SPACs and their warrants*

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ABSTRACT

Special purpose acquisition companies (SPACs) provide an alternative to traditional initial public offerings (IPOs). SPACs raise capital by issuing units that contain common shares and warrants. We argue that this combination of instruments creates staged financing that reduces agency problems arising from managers' access to excessive free cash flows. Consistent with the usage of warrants to reduce the agency problem, we show that SPACs with greater warrant coverage are of lower quality, trade at higher premiums as of closing, but have worse performance after the business combination.

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1 Introduction

Special purpose acquisition companies (SPACs) are shell companies that raise capital with the purpose of taking a private operating company public. The SPAC way of going public has become increasingly popular: In 2021 in the US, 613 SPACs raised $162.5 billion which represents 61% of all proceeds raised through IPOs during that year (SPAC Research, 2022). The growth of the SPAC market has attracted researchers' attention, but an important but sparsely examined feature of SPACs is their unit financing structure that comprises shares and warrants. The motive for issuing bundles of securities is unclear because in a full information setting, bundled securities with warrants generate no value. Klausner, Ohlrogge, and Ruan (2022) argue that warrants can increase the demand for SPAC IPOs when it is otherwise low. In this paper, we consider the alternative that warrants are purposefully used to facilitate staged financing to reduce potential agency problems arising from future managers' access to excessive cash. Throughout the paper, we study the impact of SPACs' warrant coverage—the fraction of warrants in the offering—on the SPAC process.

The ongoing discussion among practitioners, academics, and regulators often centers around SPACs' role in the economy. Critics portray SPACs as an expensive IPO alternative that has delivered poor returns (Klausner et al., 2022; Gahng, Ritter, and Zhang, 2023), while proponents argue that SPACs provide a listing option for smaller, less profitable, and riskier companies not eligible for traditional IPOs (Bai, Ma, and Zheng, 2021). Such early-stage companies generally use some of the proceeds to continue developing their products, and the remainder to set up production. The uncertain nature of the future operations to be financed by SPACs introduces the free cash flow agency problem first explained by Jensen (1986). In such cases excess cash may become available, and managers have incentives to undertake negative NPV projects for job security purposes. SPAC investors want to mitigate these problems by providing funds in an appropriate fashion. When SPACs issue units containing out-of-money warrants, they effectively create staged financing where the target company first receives proceeds from the IPO and then later receive additional financing

from warrant redemptions given successful use of the initial proceeds (Schultz, 1993b). We argue that this financing structure supports SPACs' role in the economy as vehicles to take small companies public. SPACs also give retail investors the opportunity to invest in young growth companies, an asset class previously accessible only through investments in venture capital partnerships (Boyer and Baigent, 2008). Taken together, SPACs may create value in the economy by improving the matching between young companies in need of capital with investors preferring riskier projects.

To study warrants' role in the SPAC process, we compile a sample of 1,119 SPACs that conducted an IPO between January 2015 and December 2022.[1] We begin our empirical analyses by studying determinants of the SPAC units' warrant coverage. For SPACs of higher quality, we predict that investors will be less concerned about the future managers' potential squandering of free cash flows. As such, we predict that signals of SPAC quality will be associated with smaller warrant coverage. Consistently, we find larger SPACs with more reputable underwriters and sponsors have lower warrant coverage. When we examine the role of the prevailing investor sentiment, we find that warrant coverage varies with the equity risk premium and that units have more warrants when the risk premium is higher. In aggregate, our findings suggest that sponsors choose the level of warrant coverage based on the potential risk of free cash flow agency problems.

Next, we examine the relationship between warrant coverage and first-day returns of SPAC IPOs. First-day returns for traditional companies are positively associated with uncertainty (Ritter and Welch, 2002). However, for SPAC IPOs the pricing uncertainty is low (Rodrigues and Stegemoller, 2014) and as a result of the redemption right and the lack of operating activates, SPAC IPOs often have modest first-day returns (Lewellen, 2009; Lakicevic and Vulanovic, 2011). Consistent with other studies, we report positive, but modest first-day returns. SPACs with greater warrant coverage have lower first-day returns. The staged financing structure may reduce the pricing uncertainty and lead to lower first-day

[1] In our sample, 94% of the SPACs issued units that contain warrants.

returns. We also find that indicators for investors' IPO demand such as overallotment and upsizing are associated with higher first-day returns.

When the SPAC has found a target to merge with, its shareholders and target company must endorse the business combination for it to complete. Klausner et al. (2022) explain that the SPAC structure with warrants may complicate the value proposition for shareholders of the SPAC and the target company. The shareholder groups should exchange the same amount of value with each other, but because of the claims from the outstanding warrants that is not possible.[2] We provide evidence that supports Klausner et al.'s (2022) explanation by studying the association between warrant coverage and private investments in public equity (PIPE), redemption rates, and SPAC durations. We find that SPACs with greater warrant coverage attract less PIPE proceeds, have higher redemption rates, and need more time to complete their business combination.

When we measure returns over the whole SPAC period spanning from the IPO to the completion of the business combination, we find that investors earn average annualized returns of 24.51% when the business combination completes. When we relate these returns to the level of warrant coverage, we conjecture that a more flexible financing structure could be more favorable to SPAC investors. Consistently, we find that investors, on average, pay a premium for greater warrant coverage. This finding also has implications for the SPACs' performance after the business combination (deSPAC period). Because warrant coverage reduces the agency problem from free cash flows, we expect that SPACs with greater warrant coverage merge with riskier companies. Given that investors' heterogeneous expectations increase with the riskiness of the company, we expect, following the reasoning by Miller (1977), greater overpricing of business combinations with SPACs that have greater warrant coverage. We show that greater warrant coverage is associated with lower returns in the

[2]Sponsors are aware of how the warrants may complicate the business combination. For example, the prospectus of Starboard Value Acquisition Corporation says that: "We have established the components of the units in this way in order to reduce the dilutive effect of the warrants upon completion of a business combination since the detachable redeemable warrants and distributable warrants will be exercisable in the aggregate for one-third of the number of shares compared to units that each contain a warrant to purchase one whole share, thus making us, we believe, a more attractive merger partner for target businesses."

deSPAC period for the common shares and warrants. Operating companies that conduct business combinations with SPACs that have a warrant coverage of one have -22.63 percentage points lower risk-adjusted annualized returns compared to business combinations of SPACs without warrants. Our analysis of deSPAC period volatility strengthens the evidence that SPACs with greater warrant coverage merge with riskier companies. Finally, we study returns around early warrant redemptions during the deSPAC period. A clause in the prospectus allows for early redemption of warrants if the common shares reach a predetermined trigger threshold. We find abnormal underperformance for common shares during and after early redemptions.

This paper first contributes to the emerging, but limited, research on SPACs and their use of unit IPOs. Companies that conduct traditional IPOs sometimes issue units, and Schultz (1993a) argues that such a staged financing mitigates the free cash flow agency problem. However, the argument does not line up well with the empirics for traditional IPOs. Almost every company suffers from the agency problem, but very few companies issue units in the IPO (Chemmanur and Fulghieri, 1997). SPACs, on the other hand, generally issue units in the IPO. We show results consistent with the fact that SPACs' issuance of units allows them to merge with riskier companies.

We also contribute to the literature on returns throughout the SPAC lifecycle and their determinants. We show that first-day returns are lower for SPACs with greater warrant coverage, but that SPACs with a greater warrant coverage that complete a business combination trade at a higher premium to their listing price. Gahng et al. (2023) report underperformance of common shares during the deSPAC period. We extend their finding by showing that the underperformance during the deSPAC period is worse with greater warrant coverage. Overall, our paper contributes to the literature on SPACs by highlighting the role of their warrant coverage.

2 The lifecycle of SPACs

A SPAC is a type of blank-check company that raises funds with the intention of completing a business combination with another company. SPACs are established by their sponsors, who are compensated with approximately 20% of the SPAC shares for raising capital and identifying a target company. Typically, investors in SPAC IPOs can purchase units for $10. Each unit normally consists of a common share and a fraction of an out-of-the-money warrant. In some cases, the unit also contains a fraction of a right, giving the holder the right to a common share if the SPAC completes a business combination.[3] Public warrants included in the unit usually have an exercise price of $11.50 with maturity five years after the completion of the business combination. Public warrants dilute the sponsors and to neutralize the dilution, the sponsors often purchase private units or warrants. The proceeds from selling private units or warrants cover the expenses that arise from the search for a target company.

The SPAC period commences at the IPO. Simultaneously with the IPO, sponsors begin their search for a target. The sponsors have 18 to 24 months to identify a suitable target. Once the sponsors have identified a target, they make a public announcement. The SPACs common shares usually experience abnormally high returns around the announcement of the business combination (Dimitrova, 2017; Kiesel, Klingelhöfer, Schiereck, and Vismara, 2023). At this stage, the common shareholders of the SPAC have the right to vote on the proposed business combination. Additionally, common shareholders have the opportunity to redeem their shares and receive $10 plus accrued interest per share and thus effectively providing them with a money-back guarantee. Any redemption decisions also affect the net cash per SPAC share at the time of the business combination. Klausner et al. (2022) show that SPACs, on average, provide $6.40 in cash per share. For the business combination to be approved, the redemption rate has to be less than the assigned threshold (Cumming, Haß, and Schweizer,

[3]The rights could be considered a special type of warrant with an exercise price of $0 that matures at the time of the completion of the business combination.

2014). In cases where a significant number of shareholders choose to redeem, sponsors may need to secure PIPE funding to facilitate the business combination. Before the combination is completed, the SPAC must prepare and file SEC's form S-4 (F-4 if the business combination is with a foreign company). Because the business combination is considered a merger and not an IPO for the target company, the combination proposal may contain forward-looking information (Ryan, 2020). Blankespoor, Hendricks, Miller, and Stockbridge Jr. (2022) show that forward-looking projections are given by 80% of the companies merging with a SPAC, but only 35% of the companies meet or beat these projections. The time between the announcement of the business combination and its completion spans about five months. Gahng et al. (2023) report that investors that purchase public SPAC units at the IPO and hold them until the business combination earn an average annualized return of 23.9%.

The deSPAC period begins when the SPAC and the target company have formally combined. At that time the SPAC is dissolved, and the newly formed company typically takes the SPAC's place as a listed company. Recent studies have shown that the common shares of the newly formed company underperform over the first one to three years (Dimitrova, 2017; Kiesel et al., 2023; Gahng et al., 2023). Five years after the business combination and when the warrants are in the money, the newly formed company can get a new capital infusion if investors choose to exercise their warrants. The target company normally also has the opportunity to call their warrants if their shares exceed a certain price for a set period, as outlined in the prospectus.

3 Data

To construct our sample, we begin by obtaining a list of SPACs that completed an IPO between January 2015 and December 2022 from SPAC Research (https://www.spacresearch.com).[4] The list contains 1,119 SPACs. We collect data on S-1 filings, sponsors, public unit structures, private placements, and business combinations

[4]SPAC Research is a commercial database that is restricted to US SPAC IPOs.

from SPAC Research. We use Bloomberg to complement these data, and supplement with price data for units, common shares, warrants, and rights. We complement our dataset with information from S-1s and prospectuses from the SEC's EDGAR database.

3.1 Variables

To measure warrant coverage, we create the variable *WarrantCoverage* that is the ratio of claims for common shares by public warrants divided by the number of public common shares.[5] We further calculate *TotalCoverage* as the ratio of claims for common shares by public and private warrants and rights divided by the number of public common shares. We calculate *RelativePrivateCoverage* as the coverage from private warrants and rights divided by *TotalCoverage*. We also include variables that capture changes in S-1s. The variable *Amendments* is defined as the number of S-1 amendments. The variable Δ*WarrantCovInt* equals one if *WarrantCoverage* has increased after the amendments and minus one if it has decreased; in all other cases, the variable equals zero. The variable Δ*WarrantCovPct* measures the percentage change in *WarrantCoverage* after the amendments.

We include a set of variables to capture IPO characteristics. The length of the listing process, *RegistrationDays*, is defined as the number of days between the first S-1 and the IPO. We use the dummy variable *ForwardContract* to indicate whether the SPAC had a forward purchase agreement as of the IPO. We measure SPAC size by *Proceeds* that is defined as the proceeds raised in the IPO in billions of dollars. We use *Upsizing* and *Overallotment* to capture the pre-IPO demand for the SPAC. The first variable, *Upsizing*, is calculated as the percentage change in *Proceeds* between the first S-1 and the final prospectus. The second variable, *Overallotment*, is calculated as the percentage of additional units offered by the underwriters. We also include a variable to capture the percentage fee paid to the underwriter

[5]The SPAC unit structure may provide the investors with warrants corresponding to one-half of a common share in two ways. One option is that the units contain one-half of a warrant and each whole warrant gives the right to one common share. The other option is that the units contain a whole warrant, but the warrant only gives the investors the right to one-half of a common share. In our calculations, we have made adjustments so that the warrant proportion reflects the number of common shares the investors are eligible to purchase.

(*UnderwriterFee*). To capture the quality of the underwriter we use *UnderwriterRank* that is a ranking of underwriter prestige based on Loughran and Ritter (2004).

We also use variables to capture sponsor characteristics such as the average age of the board members (*BoardAge*) and the number of board members (*BoardSize*). We measure corporate governance with *PowerConcentration* that is an indicator variable equal to one if the majority owner is also the chairperson, and zero otherwise. We define *FamilyRank* as the chronological rank of the SPAC within its sponsor family. Sponsor families are defined by SPAC Research. Appendix A gives a complete description of our variables, sources, and their definitions.

3.2 Descriptive statistics

Table 1 presents the descriptive statistics for the 1,119 SPACs. The statistics for *Warrant-Coverage* indicate that the average SPAC unit contains 0.45 public warrants for each common share.[6] The average total coverage is 0.67. The average time from the first S-1 filing to the IPO (*RegistrationDays*) is 53 days. During that time span, the SPACs amend their S-1s an average of 1.62 times (*Amendments*). When they amend their S-1, the SPACs may change the structure of their public unit. The descriptive statistics show that warrants in the public unit increase by an average of 2.13% after the amendments. Table 1 shows that SPACs, on average, raise $270 million in their IPO. The median underwriter fee is 5.50%. Table 1 also provides the descriptives for the SPACs' corporate governance. The average SPAC has 5.59 board members (*BoardSize*), and the average age of these members (*BoardAge*) is 53.69 years. For 18% of the SPACs, the majority owner is also the chairperson of the board (*PowerConcentration*).

[Table 1 about here]

In Panel A of Table 2, we report how the warrant coverage and proceeds vary over time.

[6] In our sample, 94% of the SPACs have public warrants, 11% have public rights, and the coverage from rights is 1%.

Blomkvist and Vulanovic (2020) show that the scope of SPAC IPOs varies over time. Our statistics show that the previous SPAC wave peaked during the first half of 2021 when 358 SPACs raised $111 billion. The average warrant coverage during that time was 0.31. During the second half of 2022 when 16 SPAC IPOs raised $1.3 billion, the average warrant coverage was 0.69.

Panel A also gives the changes in the units' structure between the initial S-1 and the final prospectus. We find that during the first half of 2021, SPACs often reduced their warrant coverage with their S-1 amendments. Panel A indicates that warrant coverage and changes in coverage correlate with the total SPAC proceeds raised. Panel B of Table 2 shows how the total coverage varies based on the warrant coverage. Panel B shows that the warrant coverage varies from zero to one, with one-half of a warrant being the most common. The average proceeds raised by SPACs that contain zero warrants is $200 million and $130 million for those that contain one. The average proceeds for SPACs with one-fifth of a warrant in the unit is $450 million. The average warrant coverage from private placements is highest for SPACs with one-half of a warrant in the unit.[7]

[Table 2 about here]

4 Results

In this section, we begin by examining the determinants of warrant coverage. We continue by studying the effect of that coverage during key events during the SPAC period. Finally, we examine the effect of warrant coverage on performance during the deSPAC period.

[7]For all warrant coverage subsamples, except the subsample with units containing a whole warrant, the average ratio of warrants to common shares is higher for sponsors than for unit investors. For example, for SPACs with units containing one-half of a warrant, the average warrant per sponsor common share is 1.12 (0.28 / 0.25 = 1.12). An alternative explanation by Chatterjee, Chidambaran, and Goswami (2016) for SPACs unit issuance suggests that warrants limit the risk level of sponsors' chosen company; to do so they create a sponsor to unit investor wealth transfer when the business combination is successful. Such wealth transfers do not occur when sponsors have a higher ratio of warrants per share than unit investors.

4.1 Determinants of warrant coverage

Table 3 shows the determinants of warrant coverage. In Column (1) of Panel A, we include the four key determinants *RiskPremium*, *LnProoceds, UnderwriterRank*, and *LnFamilyRank* as independent variables. The coefficient for *RiskPremium* indicates a positive association between the market risk premium and warrant coverage. Further, the coefficient for *LnProoceds* shows that larger SPACs have smaller warrant coverage. Column (1) also shows that *UnderwriterRank* and *LnFamilyRank* are negatively related to *WarrantCoverage.* These relations are consistent with higher quality SPACs deferring less proceeds. In Column (2), we add independent variables that control for IPO and sponsor characteristics. We also use fixed effects for the SPACs target geography and sector. The negative associations between warrant coverage and our key determinants remain statistically significant. Our interpretation is that *LnProoceds, UnderwriterRank*, and *LnFamilyRank* are measures of SPAC quality. All these three measures are associated with smaller warrant coverage. Consistent with our findings, using a sample of traditional IPOs, Lee, Lee, and Taylor (2003) report that companies that issue units composed of warrants are generally risker and use less prestigious underwriters.

In Panel B of Table 3, we examine the determinants of S-1 amendments. We use the same independent variables as in Panel A. Columns (1) and (2) show the determinants of directional changes to warrant coverage in amendments to the original S-1. In Columns (3) and (4), we examine the scope of the change. The results indicate that SPACs that raise more proceeds and have more reputable underwriters are less prone to increase their warrant coverage through S-1 amendments. The coefficient for *RegistrationDays* is positive and statistically significant which shows that SPACs that spend a longer time in registration are more likely to increase the warrant coverage. Columns (5) and (6) show the determinants of the number of S-1 amendments. The market risk premium is associated with more amendments, while the underwriter's rank is associated with fewer amendments. Taken together, Table 3 shows that SPACs of higher quality issue units with smaller warrant coverage.

[Table 3 about here]

4.2 Warrant coverage and the SPAC period

We begin our analysis of the SPAC period by exploring the association between warrant coverage and first-day returns of units.[8] Table 4 reports the results. For SPACs in general, first-day returns are positive, but modest (Lewellen, 2009; Lakicevic and Vulanovic, 2011).[9] For our sample, Panel A of Table 4 shows that the average first-day return is 1.48% (t-stat 14.69).[10] Rodrigues and Stegemoller (2014) find that the low pricing uncertainty of SPACs is the reason for modest first-day returns. Column (1) of Panel B presents the association between warrant coverage and market-adjusted first-day returns.[11] The coefficient for *WarrantCoverage* is −3.62 (t-stat −3.49), which implies that a SPAC unit with one warrant has 3.62% lower first-day returns than a SPAC unit without warrants. In Column (2), we estimate the regression with control variables for IPO and sponsor characteristics. The results continue to show a negative and statistically significant coefficient for *WarrantCoverage.* However, the coefficient of −1.56 is approximately half of the estimate in Column (1). The significantly positive coefficients for *Overallotment* and *Upsizing* indicate that higher pre-IPO demand is associated with higher first-day returns. Further, the sponsor quality measure *LnFamilyRank* also has positive and statistically significant coefficients. The results show that SPAC units with greater warrant coverage have lower first-day returns.

In Columns (3) and (4) of Table 4, the main independent variable is *TotalCoverage*. We

[8] We use the following method throughout our analyses to obtain a daily value for the units and their components. If the last price is missing, we use the mid-price given that the bid–ask spread was 1% or less for units and stocks, 10% or less for warrants, and 20% or less for rights. If there was no trading or the spread was too wide, we use the most recent valid observation. To calculate first-day returns, we use unit values. In six cases in which the unit contained no warrants, trading took place in the stock. In these cases, we rely on stock prices to calculate first-day returns.

[9] First-day SPAC returns are modest compared to returns for traditional IPOs. Ritter (2023) reports that the average first-day return for US IPOs between 1980 and 2022 was 19%.

[10] For the first-day returns the median is 0.40% and 75th percentile is 1.80% that indicates a positive skewness in the distribution.

[11] As a proxy for the market, we use an index that comprises all SPACs that have yet to announce their first business combination.

find that a greater *TotalCoverage* is associated with lower first-day returns. In the two remaining columns, we study the association between *RelativePrivateCoverage* and first-day returns. Column (5) reports a positive and insignificant coefficient for *RelativePrivateCoverage*. In Column (6), after adding control variables, the coefficient for *RelativePrivateCoverage* is negative and statistically significant (coef. -0.70, t-stat -2.70). The aggregate results in Table 4 are consistent with other studies and confirm that SPACs have modest first-day returns. Further, the results show that SPACs with greater warrant coverage are associated with lower first-day returns. Beatty and Ritter (1986) argue that pricing uncertainty is a driver of positive first-day returns (IPO underpricing). For traditional IPOs, high first-day returns are one of the costs of going public. The higher the first-day returns the more money preexisting shareholders have left on the table. Greater warrant coverage has the potential to reduce the agency problem, which further reduces price uncertainty and lowers first-day returns.

[Table 4 about here]

In Table 5, we explore the association between warrant coverage and PIPE proceeds, redemption rates, and SPAC durations. As outlined in Klausner et al. (2022), the SPAC structure with public and private warrants may complicate the value proposition for the shareholders of the SPAC and those of the target company. SPAC shareholders may redeem their shares for about \$10, so the target company needs to convince SPAC shareholders that it is contributing with \$10 of value per share. However, if the target company contributes \$10 per share, the target is effectively giving away the warrants at no cost. If the target company contributes less than \$10 per share, the SPAC shareholders need to accept a loss or believe that the target and the sponsor's ongoing engagement will produce enough value to compensate. As such, we expect that PIPE investors will be less willing to participate in SPAC deals in which there are more outstanding warrants. Further, we predict greater warrant coverage will be associated with higher redemption rates and longer SPAC processes.

Panel A of Table 5 presents the descriptive statistics for the 432 SPAC processes. We restrict the sample to processes completed before the end of December 2022.[12] The average PIPE proceed is 70.91% of the SPAC proceeds. The average redemption rate is 55.44% and the average length of the SPAC period is 484 days. However, the variability in these three variables is high and indicates great heterogeneity in the SPACs' deals.

Columns (1) and (2) of Panel B show a negative and statistically significant relationship between warrant coverage and PIPE that is consistent with the fact that a greater warrant coverage makes the SPAC deal less attractive for PIPE investors. The magnitude of the coefficient for *WarrantCoverage* in Column (1) means that SPACs with a warrant coverage of one have 46.05 percentage points lower PIPE proceeds than SPACs without warrants. Significant control variables are *AnnouncementDelay* and *LnFamilyRank*, which have a negative relationship with *PIPE*. The negative relationship between *AnnouncementDelay* and *PIPE* indicates that business combinations announced later in the SPAC period are of lower quality. In Columns (3) and (4), the redemption rate is the dependent variable. The coefficient for *WarrantCoverage* is 29.68 (t-stat 3.88) and implies that if the SPAC warrant coverage increases by one, then the redemption rate increases by 29.68 percentage points. These results are consistent with Klausner et al.'s (2022) argument that more outstanding warrants complicate the SPAC process. The coefficient for *AnnouncementDelay* is 6.05 (t-stat 2.69). The positive relationship between *AnnouncementDelay* and redemption rates is also an indication of the lower quality of business combinations announced later. Such results are consistent with Dimitrova (2017). The final two columns explore the relation between warrant coverage and the length of the SPAC period. Consistent with the idea that warrants complicate the SPAC process, the columns show that greater warrant coverage is associated with longer SPAC periods. Taken together, all the results in Table 5 are consistent with the argument by Klausner et al. (2022) that warrants complicate the SPAC process.

[12]Out of the 433 SPACs that completed a business combination, 23 did not issue warrants. We removed the one (and only) observation that listed in the first half of 2022 and therefore, the number of closed SPACs in our sample is 432.

[Table 5 about here]

Next, we examine the association between SPAC period returns and warrant coverage. We follow Gahng et al. (2023) and calculate the returns for the SPAC period when using the optimal redemption strategy (*Unit return*). The strategy calculates the returns for a public unit and assumes that investors sell each of the unit's components five trading days before the closure of the business combination or liquidation, with one additional rule regarding the common shares. The shares are redeemed and not sold if the redemption value is higher than the market price. To get a better understanding of the drivers of the returns from the optimal redemption strategy, we study the returns for common shares and warrants during the SPAC period separately. It is not possible to calculate the returns during the full SPAC period since those instruments are not traded at the IPO. Therefore, we calculate the value-at-risk for common shares and warrants as the price less the redemption value. Our proxy for the returns during the SPAC period of the components are the value-at-risk relative to the IPO price of \$10. For instance, our measure gives the return of 10% for a warrant with a closing price of \$1 one year after the IPO (the price of \$1 less the redemption value of \$0 divided by the IPO price of \$10). We use the last price for public units, common shares, and warrants, and adjust for splits and distributions.

Panel A of Table 6 presents the annualized returns for our sample of 432 closed SPACs. The average annualized unit return is calculated using the optimal redemption strategy and equals 24.51%.[13] Given that this figure does not include liquidated SPACs, it is low compared to the average of 23.6% reported by Gahng et al. (2023). Nevertheless, these annualized returns are high given the downside protection offered by the SPAC structure.

In Columns (1) and (2) of Panel B, we examine the relationship between warrant coverage and the unit returns in the SPAC period.[14] The coefficient for *WarrantCoverage* is

[13]Supplementary Table IA.4 provides a detailed overview of SPAC period returns by IPO year, liquidation status, and WarrantCoverage.

[14]Throughout the table, we calculate market-adjusted returns by subtracting the average annualized return for the respective components for all SPACs that announced a business combination more than 30 days earlier and subsequently closed.

economically meaningful and statistically significant. The only other significant independent variable is *LnProceeds,* which indicates that larger SPACs have higher returns during the SPAC period. In Columns (3) and (4), we examine whether warrant coverage is associated with the returns for common shares. We find that greater warrant coverage is associated with economically, but not statistically significant returns. Neither the coefficient for *WarrantCoverage* nor the coefficient for *TotalCoverage* are statistically significant. Columns (5) and (6) give the results with warrant returns as the dependent variable. In these two columns greater warrant coverage is associated with higher warrant returns. This finding is expected, as more value should flow to the warrant with greater warrant coverage. However, in that case, the coefficient in columns (3) and (4) should be negative. A caveat here is that common shares cannot realistically trade below $10 due to the redemption right and hence, the share may be overvalued on average. Overall, the findings in Table 6 indicate that SPACs with greater warrant coverage trade at a premium as of the closing of the business combination. This finding may be linked to the observation that the redemption rate for these SPACs is also higher and that investors in SPACs with a high warrant coverage, to a higher degree, hold on to their shares into the deSPAC period.

[Table 6 about here]

4.3 Warrant coverage and the deSPAC period

In Table 7, we study the returns for common shares and warrants during the deSPAC period. The returns are based on a buy-and-hold strategy in which investors hold common shares or public warrants from the SPAC's closing date for a one-year period in the deSPAC. Panel A of Table 7 presents the descriptive statistics for the returns. For our 320 observations the average return for common shares is economically meaningful at -49.92%.[15] The observed

[15]The sample consists of SPACs that closed no later than December 2021. We exclude stock returns for four deSPACs that did not survive a subsequent merger during the deSPAC period. In total, there are 320 deSPACs after excluding 7 extreme observations (studentized residuals exceeding 3 in the first specification). Out of all deSPAC in our sample, 18 did not issue warrants.

performance confirms the results in recent SPAC studies (Dimic, Goodell, Piljak, and Vulanovic, 2023; Gahng et al., 2023; Klausner et al., 2022; Kiesel et al., 2023). For our 302 observations of warrant returns, Panel A shows that the average one-year return is −27.84%. Our average return is substantially lower than the corresponding one of 72.2% reported by Gahng et al. (2023). We argue that different time periods are the underlying reason for the difference, Gahng et al. (2023) also question the sustainability of the warrant returns in their sample.

Panel B of Table 7 presents the association between warrant coverage and one-year returns for common shares and warrants. In all regressions, we use market-adjusted returns by subtracting the return on the CRSP value-weighted index. In Columns (2), and (4) through (6), we also add the SPAC period controls for *LnFamilyRank*, *RedemptionRate*, *SPACduration*, and *SPACreturn* as well as the company controls *Revenue* and *Profitable*.[16]

Columns (1) and (2) of Panel B show that companies that combine with SPACs with greater warrant coverage have lower returns on their common shares after the merger. The estimate in Column (1) indicates that if the SPAC had one more share of warrant coverage, then the new company would have a lower return by 22.63 percentage points for its common shares. However, Column (2) with an extended set of controls subsumes the significance. Regarding the SPAC characteristics, the column shows that *RedemptionRate* and *SPACreturn* have a negative and statistically significant relationship with the returns for common shares. Columns (3) and (4) of Panel B confirm these results with *TotalCoverage* as the main independent variable. In Columns (5) and (6), the dependent variable is the one-year warrant return. The coefficient for *WarrantCoverage* continues to be negative and statistically significant. Because the warrants have a levered exposure to common shares, the economical magnitude of the coefficient is substantially larger (−57.28 versus −22.63). The key takeaway from Table 7 is that the previously documented underperformance during the deSPAC period is more severe for SPACs with greater warrant coverage. Following the free

[16]In our sample, 86.9% of the companies have revenue and 22.8% are profitable.

cash flow agency problem, SPAC with greater warrant coverage take riskier companies public, and the SPAC period return reverses. The option to redeem shares effectively set a lower boundary for the share price. Given that investors' heterogeneous expectations increase with the riskiness of the company, we follow the reasoning of Miller (1977) and predict a greater overpricing of the business combination with a SPAC with greater warrant coverage.

[Table 7 about here]

If the SPAC defers more of its proceeds, it may select a risker target. In Table 8, we investigate the association between warrant coverage and the standard deviation in the deSPAC returns. The descriptive statistics in Panel A show that the average standard deviations in common shares and warrants are 94.84% and 215.28%, respectively. Panel B reports our regression results.[17] Column (1) shows a positive and statistically significant association between *WarrantCoverage* and the standard deviation in the common shares (coef. 21.16, t-stat 1.71). In Column (2), when we add more control variables, the association disappears. The control variables with significant coefficients are *RedemptionRate*, *SPACreturn*, and *Revenue*. In Columns (3) and (4), we find the same pattern when *TotalCoverage* is our independent variable of interest. Column (5) shows the results from using the standard deviation in warrants as the dependent variable, the only significant independent variables are *RedemptionRate* and *Profitable*.

[Table 8 about here]

Finally, we study the performance of common shares around early redemptions of public warrants, we do so to understand whether investors anticipate the dilution effect from outstanding warrants. Our sample contains 66 observations of early warrant redemptions. Figure 1 displays the buy-and-hold abnormal returns (BHARs) for common shares for 45

[17] We calculate market-adjusted standard deviations by subtracting the standard deviation of the CRSP value-weighted index.

days before the redemption announcement to 45 days after the announcement.[18] We calculate the BHARs using the following formula:

$$BHAR_{i,T} = \sum_{t=1}^{T}(1 + R_{i,t}) - \sum_{t=1}^{T}(1 + R_{m,t}) \tag{1}$$

where $R_{i,t}$ is the return for common share i during period t, and $R_{m,t}$ is the CRSP value-weighted index return. Typically, public warrants may be called for early redemption if the common shares' closing price exceeds \$18 for 20 of the last 30 trading days. Calling the warrants for early redemption transfers wealth to common shareholders by reducing the options of the warrant holders, as such the stock market reaction to early redemptions should be positive (Schultz, 1993a). Figure 1 shows the performance of the common shares around the early redemptions. The figure indicates that a downward trend in the BHARs had already begun before the announcement of the early redemption was made. We conjecture that investors anticipate that the warrants will be called for early redemption. After an early redemption announcement warrant holders have an average of 21 trading days to redeem their warrants. Figure 1 illustrates the poor performance of common shares from the redemption announcement to the closing of the redemption window and afterwards. We view the trend as a result of two features: First, the selling of common shares earned by redeeming the warrants causes selling pressure and second, the selling pressure is not anticipated by the investors in common shares. Thus, the two features combined result in a downward trend in prices.

[Figure 1 about here]

Table 9 shows the results for the formal tests of the pattern shown in Figure 1. Panel A of Table 9 shows the summary statistics for the BHARs of the common shares during the pre-redemption, redemption, and post-redemption periods. The redemption and post-redemption periods have significantly negative BHARs of -8.97% and -7.46%, respectively.

[18] We use 45 days to maximize our sample (primarily) and the window length (secondarily).

We further examine the effect of the two key features of early redemptions, how investors redeem their warrants, and the trigger threshold. Investors may redeem warrants early either on a "cash basis" or "cashless basis." In the case of the "cash basis" redemption, warrant holders receive a common share in exchange for paying the exercise price of $11.50. However, for a "cashless basis," warrant holders receive a fraction of a common share for each warrant without paying the exercise price.[19] Redemption on a "cash basis" leads to a greater dilution of common shares, and warrant holders have to put up additional cash. Redemption on a "cash basis" may cause greater selling pressure. The other main feature is the trigger threshold, the two common trigger prices are $10 and $18. If the trigger price is $10, investors redeem the warrants using the anti-dilution adjustment clause. The anti-dilution clause stipulates that public and private warrants must be concurrently called for redemption. Given that the early redemptions triggered at $10 cause more dilution, we expect lower returns around such redemptions.

In Panel B of Table 9, the BHAR returns are grouped based on whether the redemption was done on a "cash basis" or not. Of the early redemptions, 31 were on a "cash basis." The BHARs are more negative for redemptions during the redemption and post-redemption period. The difference in the post-redemption period of -10.70 percentage points is also statistically significant. Panel C shows the differences in the BHARs based on the trigger threshold. None of the differences are statistically significant. Taken together, Figure 1 and Table 9 show poor performance for common shares during and after the early redemption period. Further we show indications that their performance is worse when the redemption is done on a "cash basis."

[Table 9 about here]

[19]The size of the common share fraction is determined by the difference between the price of the common shares and the exercise price.

5 Conclusion

At the IPO, SPACs usually issue units that contain warrants. By attaching out-of-money warrants, the SPACs effectively create staged financing that may reduce the free cash flow agency problem. Throughout our paper, we provide evidence that SPACs use unit IPOs in a way that reduces that agency problem. SPACs of lower quality issue units that are composed of more warrants that result in lower first-day returns, higher redemption rates and SPAC period returns, and riskier deSPAC businesses.

The contemporary SPAC literature indicates that SPACs, on average, are poor vehicles for private companies to go public through due to, in most cases, a SPAC structure that benefits sponsors and warrant holders at the expense of the new company's common shareholders (Gahng et al., 2023). Our findings show that across our metrics SPACs with greater warrant coverage have poor post-combination performance, but our findings are consistent with the notion that units with a higher warrant coverage are used to take more risky companies public.

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Appendix A
Variable definitions

Variable by group	Definition
SPAC coverage	
WarrantCoverage	The fraction of shareholder coverage from public warrants. It is calculated as the fraction of a share each unit's warrants are redeemable against. Source: SPAC Research.
PrivateCoverage	The fraction of shareholder coverage from private warrants and rights. It is calculated as the fraction of a share each unit's private warrants and rights are redeemable against. Source: SPAC Research.
TotalCoverage	The sum of coverage from public warrants (*WarrantCoverage*) and rights, and private derivatives (*PrivateCoverage*). Source: SPAC Research.
RelativePrivateCoverage	The ratio of *PrivateCoverage* to *TotalCoverage*.
Δ *WarrantCov*	The change in *WarrantCoverage* from first filing to final prospectus. Source: SEC EDGAR.
Amendments	The number of amendments to S-1s filed with the SEC. Source: SEC EDGAR.
IPO characteristics	
RegistrationDays	The duration from the first filing with the SEC to the IPO. Source: Bloomberg.
ForwardContract	Indicator equal to one for SPACs that have entered into forward purchase agreements, otherwise zero. Source: Bloomberg.
Proceeds	The number of units offered in the final post green shoe times the offer price. Source: Bloomberg.
Overallotment	The number of additional units offered in the final post green shoe over the number of units in final pre green shoe. Source: Bloomberg.
RiskPremium	The monthly Implied Equity Risk Premium of Damodaran (2023). Source: Aswath Damodaran's web page available at: https://pages.stern.nyu.edu/ adamodar/.
UnderwriterFee	The sum of upfront fee and deferred fee. The upfront fee is paid to the underwriter directly while the deferred fee is paid after the business combination is completed. Source: SPAC Research.
UnderwriterRank	IPO underwriter reputation rankings based on Loughran and Ritter (2004). Source: Jay Ritter's web page available at: https://site.warrington.ufl.edu/ritter/ipo-data/.
Upsizing	The number of additional units offered in the final pre green shoe over the number of units in filing. Source: Bloomberg.
Deal characteristics	
AnnouncementDelay	The duration from the IPO to the first business combination announcement. Sources: Bloomberg and SPAC Research.
SPAC merger process	
PIPE	The ratio of Private Investment in Public Equity (PIPE) to raised proceeds. Sources: Bloomberg and SPAC Research.
RedemptionRate	The ratio of redeemed shares to units offered. Source: SPAC Research.
SPACduration	The duration of the SPAC process from the IPO to the closing date. Sources: Bloomberg and SPAC Research.
Unit return	The total annualized return during the SPAC period. Sources: Bloomberg and SPAC Research.
Revenue	Indicator equal to one if the SPAC target has revenue, otherwise zero. Source: SEC EDGAR.
Profitable	Indicator equal to one if the SPAC target is profitable, otherwise zero. Source: SEC EDGAR.

(*continued on next page*)

Appendix A
(*continued*)

Variable by group	Definition
Sponsor characteristics	
BoardAge	The average age of the board members as of the IPO. Sources: Bloomberg, SEC EDGAR, and SPAC Research.
BoardSize	The number of board members as of the IPO. Sources: Bloomberg, SEC EDGAR, and SPAC Research.
PowerConcentration	Indicator equal to one for sponsor teams that have a chair that is also the majority owner, otherwise zero. Sources: Bloomberg, SEC EDGAR, and SPAC Research.
FamilyRank	The chronological rank of the SPAC IPO within its sponsor family. The sponsor families are defined by SPAC Research. Source: SPAC Research.

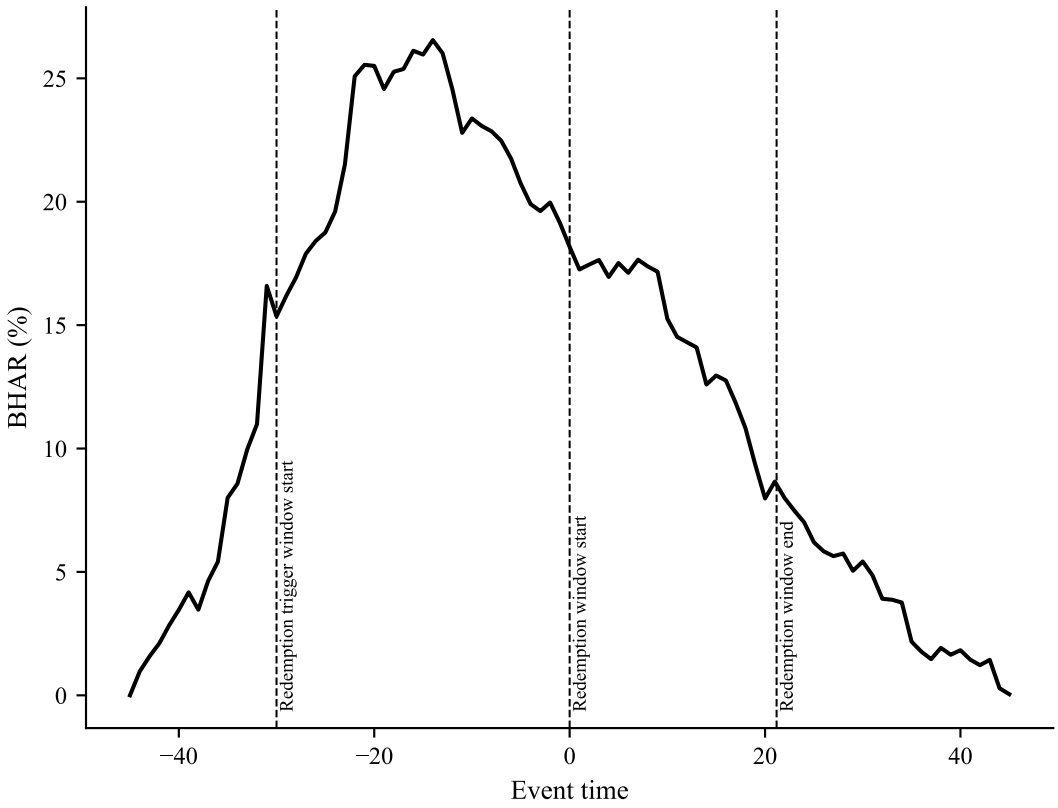

Figure 1. Buy-and-hold abnormal returns (BHARs) around warrant redemption announcements. This figure reports equal-weighted BHARs around early warrant redemptions. The sample comprises BHARs around 66 early redemptions. BHARs are calculated by subtracting the CRSP value-weighted index return.

Table 1
Summary statistics of SPAC characteristics
This table presents summary statistics for the 1,119 SPACs in the sample. The sample period is from January 2015 to December 2022. The variables are defined in Appendix A.

	Obs.	Mean	SD	25th	Median	75th
SPAC coverage						
WarrantCoverage	1,119	0.45	0.24	0.33	0.50	0.50
PrivateCoverage	1,119	0.21	0.17	0.04	0.19	0.31
TotalCoverage	1,119	0.67	0.33	0.48	0.62	0.89
RelativePrivateCoverage	1,119	0.29	0.18	0.05	0.35	0.42
Δ *WarrantCovInt* ($\pm$1)	1,119	0.04	0.48	0.00	0.00	0.00
Δ *WarrantCovPct (%)*	1,119	2.13	14.29	0.00	0.00	0.00
Amendments	1,119	1.62	1.20	1.00	1.00	2.00
IPO characteristics						
RegistrationDays (100s)	1,119	0.53	0.64	0.20	0.27	0.52
ForwardContract (0/1)	1,119	0.10	0.30	0.00	0.00	0.00
Proceeds (bn)	1,119	0.27	0.22	0.15	0.23	0.32
Overallotment (%)	1,119	11.53	5.45	9.09	15.00	15.00
RiskPremium (%)	1,119	4.71	0.53	4.24	4.74	4.85
UnderwriterFee (%)	1,119	5.48	0.55	5.50	5.50	5.50
UnderwriterRank	1,119	6.94	1.81	6.00	8.00	8.50
Upsizing (%)	1,119	4.24	8.70	0.00	0.00	10.00
Sponsor characteristics						
BoardAge	1,119	53.69	6.09	49.60	54.00	58.00
BoardSize	1,119	5.59	1.26	5.00	5.00	6.00
PowerConcentration (0/1)	1,119	0.18	0.38	0.00	0.00	0.00
FamilyRank	1,119	1.75	1.67	1.00	1.00	2.00

Table 2
Descriptive statistics for SPAC unit coverage
This table presents descriptive statistics of SPAC coverage for the 1,119 SPACs in the sample. In Panel A the statistics are reported by half-year and in Panel B by *WarrantCoverage*. The variables are defined in Appendix A.

Panel A: By IPO half-year

	Obs.	*Proceeds (bn)*	*Risk-Premium (%)*	*Warrant-Coverage (frac.)*	*ΔWarrant-CovInt (±1)*	*Private-Coverage (frac.)*	*Total-Coverage (frac.)*
2015S1	8	1.1	5.79	0.56	0.00	0.14	0.72
2015S2	12	2.8	6.20	0.44	0.08	0.20	0.67
2016S1	5	1.6	6.25	0.57	0.00	0.35	0.93
2016S2	8	1.9	6.13	0.58	0.00	0.30	0.88
2017S1	15	5.1	5.30	0.45	0.00	0.16	0.64
2017S2	19	4.9	4.93	0.52	0.05	0.17	0.74
2018S1	22	5.6	5.09	0.76	0.09	0.23	1.01
2018S2	24	5.1	5.49	0.69	0.13	0.17	0.89
2019S1	28	6.9	5.65	0.57	0.04	0.19	0.77
2019S2	31	6.7	5.42	0.55	−0.03	0.22	0.78
2020S1	36	11.9	5.56	0.47	0.14	0.15	0.63
2020S2	212	71.2	4.64	0.40	0.02	0.20	0.59
2021S1	358	111.0	4.41	0.31	−0.17	0.17	0.49
2021S2	255	51.2	4.47	0.51	0.31	0.29	0.82
2022S1	70	12.0	4.80	0.64	0.17	0.31	0.98
2022S2	16	1.3	5.73	0.69	0.19	0.10	0.90

Panel B: By public warrant coverage

	WarrantCoverage								
	0	1/8	1/6	1/5	1/4	1/3	1/2	3/4	1
Observations	72	5	4	72	85	255	477	35	114
Proceeds (bn)	0.20	0.56	0.33	0.45	0.42	0.36	0.21	0.16	0.13
RiskPremium (%)	4.48	4.43	4.30	4.45	4.49	4.66	4.79	4.69	5.04
ΔWarrantCovInt (±1)	−0.17	0.00	−0.25	−0.44	−0.25	0.02	0.10	0.54	0.38
PrivateCoverage	0.00	0.13	0.23	0.18	0.15	0.17	0.28	0.27	0.22
TotalCoverage	0.04	0.26	0.39	0.38	0.40	0.50	0.79	1.03	1.25

Table 3
Determinants of SPAC coverage
This table presents regression outputs where SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and changes (*ΔWarrantCovInt*, *ΔWarrantCovPct*, and *Amendments*) are regressed on key determinants (*RiskPremium*, *LnProceeds*, *UnderwriterRank*, and *LnFamilyRank*) and control variables. In Panel A, the dependent variables are *WarrantCoverage* and *TotalCoverage*, which measure the fraction of a share each unit's public and private warrants are redeemable against. In Panel B, the dependent variables are *ΔWarrantCovInt*, *ΔWarrantCovPct*, and *Amendments*, which measure directional, relative, and number of changes to *WarrantCoverage*. *RiskPremium* is the monthly Implied Equity Risk Premium of Damodaran (2023) as of the IPO. *LnProceeds* is the natural logarithm of the proceeds raised by the SPAC. *UnderwriterRank* measures the reputation of the underwriter, and the ranking is based on Loughran and Ritter (2004). *LnFamilyRank* measures the reputation of the sponsor and is calculated as the natural logarithm of the number of SPACs the sponsor family has taken through an IPO. The variables are defined in Appendix A. The sample comprises 1,119 SPAC IPOs between January 2015 and December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Determinants of SPAC coverage

	WarrantCoverage			*TotalCoverage*		
	(1)	(2)	(3)	(4)	(5)	(6)
RiskPremium (%)	0.10***	0.09***		0.11*	0.10**	
	(3.38)	(4.48)		(2.00)	(2.71)	
IPO characteristics						
ForwardContract (0/1)		−0.03	−0.01		−0.02	0.01
		(−1.62)	(−0.57)		(−0.72)	(0.19)
RegistrationDays (100s)		0.02	−0.01		0.04*	−0.01
		(1.01)	(−0.43)		(1.93)	(−1.00)
LnProceeds	−0.04**	−0.05***	−0.04***	−0.06**	−0.08**	−0.07***
	(−2.57)	(−3.05)	(−3.91)	(−2.45)	(−2.50)	(−3.55)
Overallotment (%)		0.00	0.00		0.00	0.00*
		(1.43)	(1.73)		(1.71)	(2.04)
UnderwriterFee (%)		0.00	−0.01		−0.02	−0.03
		(0.04)	(−0.68)		(−0.68)	(−1.37)
UnderwriterRank	−0.05***	−0.05***	−0.04***	−0.04***	−0.04***	−0.03**
	(−8.17)	(−7.18)	(−7.46)	(−3.29)	(−2.96)	(−2.23)
Upsizing (%)		−0.00	−0.00		−0.00	0.00
		(−1.28)	(−0.14)		(−0.99)	(0.15)
Sponsor characteristics						
BoardAge (10y)		0.04***	0.04***		0.05***	0.05***
		(6.41)	(4.90)		(5.51)	(4.14)
BoardSize		0.01***	0.01***		0.03***	0.03***
		(3.62)	(3.49)		(3.97)	(4.23)
PowerConcentration (0/1)		0.03***	0.02		0.05**	0.02
		(3.11)	(1.62)		(2.90)	(1.56)
LnFamilyRank	−0.10***	−0.10***	−0.08***	−0.18***	−0.17***	−0.15***
	(−5.07)	(−5.10)	(−4.72)	(−8.38)	(−7.66)	(−7.26)
Constant	0.64***	0.35*	0.78***	0.99***	0.62*	1.10***
	(4.61)	(1.98)	(7.50)	(3.43)	(1.84)	(6.49)
IPO half-year FE	No	No	Yes	No	No	Yes
Target geography FE	No	Yes	Yes	No	Yes	Yes
Target sector FE	No	Yes	Yes	No	Yes	Yes
Adj. *R*-squared	0.33	0.37	0.42	0.23	0.29	0.36
Observations	1,119	1,119	1,119	1,119	1,119	1,119

(*continued on next page*)

Table 3
(*continued*)

Panel B: Determinants of S-1 warrant amendments

	ΔWarrantCovInt (±1)		*ΔWarrantCovPct (%)*		*Amendments*	
	(1)	(2)	(3)	(4)	(5)	(6)
RiskPremium (%)	−0.00	0.02	0.06	0.51	0.46***	0.54***
	(−0.01)	(0.47)	(0.05)	(0.60)	(3.29)	(4.26)
IPO characteristics						
ForwardContract (0/1)		−0.06		−0.63		−0.04
		(−1.47)		(−0.58)		(−0.61)
RegistrationDays (100s)		0.21**		4.32**		0.82***
		(2.23)		(2.27)		(8.10)
LnProceeds	−0.13***	−0.07***	−2.52***	−1.61***	−0.04	0.17**
	(−3.77)	(−5.55)	(−3.79)	(−3.03)	(−0.68)	(2.17)
Overallotment (%)		−0.00		0.15		−0.01
		(−0.40)		(1.30)		(−0.51)
UnderwriterFee (%)		0.01		−0.31		−0.02
		(0.47)		(−0.45)		(−0.43)
UnderwriterRank	−0.02**	−0.02***	−0.87**	−0.82**	−0.07**	−0.07***
	(−2.92)	(−4.14)	(−2.55)	(−2.40)	(−2.39)	(−3.22)
Upsizing (%)		−0.00		−0.08**		−0.00
		(−1.46)		(−2.42)		(−0.24)
Sponsor characteristics						
BoardAge (10y)		0.04***		0.98		−0.04
		(3.08)		(1.11)		(−0.65)
BoardSize		0.02*		0.50		0.02
		(1.89)		(1.00)		(0.97)
PowerConcentration (0/1)		0.03		1.38		−0.03
		(0.84)		(1.17)		(−0.40)
LnFamilyRank	0.07	0.06	1.52	1.11	0.10	0.05
	(1.33)	(1.24)	(1.74)	(1.44)	(0.69)	(0.44)
Constant	0.78**	−0.09	20.15**	2.78	0.05	−1.57*
	(2.60)	(−0.36)	(2.74)	(0.36)	(0.07)	(−1.83)
IPO half-year FE	No	No	No	No	No	No
Target geography FE	Yes	Yes	Yes	Yes	Yes	Yes
Target sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.03	0.11	0.03	0.07	0.07	0.25
Observations	1,119	1,119	1,119	1,119	1,119	1,119

Table 4
SPAC IPO returns and coverage
This table presents summary statistics and regressions of SPAC first-day excess return on SPAC characteristics. Panel A reports summary statistics for SPACs' first-day returns (*IPO return*). Panel B presents regression outputs where market-adjusted first-day returns are regressed on SPAC coverage (*WarrantCoverage*, *TotalCoverage*, and *RelativePrivateCoverage*) and control variables. The market-adjusted returns are calculated as the difference between *IPO return* and and the return on an equally weighted index that comprises all SPACs that have yet to announce a business combination. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. *RelativePrivateCoverage* captures the *PrivateCoverage* in relation to *TotalCoverage*. The variables are defined in Appendix A. The sample comprises 1,119 SPAC IPOs between January 2015 and December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
IPO return (1d, %)	1,119	1.48***	3.37	0.00	0.40	1.80

(*continued on next page*)

Table 4
(*continued*)

Panel B: IPO return regressions

	Market-adjusted *IPO return (1d, %)*					
	(1)	(2)	(3)	(4)	(5)	(6)
WarrantCoverage	−3.62***	−1.56*				
	(−3.49)	(−2.05)				
TotalCoverage			−2.64***	−1.11**		
			(−4.05)	(−2.16)		
RelativePrivateCoverage					0.53	−0.70**
					(0.61)	(−2.70)
IPO characteristics						
ForwardContract (0/1)		0.48*		0.50**		0.50**
		(2.11)		(2.39)		(2.33)
RegistrationDays (100s)		−0.44*		−0.45*		−0.44*
		(−1.91)		(−1.95)		(−1.88)
LnProceeds		0.49***		0.48***		0.58***
		(3.06)		(3.05)		(3.56)
Overallotment (%)		0.13***		0.13***		0.13***
		(4.45)		(4.40)		(4.17)
UnderwriterFee (%)		−0.13*		−0.15**		−0.13*
		(−1.82)		(−2.15)		(−1.98)
UnderwriterRank		−0.02		0.02		0.07
		(−0.29)		(0.30)		(0.94)
Upsizing (%)		0.03**		0.03**		0.03***
		(2.72)		(2.73)		(3.06)
Sponsor characteristics						
BoardAge (10y)		−0.17		−0.18		−0.23
		(−0.88)		(−0.92)		(−1.16)
BoardSize		−0.01		0.00		−0.02
		(−0.19)		(0.11)		(−0.46)
PowerConcentration (0/1)		−0.09		−0.10		−0.13
		(−0.36)		(−0.37)		(−0.47)
LnFamilyRank		0.26**		0.22*		0.35**
		(2.23)		(1.88)		(2.20)
Constant	3.07***	−0.35	3.23***	−0.33	1.30**	−1.62
	(3.40)	(−0.16)	(3.74)	(−0.16)	(2.90)	(−0.77)
IPO half-year FE	No	Yes	No	Yes	No	Yes
Target geography FE	No	Yes	No	Yes	No	Yes
Target sector FE	No	Yes	No	Yes	No	Yes
Adj. R-squared	0.07	0.21	0.07	0.21	-0.0	0.21
Observations	1,119	1,119	1,119	1,119	1,119	1,119

Table 5
SPAC PIPE sizes, redemption rates, durations, and coverage
This table presents the summary statistics and regressions of SPAC deal characteristics (*PIPE*, *RedemptionRate* and *SPACduration*) on SPAC characteristics. Panel A reports summary statistics for *PIPE*, *RedemptionRate*, and *SPACduration*. *PIPE* is the proceeds from PIPE investments divided by SPAC proceeds and *RedemptionRate* is the SPAC process redemption rate. *SPACduration* is the number of days from the SPAC IPO to the business combination. Panel B presents regression outputs where SPAC deal characteristics are regressed on SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and control variables. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample is restricted to SPACs that had completed their business combination by December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
PIPE (%)	432	70.91	86.14	15.61	50.12	98.32
RedemptionRate (%)	432	55.44	37.49	10.50	68.40	90.10
SPACduration	432	484.41	222.11	315.50	426.00	634.00

Panel B: PIPE size, redemption rate, and duration regressions

	PIPE (%)		*RedemptionRate (%)*		*SPACduration*	
	(1)	(2)	(3)	(4)	(5)	(6)
WarrantCoverage	−46.05***		29.68***		106.60***	
	(−3.14)		(3.88)		(3.12)	
TotalCoverage		−39.75***		28.94***		82.42**
		(−3.70)		(6.07)		(2.17)
Deal characteristics						
AnnouncementDelay (100d)	−7.10	−6.93	6.05**	5.91**		
	(−1.74)	(−1.76)	(2.69)	(2.74)		
IPO characteristics						
ForwardContract (0/1)	4.65	5.20	−1.70	−2.16	45.10**	44.04**
	(0.39)	(0.42)	(−0.39)	(−0.51)	(2.34)	(2.22)
LnProceeds	−0.57	−0.29	−4.57*	−4.59*	−29.78	−30.83
	(−0.09)	(−0.05)	(−1.86)	(−1.89)	(−1.65)	(−1.69)
UnderwriterRank	2.01	2.12	0.77	0.91	7.04	6.19
	(0.97)	(1.12)	(0.91)	(1.15)	(0.78)	(0.70)
Sponsor characteristics						
BoardAge (10y)	5.13	4.81	−2.13	−2.08	−8.66	−7.45
	(1.00)	(0.94)	(−0.89)	(−0.89)	(−0.40)	(−0.34)
BoardSize	1.64	1.94	0.77	0.50	−6.99	−7.43*
	(0.52)	(0.60)	(0.98)	(0.59)	(−1.76)	(−1.87)
PowerConcentration (0/1)	−3.33	−3.88	−6.20***	−5.89**	−2.75	−1.37
	(−0.52)	(−0.65)	(−3.04)	(−2.74)	(−0.18)	(−0.08)
LnFamilyRank	−13.41**	−14.67**	−10.39***	−9.15***	−25.15**	−23.42*
	(−2.41)	(−2.76)	(−4.63)	(−4.01)	(−2.28)	(−2.13)
Constant	77.72	81.28	61.50**	55.75**	650.70***	651.20***
	(1.36)	(1.45)	(2.61)	(2.38)	(6.09)	(5.94)
IPO half-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Target geography FE	Yes	Yes	Yes	Yes	Yes	Yes
Target sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. *R*-squared	0.11	0.12	0.3	0.32	0.4	0.4
Observations	432	432	432	432	432	432

Table 6
SPAC returns and coverage
This table presents summary statistics and regressions of SPAC instrument returns (*Unit return*, *Stock return*, and *Warrant return*) on SPAC characteristics. Panel A reports summary statistics for *Unit return*, *Stock return*, and *Warrant return* during the SPAC period. The returns are annualized and scaled to reflect the performance of a hypothetical initial investment of $10. Panel B presents regression outputs where the market-adjusted SPAC period returns are regressed on SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and control variables. The market-adjusted returns are calculated as the difference between *Stock return* and the matched equally weighted performance of all SPACs that announced their final business combination at least 30 days earlier and that were later closed. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample is restricted to SPACs that had completed their business combination or liquidated by December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
Unit return (%)	432	24.51***	63.59	3.18	5.79	13.19
Stock return (%)	432	15.24***	45.29	0.00	1.09	3.78
Warrant return (%)	432	8.36***	14.25	1.63	4.82	9.25

Panel B: SPAC return regressions

	Market-adjusted returns					
	Unit (%)		*Stock (%)*		*Warrant (%)*	
	(1)	(2)	(3)	(4)	(5)	(6)
WarrantCoverage	37.81*		18.13		17.10**	
	(1.81)		(1.41)		(2.85)	
TotalCoverage		21.50		10.19		9.15**
		(1.61)		(1.21)		(2.62)
IPO characteristics						
LnProceeds	8.39**	7.63*	7.08**	6.71**	0.48	0.11
	(2.20)	(1.95)	(2.29)	(2.17)	(0.36)	(0.08)
UnderwriterRank	0.10	−0.68	−0.04	−0.43	0.47	0.08
	(0.06)	(−0.48)	(−0.04)	(−0.46)	(1.16)	(0.28)
Sponsor characteristics						
BoardAge (10y)	0.36	1.17	−0.50	−0.11	0.52	0.92
	(0.09)	(0.31)	(−0.18)	(−0.04)	(0.70)	(1.31)
BoardSize	−0.97	−0.93	−0.96	−0.94	−0.23	−0.20
	(−0.76)	(−0.71)	(−1.07)	(−1.03)	(−0.75)	(−0.65)
PowerConcentration (0/1)	−0.25	0.36	0.15	0.44	−0.48	−0.20
	(−0.03)	(0.04)	(0.02)	(0.08)	(−0.23)	(−0.10)
LnFamilyRank	2.69	2.30	2.87	2.66	0.54	0.29
	(0.80)	(0.64)	(1.10)	(0.94)	(0.37)	(0.19)
Constant	−59.33	−50.87	−38.36	−34.18	−14.61*	−10.17
	(−1.70)	(−1.43)	(−1.45)	(−1.26)	(−1.80)	(−1.21)
IPO half-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Target geography FE	Yes	Yes	Yes	Yes	Yes	Yes
Target sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. *R*-squared	0.1	0.09	0.08	0.08	0.14	0.12
Observations	432	432	432	432	432	432

Table 7
deSPAC returns and coverage
This table presents the summary statistics and regressions of deSPAC returns (*Stock return* and *Warrant return*) on SPAC and deSPAC characteristics. Panel A reports summary statistics for deSPAC *Stock return* and *Warrant return*. Panel B presents regression outputs where the deSPAC returns are regressed on SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and control variables. The market-adjusted returns are calculated as the difference between *Stock return* and the return on the CRSP value-weighted index. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample is restricted to former SPACs that had completed their business combination by December 2021. *t*-statistics are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
Stock return (1y, %)	320	−49.92***	40.46	−80.17	−62.98	−26.76
Warrant return (1y, %)	302	−27.84***	110.90	−85.47	−62.45	−11.26

Panel B: deSPAC return regressions

	Market-adjusted *Stock return (1y, %)*				*Warrant return (1y, %)*	
	(1)	(2)	(3)	(4)	(5)	(6)
WarrantCoverage	−22.63***	−12.96			−57.28**	
	(−2.74)	(−1.44)			(−2.03)	
TotalCoverage			−17.15***	−9.29		−37.16*
			(−2.73)	(−1.36)		(−1.71)
SPAC characteristics						
LnFamilyRank		−4.06		−4.00	−27.39	−26.41
		(−0.67)		(−0.66)	(−1.49)	(−1.43)
RedemptionRate (%)		−0.23***		−0.22***	−0.04	−0.04
		(−3.49)		(−3.41)	(−0.23)	(−0.20)
SPACduration (100d)		−0.03		−0.11	5.26*	4.82
		(−0.03)		(−0.10)	(1.74)	(1.60)
SPACreturn		−0.17***		−0.17***	−0.23*	−0.24*
		(−3.77)		(−3.76)	(−1.77)	(−1.80)
Target characteristics						
Revenue (0/1)		4.51		4.77	15.71	16.51
		(0.75)		(0.79)	(0.86)	(0.90)
Profitable (0/1)		3.36		3.18	−9.15	−10.18
		(0.66)		(0.62)	(−0.61)	(−0.67)
Constant	−40.90***	−30.76***	−40.12***	−30.67***	−2.34	−4.02
	(−9.38)	(−2.92)	(−8.66)	(−2.89)	(−0.07)	(−0.12)
Closed year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. *R*-squared	0.06	0.11	0.06	0.11	0.17	0.16
Observations	320	320	320	320	302	302

Table 8
deSPAC SDs and coverage
This table presents the summary statistics and regressions of deSPAC SDs (*Stock SD* and *Warrant SD*) on SPAC and deSPAC characteristics. Panel A reports summary statistics for deSPAC *Stock SD* and *Warrant SD*. Panel B presents regression outputs where the deSPAC returns are regressed on SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and control variables. The market-adjusted SDs are calculated as the difference between *Stock SD* and the SDs of the CRSP value-weighted index. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample is restricted to former SPACs that had completed their business combination by December 2021. *t*-statistics are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
Stock SD (%)	320	94.84	55.35	67.40	84.02	107.20
Warrant SD (%)	302	215.28	486.13	113.49	142.42	184.25

Panel B: deSPAC SD regressions

	Market-adjusted *Stock SD (1y, %)*				*Warrant SD (1y, %)*
	(1)	(2)	(3)	(4)	(5)
WarrantCoverage	21.16*	−5.23			−207.10
	(1.71)	(−0.40)			(−1.60)
TotalCoverage			19.83**	−0.01	
			(2.11)	(0.00)	
SPAC characteristics					
LnFamilyRank		−3.63		−2.91	−64.88
		(−0.41)		(−0.33)	(−0.77)
RedemptionRate (%)		0.50***		0.49***	1.94**
		(5.35)		(5.24)	(2.17)
SPACduration (100d)		2.42		2.28	5.52
		(1.63)		(1.55)	(0.40)
SPACreturn		0.12*		0.11*	0.72
		(1.84)		(1.75)	(1.18)
Target characteristics					
Revenue (0/1)		−19.43**		−19.58**	−1.42
		(−2.23)		(−2.24)	(−0.02)
Profitable (0/1)		−1.03		−1.13	122.50*
		(−0.14)		(−0.15)	(1.77)
Constant	65.38***	59.90***	62.12***	58.08***	209.20
	(10.02)	(3.95)	(8.98)	(3.80)	(1.42)
Closed year FE	Yes	Yes	Yes	Yes	Yes
Adj. *R*-squared	0.04	0.15	0.04	0.15	0.09
Observations	320	320	320	320	302

Table 9

Common share BHARs during early warrant redemptions

This table presents summary statistics of stock BHARs around early warrant redemptions. Panel A reports summary statistics for BHAR during the *Pre period*, *Redemption period*, and *Post period*. Panels B and C break down these returns by redemption type (cash or cashless basis) and trigger threshold price ($10 or above $10). The sample is restricted to former SPACs that had completed their business combination by December 2022. t-statistics are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
Pre period (30d, %)	66	1.75	32.39	−16.53	−0.20	22.32
Redemption period (%)	66	−8.97***	23.17	−27.71	−8.87	3.02
Post period (20d, %)	66	−7.42***	20.71	−22.27	−5.82	5.12

Panel B: Redemption type

	Obs.	*Pre period (30d, %)*	*Redemption period (%)*	*Post period (20d, %)*
Cash basis	31	1.07	−11.60***	−13.09***
		(0.15)	(−2.76)	(−3.65)
Cashless basis	35	2.35	−6.63*	−2.39
		(0.53)	(−1.71)	(−0.70)
Difference	66	−1.28	−4.97	−10.70**
		(−0.16)	(−0.87)	(−2.15)

Panel C: Redemption trigger threshold price

	Obs.	*Pre period (30d, %)*	*Redemption period (%)*	*Post period (20d, %)*
$10	24	−0.24	−12.60***	−6.00*
		(−0.05)	(−3.63)	(−1.75)
> $10	42	2.88	−6.89*	−8.23**
		(0.52)	(−1.72)	(−2.34)
Difference	66	−3.12	−5.70	2.23
		(−0.37)	(−0.96)	(0.42)

SPACs and their warrants

Internet appendix

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Table IA.1
Descriptive statistics for SPAC unit coverage by target geography and sector
This table presents descriptive statistics of SPAC coverage for the 1,119 SPACs in the sample. In Panel A the statistics are reported by target geography and in Panel B by target sector. The variables are defined in Appendix A. The sample comprises 1,119 SPAC IPOs between January 2015 and December 2022.

Panel A: By target geography

	Obs.	*Proceeds (bn)*	*Risk-Premium (%)*	*Warrant-Coverage (frac.)*	*ΔWarrant-CovInt (±1)*	*Private-Coverage (frac.)*	*Total-Coverage (frac.)*
Asia	66	9.3	4.97	0.57	0.03	0.16	0.79
EEMEA	22	4.8	4.40	0.44	0.00	0.21	0.66
Europe	16	4.0	4.64	0.45	−0.06	0.24	0.71
Global	883	252.9	4.70	0.44	0.05	0.21	0.66
Latin America	23	4.1	4.77	0.59	0.04	0.28	0.89
North America	109	25.1	4.70	0.43	0.03	0.24	0.68

Panel B: By target sector

	Obs.	*Proceeds (bn)*	*Risk-Premium (%)*	*Warrant-Coverage (frac.)*	*ΔWarrant-CovInt (±1)*	*Private-Coverage (frac.)*	*Total-Coverage (frac.)*
Automotive	16	3.7	4.56	0.55	−0.06	0.25	0.80
Consumer	113	29.0	4.76	0.46	0.07	0.21	0.68
Energy	75	20.6	4.86	0.52	0.09	0.29	0.82
Financial	107	30.5	4.73	0.47	0.04	0.21	0.68
General	309	91.4	4.77	0.44	0.03	0.19	0.65
Healthcare	133	26.8	4.64	0.38	0.02	0.21	0.60
Industrial	40	10.6	4.76	0.48	0.18	0.29	0.78
Materials	11	2.6	4.80	0.49	0.18	0.31	0.81
Media & entertainment	41	10.4	4.59	0.47	0.02	0.24	0.72
Real estate	19	4.8	4.62	0.44	−0.05	0.22	0.67
Technology	242	66.5	4.64	0.43	0.03	0.20	0.64
Travel & hospitality	13	3.4	4.65	0.47	0.23	0.23	0.70

Table IA.2
Determinants of SPAC coverage with University of Michigan Consumer Sentiment Index
This table presents regression outputs where SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and changes (Δ*WarrantCovInt*, Δ*WarrantCovPct*, and *Amendments*) are regressed on key determinants (*Sentiment*, *LnProceeds*, *UnderwriterRank*, and *LnFamilyRank*) and control variables. In Panel A, the dependent variables are *WarrantCoverage* and *TotalCoverage*, which measure the fraction of a share each unit's public and private warrants are redeemable against. In Panel B, the dependent variables are Δ*WarrantCovInt*, Δ*WarrantCovPct*, and *Amendments*, which measure directional, relative, and number of changes to *WarrantCoverage*. *Sentiment* is the University of Michigan Consumer Sentiment Index as of the IPO. *LnProceeds* is the natural logarithm of the proceeds raised by the SPAC. *UnderwriterRank* measures the reputation of the underwriter, and the ranking is based on Loughran and Ritter (2004). *LnFamilyRank* measures the reputation of the sponsor and is calculated as the natural logarithm of the number of SPACs the sponsor family has taken through an IPO. The variables are defined in Appendix A. The sample comprises 1,119 SPAC IPOs between January 2015 and December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Determinants of SPAC coverage

	WarrantCoverage			*TotalCoverage*		
	(1)	(2)	(3)	(4)	(5)	(6)
Sentiment	−0.00	−0.00		−0.00	−0.00	
	(−0.26)	(−0.11)		(−1.14)	(−1.14)	
IPO characteristics						
ForwardContract (0/1)		−0.02	−0.01		−0.01	0.01
		(−1.11)	(−0.57)		(−0.22)	(0.19)
RegistrationDays (100s)		0.01	−0.01		0.02	−0.01
		(0.71)	(−0.43)		(0.91)	(−1.00)
LnProceeds	−0.04***	−0.05***	−0.04***	−0.06***	−0.09***	−0.07***
	(−3.48)	(−3.47)	(−3.91)	(−3.27)	(−3.02)	(−3.55)
Overallotment (%)		0.00	0.00		0.00	0.00*
		(1.19)	(1.73)		(1.32)	(2.04)
UnderwriterFee (%)		−0.00	−0.01		−0.02	−0.03
		(−0.19)	(−0.68)		(−0.77)	(−1.37)
UnderwriterRank	−0.05***	−0.05***	−0.04***	−0.04**	−0.04**	−0.03**
	(−6.61)	(−5.94)	(−7.46)	(−2.80)	(−2.60)	(−2.23)
Upsizing (%)		−0.00	−0.00		−0.00	0.00
		(−0.73)	(−0.14)		(−0.65)	(0.15)
Sponsor characteristics						
BoardAge (10y)		0.05***	0.04***		0.07***	0.05***
		(5.12)	(4.90)		(5.59)	(4.14)
BoardSize		0.01***	0.01***		0.03***	0.03***
		(3.44)	(3.49)		(4.14)	(4.23)
PowerConcentration (0/1)		0.03**	0.02		0.05*	0.02
		(2.29)	(1.62)		(2.09)	(1.56)
LnFamilyRank	−0.11***	−0.11***	−0.08***	−0.19***	−0.18***	−0.15***
	(−4.29)	(−4.48)	(−4.72)	(−7.09)	(−6.84)	(−7.26)
Constant	1.17***	0.83***	0.78***	1.82***	1.39***	1.10***
	(7.18)	(4.90)	(7.50)	(6.76)	(4.27)	(6.49)
IPO half-year FE	No	No	Yes	No	No	Yes
Target geography FE	No	Yes	Yes	No	Yes	Yes
Target sector FE	No	Yes	Yes	No	Yes	Yes
Adj. *R*-squared	0.29	0.33	0.42	0.21	0.27	0.36
Observations	1,119	1,119	1,119	1,119	1,119	1,119

(*continued on next page*)

Table IA.2
(*continued*)

Panel B: Determinants of S-1 warrant amendments

	ΔWarrantCovInt (±1)		*ΔWarrantCovPct (%)*		*Amendments*	
	(1)	(2)	(3)	(4)	(5)	(6)
Sentiment	−0.01*	−0.00*	−0.19**	−0.11*	0.01	0.03**
	(−1.86)	(−1.85)	(−2.26)	(−1.99)	(1.52)	(2.83)
IPO characteristics						
ForwardContract (0/1)		−0.05		−0.33		−0.08
		(−1.17)		(−0.29)		(−1.54)
RegistrationDays (100s)		0.19**		3.82*		0.91***
		(2.14)		(2.02)		(8.08)
LnProceeds	−0.12***	−0.07***	−2.29**	−1.60**	−0.06	0.13*
	(−3.41)	(−4.92)	(−2.53)	(−2.51)	(−0.75)	(1.82)
Overallotment (%)		−0.00		0.13		−0.00
		(−0.61)		(1.11)		(−0.41)
UnderwriterFee (%)		0.01		−0.25		−0.06
		(0.59)		(−0.38)		(−1.50)
UnderwriterRank	−0.01**	−0.02***	−0.81**	−0.80**	−0.08**	−0.09***
	(−2.18)	(−3.54)	(−2.58)	(−2.58)	(−2.31)	(−5.16)
Upsizing (%)		−0.00		−0.08**		0.00
		(−1.41)		(−2.37)		(0.09)
Sponsor characteristics						
BoardAge (10y)		0.04***		1.12		0.00
		(3.65)		(1.27)		(0.00)
BoardSize		0.02*		0.45		0.02
		(1.76)		(0.89)		(1.21)
PowerConcentration (0/1)		0.03		1.26		0.03
		(0.67)		(1.03)		(0.42)
LnFamilyRank	0.07	0.06	1.53	1.11	0.03	−0.04
	(1.18)	(1.08)	(1.47)	(1.23)	(0.20)	(−0.30)
Constant	1.26***	0.25	33.53***	13.11	1.64***	−0.91
	(3.41)	(1.24)	(4.75)	(1.65)	(3.21)	(−1.06)
IPO half-year FE	No	No	No	No	No	No
Target geography FE	Yes	Yes	Yes	Yes	Yes	Yes
Target sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.05	0.12	0.05	0.07	0.04	0.24
Observations	1,119	1,119	1,119	1,119	1,119	1,119

Table IA.3
SPAC business combination announcement returns and coverage
This table presents summary statistics and regressions of first business combination announcement returns (*Stock return* and *Warrant return*) on SPAC characteristics. We identify the first business combination announcement using data from Bloomberg (primarily) and SPAC Research (secondarily). Panel A reports summary statistics for business combination announcement stock and warrant returns (*Stock return* and *Warrant return*). Panel B presents regression outputs where market-adjusted SPAC business combination announcement returns are regressed on SPAC coverage (*WarrantCoverage* and *TotalCoverage*) and control variables. The market-adjusted returns are calculated as the difference between *Stock return* and the return on the Russell 2000 Index. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample comprises business combination announcements between January 2015 and December 2022. *t*-statistics that are based on standard errors clustered by IPO half-year are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary statistics

	Obs.	Mean	SD	25th	Median	75th
Unit return (2d, %)	680	4.08***	13.61	0.01	0.60	2.46
Stock return (2d, %)	680	3.33***	12.04	−0.05	0.30	1.63
Warrant return (2d, %)	634	49.61***	161.04	−2.26	18.68	61.11

(*continued on next page*)

Table IA.3
(*continued*)

Panel B: Business combination announcement return regressions

	Market-adjusted *Stock return (2d, %)*				*Warrant return (2d, %)*	
	(1)	(2)	(3)	(4)	(5)	(6)
WarrantCoverage	−2.56*	−1.37			−23.41	
	(−2.03)	(−1.02)			(−1.55)	
TotalCoverage			−2.36	−1.56		−20.42
			(−1.74)	(−1.27)		(−1.05)
Deal characteristics						
AnnouncementDelay (100d)		−0.82		−0.81	20.10*	20.17*
		(−1.48)		(−1.48)	(1.99)	(1.98)
IPO characteristics						
ForwardContract (0/1)		0.48		0.48	−7.48	−7.46
		(0.47)		(0.46)	(−0.92)	(−0.91)
LnProceeds		−0.11		−0.13	8.00	7.91
		(−0.35)		(−0.41)	(0.67)	(0.67)
UnderwriterRank		0.33		0.32	−5.91	−5.72
		(1.49)		(1.35)	(−0.78)	(−0.73)
Sponsor characteristics						
BoardAge (10y)		0.17		0.19	7.82	7.64
		(0.44)		(0.47)	(1.02)	(0.99)
BoardSize		−0.54		−0.51	3.39	3.69
		(−1.23)		(−1.21)	(0.62)	(0.66)
PowerConcentration (0/1)		−0.43		−0.42	4.60	4.63
		(−0.91)		(−0.88)	(0.65)	(0.69)
LnFamilyRank		−1.74*		−1.83**	−22.91***	−23.62***
		(−2.03)		(−2.16)	(−3.82)	(−3.44)
Constant	4.50***	8.54	4.88***	8.96	−47.76	−45.94
	(7.71)	(1.59)	(5.41)	(1.53)	(−0.41)	(−0.41)
IPO half-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Target geography FE	Yes	Yes	Yes	Yes	Yes	Yes
Target sector FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.1	0.11	0.1	0.11	0.02	0.02
Observations	680	680	680	680	634	634

Table IA.4
Annualized SPAC returns
This table presents summary statistics for SPAC returns by *WarrantCoverage*. Panel A reports number of observations, annualized unit returns and dollar values, SDs, and return / SD for the stock and warrant, respectively. The returns and dollar values are scaled to reflect the performance of a hypothetical initial investment of $10. Panel B reports percentage returns for closed SPACs by IPO year and *WarrantCoverage*. Panel C reports the number of closed SPACs by IPO year and *WarrantCoverage*. Panel D reports percentage returns for liquidated SPACs by IPO year and *WarrantCoverage*. Panel E reports the number of liquidated SPACs by IPO year and *WarrantCoverage*. Panel F reports the fraction of liquidated SPACs by IPO year and *WarrantCoverage* The variables are defined in Appendix A. The sample is restricted to SPACs that had completed their business combination or liquidated by December 2022.

Panel A: Closed SPACs' unit and dollar returns

		Return (%)	Dollar value		Dollar SD		Return / SD	
	Obs.	Unit	Stock	Warrant	Stock	Warrant	Stock	Warrant
0	23	7.58	10.73		8.52		0.09	
1/8–1/5	25	17.97	11.15	0.63	14.93	3.97	0.08	0.16
1/4	32	16.84	11.09	0.54	8.90	3.33	0.12	0.16
1/3	115	31.43	12.08	0.94	13.93	5.02	0.15	0.19
1/2	174	23.08	11.40	0.79	10.16	4.96	0.14	0.16
3/4–1	63	28.49	11.50	1.31	8.33	7.84	0.18	0.17
All	432	24.51	11.52	0.84	10.99	4.96	0.14	0.17

Panel B: Closed SPACs' returns (%)

	WarrantCoverage						
	0	1/8–1/5	1/4	1/3	1/2	3/4–1	All
2015	8.47			4.79	3.88	5.68	4.42
2016				62.66	3.63	10.09	20.00
2017	35.42			8.39	9.80	6.47	9.73
2018				9.06	17.59	23.08	18.91
2019			3.15	50.01	23.53	12.54	26.49
2020	10.61	35.04	27.74	43.26	44.78	79.84	42.75
2021	3.50	4.57	4.57	5.40	3.87	13.58	4.91
All	7.58	17.97	16.84	31.43	23.08	28.49	24.51

Panel C: No. of closed SPACs

	WarrantCoverage						
	0	1/8–1/5	1/4	1/3	1/2	3/4–1	All
2015	1			1	13	2	17
2016				3	6	3	12
2017	1			8	17	5	31
2018				8	13	23	44
2019			1	12	31	12	56
2020	8	11	17	59	60	12	167
2021	13	14	14	24	34	6	105
All	23	25	32	115	174	63	432

(*continued on next page*)

Table IA.4
(*continued*)

Panel D: Liquidated SPACs' returns (%)

	WarrantCoverage						
	0	1/8–1/5	1/4	1/3	1/2	3/4–1	All
2015	2.24				2.01		2.08
2016					1.08		1.08
2017				1.66			1.66
2018					5.45	2.10	3.77
2019					1.54		1.54
2020	0.18	0.18	0.25	0.31	0.91		0.55
2021	1.02	0.48	0.40	0.62	1.01	1.76	0.77
All	0.91	0.44	0.36	0.57	1.12	1.82	0.80

Panel E: No. of liquidated SPACs

	WarrantCoverage						
	0	1/8–1/5	1/4	1/3	1/2	3/4–1	All
2015	1				2		3
2016					1		1
2017				3			3
2018					1	1	2
2019					3		3
2020	3	3	4	17	21		48
2021	8	19	12	21	28	5	93
All	12	22	16	41	56	6	153

Panel F: Fraction of liquidated SPACs

	WarrantCoverage						
	0	1/8–1/5	1/4	1/3	1/2	3/4–1	All
2015	0.50			0	0.13	0	0.15
2016				0	0.14	0	0.08
2017	0			0.27	0	0	0.09
2018				0	0.07	0.04	0.04
2019			0	0	0.09	0	0.05
2020	0.27	0.21	0.19	0.22	0.26	0	0.22
2021	0.38	0.58	0.46	0.47	0.45	0.45	0.47
All	0.34	0.47	0.33	0.26	0.24	0.09	0.26

Table IA.5
deSPAC warrant redemptions
This table presents regressions of warrant redemption probabilities on SPAC and deSPAC characteristics. The dependent variable is *WarrantRedeemed*, which indicates whether warrants were redeemed within the first year of the deSPAC. *WarrantCoverage* and *TotalCoverage* measure the fraction of a share each unit's public and private warrants are redeemable against. The variables are defined in Appendix A. The sample is restricted to former SPACs that had completed their business combination by December 2021. *t*-statistics are reported in parentheses. The *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	WarrantRedeemed			
	(1)	(2)	(3)	(4)
WarrantCoverage	−0.34***	−0.34***		
	(−3.85)	(−3.93)		
TotalCoverage			−0.21***	−0.19***
			(−3.07)	(−2.83)
SPAC characteristics				
LnFamilyRank		−0.02		−0.01
		(−0.40)		(−0.20)
RedemptionRate (%)		−0.00***		−0.00***
		(−3.25)		(−3.22)
SPACduration (100d)		−0.00		−0.01
		(−0.42)		(−0.78)
SPACreturn		0.00***		0.00***
		(5.87)		(5.63)
Target characteristics				
Revenue (0/1)		0.08		0.09
		(1.52)		(1.55)
Profitable (0/1)		−0.08*		−0.09*
		(−1.73)		(−1.85)
Constant	0.33***	0.33***	0.31***	0.30***
	(6.87)	(3.38)	(5.94)	(3.03)
Closed year FE	Yes	Yes	Yes	Yes
Adj. *R*-squared	0.1	0.31	0.09	0.29
Observations	302	302	302	302

Table IA.6

One-year deSPAC returns

This table presents summary statistics of *WarrantCoverage* and one-year deSPAC period *Stock*, *Warrant*, and *Unit* returns by year of closure of the SPAC. *WarrantCoverage* measures the coverage from public warrants. The *Unit* column reports deSPAC returns of a hypothetical unit that is based on component weights as of the IPO. The table reports returns that are based on the last price by component, ignoring prices for deSPACs that surrendered their shares due to a subsequent merger. The sample is restricted to SPACs that issued warrants. The variables are defined in Appendix A. The sample is restricted to former SPACs that issued warrants and had completed their business combination by December 2021.

			One-year deSPAC return (%)		
	Obs.	*WarrantCoverage*	*Stock*	*Warrant*	*Unit*
2016	2	0.42	9.45	8.06	9.40
2017	12	0.56	−13.26	8.48	−12.55
2018	21	0.58	−41.82	−17.82	−41.11
2019	26	0.61	−21.41	2.75	−20.66
2020	58	0.58	−26.41	50.89	−22.11
2021	183	0.44	−64.32	−61.06	−64.13
Total	302	0.49	−49.26	−27.84	−48.18