SPACs and Risk Factor Disclosures

ABSTRACT: In recent years, Special Purpose Acquisition Companies ("SPACs") have become a popular alternative to going public. This study investigates the informativeness of risk factor disclosures in SPACs' proxy statements. We find that SPACs with more specific risk factor disclosures have greater redemption rates. Cross-sectional analyses show that the positive association between specific risk factor disclosures and redemption rates exists particularly in SPACs with sponsor teams having less private equity/venture capital or CEO experience, and SPACs with more retail investor ownership. We further document that SPACs with more specific risk factor disclosures are associated with greater information asymmetry but are less likely to experience a significant decrease in net income in the post-merger period. Overall, the findings suggest that SPAC shareholders incorporate specific risk factor disclosures for their decision-making; however, they may overreact to such specific information.

Keywords: Special Purpose Acquisition Companies, SPACs, risk factor disclosures

1. Introduction

A Special Purpose Acquisition Company (SPAC) is a publicly listed blank check company whose sole purpose is to merge with a private company and take it public. In recent years, SPACs have become an increasingly popular alternative for private firms wishing to go public, especially for relatively young and risky firms (Bai, Ma, and Zhang, 2023). In 2021, SPACs reached a peak, raising $145 billion and accounting for 59 percent of all new listings.[1] Despite their growing prevalence, regulators have expressed concern about the transparency and accuracy of information provided to potential investors, which they posit leads to insufficient protection against fraud and conflicts of interest.[2] Recent research also highlights significant issues related to SPACs, including overoptimistic future projections and a tendency to underperform in the post-merger periods (Blankespoor, Hendricks, Miller, and Stockbridge, 2022; Dambra, Even-Tov, and Munevar, 2023; Lin, Lu, Michaely, and Qin, 2021). Given these issues, it is crucial to investigate the informativeness of risk factor disclosures in SPAC proxy statements, as they may contain useful information regarding the inherent uncertainties and risks involved in SPAC transactions. To that end, we examine the association between these disclosures and key SPAC outcomes, including share redemption rates, post-merger information asymmetry, and the occurrence of adverse events in the merged entities.

The timing of information available to investors about a SPAC and its target company differs significantly from that in a traditional IPO.[3] Initially, a SPAC's prospectus offers basic details about the shell company, such as management structure and goals. Sponsors use this

[1] https://www.nasdaq.com/articles/a-record-pace-for-spacs-in-2021
[2] https://www.wsj.com/articles/secs-gary-gensler-seeks-to-level-playing-field-between-spacs-traditional-ipos-11639063202.
[3] A traditional IPO in this study refers to an operating company's conventional IPO process, where detailed disclosures about business operations and potential firm risks are provided in the prospectus (Form S-1) when the firm is approved by the Securities and Exchange Commission (SEC) to launch the IPO process.

prospectus to raise funds with the promised goal of merging with an as-of-yet unidentified target company in a specified period, typically two years.[4] Once a suitable target is found, SPAC shareholders approve the merger or opt-out by redeeming their shares.[5] Crucially, the proxy statement required for the merger vote, similar to Form S-1 in traditional IPOs, is the first document to provide comprehensive risk disclosures and audited financial statements of the target company. Given the sparse information prior to this, the proxy statement becomes a critical document for shareholders, offering the detailed insights necessary to make informed decisions on whether to support the merger or redeem their shares. This setup underscores the importance of studying SPAC risk factor disclosures, as the information provided has the potential to aid investors in making informed decisions regarding SPAC risk.

It is an open question, however, as to whether information conveyed in SPAC risk disclosures is actually useful to investors. On one hand, the unique nature of SPACs leads to higher litigation risk than a traditional IPO (Wen and Zhu, 2022), suggesting that SPACs have an incentive to provide informative risk factor disclosures in an attempt to avoid potential litigation in the post-merger period. In this case, we may see risk disclosures are associated with SPAC outcomes.

On the other hand, SPAC sponsors may fear that the disclosure of more numerous and precise risk factors will dissuade existing shareholders from approving the merger or lead to relatively higher redemption rates. Should the SPAC fail to merge with a target company within

[4] We use the term sponsors, founders, and managers interchangeably to refer to the management team who formed the SPAC.
[5] This redemption right provides a money-back guarantee for SPAC investors, meaning that SPAC investors can withdraw their investment if they do not want to keep their shares.

the stipulated timeframe, it faces liquidation, and SPAC sponsors earn nothing.[6] This potential loss may incentivize sponsors to understate the SPAC's risk. Even if the merger is approved, but sponsors are faced with a high shareholder redemption rate, they must exert costly effort to raise additional capital. For these reasons, the risk factor section could include only boilerplate language to avoid high redemption rates or merger failure. In addition, managers may be unable to easily estimate or quantify the impact of an identified risk, leading to generic risk factor disclosures. In this case, SPAC risk factor disclosures should be unrelated to investor actions and post-merger performance.

To examine our research question, we manually extract sponsor team biographies and textual risk factor disclosures from the proxy statements of 296 de-SPAC transactions between 2016 and 2021.[7] We then use the list of risk key words from Campbell, Chen, Dhaliwal, Lu, and Steele (2014) to construct word count measures and follow Hope, Hu, and Lu (2016) in using the Stanford Named Entity Recognition (NER) algorithm to capture the specificity of firms' qualitative risk-factor disclosures. These two measures, while correlated, are intended to capture different aspects of risk disclosures – namely, the *amount* of risk-related information in qualitative risk-factor disclosures (risk key works) versus the *quality* of these disclosures (specificity). Both measures have been vetted through prior work. In particular, Hope et al. (2016) confirm that more specific wording in risk disclosures is associated with proxies for firm risk and makes the disclosed information more accurate and more verifiable *ex post*. Moreover, more precise signals receive

[6] When a SPAC is created, the sponsors typically retain 20 percent of the SPAC shares (referred to as founder shares) and purchase warrants. Unlike public shares, founder shares do not have voting rights, nor are they redeemable. Moreover, the purchase warrants are exercisable only after the merger is complete. These restrictions on sponsor compensation imply that their payoff will be zero if the SPAC fails.

[7] In this study, the sponsor team is defined as the CEO, CFO, president, and board chair. Additional details about our sample construction are articulated in Section 4.1.

greater weight among investors, leading to stronger market reactions. Our expectation is that both the quantity and quality of risk-related disclosures will be associated with investor responses.

We begin by examining whether risk factor disclosures are related to sponsor team characteristics. Sponsor characteristics can vary dramatically, ranging from those with business experience as a CEO or as private equity (PE) or venture capitalist (VC) investors, to those with celebrity status but little business acumen (e.g., actors, musicians, politicians) (Pawliczek, Skinner, and Zechman, 2024). We focus on two key elements of the sponsor team – the business experience of the SPAC CEO and the collective experience of the entire sponsorship team. Over half of the SPAC CEOs in our sample have PE or prior CEO experience and 20 percent have previous work experience at a top-300 ranked PE firm. Fifty-four percent of the sponsor team, on average, has a background as a PE or VC investor. We find that SPACs with CEOs who served as a director or partner of a top 300-ranked PE firm include more risk-related keywords and provide more specific risk factor disclosures. There is no discernable relation between the collective sponsor team experience and risk factor disclosure characteristics.

Our next set of empirical analyses examine the association between SPAC risk factor disclosures and investor responses. Starting with redemption rates, we find that SPACs with more specific risk factor disclosures have significantly higher investor redemption rates, suggesting that risk factor specificity is useful to shareholders when deciding to keep or redeem their shares. The count of risky words used in the proxy statement is unrelated to redemption rates. Additionally, we explore whether the risk factor disclosures predict stock returns in the post-merger period. We find that SPACs with more risk key word count experience lower abnormal returns in the post-merger period. The specificity level of risk factor disclosures is not associated with post-merger abnormal returns.

We also consider that the association between risk factor disclosures and redemption rate may vary with sponsor team characteristics or investor sophistication (e.g., retail investor ownership). Our results suggest that the positive association between specificity and redemption is strongest when SPAC sponsor teams have less business experience and when SPAC investors are less sophisticated.[8] These results are telling, as they suggest that the quality of risk factor disclosures is particularly important when the ability of the sponsor team is in question. Moreover, retail investors are more likely to incorporate specific risk disclosures into their decision-making. This underscores the need for regulators to monitor the quality of risk factor disclosures among SPACs, especially when SPACs are sponsored by so-called celebrity sponsors or attract crowds of retail investors (SEC 2021).[9]

Next, we examine whether SPAC risk factor disclosures have any effects on post-merger information asymmetry using a market-based bid-ask spread measure. We document that risk factor specificity is positively associated with post-merger information asymmetry. Kravet and Muslu (2013) propose and find that if risk disclosures credibly report unknown risks, both investors and analysts will diverge in their predictions of future performance, leading to higher future stock return volatility and higher dispersion in analysts' forecast revisions. Given the argument and results of Kravet and Muslu (2013), our finding should not be surprising and may suggest that specific risk factor disclosures of SPACs reflect divergent investor perceptions about a de-SPAC firm's risk in the post-merger environment.

[8] We define retail investor ownership as (1 – institutional ownership) immediately prior to the proxy filing date.
[9] On March 10, 2021, the SEC encouraged investors not to invest in a SPAC "just because someone famous sponsors or invests in it" because "celebrity involvement does not mean that the investment…is appropriate for all investors" (https://www.sec.gov/oiea/investor-alerts-and-bulletins/celebrity-involvement-spacs-investor-alert).

In addition to examining the whether risk factor disclosures are associated with SPAC investors' decisions and perceptions, we also investigate whether SPAC risk factor disclosures provide warnings of adverse outcomes in the post-merger period. We use a significant decrease in net income to proxy for adverse outcomes. The results indicate that SPACs with more specific risk disclosures are *less likely* to have a significant decrease in net income in the post-merger period. One possible explanation is that SPACs with more specific risk factor disclosures are better able to both estimate and manage their risks relative to SPACs with more opaque risk disclosures, leading to relatively better post-merger performance. If this is the case, it implies that SPAC investors overreact to specific risk factor disclosures. However, it is also possible that SPACs with more specific risk factor disclosures are poor performers *ex ante*, which limits their ability to decline further in the post-period. We cannot, as of yet, differentiate between these two explanations.

Our study should be of interest to researchers, regulators, and investors. First, we contribute to the current conversation surrounding SPAC disclosures by examining the informativeness of the risk factor disclosures provided in SPAC proxy statements. Prior studies have examined the information disclosed in a SPAC IPO prospectus, including the forward-looking information provided about *potential* targets, and the effect of these disclosures on investors (Pawliczek et al., 2024; Blankespoor et al., 2022; Chapman, Frankel, and Martin, 2021; Dambra et al., 2023; Castellani, Muller, and Park, 2024). A concurrent working paper by Wen and Zhu (2022) compares the sentiment of SPAC's proxy statements to traditional IPO prospectuses. Risk factor disclosures about *actual* target companies presented in the SPAC proxy statement is an unexplored area. To the best of our knowledge, our study is the first to show that SPAC shareholders, particularly retail investors, utilize specific risk disclosures when deciding if they want to redeem their shares.

Moreover, SPAC risk factor disclosures appear to be associated with *ex-post* information asymmetry and future earnings.

Second, our study contributes to the literature on risk factor disclosures. A stream of prior research examines the informativeness of risk factor disclosures in 10-Ks and M&A filings (Campbell et al., 2014; Bao and Datta, 2014; Hope et al., 2016; Gaulin, 2017; Guo, Liu, Shu, and Yan, 2024). Hanley and Hoberg (2010) and Loughran and McDonald (2013) use different content analysis techniques to study the association between information in IPO prospectuses and the price revision of post-IPO firms. Our study extends this literature by documenting that the risk factor disclosures of SPACs do not appear to be boilerplate and, more importantly, shareholders appear to incorporate the information conveyed by specific risk disclosures when making SPAC redemption decisions.

Third, our study helps inform regulators on whether and how investors are using SPAC disclosures. Our study comes on the heels of recent SEC legislation intended to more closely align SPAC disclosures and legal liability with that of traditional IPOs and, in particular, mitigate concerns "regarding the adequacy of the disclosures…explaining the potential risks and effects for investors" (SEC 2024, pg. 16).[10] However, commentators worry that as legal liability for SPAC sponsors, target companies, and underwriters increase, these parties may "attempt to avoid liability by combining boilerplate risk factors with forward looking cautionary information" (SEC 2024, pg. 253). Our study suggests that current risk factor disclosures are particularly salient to retail investors, underscoring the need to monitor the new regulation's effect on risk factor disclosure content and specificity.

[10] https://www.sec.gov/rules-regulations/2024/01/33-11265

2. Institutional background and related literature

2.1 Institutional background

There are three main phases in a typical SPAC's life cycle. First, a SPAC is created by their sponsors to initiate the IPO process and raise capital by issuing units consisting of common shares and warrants to public investors. Sponsors need to search for a target company and complete the merger within a specified period, generally 24 months. The proceeds of a SPAC IPO are held in a trust account and are used to merge with the target company. The sponsors pay a nominal amount (usually $25,000) to retain 20% of the SPAC shares (founder shares) and purchase warrants for $1.5 each. Such offerings are considered future compensation for the sponsors. The founder shares are not allowed to vote or be redeemed. The sponsors' warrants are exercisable after completion of the merger and typically for a period of five years. If the sponsors fail to find a target to merge with by the due date, their shares and warrants are worthless. Such features are intended to incentivize sponsors to find a good target to merge. On the other hand, the merger completion pressure could incentivize sponsors to force a merger even if the target company is not a good deal to shareholders. The underwriter fee is about 5.5% of the proceeds. Part of the underwriter fee will be deferred until the SPAC completes the business combination. In the IPO process, a SPAC IPO files a registration statement (Form S-1) in which the SPAC IPO provides basic information about the shell company such as management structure, the goals of the SPAC, and management's biographies, but no information about the (as of yet unidentified) target company.

When the SPAC finds a target, it then goes to the second phase. The SPAC announces the target company and discloses the information about the target by filing Form 425 in which forward-looking information, such as sales projections of the target firm, is provided. The business combination must be approved by the SPAC shareholders. The SPAC is required to file Form

DEFM14A or Form S-4 to disclose a proxy statement relating to the merger.[11] These forms include detailed information about the merger proposal such as potential risk factors and the audited financial statements of the target company for the shareholders to vote. Independent from the shareholder vote, shareholders have the right to redeem their shares before the completion of the business combination. If more shares are redeemed, less capital is available to complete the business combination. In such cases, SPAC sponsors will seek to raise additional capital through private offerings to replenish the drain from high redemption. In the last phase, the SPAC uses the raised capital to merge with the target company in exchange for the target company's shares. After the merger is completed, the target company is the surviving company, becomes publicly listed, and receives a new ticker.

A private firm may prefer to merge with a SPAC, rather than undergo a traditional IPO for several reasons. Merging with a SPAC may save time and costs by avoiding the lengthy process and preparations for required documents in a traditional IPO. The amount of cash that the target company will receive from a SPAC is more likely to be determined in advance than in a traditional IPO. The target company may benefit from the industry expertise of the sponsors. Under the safe harbor protection, a SPAC can provide promising forward-looking information about the target company to attract investors.

While SPACs benefit from the safe harbor protection, their investors may be harmed due to the insufficient legal protection, compared to the shareholders of traditional IPOs. The traditional IPO process applies Section 11 of the Securities Act, which imposes strict legal liability on the IPO's management, underwriters, and legal advisors for a material misstatement or omission

[11] If part of the SPAC transaction includes a registration of new securities, the SPAC typically files a Form S-4 for the joint registration and proxy statement.

in the filings during the IPO process. However, the process of a de-SPAC transaction applies Section 14 of the Securities Act, where investors are heavily responsible for proving that the sponsors intentionally made a misstatement or omission. Regulators are aware that this difference may lead to insufficient legal protection for SPAC investors and are proposing changes to level the regulatory playing field.

2.2 Risk factor disclosures

Many prior studies on risk disclosures focus on the risk factor section in 10-Ks. The evidence on the informativeness of risk factor disclosures is mixed. Kravet and Muslu (2013) propose and find that investors and analysts will diverge in their predictions of future performance, leading to higher future stock return volatility and higher dispersion in analysts' forecast revisions. Campbell et al. (2014) construct lists of risk key words and find that risk disclosures reflect firms' risks. Hope et al. (2016) use the NER algorithm to measure the level of specific risk factor disclosures and show that investors positively react to the level of such specificity in risk disclosures. Contrary to these studies, Bao and Datta (2014) find that 22 of the 30 risk types identified from the risk factor section have no association with post-disclosure risk assessment. Furthermore, Beatty, Cheng, and Zhang (2019) indicate that risk factor disclosures are informative before and during financial crisis; however, the association declines significantly in the post financial crisis period. Cazier et al. (2021) show that lengthier and less specific risk factor disclosures are less likely to be considered inadequate warnings by judges in shareholder securities lawsuits. They further present that when risk factor language is assessed as adequate in judicial review, industry peers are more likely to write their risk disclosures in a similar manner.

A stream of literature examines the risk factor section from IPO prospectuses and finds that firms with more risk disclosures have higher initial returns, and positive tone in risk factor section

is associated with higher pricing accuracy (Beatty and Welch, 1996; Arnold, Fische and North, 2008; Hanley and Hoberg, 2010). A concurrent study by Guo et al. (2024) investigates the information content of risk factor disclosures in M&A filings. They find that the risk topics in M&A filings focus on technology and product, valuation and fairness, accounting information, and ownership and dilution. They further show that these risk disclosures are indicative of post-merger outcomes such as integration problems.

2.3 SPAC disclosures

Pawliczek et al. (2024) find that the amount of capital raised in SPAC IPOs is associated with the tone of information disclosed in a SPAC IPO prospectus, and they further show that sponsor teams with prior SPAC experience, CEO experience or celebrities are likely to raise more capital. Several studies examine forward-looking information such as earnings forecasts and revenue projections of target companies. Blankespoor et al. (2022) find that the financial projections provided by SPACs are optimistic. Dambra et al. (2023) and Castellani et al. (2024) further find that investors react positively to SPACs' optimistic revenue projections. On the contrary, Chapman et al. (2021) find no association between the forecast attributes and redemption rates or subsequent return reversals. Wen and Zhu (2022) compare the sentiment of SPACs' proxy statements to traditional IPOs' prospectuses. They show that there seems to be regulatory arbitrage in the sense that the filings related to SPAC mergers are subject to selective SEC review and the disclosures in the merger filings are less pessimistic and overconfident, compared to the ones of the traditional IPO firms.

3. Hypothesis development

Risk factor disclosures in a SPAC's proxy statement relating to the merger typically include: (1) risk factors of the target firm, and (2) risk factors of the SPAC or the whole merger

proposal. The former part is similar to the risk factor section in a traditional IPO prospectus or 10-K of an operating company. General risk factor topics with regard to the target firm include financial conditions, legal risks, market conditions, business operations, and other macroeconomic-related risks. Risk factors of the SPAC generally include discussions on ownership structure, dilution issues, and possibility of merger failure. Appendix B presents an example of risk factor disclosures in a SPAC's proxy statement.

More shareholders of post-merger firms are filing SPAC-related lawsuits after they find the post-merger firms' operating performances are relatively disappointing given the aggressive financial projections released before the merger proposals are approved.[12] Wen and Zhu (2022) indeed show that post-merger firms experience greater litigation risk than traditional IPO firms. Given the existing high litigation risk caused by the unique features of a SPAC setting, we argue that the SPAC may have an incentive to provide informative risk factor disclosures to avoid potential litigation. That is, risk disclosures that effectively reflect warnings of future adverse outcomes may reduce high litigation costs. In addition, if SPACs disclose more precise risk information, investors should pay more attention to such disclosures and incorporate them for their decision making (Hope et al., 2016). If a SPAC credibly discloses more unfavorable risk information, the shareholders are likely to consider the merger a bad deal. When more shareholders value the future stock price of the de-SPAC firm lower than the redemption value (generally around $10), they will choose to redeem their shares, thus leading to a high redemption rate. Gahng et al. (2023) find that high redemption ratios are related to lower stock returns of de-SPACs, which

[12] https://corpgov.law.harvard.edu/2021/03/14/limiting-spac-related-litigation-risk-disclosure-and-process-considerations/

suggests that redemption rates may proxy for how shareholders evaluate the quality of the target company.

On the other hand, the risk factor section could include only boilerplate language in an attempt to avoid the costs and uncertainties caused by high redemption rates. In addition, managers may not be able to easily estimate or quantify the impact of an identified risk. Cazier et al. (2021) show that lengthier and less specific risk factors are less likely to be considered as inadequate warnings by judges in shareholder securities lawsuits. Thus, SPACs may prepare lengthier and boilerplate risk factor disclosures in their proxy statement, as judges likely view such risk disclosures as a sufficient warning statement. Therefore, the risk factor disclosures may be generic and less informative and have no relation with redemption rates.

Given the discussion above, it is unclear whether SPACs write informative or boilerplate risk factor disclosures. The first hypothesis is stated in null form due to the competing arguments.

Hypothesis 1 (H1)*: Risk factor disclosures in the proxy statement are not associated with redemption rates.*

In Hypothesis 1, we investigate whether risk factor disclosures are informative for investors to decide whether they want to redeem their shares. We next examine whether risk factor disclosures reflect divergent perceptions of investors in the post-merger period. If risk factor disclosures contain useful information, investors may incorporate such unfavorable information to revise their ex-ante beliefs about the de-SPAC firm's risks (Campbell et al., 2014). Kravet & Muslu (2013) propose and find that if risk disclosures report unknown contingencies and risk factors, investors will diverge in their risk perceptions and predictions of future performance. In addition, Campbell et al. (2014) indicate that prior studies suggest that when investors consider a firm with greater risk, the bid-ask spread typically increases due to the fact that informed investors may hold

a greater information advantage (Kyle 1985; Demsetz 1986; Jayaraman 2008), thus increasing the information asymmetry among the investors. The risk factor section in a SPAC's proxy statement is similar to such case as the unfavorable information of risk factors of the target firm and the merger proposal is first publicly released in the proxy statement. SPAC investors are likely to diverge in how they perceive or interpret the risk factor information. Moreover, it is likely that the specific information disclosed in the risk factor section may be complex for de-SPAC investors to understand and assess, which may increase the information gap between the investors with better information advantage and the ones that are less informed. Thus, we posit that the risk factor disclosures are positively associated with investors' divergence of risk perceptions and thereby are related with greater post-merger information asymmetry measured by bid-ask spread in the post-merger period. On the other hand, if risk factor disclosures are boilerplate, we should not find a significant association. Due to the competing arguments, the second hypothesis is stated in null form:

Hypothesis 2 (H2)*: Risk factor disclosures in the proxy statement are not associated with post-merger information asymmetry.*

In addition to examining the informativeness of the risk factor disclosures from the aspect of investors' perceptions, we further investigate whether the risk factor disclosures provide a warning of post-merger adverse outcomes. Risk factor disclosures are supposed to provide information about future uncertainties and possible economic events that could significantly and adversely affect the de-SPAC firms' financial performances and future cash flows. If more firm-specific information is disclosed in the risk factor section that effectively provides a warning of future performance, de-SPAC firms with such disclosures are more likely to have future adverse outcomes such as significant decreases in net income during post-merger periods. On the other

hand, if risk factor disclosures are generic and less specific, we should not observe a significant association.

Given the competing arguments, the third hypothesis is stated in null form:

Hypothesis 3 (H3): *Risk factor disclosures in the proxy statement are not associated with adverse outcomes during the post-merger period.*

4. Research design

4.1 Sample and data

We begin with a dataset of SPACs downloaded from spacresearch.com on November 24, 2021. The dataset contains the IPO date, merger announcement date, merger closing date, capital raised, redemption rate, underwriter, SPAC ticker, and de-SPAC ticker for each SPAC. To test our hypotheses, we focus on the SPACs that have merged with a target company. 302 SPAC firms completed their merger from 2016 through the date we downloaded the data. We use this list to collect CIK numbers, SIC code, and the links to the filings of DEFM14A or S-4 from EDGAR. Then we manually extract the texts of risk factor section from the proxy statements for parsing.

To measure a SPAC's sponsor team characteristics, we hand-collect the team members' biographies from DEFM14A or S-4 and rely on a set of key words to identify how many members have: (1) PE/VC experience, and (2) CEO experience. To identify PE/VC experience, we first search for the key words related to PE/VC and identify the member having any employment in a PE/VC firm.[13] If we do not find any related key word in the text, we use PitchBook, Crunchbase or Bloomberg to manually check if a company name mentioned in each member's biography is a PE or VC firm. We repeat a similar process to identify CEO experience.[14]

[13] The key word list includes: 'private equity', 'venture capital', and 'angel investor.'
[14] The key word list includes: 'ceo', and 'chief executive.'

We collect part of the financial data from Compustat, stock return data from CRSP, and institutional holdings data from Thomson Reuters Institutional (13f) Holdings. We manually collect one-year-ahead revenue and research and development (R&D) expenses for target companies, as well as any additional financial data that cannot be obtained from Compustat. Table 1, Panel A, reports the sample selection process for the final sample to test H1. Table 1, Panel B, shows that around 57 percent of SPACs firms completed their merger in 2021. Due to data availability for calculating stock market-based variables and change in net income, the numbers of observations for testing H2 and H3 are fewer than the one for H1.

[Insert Table 1 About Here]

4.2 Risk factor disclosure measures

We use the list of risk key words from Campbell et al. (2014) to compute the total key word count (*Keyword_RF*) and key word count for each subcategory: (1) financial risk (*Fin_RF*), (2) litigation risk (*Legal_RF*), (3) tax risk (*Tax_RF*), (4) other-systematic risk (*Sys_RF*), and (5) other-idiosyncratic risk (*Idio_RF*). Appendix E presents the list of risk key words from Campbell et al. (2014).

We also use the Stanford Named Entity Recognition (NER) algorithm to measure specificity level (*Specific*) of risk factor disclosures, which is the word count of specific entity names, including persons, locations, organizations, percentages, dollar values, times and dates (Hope et al., 2016). Take the following risk factor excerpt from Gordon Pointe's proxy statement for example:

> *"We entered into a $65 million Term Loan on March 20, 2018 with various lenders party thereto and GACP Finance Co., LLC ("GACP"), as administrative agent. On August 17, 2018, we received a notice of default from GACP (which default was*

waived) due to our failure to receive cash proceeds from the issuance to us of a permitted loan, or the issuance by us of equity, in an aggregate net amount of not less than $75 million by August 15, 2018 (the "Fundraising Obligation") …and the interest rate paid to the lenders was increased to 11% per annum above the prime rate from August 1, 2018 onwards."

The dollar values, dates, percentages and company names in the texts above are identified by the NER as specific entity names. The count of the identified specific entity names is how we measure specificity level (*Specific*). Then we take natural logarithm of each word count and specificity level (*Specific*) above for the measures used in the analyses. Appendix C presents a comparison of specific and less specific disclosures relating to the same risk factor topic.

4.3 Main empirical models

To test whether the risk factor disclosures are related to redemption rates, we estimate the following equation:

$$Redemption_i = \beta_0 + \beta_1 Ln(Keyword\_RF)_i + \beta_2 Ln(Specific)_i + Controls_i + \varepsilon_{i,} \qquad (1)$$

where *Redemption* is defined as the portion of the shares redeemed by shareholders. To control for the effects of sponsor team characteristics and retail investor ownership, we add the variables: (1) SPAC's CEO having work experience in a top 300 PE firm (*CEO_300PE*), (2) sponsor team with more PE/VC experience (*Sponsorteam_highPE*), (3) sponsor team with more CEO experience (*Sponsorteam_highCEO*), and (4) retail investor ownership before DEFM14A or S-4 filed (*Retail_investor%*).[15] *CEO_300PE* is an indicator variable equal to one if a SPAC's CEO serves(d) as a director/partner of a top 300 PE firm; zero otherwise.[16] *Sponsorteam_highPE* is equal to one

[15] Sponsor team members include CEO, CFO, President, and chair of the board in a SPAC.
[16] To define a top 300 PE firm, we rely on The PEI 300, a ranking list of the world's top 300 PE firms released by PEI International. https://www.privateequityinternational.com/pei-300/

if the portion of sponsor team members with PE/VC experience (*Sponsorteam_ PEVC%*) is greater than the median value of the sample; zero otherwise. *Sponsorteam_highCEO* is equal to one if the portion of sponsor team members with CEO experience (*Sponsorteam_CEO%*) is greater than the median value of the sample; zero otherwise. Retail investor ownership (*Retail_investor%*) is defined as one minus institutional ownership before the proxy statement is filed.

Following Chapman et al. (2021), we include the control variables that may affect redemption: SPAC IPO proceeds (*IPOamt)*, whether the SPAC is U.S. or Canada base (*Spac_us*), revenues in previous year (*Sale_lag*), R&D expenses in previous year (*RD_lag*) of target company, age (*Age_ta*) of target company, ranking of underwriters (*Underwriter_rank*) and whether the SPAC includes a forward purchase agreement (*Forward_purchase*).[17] In addition, we control for industry-level litigation risk (*Litind*), where *Litind* equals one when a target firm is in the biotechnology (4-digit SIC codes 2833-2836 and 8731-8734), computer (4-digit SIC codes 3570-3577 and 7370-7374), electronics (4-digit SIC codes 3600-3674), or retail (4-digit SIC codes 5200-5961) industries, and 0 otherwise. Finally, we employ year and industry fixed effects to control for other omitted variables.

To examine whether risk factor disclosures are associated with post-merger information asymmetry and future adverse outcomes, we estimate the following equations:

$$Spread\_post_i = \beta_0 + \beta_1 Ln(Keyword\_RF)_i + \beta_2 Ln(Specific)_i + Controls_i + \varepsilon_{i,} \quad (2)$$

$$NIdecline_i = \beta_0 + \beta_1 Ln(Keyword\_RF)_i + \beta_2 Ln(Specific)_i + Controls_i + \varepsilon_{i,} \quad (3)$$

where we replace the dependent variable in Eq. (1) with: post-merger bid-ask spread (*Spread_post*), and the adverse outcome variable proxied by severe net income decrease

[17] We obtain the data of underwriter rankings from the following website of Dr. Jay Ritter: https://site.warrington.ufl.edu/ritter/ipo-data/. Forward purchase agreement is a commitment (or an option) that SPAC sponsors will provide additional capital for the merger proposal.

(*NIdecline*). *Spread_post* is defined as the average of ask minus bid price divided by the mean value of ask and bid price over the 360 days after merger completion.[18] *NIdecline* is equal to one if net income in the post-merger period is decreased by at least ten percent; zero otherwise. For control variables included in Eq. (2) and (3), we replace revenues (*Sale_lag*) and R&D expenses (*RD_lag*) with de-SPAC firm's leverage (*Leverage*) and ROA (*ROA*), and exclude the variable of forward purchase agreement.

5. Results

5.1 Descriptive statistics

Table 2, Panel A presents the descriptive statistics for the variables used in the main regression model for H1. In the final sample for H1, the mean value of raised capital of the SPAC IPOs (*IPOamt*) is $297 million. The average of redemption rates is 45 percent. These estimates are similar to the ones in Chapman et al. (2021). The mean value of the total key word count (*Keyword_RF*) is 1,476, which is much greater, compared with the mean value of 293 words in Campbell et al. (2014). The mean value of the total specific word count (*Specific*) identified via the NER is 867. Table 2, Panels B and C report the statistics for the variables used in the models for H2 and H3 respectively. Table 2, Panel D shows the statistics of sponsor team characteristics and other institutional data for our sample. For about 60% (*CEO_PEexp* = 0.60) of the SPACs in our sample, their CEOs have PE/VC experience. The mean value of *CEO_CEOexp* is 0.54, which suggests that half of the SPAC CEOs serve(d) as a CEO. About 20% of the SPAC CEOs have work experience in a top 300 PE firm. The average of institutional ownership before a proxy is filed is about 68%, and their ownership lowers to about 35% after the merger is completed. The mean value of *Length_annc_close* is 0.41, indicating that it takes about five months to complete

[18] The spread measure is similar to Garfinkel (2009).

the merger after a SPAC announces a target company. The average of *Length_ipo_annc* is 0.92 year, suggesting that a SPAC generally spends about ten months to find and announce a target company. Table 3 reports Spearman correlations between the main variables used in this study.

[Insert Table 2 & 3 About Here]

5.2 Empirical results

5.2.1 Risk factor disclosures and sponsor characteristics

Before testing the main hypotheses, we examine the association between risk factor disclosures and sponsor team characteristics. It is interesting to explore this association as prior studies show that manager characteristics are associated with firm disclosures. Table 4 reports the results of regressing the two risk disclosure proxies on the three characteristic variables and other control variables. We find that SPACs with CEOs who served as a director/partner of a top PE firm are more likely to disclose more risk-related and more specific information in the risk factor disclosures. One possible explanation is that SPAC CEOs with top PE firm experience may have better ability to identify the target firms' risks. In addition, SPACs with U.S.- or Canada-base target firms disclose fewer risk key words and less specific risk information. SPACs audited by Big 4 auditors are also positively associated with risk factor disclosure measures.

[Insert Table 4 About Here]

5.2.2 Risk factor disclosures and redemption

Table 5 presents the results for H1 that examines whether SPACs' risk factor disclosures are related to redemption rates after controlling for sponsor characteristics and other controlled variables. As presented in columns (2) through (4), the estimated coefficients on the measure of *Specific* are 0.092, 0.130, and 0.130, respectively (t-statistics = 1.70, 2.16, and 2.12,

respectively).[19] The significant associations show that specific risk disclosures are related to higher redemption rates, suggesting that shareholders consider the merger proposal with more specific risk information as a bad deal. Such perception is consistent with the implication of Gahng et al. (2023) that redemption rates may proxy for how shareholders evaluate the quality of the target company. However, we fail to find that the risk-related key word count measure (*Keyword_RF*) is associated with redemption. The results overall suggest that shareholders use specific information in the risk factor section to decide whether they want to keep their shares.

[Insert Table 5 About Here]

To explore whether sponsor characteristics and retail investor ownership play a role in how risk factor disclosures are perceived by shareholders, we conduct three cross-sectional tests partitioned on: (1) sponsor team's PE/VC experience, (2) sponsor team's CEO experience, and (3) retail investor ownership.

To some extent, a SPAC's management and arrangement are similar to a PE/VC fund (Pawliczek et al., 2024). A SPAC's investors may rely on the sponsor team's ability and resources to make their decision. If they see a SPAC with more PE/VC people in the sponsor team, they might believe that such sponsor team will perform better due diligence and is more likely to have a better network connection to approach a good target. As a result, they tend to trust the experienced sponsor team and rely less on the risk factor disclosures. On the other hand, if a sponsor team has less PE/VC experience, the shareholders may put more weight on the information publicly released such as the disclosures in a proxy statement. Thus, we predict a significantly positive association between specific risk disclosures and redemption exists for SPAC sponsor

[19] In column 4, we estimate the model with the three sponsor characteristics in the same regression. Since *CEO_300PE* and *Sponsorteam_highPE* are highly correlated (correlation = 0.4), we also estimate the model with each sponsor characteristic included separately; the results are similar to column (4).

teams with less PE/VC experience. We use *Sponsorteam_highPE* to partition the sample into two groups: SPACs with *Sponsorteam_highPE* equal to 1 are defined as more PE/VC experience; SPACs with *Sponsorteam_highPE* equal to 0 are defined as less PE/VC experience. In Panel A of Table 6, we find that the positive association between specific risk disclosures and redemption is significantly positive when the sponsor team has less PE/VC experience. The coefficient on the specificity measure is 0.163 (t-statistic = 2.10). In contrast, the coefficient on the specificity measure is statistically insignificant when the sponsor team has more PE/VC experience.

For CEO experience, the argument and prediction are similar to PE/VC experience as a SPAC with more former or current CEOs in the sponsor team is typically initiated by industry experts or well-known entrepreneurs. We use *Sponsorteam_highCEO* to partition the sample into two groups: SPACs with *Sponsorteam_highCEO* equal to 1 are defined as more CEO experience; SPACs with *Sponsorteam_highCEO* equal to 0 are defined as less CEO experience. Panel B of Table 6 presents the results for CEO experience. In the lower CEO experience group, the coefficient on the specificity measure is 0.180 (t-statistic = 2.13). Collectively, the results are consistent with our prediction.

In the third cross-sectional analysis, we predict the significantly positive association between specific risk disclosures and redemption particularly exists when SPACs have higher retail investor ownership. We posit that retail investors are more likely to incorporate public information such as risk factor disclosures to make a decision. In addition, institutional investors in SPACs may be short-term oriented, which implies that they plan to redeem or sell their shares before the merger is completed no matter what is disclosed in the risk factor section. We then partition the sample according to the median of *Retail_investor%*. In Panel C of Table 6, the coefficient on the specificity measure is 0.244 (t-statistic = 3.12) for the subsample with higher

retail investor ownership, which is consistent with our prediction. Collectively, the findings of the cross-sectional analyses suggest that when shareholders value the sponsor team's ability, they are less likely to rely on risk factor disclosures; risk factor disclosures are also more informative to retail investors.

[Insert Table 6 About Here]

5.2.3 Risk factor disclosures and post-merger information asymmetry

Table 7 presents the results for H2 that examines whether SPAC's risk factor disclosures are associated with post-merger information asymmetry. In columns (2) and (3), the estimated coefficients on the measure of *Specific* are 0.005 and 0.006, respectively (t-statistics = 2.55 and 2.81, respectively).[20] After sponsor-related measures are controlled for, the coefficient on the measure of *Specific* in column (4) is 0.006 (t-statistic = 2.83). These significant associations suggest that specific information from the risk factor section reflects future uncertainties and divergent assessments among investors. In untabulated analyses, we further follow Campbell et al. (2014) to control for the investor risk perceptions such as redemption rate and post-merger stock return volatility, and find that the coefficients on the measure of *Specific* are still significantly positive.

[Insert Table 7 About Here]

5.2.4 Risk factor disclosures and severe net income decline

Next, we examine whether risk factor disclosures of SPACs reflect adverse outcomes during the post-merger period. In addition to the measure of a significant decrease in net income (*NIdecline)* discussed in Section 4.3, we also use an alternative measure (*NIdecline_med*) to proxy for a significant decrease in net income. *NIdecline_med* is defined as an indicator variable equal

[20] We also calculate the bid-ask spread over 180 days and test H2. The results are similar to the ones in Table 7.

to one if the change in net income is lower than the industry median values. Table 8, Panels A and B present the results for the two outcome variables measured as a significant decrease in net income. In Panel A, columns (2) through (4), the estimated coefficients on the measure of *Specific* are -0.678, -0.909, and -0.925, respectively (t-statistics = -2.14, -2.45, and -2.47, respectively). . In Panel B, columns (2) through (4), the estimated coefficients on the measure of *Specific* are -0.998, -1.156, and -1.166, respectively (t-statistics = -3.11, -3.12, and -3.13, respectively). Collectively, the results imply that SPACs with more specific risk disclosures are less likely to have significant decreases in net income during the post-merger period. A possible explanation is that SPACs with more specific risk disclosures may be better to estimate their risks relative to those firms with more opaque risk disclosures.

One alternative explanation is that the negative association is driven by the target firms that perform too poorly to further worsen. Thus, such target firms are less likely to experience a severe net income decrease. To address this viewpoint, we first rank the specificity level into five groups and compute the mean values of net income in the close year (*t*), net income one year after the close year (*t+1*), *ROA* in the close year (*t*), and *ROA* one year after the close year (*t+1*). The univariate analysis (untabulated) shows that the mean values of net income and *ROA* across the five groups are very negative and do not show much difference across groups, suggesting that the target firms generally perform poorly in each group.

[Insert Table 8 About Here]

6. Additional analyses

Following the main analyses in the prior studies on risk factor disclosures, we examine whether SPAC risk factor disclosures are related to stock market responses. To measure the stock

market reactions, we calculate the average of abnormal returns over 360 days after the merger completion dates (*Abret_post*). The abnormal returns are measured as a firm's daily raw return minus CSRP value-weighted market returns. We also use an alternative stock market measure defined as an indicator variable equal to one if the average abnormal returns in the post-merger period are positive (*GOODMA*). In Panels A and B of Table 9, the estimated coefficients on the measure of risk-related key words (*Keyword_RF*) of column (1) are -0.001 and -1.124, respectively (t-statistics = -2.01 and -2.28, respectively). After controlling for sponsor characteristics, the coefficients on *Keyword_RF* become marginally significant. The overall findings show that the SPAC firms with more risk-related key words in the risk factor section experience more negative returns in the post-merger period.

[Insert Table 9 About Here]

We also conduct a number of additional tests by using different ways to measure risk factor disclosures or adverse outcome. First, instead of taking the natural logarithm of each word count and specificity level, we divide *Keyword_RF* and *Specific* by the total word count of the risk factor section to create percentage variables and we rank these two percentage variables into four groups. Then we use the two ranked risk disclosure measures to replace the original risk disclosure measures and repeat the three main analyses. For H1, we find significantly positive association between specific risk factor disclosures and redemption rates. For H2, we find that the ranked specificity measure is overall significantly and positively associated with bid-ask spread measure. For H3, the results still show that SPACs with more specific risk disclosures are less likely to experience severe net income decline.

Second, we examine whether risk factor disclosures are associated with other adverse outcome: if ROA in the post-merger period is lower than the industry median value. We find that

SPACs with more specific risk disclosures are less likely to have lower ROA in the post-merger period.

7. Conclusion

During 2020 and 2021, SPACs became a popular alternative for private firms to go public. Compared with traditional IPOs, SPACs likely attract riskier and younger firms. There are many concerns with regard to insufficient information and agency problems due to the unique features of a SPAC setting. For example, sponsors have an incentive to complete a merger proposal of poor quality due to the merger completion pressure. While SPACs are allowed to issue optimistic looking-forward information on the target's future performance under safe harbor protection, their investors can only access the risk factor disclosures and audited financial statements of the targets in a proxy statement, which is the last filing before the merger is closed. Thus, it is important to examine whether risk factor disclosures in SPACs' proxy statements convey useful information to investors.

Measuring the word count of risk key words and the level of specific information disclosed, we find that SPACs with more specific risk factor information in the proxy statements have higher redemption rates and greater post-merger information asymmetry. We further document that the positive association between specific risk disclosures and redemption rates is primarily driven by SPACs with sponsor teams having less PE/VC or CEO experience, and SPACs with higher retail investor ownership. The findings suggest that shareholders of SPACs with less experienced sponsor teams put more weight on specific information from the risk factor section. Less-sophisticated retail investors are more likely to incorporate specific risk disclosures for their

decision-making. We also examine whether these risk factor disclosures are associated with future adverse outcomes. The finding shows that SPACs with more specific risk disclosures are less likely to experience a significant decrease in net income in the post-merger period. In addition, SPACs with more specific risk disclosures are less likely to have lower ROA in the post-merger period. Taken together, these findings suggest that SPAC investors do incorporate specific information disclosed in the risk factor section for their decision-making; however, they may overreact to such specific risk factor disclosures.

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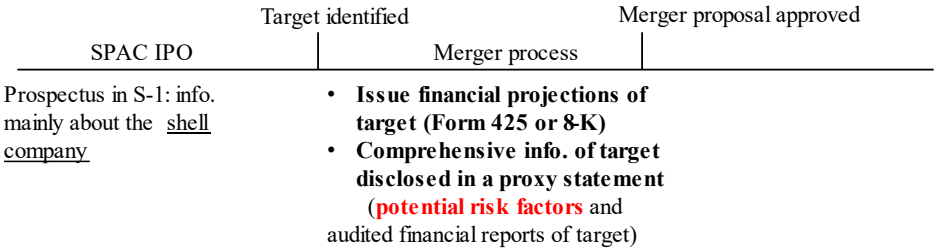
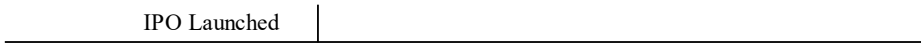
Appendix A: Comparison between SPACs and Traditional IPOs

In a SPAC:



In a Traditional IPO:



- Prospectus in S-1 form: comprehensive info. about the operating company
- No financial projections allowed!

Appendix B: Example of risk-factor disclosures

From LF Capital Acquisition's proxy statement

Risk factor disclosures about the target firm Landsea:

"If Landsea is not able to develop communities successfully and in a timely manner, its revenues, financial condition and results of operations may be adversely impacted.

Before a community generates any revenue, time and material expenditures are required to acquire land, obtain or renew permits and development approvals and construct significant portions of project infrastructure, amenities, model homes and sales facilities. There may be a significant lag from the time Landsea acquires land or options for land for development or developed home sites and the time Landsea can bring the communities to market and sell homes. Landsea's ability to process a significant number of transactions (which include, among other things, evaluating the site purchase, designing the layout of the development, sourcing materials and subcontractors and managing contractual commitments) efficiently and accurately is important to its success. Errors by employees, failure to comply with or changes in regulatory requirements and conduct of business rules, failings or inadequacies in internal control processes, equipment failures, natural disasters or the failure of external systems, including those of suppliers or counterparties, could result in delays and operational issues that could adversely affect Landsea's business, financial condition and operating results and relationships with customers. Landsea can also experience significant delays in obtaining permits, development approvals, entitlements, and local, state or federal government approvals (including due to an extended failure by lawmakers to agree on a budget or appropriation legislation to fund relevant operations or programs), utility company constraints or delays, delays in a land seller's lot deliveries or delays resulting from rights or claims asserted by third parties, which may be outside of Landsea's control. Additionally, Landsea may also have to renew existing permits and there can be no assurances that these permits will be renewed. Delays in the development of communities also expose Landsea to the risk of changes in market conditions for homes. A decline in Landsea's ability to develop and market communities successfully and to generate positive cash flow from these operations in a timely manner could have a material adverse effect on its business and results of operations and on its ability to service its debt and to meet its working capital requirements.

The homebuilding industry is highly competitive and, if Landsea's competitors are more successful or offer better value to customers, it may materially and adversely affect Landsea's business and financial condition.

Landsea operates in a very competitive environment that is characterized by competition from a number of other homebuilders and land developers in each geographical market in which Landsea operates. There are relatively low barriers to entry into the homebuilding business. Landsea competes with numerous large national and regional homebuilding companies and with smaller local homebuilders and land developers for, among other things, homebuyers, desirable land parcels, financing, raw materials and skilled management and labor resources. If Landsea is unable to compete effectively in its markets, its business could decline disproportionately to the businesses of its competitors and Landsea's financial condition could be materially and adversely affected.

Increased competition could hurt Landsea's business by preventing it from acquiring attractive land parcels on which to build homes or making acquisitions more expensive, hindering Landsea's market share expansion and causing it to increase selling incentives and reduce prices. Additionally, an oversupply of homes available for sale or a discounting of home prices could materially and adversely affect pricing for homes in the markets in which Landsea operates.

Over the past several years, Landsea has embarked on a strategy to expand its product offerings to include more affordably-priced homes to reach a deeper pool of qualified buyers and grow its overall community count. Landsea anticipates that it will continue to build more affordably priced homes. We believe there is more competition among homebuilding companies in more affordable product offerings than in the luxury and move-up segments. Landsea also competes with the resale, or "previously owned," home market, the size of which may change significantly as a

result of changes in the rate of home foreclosures, which is affected by changes in economic conditions both nationally and locally.

Landsea may be at a competitive disadvantage with regard to certain large national and regional homebuilding competitors whose operations are more geographically diversified, as these competitors may be better able to withstand any future regional downturn in the housing market. Landsea competes directly with a number of large national and regional homebuilders that may have longer operating histories and greater financial and operational resources than Landsea does, including a lower cost of capital. Many of these competitors also have longstanding relationships with subcontractors, local governments and suppliers in the markets in which Landsea operates or in which Landsea may operate in the future. This may give Landsea's competitors an advantage in securing materials and labor at lower prices, marketing their products and allowing their homes to be delivered to customers more quickly and at more favorable prices. This competition could reduce Landsea's market share and limit its ability to expand its business…"

Risk factor disclosures about the merger proposal:

"Risks Related to the Business Combination

Our LF Capital Restricted Stockholders that have entered into the Voting and Support Agreement have agreed to vote in favor of the Business Combination and the other proposals described in this proxy statement, regardless of how our public stockholders vote.

Unlike many other blank check companies in which the founders agree to vote their Founder Shares in accordance with the majority of the votes cast by the public stockholders in connection with an initial business combination, our LF Capital Restricted Stockholders, and other than the BlackRock Holders, are parties to the Voting and Support Agreement pursuant to which they have agreed to vote any shares of Common Stock owned by them in favor of the Business Combination Proposal and the other proposals described in this proxy statement. As of September 17, 2020, our LF Capital Restricted Stockholders, and other than the BlackRock Holders, own shares equal to 22.6% of our issued and outstanding shares of Common Stock. Accordingly, it is more likely that the necessary stockholder approval will be received for the Business Combination than would be the case if our LF Capital Restricted Stockholders agreed to vote any shares of Common Stock owned by them in accordance with the majority of the votes cast by our public stockholders…

We did not obtain an opinion from an independent investment banking or accounting firm, and consequently, you have no assurance from an independent source that the price we are paying in connection with the Business Combination is fair to us from a financial point of view.

We are not required to obtain an opinion from an independent investment banking or accounting firm that the price we are paying in connection with the Business Combination is fair to us from a financial point of view. Our board of directors did not obtain a third-party valuation or fairness opinion in connection with its determination to approve the Business Combination. In analyzing the Business Combination, our board of directors and management conducted due diligence on Landsea and the industry in which Landsea operates, including through the review of financial and other information provided by Landsea in the course of our due diligence investigations. Based on such due diligence, our board of directors believes that the Business Combination with Landsea is in the best interests of us and our stockholders and presents an opportunity to increase stockholder value. For more information related to the criteria and justifications of our board of directors for making its determination, see "*The Business Combination— The Company's Board of Directors' Reasons for the Approval of the Business Combination*." For more information, generally, about the decision-making process of the Board and management, see "*The Business Combination*." Accordingly, our stockholders will be relying solely on the business judgment of our board of directors regarding Landsea's value and the benefits of the Business Combination. There is no assurance that our board of directors properly valued Landsea's business and the Business Combination.

The lack of an independent third-party fairness opinion may also lead to an increased number of stockholders voting against the Business Combination or demand redemption of their shares, which could potentially impact our ability to consummate the Business Combination…."

Appendix C: Comparison of specific and less specific disclosures

Specific Example from LGL Systems' proxy statement

"IronNet has a history of losses and the Combined Company may not be able to achieve or sustain profitability in the future. IronNet has incurred net losses in all periods since its inception. IronNet experienced net losses of $55.4 million and $47.9 million for fiscal 2021 and fiscal 2020, respectively, and $15.5 million and $16.4 million for the three months ended April 30, 2021 and 2020, respectively. As of April 30, 2021, IronNet had an accumulated deficit of $188.8 million. While IronNet has experienced significant growth in revenue in recent periods, we cannot predict when or whether the Combined Company will reach or maintain profitability. ……"

Less Specific Example from Graf Industrial's proxy statement

"Diginex has a limited operating history and has incurred operating losses since its inception as it has been investing in the build out of its business lines. Its business lines are nascent, unproven and subject to material legal, regulatory, operational, reputational, tax and other risks in every jurisdiction and are not assured to be profitable."

Appendix D: Variable definition

Variable	Definition
Main dependent Variables:	
Redemption	The portion of the shares redeemed by SPAC shareholders.
Spread_post	The average of ask minus bid price divided by the mean value of ask and bid price standard deviation of daily abnormal returns over the 360 days after merger completion.
NIdecline	Indicator variable equal to one when net income in post-merger period is decreased by at least ten percent; zero otherwise.
Other Variables:	
Totalword_RF	The length of the risk factor section in a proxy statement.
Keyword_RF	Word count of all the risk key words from Campbell et al. (2014). Please see Appendix E for the word list.
Specific	Word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section by using NER technique.
CEO_PEexp	Indicator variable equal to one if a SPAC's CEO has PE/VC experience; zero otherwise.
CEO_CEOexp	Indicator variable equal to one if a SPAC's CEO has other CEO experience; zero otherwise.
CEO_300PE	Indicator variable equal to one if a SPAC's CEO serves(d) as a director/partner of a top 300 PE firm; zero otherwise. To define a top 300 PE firm, we rely on The PEI 300, a ranking list of the world's top 300 PE firms released by PEI International.
Sponsorteam_ PEVC%	Portion of the sponsor team members with PE/VC experience. The portion is defined as the number of sponsor team members with PE/VC firm experience divided by the total number of sponsor team members.
Sponsorteam_CEO%	Portion of the sponsor team members with CEO experience. The portion is defined as the number of sponsor team members with CEO firm experience divided by the total number of sponsor team members.
Sponsorteam_highPE	Indicator variable equal to one if the *Sponsorteam_ PEVC%* is greater than the median of the sample; zero otherwise.
Sponsorteam_highCEO	Indicator variable equal to one if the *Sponsorteam_ CEO%* is greater than the median of the sample; zero otherwise.
Retail_investor%	Retail investor ownership equal to one minus institutional ownership before the proxy statement is filed.
IPOamt	SPAC IPO proceeds.
Spac_us	Indicator variable equal to one if the SPAC is U.S. or Canada base; zero otherwise.
Sale_lag	Target company's revenue in one year prior to the year of merger completion.

Variable	Definition
RD_lag	Target company's R&D expenses in one year prior to the year of merger completion.
Leverage	Target company's book value of total liabilities divided by total assets in the year of merger completion.
ROA	Target company's net income divided by total assets in the year of merger completion.
Merger_us	Indicator variable equal to 1 when the target firm is U.S or Canada base.
Age_ta	Age of target company when the merger is completed
Forward_purchase	Indicator variable equal to one if the SPAC includes a forward purchase agreement; zero otherwise. It is a commitment (or an option) that SPAC sponsors will provide additional capital for the merger proposal; zero otherwise.
Underwriter_rank	The ranking of SPAC IPO underwriter at the values between 1 to 9.
Big4_spac	Indicator variable equal to one when a SPAC IPO is audited by Big 4; zero otherwise.
Big4_post	Indicator variable equal to one when a de-SPAC firm is audited by Big 4 for post-merger period; zero otherwise.
Litind	Indicator variable equal to one when a target firm is in the biotechnology (4-digit SIC codes 2833-2836 and 8731-8734), computer (4-digit SIC codes 3570-3577 and 7370-7374), electronics (4-digit SIC codes 3600-3674), or retail (4-digit SIC codes 5200-5961) industries; zero otherwise

Appendix E: Word list of risk key words from Campbell et al. (2014)

1. Word list of financial risk:
   'anti-takeover provisions', 'anti-takeover provision', 'bank debt', 'capital expenditures', 'capital expenditure', 'capital leases', 'capital lease', 'chapter 11', 'chapter 7', 'chapter 9', 'collateral', 'concentrated ownership', 'covenant', 'covenants', 'credit facility', 'credit facilities', 'credit rating', 'credit risk', 'debt burden', 'decline in stock price', 'default', 'defined benefit', 'dilution', 'dividends', 'downgrade', 'family', 'financial condition', 'financing costs', 'funded status', 'illiquid market', 'improvements', 'indebtedness', 'insider sales', 'investment in equipment', 'investment in plant', 'lease', 'leases', 'leasing', 'lease commitment', 'lease commitments', 'leverage', 'leveraged lease', 'leveraged leases', 'limited trading', 'liquidity', 'loan', 'locked-in lease', 'locked-in leases', 'mandatory contribution', 'maturity', 'negative operating cash flow', 'new financing', 'obligations', 'opeb', 'o.p.e.b.', 'operating losses', 'penny stock', 'postretirement', 'rating', 'refinance', 'refinancing', 'reinsurance', 'renegotiation', 'reorganization', 'reserves', 'revolver', 'sale of productive assets', 'stock market listing', 'stock price drop', 'stock price volatility', 'underfunded pensions', 'underwriting', 'volatility of operating results', 'volatility of revenues', 'volatility of sales', 'working capital'.
2. Word list of other-idiosyncratic risk:
   'acquisition', 'adequate staffing', 'advertising', 'asset impairment', 'asset impairments', 'asset securitization', 'asset securitizations', 'assimilation', 'backlog', 'brand', 'brand recognition', 'california power crisis', 'certification', 'clinical trials', 'clinical trial', 'commercialize', 'concentration', 'consolidation', 'construction', 'contracts', 'contract', 'copyright', 'copyrights', 'corporate culture', 'cost control', 'customer concentration', 'customer service', 'delivery', 'distribution', 'distributor', 'distributors', 'downsizing', 'economies of scale', 'embargo', 'enron', 'expand', 'expanding', 'expansion', 'export', 'exports', 'facilities', 'franchise', 'franchisee', 'goodwill', 'goodwill impairment', 'goodwill impairments', 'impairment', 'information technology', 'innovation', 'insurance coverage', 'intangible', 'integrate', 'integrating', 'integration', 'intellectual', 'internal control', 'internal controls', 'internet', 'investment in subsidiary', 'investment in subsidiaries', 'it', 'i.t.', 'joint venture', 'joint ventures', 'keep and retain top management', 'key personnel', 'labor cost', 'labor costs', 'labor relations', 'labor union', 'labor unions', 'license', 'licenses', 'limited operating history', 'maintenance', 'management retention', 'market acceptance', 'marketing', 'material weakness', 'material weaknesses', 'mbs', 'm.b.s.', 'merger', 'mortgage backed securities', 'mortgage servicing rights', 'msr', 'm.s.r.', 'natural disasters', 'new construction', 'new product acceptance', 'new product development', 'no current operations', 'online', 'orders', 'patent', 'personnel', 'preclinical', 'product', 'product development', 'product mix', 'product performance', 'production', 'proprietary', 'publicity', 'redundancy', 'reliance on key customer', 'reliance on key customers', 'reliance on key supplier', 'reliance on key suppliers', 'reporting controls', 'research and development', 'restructuring', 'restructuring implementation', 'sarbanes–oxley', 'sars', 'secret', 'secrets', 'security', 'shortages', 'single customer', 'single supplier', 'software', 'sole supplier', 'sole suppliers', 'spe', 's.p.e.', 'special purpose entity', 'strike', 'supplier', 'suppliers', 'supply chain', 'synergy', 'synergies', 'systems', 'tariff', 'tariffs', 'technological obsolescence', 'technologies', 'technology', 'trade', 'trademark', 'trademarks', 'training', 'union election', 'variable interest entity', 'vendor', 'vendors', 'vie', 'v.i.e.', 'weather', 'web security', 'website', 'websites'
3. Word list of litigation risk:

‘adverse judgment’, ‘anti-trust’, ‘casualty’, ‘charged’, ‘class action’, ‘compliance’, ‘comply’, ‘conflict of interest’, ‘conflicts of interest’, ‘contamination’, ‘defendant’, ‘deregulation’, ‘effects of implementing new standard’, ‘effects of implementing new standards’, ‘effects of implementing new method’, ‘effects of implementing new methods’, ‘enforceability of judgments’, ‘enforcement’, ‘environmental’, ‘fda approval’, ‘federal’, ‘fines’, ‘fraud’, ‘government investigation’, ‘government policy’, ‘governmental approval’, ‘hazardous’, ‘ifrs’, ‘i.f.r.s.’, ‘infringe’, ‘injury’, ‘inquiries’, ‘inquiry’, ‘intellectual property’, ‘investigation’, ‘investigations’, ‘legislation’, ‘litigation’, ‘pay damages’, ‘penalty’, ‘penalties’, ‘pending lawsuit’, ‘pending lawsuits’, ‘plaintiff’, ‘possibility of restatement’, ‘possibility of restatements’, ‘potential lawsuit’, ‘potential lawsuits’, ‘product liability’, ‘regulation’, ‘regulations’, ‘regulatory’, ‘regulatory approval’, ‘regulatory change’, ‘regulatory compliance’, ‘regulatory environment’, ‘related party’, ‘related parties’, ‘remediation’, ‘restatement’, ‘restatements’, ‘safety’, ‘superfund’, ‘uncertainties regarding accounting estimates’

4. Word list of other-systematic risk:
‘afghanistan’, ‘aggregate demand’, ‘asian crisis’, ‘business conditions’, ‘call’, ‘capacity’, ‘coal’, ‘commodity’, ‘commodities’, ‘competition’, ‘competitor’, ‘competitors’, ‘complement’, ‘concentration’, ‘consumer confidence’, ‘consumer spending’, ‘consumption’, ‘currency collapse’, ‘currency fluctuation’, ‘currency fluctuations’, ‘cyclical’, ‘demand’, ‘derivative’, ‘derivatives’, ‘discounting’, ‘economic’, ‘economics’, ‘economic condition’, ‘economic conditions’, ‘economic downturn’, ‘economic downturns’, ‘economic growth’, ‘economic uncertainties’, ‘economy’, ‘electricity’, ‘energy’, ‘eu’, ‘e.u.’, ‘euro’, ‘european union’, ‘exchange rate’, ‘exchange rates’, ‘financial crisis’, ‘fiscal policy’, ‘foreign currency’, ‘foreign exchange’, ‘forward’, ‘forwards’, ‘fuel’, ‘future’, ‘gas’, ‘gasoline’, ‘gdp’, ‘g.d.p.’, ‘gnp’, ‘g.n.p.’, ‘general business risks’, ‘general conditions’, ‘general economic conditions’, ‘gold’, ‘growth rate’, ‘growth rates’, ‘hedge’, ‘hedging’, ‘housing’, ‘housing starts’, ‘industry condition’, ‘industry conditions’, ‘industry environment’, ‘inflation’, ‘iraq’, ‘market’, ‘markets’, ‘market demand’, ‘market supply’, ‘marketplace’, ‘materials’, ‘metal’, ‘metals’, ‘middle east’, ‘mineral’, ‘minerals’, ‘mining’, ‘monetary policy’, ‘mortgage’, ‘natural gas’, ‘obsolescence’, ‘oil’, ‘operating environment’, ‘option’, ‘ore’, ‘overstocked’, ‘peso’, ‘petroleum’, ‘political climate’, ‘political instability’, ‘pound’, ‘price pressure’, ‘prices’, ‘pricing power’, ‘raw material’, ‘raw materials’, ‘real’, ‘real estate investment trust’, ‘recession’, ‘reit’, ‘r.e.i.t.’, ‘renmenbi’, ‘rmb’, ‘ruble’, ‘rupee’, ‘saving’, ‘seasonal’, ‘september 11’, ‘september 11th’, ‘short’, ‘silver’, ‘steel’, ‘substitute’, ‘substitutes’, ‘swap’, ‘terrorism’, ‘u.s. dollar’, ‘underlying’, ‘unsalable inventory’, ‘war’, ‘yen’, ‘yuan’

5. Word list of tax risk:
‘uncertain tax position’, ‘uncertain tax positions’, ‘vat’, ‘v.a.t.’, ‘value added tax’, ‘aggressive tax position’, ‘aggressive tax positions’, ‘back taxes’, ‘deferred tax asset’, ‘deferred tax assets’, ‘deferred tax liability’, ‘deferred tax liabilities’, ‘excise tax’, ‘excise taxes’, ‘fin 48’, ‘internal revenue service’, ‘irs’, ‘i.r.s.’, ‘irs audit’, ‘irs judgment’, ‘loss carryback’, ‘loss carrybacks’, ‘loss carryforward’, ‘loss carryforwards’, ‘property tax’, ‘property taxes’, ‘provision for income tax’, ‘provision for income taxes’, ‘state tax’, ‘state taxes’, ‘tax’, ‘taxes’, ‘tax audit’, ‘tax authority’, ‘tax authorities’, ‘tax liability’, ‘tax liabilities’, ‘tax penalty’, ‘tax penalties’, ‘taxable’

Table 1: Sample Selection and Distribution

Panel A: Sample selection

	# Unique Firms
SPACs data downloaded from spacresearch.com between 2015 and 2021	432
Less: liquidated SPACs	(10)
Less: SPACs with live merger deals (as of November 24, 2021)	(120)
Sample of SPACs with completed mergers	302
Less: SPACs without data for H1 analysis	(6)
Final sample for H1 analysis	296

Panel B: Year distribution of sample

close_yr	Freq.	Percent
2016	4	1.35
2017	13	4.39
2018	23	7.77
2019	26	8.78
2020	61	20.61
2021	169	57.09
Total	296	100%

Table 1 presents the sample selection and firm distribution by the year of merger completion.

Table 2: Descriptive Statistics

Panel A: Variables used for Hypothesis 1

	Mean	STD	Min	Q1	Median	Q3	Max
Redemption	0.45	0.37	0.00	0.004	0.48	0.82	0.99
Totalword_RF	18,408.52	5,411.63	6,636.00	14,731.50	18,030.50	22,145.50	31,855.00
Keyword_RF	1,475.53	545.16	510.00	1,076.00	1,413.50	1,763.00	3,299.00
Specific	867.47	378.41	205.00	595.00	800.00	1051.50	1,935.00
Ln(Keyword_RF)	7.23	0.37	6.23	6.98	7.25	7.48	8.10
Ln(Specific)	6.67	0.46	5.32	6.39	6.69	6.96	7.57
CEO_300PE	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Sponsorteam_highPE	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Sponsorteam_highCEO	0.49	0.50	0.00	0.00	0.00	1.00	1.00
Retail_investor%	0.32	0.25	0.00	0.12	0.27	0.46	0.98
IPOamt	296.61	223.88	40.00	155.30	250.00	350.00	1,467.00
Ln(IPOamt)	5.45	0.73	3.69	5.05	5.52	5.86	7.29
Spac_us	0.10	0.30	0.00	0.00	0.000	0.000	1.00
Sale_lag	0.75	0.96	0.00	0.08	0.40	1.01	5.23
RD_lag	0.24	0.63	0.00	0.00	0.02	0.26	4.61
Merger_us	0.71	0.46	0.00	0.00	1.00	1.00	1.00
Age_ta	14.27	18.63	1.00	5.00	8.50	15.00	120.00
Ln(Age_ta)	2.16	0.98	0.00	1.61	2.14	2.71	4.79
Forward_purchase	0.28	0.45	0.00	0.00	0.00	1.00	1.00
Underwriter_rank	7.20	1.82	2.00	6.00	8.00	8.50	9.00
Big4_spac	0.05	0.21	0.00	0.00	0.00	0.00	1.00
Litind	0.35	0.48	0.00	0.00	0.00	1.00	1.00
N	296						

Panel B: Variables used for Hypothesis 2

	Mean	STD	Min	Q1	Median	Q3	Max
Totalword_RF	18,469.13	5,400.95	6,636.00	14,845.00	18,152.00	22,256.00	31,855.00
Keyword_RF	1,483.24	546.73	510.00	1,083.00	1,418.00	1,764.00	3,299.00
Specific	871.98	376.56	205.00	599.00	801.00	1,055.00	1,935.00
Ln(Keyword_RF)	7.24	0.37	6.23	6.99	7.26	7.48	8.10
Ln(Specific)	6.67	0.46	5.32	6.40	6.69	6.96	7.57
Abret_post	-0.00	0.00	-0.01	-0.00	-0.00	-0.00	0.01
GOODMA	0.24	0.43	0.00	0.00	0.00	0.00	1.00
Spread_post	0.01	0.01	0.00	0.00	0.00	0.01	0.09
CEO_300PE	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Sponsorteam_highPE	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Sponsorteam_highCEO	0.49	0.50	0.00	0.00	0.00	1.00	1.00
Retail_investor%	0.33	0.25	-0.19	0.13	0.27	0.46	0.98
IPOamt	295.84	225.20	40.00	150.00	250.00	350.00	1,467.00
Ln(IPOamt)	5.44	0.74	3.69	5.01	5.52	5.86	7.29
Leverage	0.23	0.27	0.00	0.01	0.12	0.37	1.01
ROA	-0.28	0.49	-2.93	-0.36	-0.13	-0.02	0.32
Age_ta	13.99	18.34	1.00	5.00	8.00	15.00	120.00
Ln(Age_ta)	2.14	0.98	0.00	1.61	2.08	2.71	4.79
Underwriter_rank	7.18	1.83	2.00	6.00	8.00	8.50	9.00
Big4_post	0.65	0.48	0.00	0.00	1.00	1.00	1.00
Litind	0.34	0.48	0.00	0.00	0.00	1.00	1.00
N	293						

Panel C: Variables used for Hypothesis 3

	Mean	STD	Min	Q1	Median	Q3	Max
Totalword_RF	18,298.43	5,442.66	6,636.00	14,669.00	17,978.00	22,035.00	31,855.00
Keyword_RF	1,466.41	543.99	510.00	1,068.00	1,404.00	1,763.00	3,299.00
Specific	867.77	382.52	205.00	591.00	795.00	1,048.00	1,935.00
Ln(Keyword_RF)	7.22	0.38	6.23	6.97	7.25	7.48	8.10
Ln(Specific)	6.67	0.47	5.32	6.38	6.68	6.96	7.57
NIdecline	0.47	0.50	0.00	0.00	0.00	1.00	1.00
CEO_300PE	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Sponsorteam_highPE	0.44	0.50	0.00	0.00	0.00	1.00	1.00
Sponsorteam_highCEO	0.50	0.50	0.00	0.00	0.00	1.00	1.00
Retail_investor%	0.33	0.25	-0.19	0.13	0.28	0.46	0.98
IPOamt	299.99	224.71	40.00	163.80	250.00	350.00	1,467.00
Ln(IPOamt)	5.46	0.72	3.69	5.10	5.52	5.86	7.29
Leverage	0.22	0.26	0.00	0.01	0.12	0.36	1.01
ROA	-0.27	0.467	-2.84	-0.36	-0.12	-0.02	0.32
Age_ta	14.37	18.94	1.00	5.00	8.00	15.00	120.00
Ln(Age_ta)	2.16	0.99	0.00	1.61	2.08	2.71	4.79
Underwriter_rank	7.20	1.83	2.00	6.00	8.00	8.50	9.00
Big4_post	0.66	0.47	0.00	0.00	1.00	1.00	1.00
Litind	0.34	0.47	0.00	0.00	0.00	1.00	1.00
N	277						

Panel D: Sponsor Team and Other Institutional Data

	Mean	STD	Min	Q1	Median	Q3	Max
Sponsor team:							
CEO_PEexp	0.60	0.49	0.00	0.00	1.00	1.00	1.00
CEO_CEOexp	0.54	0.50	0.00	0.00	1.00	1.00	1.00
CEO_300PE	0.20	0.40	0.00	0.00	0.00	0.00	1.00
Sponsorteam_ PEVC%	0.54	0.34	0.00	0.33	0.50	0.80	1.00
Sponsorteam_CEO%	0.39	0.29	0.00	0.23	0.33	0.50	1.00
Institutional ownership (IOR)							
IOR before proxy statement	0.68	0.25	0.00	0.54	0.73	0.88	1.20
IOR after proxy statement	0.42	0.30	0.00	0.15	0.36	0.67	1.42
IOR after merger closed	0.35	0.27	0.00	0.12	0.28	0.53	1.25
SPAC's merger duration:							
Length_annc_close (year)	0.41	0.15	0.07	0.31	0.40	0.47	1.29
Length_ipo_annc (year)	0.92	0.66	0.09	0.38	0.68	1.35	3.17
N	296						

Table 2 presents the descriptive statistics for the variables used in the main tests. Panel A presents the variables used for Hypothesis 1. Panel B is for Hypothesis 2 and Panel C is for Hypothesis 3. Panel D presents the statistics of sponsor team characteristic and other institutional data for our sample. *CEO_PEexp* equals one if a SPAC's CEO has PE/VC experience; zero otherwise. *CEO_CEOexp* equals one if a SPAC's CEO has other CEO experience; zero otherwise. *CEO_300PE* equals one if SPAC's CEO serves(d) as a director/partner of a top 300 PE firm; zero otherwise. *Sponsorteam_ PEVC%* is defined as the portion that sponsor team members with PE/VC experience. *Sponsorteam_ CEO%* is defined as the portion that sponsor team members with CEO experience. *Length_annc_close* is defined as the duration between target announcement date and merger closed date. *Length_ipo_annc* is defined as the duration between SPAC IPO date and target announcement date. Other variables are defined in Appendix D.

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) *Redemption*	1.00														
(2) *Ln(Specific*)	0.10	1.00													
(3) *Ln*(*Keyword_RF*)	-0.05	**0.58**	1.00												
(4) *Spread_post*	**0.43**	-0.01	*-0.13*	1.00											
(5) *NIdecline*	-0.05	*-0.13*	-0.02	0.02	1.00										
(6) *CEO_300PE*	-0.05	**0.15**	*0.13*	-0.11	-0.04	1.00									
(7) *Sponsorteam_highPE*	0.00	0.06	0.00	-0.05	0.02	**0.40**	1.00								
(8) *Sponsorteam_highCEO*	-0.02	-0.03	-0.05	-0.07	*-0.13*	-0.06	*-0.14*	1.00							
(9) *Retail_investor%*	*-0.12*	-0.06	0.01	**0.16**	0.11	-0.09	*-0.13*	-0.01	1.00						
(10) *Ln(IPOamt*)	**-0.28**	0.10	0.08	**-0.51**	-0.07	**0.24**	**0.20**	*0.14*	**-0.27**	1.00					
(11) *Ln*(*Age_ta*)	-0.01	-0.05	-0.10	-0.01	-0.11	0.08	0.07	0.06	**-0.16**	**0.15**	1.00				
(12) *Forward_purchase*	-0.04	-0.01	0.05	*-0.13*	-0.02	-0.02	-0.04	-0.02	-0.10	**0.21**	*0.14*	1.00			
(13) *Underwriter_rank*	**-0.20**	0.08	*0.12*	**-0.37**	0.00	**0.27**	**0.25**	0.03	**-0.29**	**0.70**	*0.13*	*0.14*	1.00		
(14) *Big4_spac*	**-0.19**	0.07	0.00	*-0.12*	-0.10	0.05	**0.15**	0.01	-0.08	**0.20**	-0.02	-0.07	**0.16**	1.00	
(15) *Litind*	0.09	0.05	**0.15**	**0.16**	0.05	-0.02	-0.05	-0.06	0.06	**-0.23**	-0.02	0.01	**-0.17**	-0.06	1.00

This matrix presents Spearman correlations. If p-value < 0.01, then the correlation coefficients are marked as bold. If p-value is between 0.01 and 0.05, the coefficients are marked as Italic. If p-value is between 0.05 and 0.1, the coefficients are underlined. Variables are defined in Appendix D.

Table 4: Risk Factor Disclosures and Sponsor Team Characteristics

	(1) *Ln(Keyword_RF)*	(2) *Ln(Specific)*
CEO_300PE	**0.120****	**0.166****
	(2.52)	**(2.47)**
Sponsorteam_highPE	**-0.039**	**0.024**
	(-0.99)	**(0.43)**
Sponsorteam_highCEO	**0.011**	**0.026**
	(0.29)	**(0.51)**
Ln(IPOamt)	-0.012	0.050
	(-0.30)	(0.93)
Spac_us	-0.008	0.113
	(-0.15)	(1.50)
Leverage_lag	-0.020	0.011
	(-0.95)	(0.59)
ROA_lag	-0.023	0.001
	(-1.16)	(0.06)
Merger_us	-0.080*	-0.273***
	(-1.94)	(-4.97)
Ln(Age_ta)	-0.010	-0.018
	(-0.48)	(-0.59)
Forward_purchase	0.011	-0.009
	(0.25)	(-0.16)
Underwriter_rank	0.018	-0.011
	(1.22)	(-0.54)
Big4_spac	0.108*	0.223**
	(1.68)	(2.16)
Litind	0.110*	0.064
	(1.72)	(0.83)
Intercept	6.743***	6.573***
	(21.40)	(17.47)
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	296	296
Adj. R^2	0.343	0.217

Table 4 presents the results for the relation between risk factor disclosures and sponsor team characteristics. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using the NER technique. *CEO_300PE* is an indicator variable equal to one if a SPAC's CEO serves(d) as a director/partner of a top 300 PE firm; zero otherwise. *Sponsorteam_highPE* is an indicator variable equal to one if *Sponsorteam_ PEVC%* is greater than the median of the sample; zero otherwise. *Sponsorteam_highCEO* is an indicator variable equal to one if *Sponsorteam_ CEO%* is greater than the median of the sample; zero otherwise. *Sponsorteam_ PEVC%* is calculated as the number of sponsor team members with PE/VC firm experience divided by total number of sponsor team members. *Sponsorteam_ CEO%* is calculated as the number of sponsor team members with CEO experience divided by total number of sponsor team members. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.

Table 5: Risk Factor Disclosures and Redemption

	(1) *Redemption*	(2) *Redemption*	(3) *Redemption*	(4) *Redemption*
Ln(Keyword_RF)	**-0.025**		**-0.110**	**-0.104**
	(-0.36)		**(-1.41)**	**(-1.31)**
Ln(Specific)		**0.092***	**0.130****	**0.130****
		(1.70)	**(2.16)**	**(2.12)**
CEO_300PE				-0.036
				(-0.64)
Sponsorteam_highPE				0.038
				(0.79)
Sponsorteam_highCEO				0.024
				(0.54)
Retail_investor%	-0.288***	-0.281***	-0.270***	-0.267***
	(-3.01)	(-2.89)	(-2.80)	(-2.75)
Ln(IPOamt)	-0.109**	-0.113***	-0.116***	-0.118***
	(-2.53)	(-2.62)	(-2.69)	(-2.76)
Spac_us	0.037	0.029	0.022	0.021
	(0.59)	(0.46)	(0.36)	(0.35)
Sale_lag	0.030	0.037	0.035	0.035
	(1.23)	(1.52)	(1.43)	(1.39)
RD_lag	0.049	0.043	0.048	0.048
	(1.48)	(1.29)	(1.42)	(1.43)
Merger_us	-0.152***	-0.125***	-0.124***	-0.125***
	(-3.41)	(-2.72)	(-2.70)	(-2.69)
Ln(Age_ta)	0.003	0.003	0.003	0.002
	(0.11)	(0.14)	(0.13)	(0.09)
Forward_purchase	0.010	0.012	0.013	0.015
	(0.22)	(0.26)	(0.28)	(0.32)
Underwriter_rank	-0.009	-0.010	-0.007	-0.007
	(-0.57)	(-0.61)	(-0.43)	(-0.42)
Big4_spac	-0.272***	-0.296***	-0.294***	-0.300***
	(-4.16)	(-4.53)	(-4.51)	(-4.30)
Litind	-0.025	-0.034	-0.026	-0.024
	(-0.41)	(-0.55)	(-0.42)	(-0.39)
Intercept	1.451***	0.679	1.152**	1.111*
	(2.77)	(1.52)	(2.09)	(1.96)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	296	296	296	296
Adj. R^2	0.158	0.168	0.171	0.164

Table 5 presents the results of Hypothesis 1 that examines whether risk factor disclosures are associated with redemption rate. *Redemption* is defined as the portion of the shares redeemed by shareholders. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using the NER technique. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.

Table 6: Cross-Sectional Tests Regarding Redemption

Panel A: PE/ VC Experience in Sponsor Team

	(More PE/ VC Experience)	(Less PE/ VC Experience)
	Redemption	*Redemption*
Ln(Keyword_RF)	**-0.080**	**-0.102**
	(-0.59)	**(-0.95)**
Ln(Specific)	**0.057**	**0.163****
	(0.49)	**(2.10)**
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	131	165
Adj. R^2	0.063	0.185

Panel B: CEO Experience in Sponsor Team

	(More CEO Experience)	(Less CEO Experience)
	Redemption	*Redemption*
Ln(Keyword_RF)	**0.136**	**-0.159**
	(1.11)	**(-1.51)**
Ln(Specific)	**0.022**	**0.180****
	(0.26)	**(2.13)**
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	145	151
Adj. R^2	0.203	0.184

Panel C: Retail Investor Ownership

	(High retail investor ownership)	(Low retail investor ownership)
	Redemption	*Redemption*
Ln(Keyword_RF)	**-0.139**	**-0.061**
	(-1.36)	**(-0.44)**
Ln(Specific)	**0.244*** **	**0.043**
	(3.12)	**(0.40)**
Controls	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
N	148	148
Adj. R^2	0.270	0.031

Table 6 reports the cross-sectional variations in the relations between risk factor disclosures and redemption. In Panel A, we use *Sponsorteam_highPE* to partition the sample: SPACs with *Sponsorteam_highPE* equal to 1 are defined as more PE/ VC experience; SPACs with *Sponsorteam_highPE* equal to 0 are defined as less PE/VC experience. *Sponsorteam_highPE* is an indicator variable equal to one if *Sponsorteam_ PEVC%* is greater than the median of the sample; zero otherwise. *Sponsorteam_ PEVC%* is calculated as the number of sponsor team members with PE/VC firm experience divided by total number of sponsor team members.

In Panel B, we use *Sponsorteam_highCEO* to partition the sample: SPACs with *Sponsorteam_highCEO* equal to 1 are defined as more CEO experience; SPACs with *Sponsorteam_highCEO* equal to 0 are defined as less CEO experience. *Sponsorteam_highCEO* is an indicator variable equal to one if *Sponsorteam_ CEO%* is greater than the median of the sample; zero otherwise. *Sponsorteam_ CEO%* is calculated as the number of sponsor team members with CEO experience divided by total number of sponsor team members.

In Panel C, we partition the sample according to the median of *Retail_investor%*. *Redemption* is defined as the portion of the shares redeemed by shareholders. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using NER technique. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.

Table 7: Risk Factor Disclosures and Information Asymmetry

	(1) *Spread_post*	(2) *Spread_post*	(3) *Spread_post*	(4) *Spread_post*
Ln(Keyword_RF)	**0.001**		**-0.003**	**-0.002**
	(0.60)		**(-1.11)**	**(-1.02)**
Ln(Specific)		**0.005****	**0.006*****	**0.006*****
		(2.55)	**(2.81)**	**(2.83)**
CEO_300PE				-0.002
				(-1.41)
Sponsorteam_highPE				0.000
				(0.07)
Sponsorteam_highCEO				-0.001
				(-0.84)
Retail_investor%	0.002	0.003	0.003	0.003
	(0.59)	(0.78)	(0.87)	(0.85)
Ln(IPOamt)	-0.008***	-0.008***	-0.008***	-0.008***
	(-4.90)	(-5.14)	(-5.09)	(-5.03)
Leverage	0.000	0.000	0.000	0.000
	(0.10)	(0.13)	(0.15)	(0.12)
ROA	0.000	0.001	0.001	0.000
	(0.38)	(0.57)	(0.50)	(0.38)
Ln(Age_ta)	0.001	0.001	0.001	0.001
	(1.43)	(1.51)	(1.51)	(1.58)
Underwriter_rank	-0.000	0.000	0.000	0.000
	(-0.01)	(0.18)	(0.29)	(0.37)
Big4_post	-0.000	-0.001	-0.000	-0.001
	(-0.17)	(-0.42)	(-0.28)	(-0.39)
Litind	0.002	0.002	0.002	0.002
	(1.09)	(0.98)	(1.10)	(1.14)
Intercept	0.040**	0.015	0.027	0.022
	(2.32)	(1.03)	(1.46)	(1.21)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	293	293	293	293
adj. R^2	0.355	0.378	0.379	0.376

Table 7 presents the results of H2 that examines the relation between risk factor disclosures and post-merger information asymmetry measured as bid-ask spread. *Spread_post* is defined as the average of ask minus bid price divided by the mean value of ask and bid price over the 360 days after merger completion. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using the NER technique. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.

Table 8: Risk Factor Disclosures and Net Income Decline

Panel A: *NIdecline*

	(1) *NIdecline*	(2) *NIdecline*	(3) *NIdecline*	(4) *NIdecline*
Ln(Keyword_RF)	**-0.004**		**0.655**	**0.743**
	(-0.01)		**(1.30)**	**(1.43)**
Ln(Specific)		**-0.678****	**-0.909****	**-0.925****
		(-2.14)	**(-2.45)**	**(-2.47)**
CEO_300PE				-0.189
				(-0.46)
Sponsorteam_highPE				-0.014
				(-0.04)
Sponsorteam_highCEO				-0.628**
				(-2.09)
Retail_investor%	1.120*	1.091*	1.029*	1.079*
	(1.84)	(1.79)	(1.67)	(1.74)
Ln(IPOamt)	-0.368	-0.349	-0.333	-0.213
	(-1.26)	(-1.19)	(-1.13)	(-0.71)
Leverage	-1.430**	-1.545**	-1.593**	-1.598**
	(-2.12)	(-2.19)	(-2.21)	(-2.19)
ROA	1.952***	1.922***	1.980***	1.917***
	(3.85)	(3.79)	(3.73)	(3.66)
Ln(Age_ta)	-0.276*	-0.296**	-0.294*	-0.278*
	(-1.85)	(-1.97)	(-1.94)	(-1.82)
Underwriter_rank	0.154	0.141	0.125	0.122
	(1.38)	(1.28)	(1.12)	(1.08)
Big4_post	0.178	0.232	0.188	0.100
	(0.55)	(0.71)	(0.57)	(0.30)
Litind	0.066	0.089	0.026	0.024
	(0.17)	(0.23)	(0.07)	(0.06)
Intercept	1.609	6.155**	3.050	2.160
	(0.49)	(2.55)	(0.92)	(0.63)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	277	277	277	277
Pseudo R^2	0.13	0.14	0.15	0.16

Panel B: *NIdecline_med*

	(1) *NIdecline_med*	(2) *NIdecline_med*	(3) *NIdecline_med*	(4) *NIdecline_med*
Ln(Keyword_RF)	**-0.393**		**0.446**	**0.484**
	(-0.89)		**(0.88)**	**(0.95)**
Ln(Specific)		**-0.998*** **	**-1.156*** **	**-1.166*** **
		(-3.11)	**(-3.12)**	**(-3.13)**
CEO_300PE				-0.002
				(-0.00)
Sponsorteam_highPE				-0.241
				(-0.73)
Sponsorteam_highCEO				-0.583*
				(-1.95)
Retail_investor%	1.402**	1.348**	1.309**	1.314**
	(2.24)	(2.12)	(2.03)	(2.03)
Ln(IPOamt)	-0.327	-0.292	-0.280	-0.176
	(-1.18)	(-1.04)	(-0.99)	(-0.61)
Leverage	-0.832	-1.000	-1.031	-1.049
	(-1.31)	(-1.47)	(-1.49)	(-1.48)
ROA	1.959***	1.964***	2.000***	1.980***
	(4.12)	(3.99)	(3.94)	(3.87)
Ln(Age_ta)	-0.394***	-0.420***	-0.418***	-0.408***
	(-2.66)	(-2.76)	(-2.74)	(-2.64)
Underwriter_rank	0.090	0.065	0.054	0.056
	(0.80)	(0.58)	(0.48)	(0.48)
Big4_post	0.169	0.212	0.181	0.122
	(0.53)	(0.66)	(0.56)	(0.37)
Litind	-0.069	-0.064	-0.105	-0.112
	(-0.17)	(-0.16)	(-0.26)	(-0.27)
Intercept	4.998	8.908***	6.789**	6.349*
	(1.49)	(3.69)	(2.03)	(1.84)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	277	277	277	277
Pseudo R2	0.12	0.14	0.14	0.15

Table 8 presents the results of H3 that investigates whether SPACs' risk disclosures reflect the risk of future adverse outcome. In Panel A, *NIdecline* is an indicator variable equal to one if net income in post-merger period is decreased by at least ten percent. In Panel B, *NIdecline_med* is defined as an indicator variable equal to one if the change in net income is lower than the industry median values. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using the NER technique. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.

Table 9: Risk Factor Disclosures and Stock Market Responses

Panel A: Average of Abnormal Returns in the Post-merger Period

	(1)	(2)	(3)	(4)
	Abret_post	*Abret_post*	*Abret_post*	*Abret_post*
Ln(Keyword_RF)	**-0.001****		**-0.001***	**-0.001***
	(-2.01)		**(-1.82)**	**(-1.77)**
Ln(Specific)		**-0.000**	**0.000**	**0.000**
		(-0.74)	**(0.21)**	**(0.22)**
Sponsorteam_highPE				0.000
				(0.29)
Sponsorteam_highCEO				0.000
				(0.65)
CEO_300PE				-0.000
				(-0.43)
Retail_investor%	0.001	0.001	0.001	0.001
	(0.89)	(0.71)	(0.90)	(0.89)
Ln(IPOamt)	-0.001	-0.000	-0.001	-0.001
	(-1.22)	(-1.12)	(-1.21)	(-1.27)
Leverage	0.000	0.000	0.000	0.000
	(0.17)	(0.13)	(0.17)	(0.13)
ROA	0.001**	0.001**	0.001**	0.001**
	(2.21)	(2.26)	(2.21)	(2.19)
Ln(Age_ta)	0.000	0.000	0.000	0.000
	(1.25)	(1.28)	(1.26)	(1.22)
Underwriter_rank	0.000	0.000	0.000	0.000
	(1.40)	(1.21)	(1.40)	(1.43)
Big4_post	0.000	-0.000	0.000	0.000
	(0.11)	(-0.13)	(0.10)	(0.13)
Litind	-0.000	-0.000	-0.000	-0.000
	(-0.44)	(-0.67)	(-0.44)	(-0.40)
Intercept	0.008	0.001	0.008	0.008
	(1.56)	(0.38)	(1.50)	(1.42)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	293	293	293	293
adj. R^2	0.123	0.111	0.120	0.112

Panel B: Positive Average Abnormal Returns in the Post-merger Period

	(1) *GOODMA*	(2) *GOODMA*	(3) *GOODMA*	(4) *GOODMA*
Ln(Keyword_RF)	**-1.124****		**-0.939***	**-0.925**
	(-2.28)		**(-1.65)**	**(-1.62)**
Ln(Specific)		**-0.615***	**-0.257**	**-0.183**
		(-1.72)	**(-0.61)**	**(-0.44)**
Sponsorteam_highPE				-0.409
				(-1.19)
Sponsorteam_highCEO				0.025
				(0.08)
CEO_300PE				-0.384
				(-0.84)
Retail_investor%	-0.081	-0.281	-0.146	-0.197
	(-0.11)	(-0.39)	(-0.20)	(-0.26)
Ln(IPOamt)	-0.209	-0.160	-0.194	-0.172
	(-0.63)	(-0.51)	(-0.59)	(-0.52)
Leverage	-0.156	-0.183	-0.168	-0.239
	(-0.27)	(-0.31)	(-0.28)	(-0.41)
ROA	-0.145	-0.094	-0.149	-0.142
	(-0.49)	(-0.30)	(-0.50)	(-0.50)
Ln(Age_ta)	-0.049	-0.036	-0.052	-0.039
	(-0.29)	(-0.21)	(-0.31)	(-0.23)
Underwriter_rank	0.180	0.144	0.170	0.208
	(1.40)	(1.14)	(1.32)	(1.63)
Big4_post	-0.169	-0.245	-0.165	-0.137
	(-0.45)	(-0.68)	(-0.44)	(-0.36)
Litind	0.177	0.087	0.163	0.164
	(0.50)	(0.25)	(0.46)	(0.46)
Intercept	6.333	2.401	6.744	5.937
	(1.57)	(0.82)	(1.62)	(1.41)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
N	293	293	293	293
Pseudo R^2	0.12	0.11	0.12	0.13

Table 9 presents the results of the additional analyses that investigate the association between SPACs' risk factor disclosures and abnormal returns in the post-merger period. In Panel A, *Abret_post* is defined as the average of abnormal returns over the 360 days after merger completion. The abnormal returns are measured as a firm's daily raw return minus CSRP value-weighted market returns. In Panel B, *GOODMA* is defined as an indicator variable equal to one if the average abnormal returns for post-merger period are positive. *Keyword_RF* is defined as word count of all the risk key words. *Specific* is defined as word count of specific entity names, including names, locations, organizations, money values, percent and date, in the risk factor section identified by using the NER technique. Other variables are defined in Appendix D. ***, **, and * denote significance at the 1%, 5% and 10 % (two-sided) levels, respectively.