&A_t$. This measure captures the total dollar amount of future operating income generated from the current level of SG&A. Following Banker et al. (2019), we deflate this measure by total assets and obtain our first measure of firm-specific intangible investments (*$SGAFV/TA_1*). We also construct a measure of intangible investments (*$SGAFV/TA_2*) by redefining *SG&A* as total SG&A expenditure, without excluding R&D and advertising expenses in our estimation procedure.

3.1.4 Measurement of Investment Narratives

Introduced by Blei, Ng, and Jordan (2003), latent Dirichlet allocation (LDA) is a topic modeling method for identifying topics of textual materials, without reference to linguistic structure or sentiment. The most important assumption of the LDA method is that both the topics covered in a document and the words related to a single topic follow the Dirichlet distribution. Under this assumption, LDA algorithm 1) pre-specifies the document-topic model and topic-word model with unknown parameters (i.e., the probabilistic distribution of each word for a certain topic and the probabilistic distribution of each topic for a certain document), 2) fits the models into the corpora, and 3) selects the parameters that best describe the observed distribution of topics and words. As a result, the estimated models generate a mapping from each topic (document) to the related words (topics) and allocate different weight on each word (topic). In other words, LDA method can be used to determine the relative weight of each topic covered in a given document, as well as the relative weight of each word discussing a given topic.

Since its debut in accounting research (Bao and Datta 2014), LDA has been utilized to discover high-frequency topics underlying a population of financial documents, such as 10-K fillings (Bao and Datta 2014; Dyer et al. 2017; Brown et al. 2020), earnings conference call transcripts, analyst reports (Huang, Lehavy, Zang, and Zheng 2018), and SEC comment letters (Ryans 2021). Compared to dictionary-based method (Basu et al. 2022), the LDA-based method has two major advantages in categorizing and quantifying certain topics discussed in a document. First, while it is costly to manually include all eligible topics and related keywords in the dictionary, LDA method takes full advantage of the corpus to derive a virtually complete list of topics and keywords using an automated algorithm. Second, keywords selected into the dictionary are prone to subjective judgment, whereas the LDA algorithm only assumes the distribution of topics and words and generates keyword list without any further human intervention (Huang et al. 2018).

We measure LDA-based investment narratives using the following three steps. To begin with, we identify high-frequency investment-related topics by counting the occurrence of all topics discussed in Wall Street Journal (WSJ) articles covering S&P 500 firms. Topics covered in each article are obtained from the keywords of the original report. Next, we run LDA algorithm on the WSJ corpus to estimate the document-topic and topic-word models. Specifically, for each article, we obtain a dataset including a list of topics and their corresponding frequencies covered in this article, and for each topic, we obtain a dataset including the word list and frequencies of all possible words related to this topic. Finally, we measure the relative weights of investment-related topics discussed in Item 1 (Item 7) of 10-K filings for non-financial firms during the period of 2010 to 2016. To do this, we divide the number of words discussing high-frequency investment-related topics identified in the first step in Item 1 (Item 7), by the total word count of Item 1 (Item 7). As a result, we obtain three measures for investment narratives—*Invest_Narrative_i7*, *Invest_Narrative_i1*, and the sum of these two measures, *Invest_Narrative_i1&i7*.

Our implementation of LDA method differs from prior literature in two aspects. On the one hand, we select WSJ articles as our corpus to obtain high-frequency topics. Using WSJ articles has three advantages. First, the latent nature of topics underlying normal textual documents gives rise to one major concern in implementing LDA algorithm—the number of topics *to be identified* and the topic labeling depend entirely on researchers' subjective judgment. However, the keyword item in WSJ reports explicitly presents essential topics covered in each report, which ensures that topics to be identified are finite, distinct, and labeled objectively. Second, WSJ typically covers business topics of interest to the general public. It helps us screen out the most representative topics, compared to numerous idiosyncratic topics in firm-specific documents. Third, this method allows us to change the LDA algorithm from unsupervised learning to supervised learning (i.e., labeled LDA) by inputting both textual

materials and topic labels into the model estimation. In addition to increasing the objectivity in topic selection, these WSJ labels allow us to compare estimated topic distribution with input label distribution, particularly useful for iterative model evaluation and calibration.

On the other hand, we only focus on investment-related topics among all high-frequency topics discussed in the corpus. In doing so, we can easily conduct inter-industry comparison of investment narratives, because investment is common to all industries while many other topics are rather specific to certain industry. Furthermore, by narrowing down the scope of topic, we are able to investigate the economic consequences of narratives centering on investment-related topics more directly. Specifically, we can examine whether debtholders perceive higher weights of investment narratives in NEG-BV firms' 10-K filings as a signal of future investment opportunities, and thus do not push NEG-BV firms into liquidation.

3.1.5 Control Variables

We include the following variables to control for firm characteristics that may affect the likelihood of liquidation (Altman 1968; Ohlson 1980; Zmijewski 1984; Shumway 2001; Hillegeist, Keating, Cram, and Lundstedt 2004): book value (*BV/TA*) measured as the ratio of book value of common equity to total assets, Tobin's Q (*Tobin's Q*) measured as the market-to-book ratio of assets where the market value of assets is the market value of equity plus the book value of total assets minus the book value of equity and deferred tax, cash flow (*Cash Flow*) measured as net income plus depreciation expenses minus cash dividends divided by total assets, return on assets (*ROA*) measured as earnings before extraordinary items and discontinued operations divided by total assets, loss indicator (*Loss*) that equals one if ROA is negative and zero otherwise, leverage ratio (*Leverage*) measured as the ratio of total liabilities to total assets, net working capital (*Net Working Capital*) measured as the ratio of net working capital to total assets, and firm age (*Firm Age*) computed as the natural logarithm of one plus

the number of years the firm has been listed on Compustat. We also add expected asset liquidation value (*Liquidation Value*), computed as [0.715 × receivables + 0.547 × inventories + 0.535 × property, plant and equipment + cash and short-term investments] / total assets (Almeida and Campello 2007), capital expenditure (*Capital Expenditure*) measured as the ratio of capital expenditure to total assets, and R&D expenditure (*R&D*) measured as ratio of R&D expenditure to total assets into our model.

We expect that firms with higher values of *BV*, *Tobin's Q*, *ROA*, and net working capital are less likely to be liquidated because they are financially healthy. In contrast, firms with higher leverage and reporting losses are more likely to be liquidated because these firms tend to exhibit higher financial distress. We do not make a prediction on the relation between liquidation likelihood and liquidate value. On the one hand, firms with higher liquidation values have more tangible assets, reducing the likelihood of entering the default or distressed status. On the other hand, higher liquidation values may incentivize creditors to liquidate the firms because creditors may recover higher claim rights from selling the assets of these firms. Finally, we control for industry and year fixed effects. All continuous variables are winsorized at 1% and 99% levels. We provide detailed variable definitions in Appendix.

3.2 Data and Sample

We obtain financial variables from Compustat, stock returns information from CRSP, and bank debt-related variables from Capital IQ. Our initial sample includes all Compustat firms during 1961-2016. We remove firm-year observations with fiscal-year ending after their liquidation dates. We also delete firm-year observations with missing financial and industry information necessary for calculating dependent and independent variables. Our final sample contains 290,253 firm-year observations. Note that the sample size varies when estimating Equations (1)–(3) due to data availability of main variables.

Table 1 presents summary statistics of sample characteristics. In our main sample, there are approximately 7% of firm-years exhibiting NEG-BV status, and 0.3% of firm-years experiencing subsequent liquidations. The distribution of book value is left-skewed with a mean of 0.337 and a median of 0.440. The average cash flow-to-assets ratio is -0.121. Around 32.3% of firm-years have experienced a loss in our sample period. The mean (median) liquidation value for our sample firms is 0.522 (0.542), similar to that reported by Almeida and Campello (2007). On average, firms' capital (R&D) expenditure is 5.9% (4.2%) of total assets.

Table 2 presents Pearson (Spearman) correlation coefficients among main variables used in our analyses. We find that the liquidation likelihood is positively correlated with NEG-BV status, suggesting that negative book value firms are more likely to be liquidated than positive book value firms. Furthermore, we find that the liquidation likelihood is positively related to reported loss and financial leverage and negatively correlated with book value, cash flow capacity, profitability, liquidation value, and working capital.

4. Empirical Results

4.1 Frequency of NEG-BV Firms

We first examine the prevalence of NEG-BV firms over time and across industries. Figure 1 illustrates the time trend of NEG-BV firms for a sample of 411,131 firm-years with non-missing *BV/TA* ratio during the period 1961-2016. We find that the proportion of firms with negative book value is increasing over time, from 0.41% in 1961 to 12.47% in 2016 with a peak of 15.15% in 2002. During the past ten years, this ratio ranges between 10% and 15%, suggesting that the NEG-BV firms have become more prevalent in the recent time period. This evidence highlights the importance of investigating NEG-BV firms, especially given the recent shift from income-statement-focus to balance-sheet-focus of accounting standards.

Table 3 shows the distribution of NEG-BV firm-years in the full sample across different industries. We find that the proportion of NEG-BV firm-years is the highest in the telephone and television transmission industry (18.10%), followed by the healthcare industry (16.01%) and the business equipment industry (12.96%). In contrast, the proportion of NEG-BV observations is the lowest in the financial (3.67%) and the utility (0.94%) industries. This industry distribution suggests that firms in technology-intensive industries are more likely to report negative book values, possibly due to high levels of risky investment.

Figure 2 presents the histogram of *BV/TA* ratio for 5,396 firm-year observations with *BV/TA* ratios ranging from –0.025 to +0.025. The width of each bin is 0.001. Specifically, the bin immediately to the right of zero contains all observations with *BV/TA* in the [0, 0.001) interval, while the bin immediately to the left of zero contains all observations in the [-0.001, 0) interval. Figure 2 shows that the distribution of *BV/TA* within the [–0.025, 0.025) interval is relatively even, and the observations to the right of zero outnumber those to the left. However, there is a kink of *BV/TA* around zero with abnormally high frequency of small positive book value firms (i.e., *BV/TA* in [0, 0.001)) and abnormally low frequency of small negative book value firms (i.e., *BV/TA* in [-0.001, 0)). Similar to prior evidence that firms avoid falling below earning benchmarks (e.g., Burgstahler and Dichev 1997; Dichev and Skinner 2002), our evidence of the around-zero-book-value discontinuity suggests that firms also try to avoid entering into NEG-BV status, possibly because negative book value firms are more likely to be liquidated than positive book value firms.

4.2 Descriptive Statistics of Investment Narratives

Following the procedure in Section 3.1.4, we obtain the relative weight of investment narratives in Item 1 and Item 7 of the 10-K filing for each firm-year. Figure 3 illustrates the time trend of investment narratives in Item 7 of 10-K filing (*Invest_Narrative_i7*). Notice that

there is a surge from 2010 to 2011, coinciding with the post-financial-crisis recovery period for U.S. firms.

Table 4 presents the industry distribution of investment narratives. The average relative weight of investment narratives is 2.43%, indicating that investment-related topics on average represent 2.43% of total contents in Item 7 of the 10-K filing for each firm-year. We find that firms operating in the healthcare, medical equipment, and drugs industry have the highest relative weight of investment narratives in Item 7 of 10-K filings (2.68%), followed by those in consumer durables industry (2.48%), other industry (2.47%), and business equipment industry (2.44%). This evidence suggests that firms in these industries tend to discuss more about their investment in 10-K filings due to the uncertain nature of their investment. However, firms in the utilities sector provide least discussion on investment-related topics (2.08%), indicating that highly-regulated utilities firms do not emphasize the investment content in 10-K filings, possibly because the signaling benefit of investment narratives is limited due to their stable operating environments. Overall, the time trend and the industry distribution of *Invest_Narrative_i7* suggest that our LDA-based measure of investment narratives captures a firm's tendency to focus on future investment opportunities.

4.3 Determinants of NEG-BV Status

To shed light on what drives firms to enter into the NEG-BV status, we first conduct an analysis on the determinants of NEG-BV firms by estimating a logistic regression of the NEG-BV status on a set of possible contributing factors, including our proxies for accounting conservatism, intangible investments, and investment narratives. Column (1) of Table 5 presents the result of our baseline regression, where the dependent variable is *Negative BV* and the independent variables are *Tobin's Q*, *Cash Flow*, *Loss*, *Liquidation Value*, *Capital Expenditure*, *R&D*, and *Firm Age*, as well as industry- and year-fixed effects. We find that the

coefficients on *Tobin's Q*, *Loss*, *Capital Expenditure*, and *Firm Age* are significantly positive, suggesting firms with higher market values, negative earnings, higher capital investments, and longer histories are more likely to enter into the NEG-BV status. In contrast, *Cash Flow*, *Liquidation Value*, and *R&D* are negatively correlated with *Negative BV*, consistent with the notion that firms with higher levels of cash flows, tangible asset values, and R&D investments are less likely to fall below the zero-book-value threshold.

Columns (2)–(4) present the results of adding the accounting conservatism variables to the baseline model of Column (1). The coefficients on all three accounting conservatism variables are significant and positive (coefficient = 5.529, z-statistic = 11.33 in Column (2); coefficient = 0.281, z-statistic = 8.98 in Column (3); coefficient = 0.123, z-statistic = 3.12 in Column (4)), indicating that asymmetric verification thresholds for gains versus losses may result in an under-stated book value, and thus a higher likelihood for firms to enter the NEG-BV status.

Columns (5)–(6) report the results of including intangible investment as one possible determinant of *Negative BV*. The coefficients on the two intangible investment variables, *$SGAFV/TA_1* and *$SGAFV/TA_2*, are both positive, and the coefficient on *$SGAFV/TA_2* is significant at the 5% level (coefficient = 0.253, z-statistic = 2.13). The evidence suggests that firms with higher intangible assets are more likely to enter into the NEG-BV status, possibly because their reported book values are understated due to the accounting treatment of expensing intangible investments rather than capitalizing them (Banker et al. 2019).

Columns (7)–(9) provide the results of including investment narratives. The coefficients on the investment narrative variables are all significantly positive (coefficient = 0.210, z-statistic = 2.63 in Column (7); coefficient = 0.272, z-statistic = 3.60 in Column (8); coefficient = 0.164, z-statistic = 3.41 in Column (9)). The results show that firms disclosing more investment-related narratives in their 10-K filings are more likely to report a negative

book value, suggesting that firms disclosing future investment opportunities may undergo a depressed current NEG-BV status.

4.4 Liquidation Likelihood of NEG-BV Firms Conditional on Accounting Conservatism

Next, we examine the liquidation likelihood of NEG-BV firms conditional on accounting conservatism. Table 6 presents the estimation results of Equation (1). Column (1) shows the result using *C_Score* to measure accounting conservatism. We find that the coefficient on *Negative BV* is positive and significant at the 1% level, indicating that NEG-BV firms are more likely to be liquidated compared to firms with positive book values. This evidence partially explains the discontinuity around the zero-book-value documented in Figure 2, suggesting that firms try to avoid entering into the NEG-BV status because this status may trigger liquidation. More importantly, we find that the coefficient on the interaction term of *Negative BV* and *C_Score* is significantly negative (coefficient = -1.246, z-statistic = -2.13), consistent with *H1* that NEG-BV firms adopting a more conservative accounting practice are less likely to be liquidated.

We also find that the coefficient on *Tobin's Q* (*Loss*) is significantly negative (positive), suggesting a higher (lower) liquidation likelihood for firms with higher market values (reporting a loss). Consistent with prior literature (Altman 1968; Zmijewski 1984; Shumway 2001), we find that the coefficient on *Leverage* is positive and the coefficients on *ROA* and *Net Working Capital* are negative. In addition, the coefficients on *Liquidation Value* are insignificant, consistent with our expectation that the effect of asset tangibility on creditors' liquidation decision is ambiguous.

Finally, we repeat the above analyses using two alterative measures of accounting conservatism, i.e., *Conservatism_accrual1* and *Conservatism_accrual2*. Columns (2) and (3) of Table 6 show that the results are qualitatively the same using these two measures. We continue

to find a positive relation between liquidation likelihood and the NEG-BV status, suggesting that NEG-BV firms are more likely to be liquidated than POS-BV firms. Finally, the coefficients on the interaction *Negative BV × Conservatism* remain negative and significant (coefficient = -0.644, z-statistic = -4.21 in Column (2); coefficient = -0.394, z-statistic = -1.96 in Column (3)). Overall, the results presented in Table 6 support *H1* that NEG-BV firms with more conservative accounting practices are less likely to be liquidated subsequently.

4.5 Liquidation Likelihood of NEG-BV Firms Conditional on Intangible Investments

Table 7 presents the estimation results of the liquidation likelihood of NEG-BV firms conditional on intangible investments measured by SG&A future values. Column (1) shows that the coefficient on *Negative BV × $SGAFV/TA_1* is significantly negative (coefficient = -0.525, z-statistic = -1.94), consistent with *H2* that NEG-BV firms are less likely to be liquidated when their SG&A expenditures generate higher future values.

We replace *$SGAFV/TA_1* with an alternative measure *$SGAFV/TA_2*, which is obtained by defining *SG&A* as total SG&A expenditure rather than SG&A expenditure excluding R&D and advertising expenditures. We obtain similar results as with *$SGAFV/TA_1*. The coefficient on *Negative BV × $SGAFV/TA_2* is significant and negative (coefficient = -0.721, z-statistic = -2.48). Taken together, the results in Table 7 support *H2* that negative book value firms engaging in higher levels of future intangible investments are less likely to be liquidated.

4.6 Liquidation Likelihood of NEG-BV Firms Conditional on Investment Narratives

Table 8 provides the estimation results of NEG-BV firms' liquidation likelihood conditional on investment narratives. Column (1) shows the results using the investment narrative measure derived from Item 7 of 10-K filings. We find that the coefficient on the

interaction term *Negative BV × Invest_Narrative_i7* is negative and significant (coefficient = -0.653, z-statistic = -3.12). This result supports *H3* that NEG-BV firms disclosing more investment narratives in their 10-K filings are less likely to be liquidated.

We also repeat the above analyses using two alterative measures of investment narratives based on Item 1 (*Invest_Narrative_i1*) and combined Items 1 and 7 (*Invest_Narrative_i1&i7*) of 10-K filings, respectively. Columns (2) and (3) show that the coefficients on the interaction terms continue to be negative and significant (coefficient on *Negative BV × Invest_Narrative_i1* = -0.878, z-statistic = -2.03; coefficient on *Negative BV × Invest_Narrative_i1&i7* = -0.495, z-statistic = -2.61). Overall, the evidence presented in Table 8 provides support for *H3*: the more discussions on investment-related topics provided by NEG-BV firms in their 10-K filings, the less likely debtholders will push them into liquidation, possibly because debtholders expect an improvement in these firms' future performance.

5. Additional Analyses

5.1 Liquidation Likelihood of NEG-BV and Small POS-BV Firms

An implicit assumption underlying our hypotheses is that zero book value serves as a threshold for debtholders' liquidation decisions. As a result, we examine the liquidation likelihood for firms entering into NEG-BV status. However, it is plausible that a small positive book value serves as the threshold of liquidation decision. In this case, our empirical results may simply capture the conditional liquidation likelihood of low book value firms. To rule out this alternative explanation, we examine the liquidation likelihood of NEG-BV firms and small POS_BV firms using the following equation:

$$Liquidation_{i,t+1} = \beta_0 + \beta_1 Negative\ BV_{i,t} + \beta_2 SmallPos\ BV_{i,t} + \gamma Controls_{i,t} + \mu_j + \delta_t + \varepsilon_{i,t}\ , (7)$$

where *SmallPos BV* is an indicator variable that equals one if the positive book value falls in the lowest decile of the positive-BV sample, and zero otherwise. By doing so, we compare the

liquidation likelihood of Small-POS-BV firms with NEG-BV firms, both benchmarked against the reference group (i.e., firms with large positive book values). After including control variables as in Equations (1)–(3), we estimate and present the results in Table 9.

Table 9 presents the results of estimating Equation (7). We find that the coefficient on *Negative BV* is positive and significant (coefficient = 1.464, z-statistic = 10.12), consistent with our earlier finding that negative book value firms are more likely to be liquidated than large positive book value firms. We also find that the coefficient on *SmallPos BV* is significantly positive (coefficient = 0.733, z-statistic = 4.14), suggesting that firms with small positive book values indeed are more likely to be liquidated than firms with large positive book values. However, we also find that the coefficient on *Negative BV* (1.464) is significantly higher than that on *SmallPos BV* (0.733), suggesting that that the liquidation likelihood of NEG-BV firms is much larger than that of Small-POS-BV firms. Therefore, it is unlikely that a small positive rather than zero book value is used as the threshold for liquidation.

5.2 Bankruptcy Likelihood of NEG-BV Firms

Prior studies suggest that firms filing for bankruptcy may either undergo a liquidation or a reorganization. Although liquidation is the main mechanism through which creditors can recover their claim immediately, they may also receive some of their claim rights under certain arrangement of reorganization. Therefore, we expand our sample by including firms that have undergone a reorganization. We identify firms that have experienced a reorganization during our sample period, using bankruptcy-related events extracted from Capital IQ and UCLA-LoPucki Bankruptcy Research Database. Next, we merge this reorganization sample with our liquidation sample to create a bankruptcy sample. We define an indicator variable (*Bankruptcy*) that equals one if bankruptcy (i.e., either liquidation or reorganization) is filed within 12 months following the fiscal year end of year *t*, or occurs within five years after the year of the

firm's last observation in Compustat, and zero otherwise. We then replace *Liquidation* with *Bankruptcy* and re-estimate Equations (1)–(3). Results are presented in Tables 10–12. Similar to the findings under the liquidation scenario, we find that NEG-BV firms are less likely to file for bankruptcy if they exhibit higher current levels of accounting conservatism, engage in more intangible investments, and disclose more future-investment-related narratives. Therefore, our main findings are robust to incorporating a less stringent scenario of reorganization where firms are allowed to continue as a going concern.

5.3 Two-year-ahead Liquidation Likelihood of NEG-BV Firms

In our previous analysis, we examine the likelihood of liquidation occurring in the subsequent twelve months. However, it may take a longer time for creditors to decide whether to liquidate a NEG-BV firm. Thus, it is possible that the documented lower liquidation likelihood of NEG-BV firms with higher levels of accounting conservatism, intangible investments, and investment narratives, is simply driven by the fact that it takes more than a year for creditors to decide whether to liquidate these NEG-BV firms, even though these firms are already deeply distressed. To address this concern, we extend the length of the liquidation window from the subsequent year to the subsequent two years. Specifically, we define *Liquidation_2yr* as an indicator variable that equals one if liquidation-related delisting or bankruptcy is filed within 24 months following the fiscal year end of year *t*, or occurs within five years after the year of the firm's last observation in Compustat, and zero otherwise. Tables 13–15 present results using the two-year-ahead liquidation likelihood as the dependent variable. The results are qualitatively similar to those in Tables 6–8, indicating that our evidence is robust to extending the liquidation window to a longer time period.

6. Conclusion

In this study, we focus on firms with a negative book value of equity. Unlike loss firms, these firms have been understudied despite their high prevalence across industries and over time. Given the current shift of financial reporting regimes from the income-statement orientation to the balance-sheet orientation (Watts 2006; Dichev 2017), it becomes essential to understand the determinants and consequences of the NEG-BV status.

We show that NEG-BV firms are more prevalent in recent years and among technology-intensive industries, suggesting that recent advances in technology may have generated a large sample of new economy firms whose book values are understated due to the current conservative accounting treatment. Our findings confirm our expectation that firms with higher levels of accounting conservatism, intangible investments, and investment narratives are more likely to enter into the NEG-BV status. We further examine whether these NEG-BV firms may continue as a going concern without being liquidated. Our results show that NEG-BV firms are less likely to be liquidated when they exhibit higher current levels of accounting conservatism, possess more future investment opportunities, and disclose more future-investment-related narratives. Our results are robust to including reorganization firms, extending the length of the liquidation window, and using a small positive book value rather than zero book-value as an alternative liquidation threshold. Taken together, our study suggests that a firm's current accounting practices and future investment opportunities affect its likelihood of entering into the NEG-BV status without being liquidated.

Our study highlights the importance of examining the balance-sheet-oriented NEG-BV firms in addition to the income-statement-oriented loss firms. Prior studies remove these firms from the sample due to the difficulty of interpreting them. We show that these firms tend to exhibit high levels of conservatism, intangible investments, and investment narratives, which are essential features of the increasingly important new economy firms. Furthermore, we show

that creditors consider these features when making liquidation decisions, reducing the liquidation likelihood of NEG-BV when they exhibit the above desirable features. Finally, we document that NEG-BV firms with more future-investment-related narrative disclosures are less likely to be liquidated by employing the machine-learning-based LDA method to capture future-investment-related disclosure contents. Therefore, our study also contributes to the narrative disclosure literature by providing a measure of investment narratives using the topic modeling method.

Our study provides initial evidence on the determinants and consequences of the NEG-BV status. Future research may investigate the market valuation, analyst forecasts, and management forecasts associated with NEG-BV firms. Our LDA-based measure of investment narratives may also be applied to other contexts such as investors' trading behavior and firms' compensation contract design.

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Variables	Definitions
Liquidation	An indicator variable that equals one if liquidation-related delisting or bankruptcy is filed within 12 months following the fiscal year end of year *t*, or occurs within five years after the firm's last observation in Compustat, and zero otherwise.
Negative BV	An indicator variable that equals one if book value of common equity (CEQ) is negative, and zero otherwise.
BV/TA	Ratio of book value of common equity to total assets (AT).
Tobin's Q	The market value of equity (CSHO*PRCC_F) plus the book value of total assets (AT) minus the book value of equity (CEQ) and deferred tax (TXDB), divided by the book value of total assets (AT).
Cash Flow	Cash flow measured as net income plus depreciation expenses minus cash dividends (NI + DP - DV) divided by total assets.
ROA	Return on assets measured as earnings before extraordinary items and discontinued operations (IB) divided by total assets.
Loss	An indicator variable that equals one if ROA is negative, and zero otherwise.
Liquidation Value	Expected asset liquidation value computed using the following formula: (0.715×RECT+0.547×INVT+0.535×PPENT+CHE)/AT (Almeida and Campello 2007).
Leverage	Ratio of total liabilities (LT) to total assets (AT).
Net Working Capital	Ratio of net working capital (WCAP) to total assets (AT).
Capital Expenditure	Ratio of capital expenditure (CAPX) to total assets (AT).
R&D	Ratio of R&D expenditure (XRD) to total assets (AT).
Firm Age	The natural logarithm of one plus the number of years the firm has been listed on Compustat.
C_Score	Conservatism measured as sensitivity of earnings to bad news (Khan and Watts 2009). Specifically, we estimate the following cross-sectional model for each fiscal year *t*: $Earn_i = \alpha_0 + R_i(\mu_1 + \mu_2 MVE_i + \mu_3 MTB_i + \mu_4 Lev_i) + D_i R_i(\lambda_1 + \lambda_2 MVE_i + \lambda_3 MTB_i + \lambda_4 Lev_i) + (\delta_1 MVE_i + \delta_2 MTB_i + \delta_3 Lev_i + \delta_4 D_i MVE_i + \delta_5 D_i MTB_i + \delta_6 D_i Lev_i) + \varepsilon_i$ and $C\_Score_{i,t} = \lambda_{1,t} + \lambda_{2,t} MVE_{i,t} + \lambda_{3,t} MTB_{i,t} + \lambda_{4,t} Lev_{i,t}$.
Conservatism_accrual1	Conservatism measured as negative one times the average non-operating accruals for the prior five-year period. Non-operating accruals are calculated as (IB + DP - CFO - DRECT - DINVT - DXPP + DAP + DTXP)/AT (Beatty et al. 2008).
Conservatism_accrual2	Conservatism measured as negative one times non-operating accruals.
Invest_Narrative_i7	Relative weight of investment-related narratives in Item 7- Management Discussion and Analysis (MD&A) of 10-K filing.
Invest_Narrative_i1	Relative weight of investment-related narratives in Item 1- Business of 10-K filing.
Invest_Narrative_i1&i7	Sum of relative weight of investment-related narratives in both Section 1- Business and in Section 7- MD&A of 10-K filing.
$SGAFV/TA_1	The sum of discounted coefficients on past SG&A times the current level of SG&A $\sum_{k=1}^{3} \frac{\alpha_{2,k}}{(1.1)^k} \times SG\&A_t$, scaled by total assets, in which the coefficients are estimated from the following model on a firm-by-firm basis using a rolling window of time-series data starting from 1982. *SG&A*=XSGA-XRD-XAD. (Banker et al. 2019) $$\left(\frac{OI}{TA}\right)_{i.t} = \alpha_0 + \alpha_1\left(\frac{1}{TA}\right)_{i,t-k} + \sum_{k=0}^{n} \alpha_{2,k}\left(\frac{SG\&A}{TA}\right)_{i,t-k} + \alpha_{3,k}\left(\frac{R\&D}{TA}\right)_{i,t} + \alpha_4\left(\frac{ADV}{TA}\right)_{i,t} + \varepsilon_{i,t}$$
$SGAFV/TA_2	The sum of discounted coefficients on past SG&A times the current level of SG&A $\sum_{k=1}^{3} \frac{\alpha_{2,k}}{(1.1)^k} \times SG\&A_t$, scaled by total assets, in which the coefficients are estimated from the following model on a firm-by-firm basis using a rolling window of time-series data starting from 1982. *SG&A*=XSGA. $$\left(\frac{OI}{TA}\right)_{i.t} = \alpha_0 + \alpha_1\left(\frac{1}{TA}\right)_{i,t-k} + \sum_{k=0}^{n} \alpha_{2,k}\left(\frac{SG\&A}{TA}\right)_{i,t-k} + \varepsilon_{i,t}$$

SmallPos BV	An indicator variable that equals one if the positive book value falls in the lowest decile in the positive-BV sample, and zero otherwise. Deciles are ranked each year.
Bankruptcy	An indicator variable that equals one if bankruptcy is filed within 12 months following the fiscal year end of year *t*, or occurs within five years after the fiscal year end in the year of the firm's last observation in Compustat, and zero otherwise.
Liquidation_2yr	An indicator variable that equals one if liquidation-related delisting or bankruptcy is filed within 24 months following the fiscal year end of year *t*, or occurs within five years after the fiscal year end in the year of the firm's last observation in Compustat, and zero otherwise.

Table 1 Summary Statistics

Variable	N	Mean	P25	Median	P75	Std
Liquidation	290,253	0.003	0.000	0.000	0.000	0.056
Negative BV	290,253	0.067	0.000	0.000	0.000	0.250
BV/TA	290,253	0.337	0.229	0.440	0.647	0.735
Tobin's Q	290,253	2.627	0.989	1.252	2.053	5.615
Cash Flow	290,253	-0.121	-0.015	0.044	0.097	0.764
ROA	290,253	-0.149	-0.038	0.022	0.064	0.760
Loss	290,253	0.323	0.000	0.000	1.000	0.467
Liquidation Value	290,253	0.522	0.446	0.542	0.612	0.180
Leverage	290,253	0.652	0.340	0.541	0.744	0.811
Net Working Capital	290,253	0.129	0.000	0.161	0.386	0.630
Capital Expenditure	290,253	0.059	0.009	0.035	0.077	0.078
R&D	290,253	0.042	0.000	0.000	0.024	0.115
Firm Age	290,253	2.368	1.792	2.398	2.996	0.858

Notes: This table reports summary statistics of variables for our main sample of 290,253 firm-years from 1961 to 2016. All continuous variables are winsorized at 1% and 99%. Variables are defined as in Appendix.

Table 2 Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Liquidation		0.07	-0.04	-0.01	-0.05	-0.06	0.06	-0.01	0.04	-0.04	-0.01	-0.01	-0.00
Negative BV	0.07		-0.43	0.29	-0.28	-0.30	0.31	-0.04	0.40	-0.30	-0.07	0.05	-0.05
BV/TA	-0.03	-0.68		0.08	0.28	0.29	-0.07	0.27	-0.97	0.63	0.20	0.24	-0.06
Tobin's Q	-0.01	0.42	-0.60		-0.00	0.03	0.15	0.13	-0.09	0.09	0.10	0.30	-0.17
Cash Flow	-0.03	-0.52	0.68	-0.70		0.87	-0.70	0.03	-0.26	0.22	0.35	-0.07	0.17
ROA	-0.03	-0.53	0.69	-0.71	0.98		-0.81	0.02	-0.27	0.23	0.21	-0.10	0.18
Loss	0.06	0.31	-0.20	0.23	-0.38	-0.40		0.06	0.05	-0.07	-0.07	0.20	-0.19
Liquidation Value	-0.01	-0.03	0.09	0.11	-0.04	-0.04	0.08		-0.26	0.52	0.10	0.23	-0.13
Leverage	0.03	0.63	-0.97	0.63	-0.69	-0.70	0.19	-0.08		-0.63	-0.20	-0.24	0.07
Net Working Capital	-0.03	-0.56	0.88	-0.58	0.66	0.67	-0.18	0.24	-0.90		0.10	0.38	-0.01
Capital Expenditure	-0.00	-0.01	0.05	0.02	0.01	-0.02	-0.00	0.10	-0.04	-0.04		0.06	0.02
R&D	0.01	0.21	-0.17	0.30	-0.39	-0.40	0.31	0.24	0.16	-0.09	-0.04		-0.01
Firm Age	-0.00	-0.05	0.02	-0.14	0.14	0.14	-0.18	-0.10	-0.02	0.04	-0.10	-0.10	

Notes: This table presents the correlation among dependent and independent variables. Pearson (Spearman) correlation coefficients are presented in the lower left (upper right). Variables are defined as in Appendix. Bold indicates significance at or below the 10% level.

Figure 1 Time Trend of NEG-BV Firms
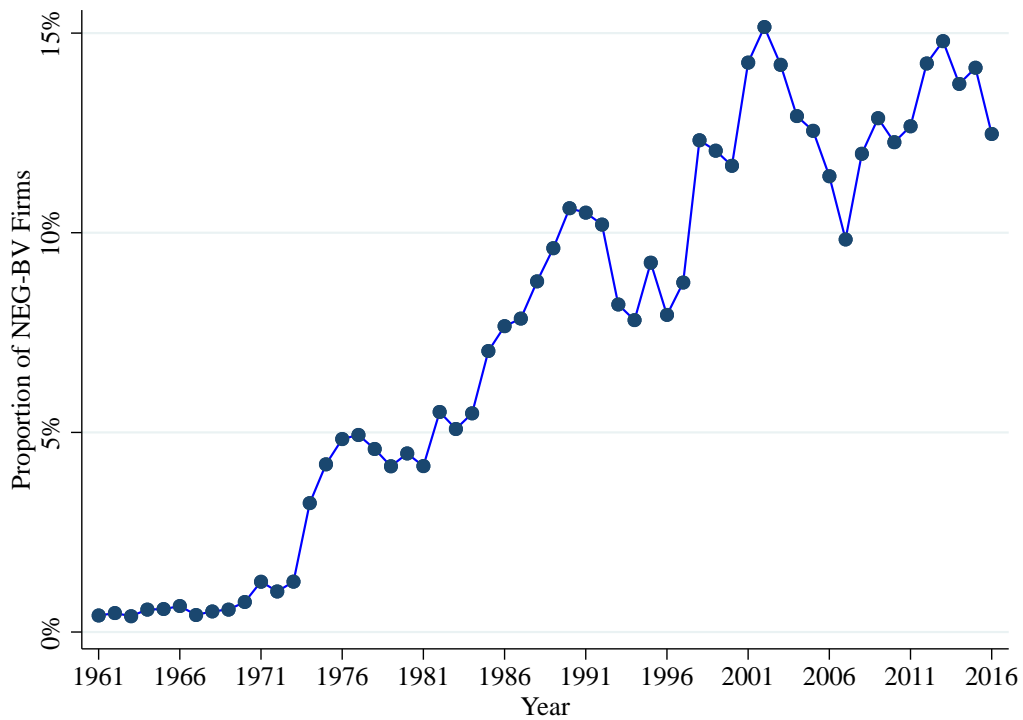
Notes: This figure illustrates the time trend of the proportion of NEG-BV firms out of all firms with non-missing book values from 1961 to 2016. The sample includes 411,131 firm-years.

Table 3 Industry Distribution of NEG-BV Firm-years

FFind12 Classification	Proportion of NEG-BV Firm-years
Telephone and Television Transmission	18.10%
Healthcare, Medical Equipment, and Drugs	16.01%
Business Equipment—Computers, Software, and Electronic Equipment	12.96%
Other—Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment	11.86%
Chemicals and Allied Products	10.35%
Consumer Durables—Cars, TV's, Furniture, Household Appliances	8.32%
Oil, Gas, and Coal Extraction and Products	8.17%
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	7.70%
Manufacturing—Machinery, Trucks, Planes, Off Furn, Paper, Com Printing	7.15%
Consumer Non-Durables—Food, Tobacco, Textiles, Apparel, Leather, Toys	6.56%
Finance	3.67%
Utilities	0.94%
Total	**9.25%**

Notes: This table reports industry distribution of the proportion of NEG-BV firm-years out of all firms with non-missing book values from 1961 to 2016. The sample includes 411,131 firm-years. Industry classification is based on Fama-French 12 industries.

Figure 2 Distribution of Observations for the Full sample
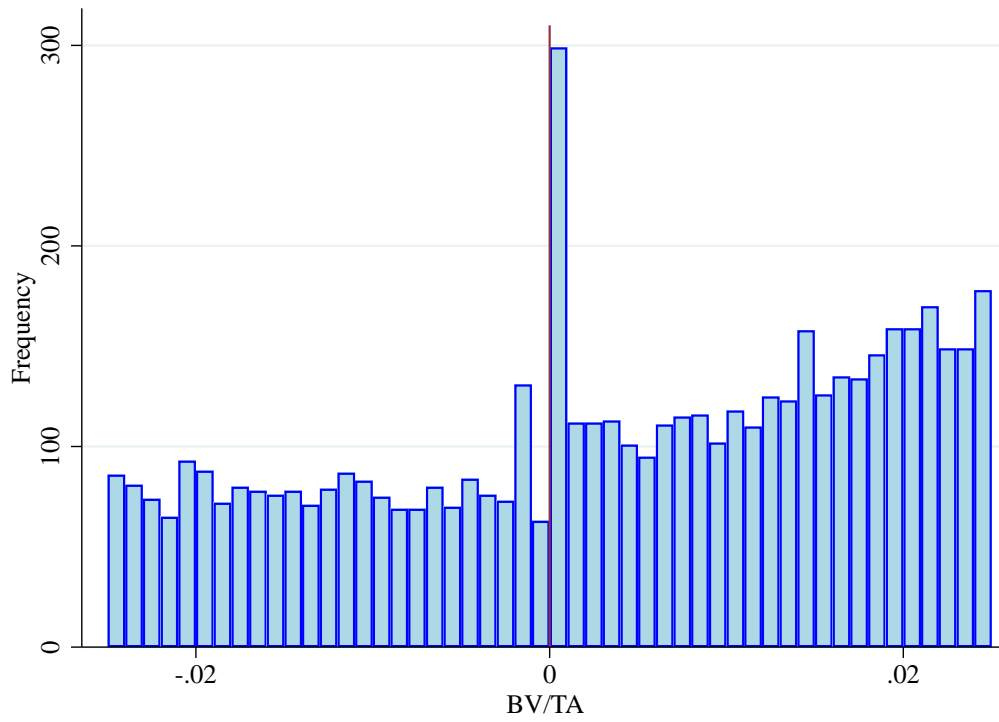
Notes: This figure illustrates the distribution of the frequency of *BV/TA*. Bin width is 0.001. The sample includes 5,396 firm-years with the BV/TA ratio ranging from –0.025 to +0.025.

Figure 3 Time Trend of Investment Narratives
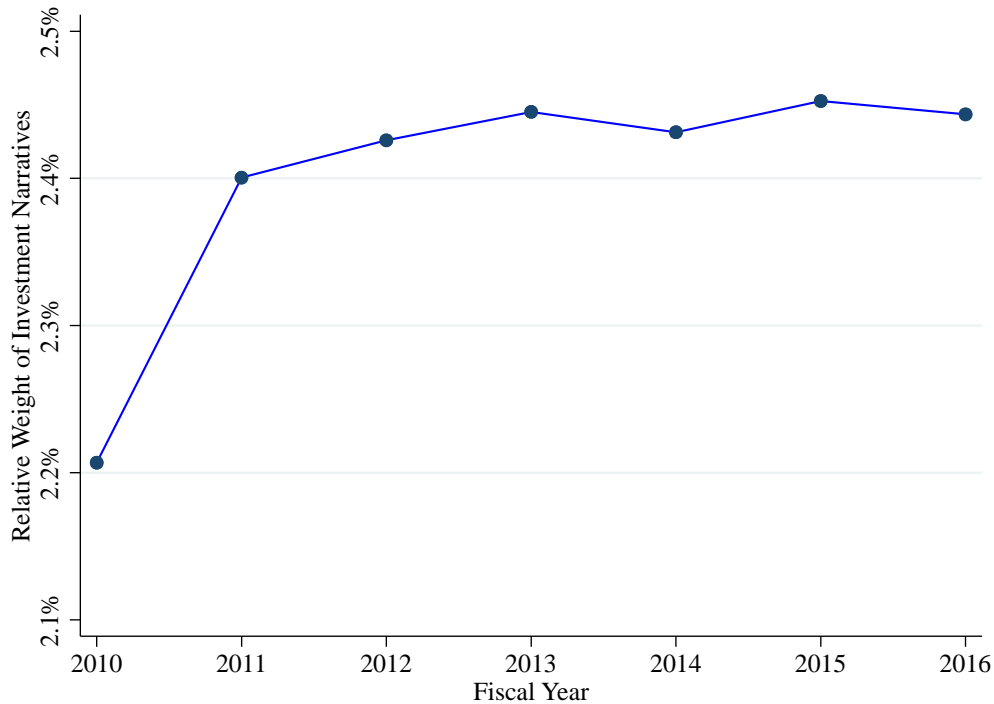
Notes: This figure illustrates the time trend of the annual mean of *Invest_Narratives_i7* from 2010 to 2016. The sample includes 20,329 firm-years.

Table 4 Industry Distribution of Investment Narratives

FFind12 Classification	Relative Weight of Investment Narratives
Healthcare, Medical Equipment, and Drugs	2.68%
Consumer Durables—Cars, TV's, Furniture, Household Appliances	2.48%
Other—Mines, Constr, BldMt, Trans, Hotels, Bus Serv, Entertainment	2.47%
Business Equipment—Computers, Software, and Electronic Equipment	2.44%
Consumer Non-Durables—Food, Tobacco, Textiles, Apparel, Leather, Toys	2.43%
Manufacturing—Machinery, Trucks, Planes, Off Furn, Paper, Com Printing	2.34%
Chemicals and Allied Products	2.33%
Telephone and Television Transmission	2.26%
Oil, Gas, and Coal Extraction and Products	2.23%
Wholesale, Retail, and Some Services (Laundries, Repair Shops)	2.18%
Utilities	2.08%
Total	**2.43%**

Notes: This table reports industry distribution of the mean of *Invest_Narratives_i7*. The sample consists of 20,329 firm-years. Industry classification is based on Fama-French 12 industries.

Table 5 Determinants of NEG-BV Status

	(1) Negative BV	(2) Negative BV	(3) Negative BV	(4) Negative BV	(5) Negative BV	(6) Negative BV	(7) Negative BV	(8) Negative BV	(9) Negative BV
C_Score		5.529***							
		(11.33)							
Conservatism$_{\_accrual1}$			0.281***						
			(8.98)						
Conservatism$_{\_accrual2}$				0.123***					
				(3.12)					
$SGAFV/TA_1					0.151				
					(1.57)				
$SGAFV/TA_2						0.253**			
						(2.13)			
Invest_Narrative_i7							0.210***		
							(2.63)		
Invest_Narrative_i1								0.272***	
								(3.60)	
Invest_Narrative_i1&i7									0.164***
									(3.41)
Tobin's Q	0.058***	0.124***	0.065***	0.061***	0.115***	0.115***	0.051***	0.050***	0.050***
	(14.31)	(11.51)	(12.29)	(14.35)	(9.66)	(9.61)	(11.50)	(11.51)	(11.39)
Cash Flow	-0.755***	-0.778***	-0.698***	-0.704***	-0.635***	-0.635***	-0.687***	-0.698***	-0.681***
	(-19.18)	(-10.48)	(-15.31)	(-15.91)	(-10.31)	(-10.54)	(-9.47)	(-9.89)	(-9.40)
Loss	1.844***	0.980***	1.779***	1.778***	1.694***	1.698***	1.176***	1.201***	1.175***
	(30.63)	(12.33)	(30.74)	(30.97)	(18.82)	(18.89)	(10.44)	(9.88)	(10.19)
Liquidation Value	-1.565***	-2.196***	-1.612***	-1.628***	-1.690***	-1.641***	-1.244***	-1.191***	-1.197***
	(-19.16)	(-14.92)	(-17.44)	(-18.22)	(-8.21)	(-8.09)	(-7.43)	(-6.87)	(-7.04)
Capital Expenditure	0.340**	0.784***	0.391***	0.406***	0.952***	0.918***	0.438	0.591*	0.507*
	(2.55)	(3.55)	(2.62)	(2.86)	(2.88)	(2.91)	(1.58)	(1.95)	(1.76)
R&D	-0.983***	1.017***	-0.988***	-0.965***	0.401	0.383	0.198	0.201	0.265
	(-4.17)	(3.62)	(-3.69)	(-4.08)	(0.62)	(0.63)	(0.29)	(0.29)	(0.39)
Firm Age	0.266***	0.319***	0.240***	0.259***	-0.041	-0.043	0.156***	0.136***	0.151***
	(8.86)	(7.14)	(7.13)	(7.72)	(-0.34)	(-0.37)	(3.02)	(2.71)	(2.98)
Intercept	-11.815***	-5.120***	-3.588***	-3.603***	-15.667***	-16.835***	-4.098***	-4.253***	-4.399***

	(-7.49)	(-15.76)	(-24.09)	(-24.88)	(-8.38)	(-3.39)	(-16.34)	(-15.30)	(-15.51)
Industry & year fixed effects	Included	Included	Included	Included	Included	Included	Included	Included	Included
Number of observations	293,619	244,541	237,805	247,154	45,764	46,955	19,390	19,390	19,390
Pseudo R^2	0.346	0.265	0.331	0.337	0.288	0.288	0.35	0.35	0.351

Notes: This table reports the results for the logistic regression of the determinants of NEG-BV firms. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 6 Liquidation Likelihood of NEG-BV Firms Conditional on Accounting Conservatism

	(1) Liquidation	(2) Liquidation	(3) Liquidation
Negative BV	1.455***	1.346***	1.293***
	(4.70)	(9.61)	(9.24)
Negative BV × C_Score	-1.246**		
	(-2.13)		
C_Score	3.078***		
	(6.13)		
Negative BV × Conservatism$_{accrual1}$		-0.644***	
		(-4.21)	
Conservatism$_{accrual1}$		0.130	
		(1.04)	
Negative BV × Conservatism$_{accrual2}$			-0.394**
			(-1.96)
Conservatism$_{accrual2}$			-0.016
			(-0.08)
BV/TA	-0.255	-0.005	-0.105
	(-1.08)	(-0.05)	(-0.99)
Tobin's Q	-0.228**	-0.302***	-0.323***
	(-2.14)	(-5.83)	(-5.89)
Cash Flow	-0.152	-0.040	-0.048
	(-0.57)	(-0.26)	(-0.27)
ROA	-0.300	-0.194	-0.241
	(-1.10)	(-1.24)	(-1.50)
Loss	1.278***	2.056***	1.932***
	(8.34)	(17.77)	(12.91)
Liquidation Value	0.190	0.143	0.159
	(0.55)	(0.64)	(0.75)
Leverage	0.142	0.380***	0.323***
	(0.91)	(3.65)	(3.26)
Net Working Capital	-0.137	-0.143	-0.091
	(-0.71)	(-1.51)	(-0.96)
Capital Expenditure	-0.093	1.046	0.920
	(-0.10)	(1.58)	(1.28)
R&D	0.556	0.536**	0.516**
	(0.96)	(2.07)	(2.34)
Firm Age	-0.039	0.023	0.044
	(-0.40)	(0.28)	(0.42)
Intercept	-7.859***	-7.543***	-7.424***
	(-13.75)	(-21.31)	(-17.80)
Industry & year fixed effects	Included	Included	Included
Number of observations	230,582	228,967	236,196
Pseudo R^2	0.15	0.172	0.166

Notes: This table reports the results for the logistic regression of the liquidation likelihood of NEG-BV firms conditional on accounting conservatism. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 7 Liquidation Likelihood of NEG-BV Firms Conditional on Intangible Investments

	(1) Liquidation	(2) Liquidation
Negative BV	1.591***	1.524***
	(6.91)	(6.77)
Negative BV × $SGAFV/TA_1	-0.525*	
	(-1.94)	
$SGAFV/TA_1	0.415***	
	(2.68)	
Negative BV × $SGAFV/TA_2		-0.721**
		(-2.48)
$SGAFV/TA_2		0.577***
		(2.59)
BV/TA	0.324	0.332
	(0.53)	(0.57)
Tobin's Q	-0.418***	-0.398***
	(-2.70)	(-2.89)
Cash Flow	0.032	0.054
	(0.12)	(0.19)
ROA	-0.272	-0.300
	(-1.16)	(-1.21)
Loss	2.359***	2.342***
	(9.11)	(10.09)
Liquidation Value	-0.216	-0.164
	(-0.38)	(-0.31)
Leverage	0.813	0.778
	(1.62)	(1.64)
Net Working Capital	-0.084	-0.110
	(-0.50)	(-0.69)
Capital Expenditure	1.463***	1.240**
	(3.20)	(2.50)
R&D	0.857	0.420
	(0.81)	(0.44)
Firm Age	0.307	0.237
	(1.54)	(1.36)
Intercept	-18.460***	-18.092***
	(-8.77)	(-14.45)
Industry & year fixed effects	Included	Included
Number of observations	41,227	42,322
Pseudo R^2	0.213	0.205

Notes: This table reports the results for the logistic regression of the liquidation likelihood of NEG-BV firms conditional on SG&A future value. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 8 Liquidation Likelihood of NEG-BV Firms Conditional on Investment Narratives

	(1) Liquidation	(2) Liquidation	(3) Liquidation
Negative BV	2.691***	3.106***	3.446***
	(4.21)	(3.36)	(3.81)
Negative BV × Invest_Narrative_i7	-0.653***		
	(-3.12)		
Invest_Narrative_i7	0.344**		
	(2.11)		
Negative BV × Invest_Narrative_i1		-0.878**	
		(-2.03)	
Invest_Narrative_i1		0.203	
		(0.79)	
Negative BV × Invest_Narrative_i1&i7			-0.495***
			(-2.61)
Invest_Narrative_i1&i7			0.179
			(1.54)
BV/TA	-0.038	0.020	-0.029
	(-0.05)	(0.02)	(-0.04)
Tobin's Q	-0.407***	-0.411***	-0.404***
	(-3.17)	(-3.32)	(-3.17)
Cash Flow	-0.163	-0.256	-0.215
	(-0.51)	(-0.75)	(-0.66)
ROA	0.062	0.162	0.109
	(0.16)	(0.37)	(0.27)
Loss	2.652***	2.725***	2.684***
	(3.26)	(3.41)	(3.34)
Liquidation Value	-0.810	-0.665	-0.726
	(-1.41)	(-1.03)	(-1.20)
Leverage	0.705	0.742*	0.693
	(1.61)	(1.70)	(1.61)
Net Working Capital	0.071	0.027	0.031
	(0.28)	(0.10)	(0.11)
Capital Expenditure	0.052	-0.155	-0.056
	(0.06)	(-0.16)	(-0.06)
R&D	2.075***	2.004***	2.035***
	(5.74)	(5.13)	(5.34)
Firm Age	0.168*	0.139	0.151
	(1.85)	(1.53)	(1.62)
Intercept	-7.729***	-7.514***	-7.766***
	(-6.95)	(-7.17)	(-6.92)
Industry and year fixed effects	Included	Included	Included
Number of observations	17,946	17,946	17,946
Pseudo R^2	0.223	0.225	0.224

Notes: This table reports the results for the logistic regression of the liquidation likelihood of NEG-BV firms conditional on investment narratives. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 9 Liquidation Likelihood of NEG-BV Firms and Small Positive Book Value Firms

	(1) Liquidation
Negative BV	1.464***
	(10.12)
SmallPos BV	0.733***
	(4.14)
BV/TA	0.139
	(1.13)
Tobin's Q	-0.231***
	(-5.01)
Cash Flow	-0.103
	(-0.60)
ROA	-0.074
	(-0.41)
Loss	1.970***
	(14.74)
Liquidation Value	0.189
	(0.92)
Leverage	0.279**
	(2.56)
Net Working Capital	-0.178*
	(-1.72)
Capital Expenditure	0.453
	(0.61)
R&D	0.594**
	(2.37)
Firm Age	0.106
	(1.22)
Intercept	-16.292
	(-0.33)
Industry and year fixed effects	Included
Number of observations	277,357
Pseudo R^2	0.16

Notes: This table reports the results for the logistic regression of the liquidation likelihood of NEG-BV firms and small positive book value firms. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 10 Bankruptcy Likelihood of NEG-BV Firms Conditional on Accounting Conservatism

	(1) Bankruptcy	(2) Bankruptcy	(3) Bankruptcy
Negative BV	1.036***	1.426***	1.383***
	(3.45)	(11.15)	(10.99)
Negative BV × C_Score	-0.487		
	(-1.16)		
C_Score	2.735***		
	(7.15)		
Negative BV × Conservatism$_{accrual1}$		-0.556***	
		(-5.18)	
Conservatism$_{accrual1}$		0.154**	
		(2.06)	
Negative BV × Conservatism$_{accrual2}$			-0.304**
			(-2.03)
Conservatism$_{accrual2}$			0.020
			(0.13)
BV/TA	-0.376**	0.032	-0.019
	(-2.20)	(0.33)	(-0.18)
Tobin's Q	-0.357***	-0.269***	-0.280***
	(-3.12)	(-5.57)	(-5.68)
Cash Flow	-0.035	-0.107	-0.107
	(-0.19)	(-1.04)	(-0.91)
ROA	-0.269	-0.081	-0.107
	(-1.47)	(-0.83)	(-0.96)
Loss	1.597***	2.224***	2.140***
	(12.67)	(25.50)	(17.78)
Liquidation Value	-0.094	-0.248	-0.240
	(-0.31)	(-1.25)	(-1.29)
Leverage	0.210	0.318***	0.274***
	(1.51)	(3.54)	(3.10)
Net Working Capital	-0.494***	-0.243***	-0.221***
	(-3.63)	(-3.58)	(-3.42)
Capital Expenditure	0.904*	0.274	0.295*
	(1.91)	(1.25)	(1.76)
R&D	0.476	1.283**	1.152*
	(0.65)	(2.25)	(1.92)
Firm Age	0.190**	0.122**	0.158**
	(2.54)	(2.19)	(2.33)
Intercept	-7.347***	-6.994***	-6.968***
	(-15.10)	(-26.46)	(-23.23)
Industry & year fixed effects	Included	Included	Included
Number of observations	229907	228082	235323
Pseudo R^2	0.189	0.202	0.197

Notes: This table reports the results for the logistic regression of the bankruptcy likelihood of NEG-BV firms conditional on accounting conservatism. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 11 Bankruptcy Likelihood of NEG-BV Firms Conditional on Intangible Investments

	(1) Bankruptcy	(2) Bankruptcy
Negative BV	1.627***	1.594***
	(8.25)	(8.26)
Negative BV × $SGAFV/TA_1	-0.403*	
	(-1.83)	
$SGAFV/TA_1	0.310*	
	(1.75)	
Negative BV × $SGAFV/TA_2		-0.593**
		(-2.01)
$SGAFV/TA_2		0.473**
		(2.17)
BV/TA	0.018	0.020
	(0.05)	(0.06)
Tobin's Q	-0.319***	-0.308***
	(-3.08)	(-3.22)
Cash Flow	-0.063	-0.039
	(-0.15)	(-0.10)
ROA	-0.058	-0.071
	(-0.15)	(-0.19)
Loss	2.553***	2.541***
	(14.53)	(14.88)
Liquidation Value	0.078	0.035
	(0.17)	(0.08)
Leverage	0.220	0.229
	(0.78)	(0.84)
Net Working Capital	-0.399***	-0.388***
	(-2.58)	(-2.75)
Capital Expenditure	0.812	0.694
	(1.44)	(1.26)
R&D	0.504	0.486
	(0.51)	(0.51)
Firm Age	0.394	0.356
	(1.61)	(1.62)
Intercept	-17.850***	-17.655***
	(-14.33)	(-13.47)
Industry & year fixed effects	Included	Included
Number of observations	43,750	44,871
Pseudo R^2	0.227	0.223

Notes: This table reports the results for the logistic regression of the bankruptcy likelihood of NEG-BV firms conditional on SG&A future value. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 12 Bankruptcy Likelihood of NEG-BV Firms Conditional on Investment Narratives

	(1) Bankruptcy	(2) Bankruptcy	(3) Bankruptcy
Negative BV	2.909***	2.865***	3.404***
	(6.03)	(5.32)	(6.34)
Negative BV × Invest_Narrative_i7	-0.633***		
	(-5.08)		
Invest_Narrative_i7	0.008		
	(0.05)		
Negative BV × Invest_Narrative_i1		-0.644***	
		(-2.87)	
Invest_Narrative_i1		0.093	
		(0.52)	
Negative BV × Invest_Narrative_i1&i7			-0.428***
			(-4.60)
Invest_Narrative_i1&i7			0.025
			(0.26)
BV/TA	0.275	0.322	0.294
	(0.56)	(0.66)	(0.58)
Tobin's Q	-0.204**	-0.215**	-0.206**
	(-2.24)	(-2.15)	(-2.17)
Cash Flow	-0.232	-0.288	-0.285
	(-0.52)	(-0.64)	(-0.65)
ROA	0.020	0.110	0.081
	(0.05)	(0.25)	(0.19)
Loss	3.070***	3.088***	3.078***
	(5.44)	(5.47)	(5.49)
Liquidation Value	-0.209	-0.108	-0.150
	(-0.34)	(-0.18)	(-0.24)
Leverage	0.506**	0.584***	0.525**
	(2.12)	(2.59)	(2.24)
Net Working Capital	-0.145	-0.114	-0.158
	(-0.58)	(-0.50)	(-0.63)
Capital Expenditure	1.173***	1.037***	1.056***
	(3.34)	(2.62)	(2.90)
R&D	-0.099	-0.084	-0.156
	(-0.22)	(-0.18)	(-0.34)
Firm Age	0.248***	0.254***	0.246***
	(3.12)	(3.57)	(3.18)
Intercept	-8.850***	-9.240***	-8.998***
	(-9.06)	(-12.97)	(-9.91)
Industry and year fixed effects	Included	Included	Included
Number of observations	18,522	18,522	18,522
Pseudo R^2	0.244	0.243	0.245

Notes: This table reports the results for the logistic regression of the bankruptcy likelihood of NEG-BV firms conditional on investment narratives. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 13 Two-Year-Ahead Liquidation Likelihood of NEG-BV Firms Conditional on Accounting Conservatism

	(1) Liquidation_2yr	(2) Liquidation_2yr	(3) Liquidation_2yr
Negative BV	0.558***	1.009***	0.977***
	(2.78)	(10.69)	(10.70)
Negative BV × C_Score	-0.513		
	(-1.44)		
C_Score	2.117***		
	(7.20)		
Negative BV × Conservatism$_{accrual1}$		-0.410***	
		(-5.56)	
Conservatism$_{accrual1}$		0.170***	
		(2.61)	
Negative BV × Conservatism$_{accrual2}$			-0.247**
			(-2.56)
Conservatism$_{accrual2}$			-0.055
			(-0.46)
BV/TA	-0.458***	-0.060	-0.086
	(-3.48)	(-0.90)	(-1.26)
Tobin's Q	-0.166***	-0.156***	-0.146***
	(-3.20)	(-6.18)	(-6.03)
Cash Flow	-0.375**	-0.101	-0.107
	(-2.45)	(-1.29)	(-1.29)
ROA	0.059	0.004	-0.058
	(0.39)	(0.06)	(-0.74)
Loss	1.396***	1.751***	1.698***
	(15.63)	(22.62)	(19.66)
Liquidation Value	-0.230	-0.551***	-0.540***
	(-0.79)	(-2.87)	(-2.70)
Leverage	0.221*	0.325***	0.285***
	(1.77)	(4.42)	(3.96)
Net Working Capital	-0.077	0.054	0.086
	(-0.65)	(0.84)	(1.37)
Capital Expenditure	-0.244	0.168	0.129
	(-0.55)	(0.74)	(0.61)
R&D	1.132**	1.505***	1.337***
	(2.02)	(3.39)	(2.90)
Firm Age	-0.021	-0.004	0.027
	(-0.34)	(-0.11)	(0.50)
Intercept	-6.571***	-6.330***	-6.369***
	(-26.62)	(-31.70)	(-31.16)
Industry & year fixed effects	Included	Included	Included
Number of observations	238,162	231,740	239,144
Pseudo R^2	0.155	0.161	0.157

Notes: This table reports the results for the logistic regression of the two-year-ahead liquidation likelihood of NEG-BV firms conditional on accounting conservatism. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 14 Two-Year-Ahead Liquidation Likelihood of NEG-BV Firms Conditional on Intangible Investments

	(1) Liquidation_2yr	(2) Liquidation_2yr
Negative BV	1.405***	1.377***
	(9.33)	(8.86)
Negative BV × $SGAFV/TA_1	-0.125	
	(-0.80)	
$SGAFV/TA_1	0.163	
	(1.06)	
Negative BV × $SGAFV/TA_2		-0.468**
		(-2.04)
$SGAFV/TA_2		0.457**
		(2.36)
BV/TA	-0.010	-0.040
	(-0.04)	(-0.17)
Tobin's Q	-0.347***	-0.334***
	(-4.33)	(-4.53)
Cash Flow	0.211	0.260
	(0.69)	(0.85)
ROA	-0.323	-0.358
	(-1.19)	(-1.33)
Loss	2.176***	2.149***
	(14.06)	(14.42)
Liquidation Value	-0.180	-0.235
	(-0.49)	(-0.67)
Leverage	0.552**	0.503**
	(2.29)	(2.22)
Net Working Capital	0.060	0.038
	(0.47)	(0.30)
Capital Expenditure	1.052**	1.007**
	(2.47)	(2.35)
R&D	0.474	0.371
	(0.48)	(0.39)
Firm Age	0.132	0.107
	(0.76)	(0.63)
Intercept	-16.231***	-16.400***
	(-13.66)	(-14.32)
Industry & year fixed effects	Included	Included
Number of observations	43,962	45,090
Pseudo R^2	0.214	0.213

Notes: This table reports the results for the logistic regression of the two-year-ahead liquidation likelihood of NEG-BV firms conditional on SG&A future value. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.

Table 15 Two-Year-Ahead Liquidation Likelihood of NEG-BV Firms Conditional on Investment Narratives

	(1) Liquidation_2yr	(2) Liquidation_2yr	(3) Liquidation_2yr
Negative BV	2.175***	1.918***	2.449***
	(5.03)	(2.92)	(4.56)
Negative BV × Invest_Narrative_i7	-0.479***		
	(-3.10)		
Invest_Narrative_i7	-0.008		
	(-0.05)		
Negative BV × Invest_Narrative_i1		-0.391*	
		(-1.81)	
Invest_Narrative_i1		-0.093	
		(-0.50)	
Negative BV × Invest_Narrative_i1&i7			-0.302***
			(-3.39)
Invest_Narrative_i1&i7			-0.034
			(-0.32)
BV/TA	-0.160	-0.114	-0.158
	(-0.51)	(-0.37)	(-0.51)
Tobin's Q	-0.219***	-0.226***	-0.219***
	(-4.19)	(-3.97)	(-4.03)
Cash Flow	-0.015	-0.039	-0.044
	(-0.03)	(-0.09)	(-0.10)
ROA	-0.065	-0.013	-0.032
	(-0.16)	(-0.03)	(-0.08)
Loss	2.263***	2.279***	2.277***
	(8.87)	(8.80)	(8.89)
Liquidation Value	-0.766	-0.723	-0.730
	(-1.64)	(-1.51)	(-1.55)
Leverage	0.498**	0.558***	0.499***
	(2.53)	(3.09)	(2.73)
Net Working Capital	0.285	0.294*	0.270
	(1.44)	(1.68)	(1.42)
Capital Expenditure	1.395***	1.245***	1.302***
	(3.34)	(3.00)	(3.13)
R&D	0.687	0.660	0.632
	(0.67)	(0.64)	(0.60)
Firm Age	-0.017	-0.012	-0.021
	(-0.23)	(-0.16)	(-0.28)
Intercept	-5.699***	-5.609***	-5.574***
	(-6.83)	(-6.52)	(-6.07)
Industry and year fixed effects	Included	Included	Included
Number of observations	18,540	18,540	18,540
Pseudo R^2	0.236	0.236	0.237

Notes: This table reports the results for the logistic regression of the two-year-ahead liquidation likelihood of NEG-BV firms conditional on investment narratives. All continuous variables are winsorized at 1% and 99%. Z-statistics (reported in parentheses) are calculated based on robust standard errors clustered at firm and year levels. *, ** and *** represent significance at or below the 10%, 5%, and 1% levels, respectively. Variables are defined as in Appendix.