

# SPACs \*

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## Abstract

Going public by merging with a Special Purpose Acquisition Company (SPAC) is much more expensive than conducting a traditional IPO. We rationalize why some companies merge with a SPAC by listing the potential benefits. We analyze the agency problems that certain SPAC features address. SPAC IPO investors and deal sponsors have earned remarkably high annualized average returns, although we warn that recent deals are likely to disappoint. Public investors in the merged companies have earned very low market-adjusted returns on an equally weighted basis, although high redemptions on the worst deals have limited the amount of money that they lost. (*JEL G30, G34, G24*)

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Special Purpose Acquisition Companies (SPACs) are blank check companies created by a sponsor that go public to raise capital and then find a non-listed operating company to merge with, in the process taking the operating company public. In 2021, initial public offerings (IPOs) by SPACs set records. A total of 613 SPACs raised \$162.5 billion according to SPAC Research, more proceeds than in all previous years combined. The recent rise of the SPAC market has resulted in a heated debate about SPACs among practitioners, academics, and regulators. Proponents of SPACs argue that private companies benefit by gaining an additional option for raising capital and listing, and that retail investors benefit by being able to invest in young growth companies that otherwise would be accessible only through venture capital partnerships. Critics voice concerns regarding overoptimistic forecasts and low cash delivered per share, citing poor post-merger returns. The U.S. Securities and Exchange Commission (SEC) has proposed regulations requiring more disclosure and greater investor protection.<sup>1</sup>

For almost all SPACs created from 2010 until now, units priced at \$10 each are issued in the IPO. A typical unit is composed of a common share and one or more derivative securities, usually a fraction of a warrant (a call option issued by the company), entitling the holder to buy a share at an exercise price of \$11.50 within 5 years after the completion of a merger. Importantly, the money raised in the IPO is placed in an escrow (trust) account where it typically earns interest. The units later become unbundled, allowing the shares and warrants to trade separately.

SPACs almost always pay 5.5% of the proceeds as underwriting commissions, with 2% paid at the time of the IPO, leaving \$9.80 per share in net proceeds, and the rest deferred—payable only upon the completion of a merger. Sponsors are typically compensated by retaining 20% of the SPAC shares, but these sponsor shares (known as the “promote”) have no access to the trust account.<sup>2</sup> Sponsors also usually purchase private placement warrants or units at the time of the IPO for approximately their fair market value, with the millions of dollars paid for these securities used to pay future expenses as the SPAC searches for an operating company to merge with. Cash from the warrant or unit purchase is also used to pay the initial 2% underwriting fee to top up the trust account to \$10 per share or more, rather than the \$9.80 in net proceeds from the IPO. All

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<sup>1</sup>See the [SEC \(2022\)](#) press release.

<sup>2</sup>The units purchased by investors include Class A shares that are redeemable. Sponsors purchase Class B shares that are not redeemable but will convert into Class A shares, which will be subject to lockup restrictions, when a merger is completed. Sponsors typically pay a total of \$25,000 for 5,000,000 or so Class B shares, a price of about 0.5 cents per share.

of the sponsors' compensation (payoffs on their shares and warrants) and more than half of the underwriters' fees are thus contingent on the consummation of a business combination.

SPACs are not allowed to have preidentified target companies and usually set 18 to 24 months as a deadline to complete a merger. If a SPAC cannot consummate a merger within this timeline, it must liquidate, distributing the IPO proceeds and the accrued interest in the trust account to its public shareholders.<sup>3</sup> Once a SPAC identifies a target company and reaches an agreement for a merger, shareholders of the SPAC vote whether or not to approve the proposed merger. Separately, at this time, each public shareholder decides whether or not to redeem their shares. The redemption option means that there is a money-back guarantee for SPAC IPO investors. Unit holders are allowed to keep (or sell) their warrants even when they redeem their shares.

Because some shareholders may choose to redeem their shares, collecting the redemption value of the initial trust amount plus interest, the amount of cash available for a merger is uncertain. To mitigate this uncertainty, in the merger agreement, operating companies negotiate a minimum amount of cash that the SPAC must deliver. Sponsors frequently invite PIPE (Private Investment in Public Equity) investments as a part of the merger, providing additional cash. Sponsors themselves sometimes participate as PIPE investors.<sup>4</sup> These PIPE investments either offset redemptions or augment the cash that is delivered in the merger. Securing prominent PIPE investors also has a certification effect, encouraging SPAC investors not to redeem. If the merger is approved by shareholders and the SPAC still has enough cash after redemptions to meet the terms of the merger agreement, the business combination is consummated, and the SPAC starts to trade as a newly merged company under a new ticker symbol.

In this paper, we document that merging with a SPAC on average is a much more expensive way of going public than a traditional IPO for an operating company. A SPAC delivers less cash per share than the \$10 IPO price to the merging company even after new investments from PIPE investors, due to redemptions, underwriting fees, other fees, and the promote. For the 153 business combinations completed by the end of March 2021 from SPACs that went public in 2015 or later, the mean and median cash delivered per share are only \$7.46 and \$8.13, respectively. The

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<sup>3</sup>The sponsor can ask public shareholders to vote on an extension of the deadline to complete a merger, but must offer the right to redeem if the extension is granted. The sponsor also often makes a contribution, usually a few cents per share, to cover additional costs or to serve as an inducement for investors not to redeem their shares.

<sup>4</sup>Sponsors and their affiliates sometimes commit at the time of the IPO to purchase shares at \$10 each when the merger happens in what is known as a Forward Purchase Agreement (FPA).

total costs of the median company going public via a SPAC merger between January 2015 and March 2021 were 15.1% of the post-issue market cap, while they were 3.2% for traditional IPOs. [Klausner, Ohlrogge, and Ruan \(2022\)](#) analyze SPACs, and identify several of the costs associated with SPACs that are not present with traditional IPOs. The sponsor's ownership of shares and warrants imposes a dilution cost on other shareholders. Furthermore, because of the practice of the IPO underwriter collecting commissions on the IPO units even if many IPO shares are redeemed, if there is a high redemption ratio, the cash delivered per share falls.

In spite of these high average costs, we still find that many private companies choose to go public via a SPAC merger. In 2022, for the first time ever, more companies went public via SPAC mergers than traditional IPOs. We rationalize why some operating companies merge with a SPAC by outlining the potential advantages. These advantages are based on the structure of the SPAC, as well as the economic roles of SPAC sponsors and SPAC IPO investors. For example, having raised capital in an IPO, a SPAC can potentially consummate a merger with an operating company in a timely manner, especially if the operating company does not have audited financial statements. We document, however, that on average merging with a SPAC does not appear to be quicker than conducting a traditional IPO or direct listing. In addition, in the United States, it has been widely believed that merger law applies rather than securities issuance law for the business combinations, providing a "safe harbor" provision for forecasts of future revenue and profits that security issuance law lacks. It has been argued that SPAC mergers are partly motivated by this regulatory arbitrage opportunity for private operating companies.

In this paper, we study the three key participants in the SPAC market: investors, operating companies merging with a SPAC, and sponsors who create the SPACs. We find consistent winners and losers in the market—sponsors and IPO investors have persistently performed well, whereas public market shareholders in the merged companies have performed poorly, while at the same time warrant holders have on average done well. We identify economic frictions, such as incentive misalignment and agency issues, and analyze how the structure of SPACs creates and sometimes mitigates these frictions.

We document investor returns on SPACs by dividing the life cycle of SPACs into two periods: the SPAC period, which is between the SPAC IPO and the completion of the business combination or the SPAC liquidation, and the deSPAC period, which, if there is a merger,

starts on the first trading day as a merged company. To measure investor returns in the SPAC period, we implement an “optimal redemption strategy.” This strategy calculates an annualized return for an investor who purchases a SPAC unit at the offer price. The investor sells each component of the SPAC unit if the market prices are higher than the redemption values, or redeems if the market prices are below the redemption values, five trading days prior to the close of a business combination or liquidation, mimicking a real-world strategy in which settlement delays must be taken into account.

For the 458 SPAC IPOs from January 2010 to December 2020, investors have on average earned an equally weighted (EW) annualized return of 23.9% during the SPAC period. Although SPAC period investors earn most of their returns when SPACs consummate business combinations (33.2% per year), even liquidated SPACs provide positive returns (2% per year). SPACs are structured to provide upside potential for the SPAC period investors by offering an option to become a shareholder of a newly traded company, with a money-back guarantee that, since 2010, is typically *gross of fees*. Accordingly, from 2010, even the worst-performing SPAC provided a positive return of 0.51% per year. Given this downside protected nature of the SPAC period investment, a SPAC IPO is equivalent to a *default-free* convertible bond with extra warrants, making 23.9% an attractive average annual return.

For the second half of the life cycle of SPACs, the deSPAC period for SPACs that consummate a business combination, we implement a simple buy and hold strategy in which an investor purchases a merged company share on the first day of trading as a deSPAC (merged) company and holds it for 1 or 3 years (or until December 31, 2021, for recent mergers). We find that the EW average one-year buy-and-hold return of the merged companies’ common shares is -11.3%, while the CRSP value-weighted (VW) market index return is 19.4% for the matched period, resulting in an average one-year market-adjusted return of -30.7%. We also find that while the EW post-merger one-year common share return is -11.3%, if returns are weighted by the amount of money that public SPAC investors leave in after redemptions, the returns are not as bad, with the public cash-weighted return being -3.0%. The higher public cash-weighted return is due to the pattern that shareholders redeem most of their shares for mergers that subsequently produce the lowest returns, and thus have relatively little money invested in the worst-performing deals.

Consequently, focusing exclusively on the EW common share returns paints a worse picture of the deSPAC period investments than what a dollar-weighted portfolio produces.

We calculate the return on warrants as well and, surprisingly, find that the EW average one-year buy-and-hold return of the merged companies' warrants is 72.2%. We find that warrant investors have persistently outperformed common share investors. The warrants, out-of-the-money call options in many cases, benefited from the bull market of 2009–2021. The high EW average return is driven by out-of-the-money warrants: the EW average one-year buy-and-hold return on out-of-the-money warrants is 104.3%, while it is 9.5% for in-the-money warrants. Because of this large difference, the price-weighted average one-year return on warrants is a modest 13.5%.

We then focus on the cross-sectional variation of deSPAC period returns. We find that sponsor expertise, measured by the sponsor's experience in an industry related to the merging company's operation, and underwriter quality weakly predict higher deSPAC period common share returns. Furthermore, using SPAC shareholders' redemption decisions as a proxy for the quality of the proposed merger ([Jenkinson and Sousa \(2011\)](#)) and the timing of a business combination as a proxy for the SPAC sponsors' time pressure ([Dimitrova \(2017\)](#) and [Degeorge, Martin, and Phalippou \(2016\)](#)), we find that higher redemption ratios and the late timing of the deals (i.e., toward the deadline) are associated with both lower SPAC and deSPAC period returns.

In simple univariate sorts, deSPAC returns are lower for operating companies with less than \$100 million in trailing annual revenue than for larger companies. Furthermore, within a sales category, the returns are even lower for unprofitable firms than for profitable firms. These patterns are consistent with the hypothesis advanced by SPAC critics that many of the operating companies merging with SPACs are low-quality companies that would have had difficulty going public in a traditional IPO. We should note, however, that similar relations between subsequent investor returns and sales and profitability are also present among traditional IPOs.

This paper contributes to the literature by providing a better understanding of SPACs, in particular focusing on the economic tensions embedded in the structure of SPACs. We analyze the economic rationale for certain features of SPACs, such as the redemption option and merger deadlines. We posit that the merger deadline exists to reduce the illiquidity cost facing SPAC IPO investors. This deadline, however, creates an agency problem that

encourages a sponsor to pursue an unpromising acquisition, because if the SPAC is liquidated, the sponsor shares and warrants become worthless. The redemption option is designed to address this agency problem. By redeeming, public shareholders can avoid suffering losses on their shares, and they may force the SPAC to liquidate. The threat of redemptions thus helps to align sponsor and public shareholder incentives.

While previous studies examining SPACs that went public before 2010 ([Jenkinson and Sousa \(2011\)](#) and [Dimitrova \(2017\)](#), among others), and studies by [Renaissance Capital \(2020\)](#), [J.P. Morgan \(2021\)](#), and [Klausner et al. \(2022\)](#) using more recent deals, document poor deSPAC period common share returns, this is the first paper documenting the stark differences in investor returns between common shares and warrants.<sup>5</sup> In addition to documenting returns earned by public market investors, we also analyze returns earned by PIPE investors and sponsors. Our calculations require some assumptions, and because the timing of PIPE and sponsor exits is in general not publicly available, our calculations are based on assumed holding periods. We report an EW average one-year PIPE return of 9.3%, which is substantially higher than the average return earned by public market investors, mainly because PIPE investors have an effective cost that on average is a 20% discount from the market price at the time of the deSPAC. On average, PIPE investors still underperform the market.

Sponsors, on average, receive a net dollar gain of \$51 million, producing a total return of 619%, to either the liquidation date or one year after the merger if we assume that any sponsor shares subject to vesting restrictions have zero value.<sup>6</sup> These lower bound numbers convert into EW average annualized sponsor returns, over a period of approximately 2.5 years measured from the investment at the IPO, of 113%. We document that sponsors sometimes give up a sizable chunk of their predetermined compensation, making their profits not as lucrative as critics suggest, especially for weak deals. On average, sponsors forfeit 17% of their common share promotes and 19% of their private placement warrants, and transfer some of them to other investors as inducements either not to redeem or to invest new capital. We document, as do [Klausner et al. \(2022\)](#), that underwriters sometimes also take haircuts; on average they

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<sup>5</sup>See a press release from Renaissance Capital (2020) and report by J.P. Morgan ([Cembalast \(2021\)](#)).

<sup>6</sup>The sponsor investment in a SPAC IPO is often referred to as at-risk capital. As reported in [Table 10](#), the average amount of sponsor at-risk capital for the 162 SPAC IPOs, including 153 mergers and 9 liquidated SPACs, is \$7.5 million (median: \$6.8 million). The sponsor at-risk capital as a fraction of the SPAC IPO proceeds is on average 3.5%.

surrender 4% of their deferred commissions. Importantly, this is the first paper to show that these haircuts have covariance properties that are attractive for other participants: sponsors take larger haircuts and underwriters forfeit commissions more when the proposed merger is not welcomed by the market, as evidenced by high redemption ratios.

Lastly, we caution that the high average annualized returns for SPAC IPO investors and sponsors that we document are likely to be much lower for SPAC IPOs and deSPACs from 2021 and later. Given the large number of SPACs from 2020 to 2021 that are still searching for a merger partner as of January 2023, we expect much higher liquidation rates than during our sample period, dragging down the average returns for these cohorts.

## **1. SPACs and the Market for IPOs**

This section addresses SPACs from the point of view of an operating company considering going public and discusses the economics of the SPAC structure. We start by comparing the costs of three different going public methods: (1) merging with a SPAC, (2) a traditional IPO, and (3) a direct listing. We discuss the economic roles of sponsors and SPAC IPO investors. Finally, we outline the relative advantages of going public via merging with a SPAC compared to a traditional IPO.

### **1.1. The relative costs of going public**

Panel A of [Table 1](#) summarizes the costs associated with three different going public options. The major costs associated with traditional IPOs are twofold: the direct costs of underwriter commissions and indirect costs from the underpricing (i.e., the money left on the table). In addition to the direct costs of underwriter commissions and the indirect costs of underpricing, merging with a SPAC also incurs indirect costs from dilution. The dilution costs are primarily from two sources: promote shares held by sponsors, and warrants and/or rights held by public SPAC shareholders and sponsors. For direct listings, the main costs are financial advisory fees that operating companies pay investment banks. We do not consider miscellaneous costs, such as SEC registration, audit, and legal fees, for all three cases. Internet Appendix Section A3 explains how we estimate the costs in more detail.

— PLACE [TABLE 1](#) ABOUT HERE —



Inspection of panel A of [Table 1](#) shows that merging with a SPAC is substantially more expensive than pursuing a traditional IPO, both in terms of the total cost as a fraction of the cash raised and as a fraction of the post-issuance market capitalization. For the median deSPAC, the costs are 15.1% of the market cap, as compared to 3.2% for the median IPO. Merging with a SPAC is even more expensive in comparison with going public via a direct listing, for which the median cost as a percentage of market cap is only 0.3%. The higher average costs of merging with a SPAC are not driven by differences in size: the median post-transaction market cap for the IPOs in our sample is \$615 million, and for SPAC mergers the median market cap is \$646 million.

Then why do certain companies select merging with a SPAC instead of a less expensive method of going public? Are there any benefits that outweigh the extra costs associated with merging with a SPAC? To answer this question, we first discuss the economic roles of SPAC sponsors and SPAC IPO investors. Then we list some of the possible advantages of merging with a SPAC over a traditional IPO.

## **1.2. The economic role of sponsors and SPAC investors**

We view SPAC sponsors as equivalent to specialized private equity (PE) general partners (GPs) with deep pockets, working as *ad hoc* underwriters (see [Lewellen \(2009\)](#) and [Dimitrova \(2017\)](#), among others, for the analogy of SPACs as private equity funds). [Stulz \(2020\)](#) points out that the growing importance of intangible assets for young companies makes it costlier for them to be public when specialized private investors can provide mentoring as well as capital. SPAC sponsors can fill this gap between young companies and specialized private investors, as the individuals behind many SPAC sponsors are industry veterans.

Deep pockets allow sponsors to invest their own capital, differentiating them from regular underwriters in two ways. First, when sponsors, many of which have expertise in certain industries regarding the merging company, invest their own capital, it serves as a certification to attract PIPE investors or induce SPAC investors not to redeem their shares. Sponsors and their affiliates sometimes commit at the time of the IPO to purchase shares at \$10 each when the merger happens in what is known as a Forward Purchase Agreement (FPA).

Second, having deep pockets is also important for weak deals because merger agreements almost always require a minimum amount of cash to be delivered as a closing condition. When most SPAC investors redeem and it is difficult to find PIPE investors, a deep-pocketed sponsor can give inducements to SPAC investors not to redeem or invest its own money to save the deal. Sponsors are often willing to invest in merging companies at \$10 per share, even when they are of the opinion that the correct value is, say, \$6 per share. Their weighted average cost, including sponsor shares purchased for less than a penny per share, may still be less than \$6. The warrants are another source of possible value, giving a sponsor a strong incentive to complete the merger by investing its own capital.

SPAC sponsors are similar to private equity general partners (GPs) in several ways. Both SPACs and GPs have deadlines for investing the capital provided by investors. These deadlines are designed to prevent a sponsor or GP from making the investment illiquid for a long period of time, but at the cost of creating incentives for investing in negative NPV endeavors as the deadline approaches. In a world of incomplete contracting, the contractual features that we observe frequently involve tradeoffs. In [Section 3](#), we find that a business combination completed under time pressure (i.e., toward the end of the SPAC life cycle) tends to underperform, the same pattern that [DeGeorge et al. \(2016\)](#) document for private equity.

The compensation structure of sponsors and GPs is similar as well, as noted by [Rodrigues and Stegemoller \(2013\)](#). Private equity (venture capital and buyouts) GPs are frequently compensated with a 2% per year management fee and carried interest. [Metrick and Yasuda \(2010\)](#) and [Phalippou, Rauch, and Umler \(2018\)](#) show that the sum of management fees over the life cycle of PE funds has a present value of about 20% of the capital committed, making it equivalent to the sponsor's 20% promote share. The private placement warrants that sponsors purchase at the time of the IPO are similar to the carried interest received by general partners in a typical private equity contract because both provide payoffs only when other investors earn positive returns. Both SPAC sponsors and private equity GPs nurture the operating companies by joining their boards. Considering these similarities, the compensation of the sponsors does not seem particularly outrageous when we compare it to the compensation that GPs get in private equity.

However, the analogy is not perfect. While SPAC sponsors search for target companies for up to 2 years, private equity GPs search for and then monitor their portfolio companies

for many more years. The SPAC sponsors' reputational concern (i.e., the inability to conduct future deals if there is a poor track record) is relatively less important compared to private equity because SPAC IPO investors are downside protected by redemption rights, while private equity investors do not have redemption rights.

We posit that the redemption right of SPAC shareholders is a critical component of the structure of a SPAC, offering an economic role for SPAC IPO investors in addition to being suppliers of capital. SPACs are faced with three possible outcomes: a good merger, a bad merger, or no merger (i.e., liquidations). As the deadline approaches, a sponsor that is unable to come up with a good merger has an incentive to propose a bad merger. Crucially, however, the redemption option discourages sponsors from doing so. If the shareholders redeem almost all of their shares, the merger will fail because the SPAC does not have enough cash to fulfill the merger agreement requirements, unless the sponsor invests its own money or induces other parties to provide cash, possibly taking a haircut in the process. Internet Appendix Section A2.2 explains how the evolution of the SPAC market has changed the disciplinary role of SPAC IPO investors.

### **1.3. The relative advantages of going public via merging with a SPAC**

In this section, we outline six potential advantages of merging with a SPAC over a traditional IPO based on the structure of SPACs, and discuss their validity and limitations.

First, based on our interpretation of SPAC sponsors as specialized GPs, sponsors can provide advice and certification. This is similar to venture capital (VC) financing: VCs not only bring capital to companies but also provide mentorship. [Hsu \(2004\)](#) documents that startup companies take offers with 10%–14% premoney valuation discounts made by VCs with a high reputation because many startup companies consider “extra financial” considerations to be important. Similarly, entrepreneurs who decided to go public via merging with a SPAC often mention the business insight that sponsors can bring into their companies. Although we cannot observe counterfactuals (i.e., how much it would cost if a company chose an alternative option to go public) to directly compare relative costs, as [Hsu \(2004\)](#) does, it is still questionable whether these “extra financial” values are worth the significant dilution costs associated with merging with a SPAC. Instead of going public via merging with a SPAC, going public via a traditional IPO and appointing industry veterans as board members would seem to be less costly.

Second, it is frequently stated that the time it takes for an operating company to negotiate a merger with a SPAC and win shareholder approval is less than that of a traditional book-built IPO. How long a traditional IPO takes varies, depending on the circumstances and how much advanced work the company has done in terms of preparing audited financial statements, etc.<sup>7</sup> Table 2 from [Chaplinsky, Hanley, and Moon \(2017\)](#) reports a median of 104 days in registration (draft registration statement [DRS] to IPO date) for their sample of 312 Emerging Growth Company IPOs from April 2012 to April 2015. The time it takes to draft a DRS might be a minimum of a month or so, suggesting a median of about 5 months for the time it takes to do a conventional IPO.

Panel B of [Table 1](#) shows that, on average, it takes 153 calendar days (5 months) for business combinations from the announcement to completion. The time it takes from the start of a merger negotiation and the announcement of a definitive agreement is unknown to the public. Assuming that it takes a month to negotiate a deal (including lining up PIPE financing in most cases), it typically takes at least 6 months for an operating company to consummate a merger with a SPAC. These numbers suggest that for companies with audited financial statements, SPAC mergers provide no speed advantage. For operating companies without audited financial statements, however, SPAC mergers might be quicker.

Third, in the United States, companies going public rarely make forecasts of revenue or earnings, but these are common with merger announcements for which shareholder approval is needed, whether it is a merger between two operating companies or a merger between a SPAC and an operating company. These projections are largely shielded from lawsuits with a “safe harbor” provision in U.S. laws for mergers ([Cazier, Merkley, and Treu \(2020\)](#), among others), but not for initial public offerings: with mergers, plaintiffs have the burden of proof to show that managers knowingly made false statements, rather than merely having had bad luck, if the company fails to meet the projections. Thus, certain companies wanting to make forward-looking statements to maximize their premerger valuations can potentially benefit from merging with SPACs, essentially engaging in regulatory arbitrage.<sup>8</sup> A 2021 statement by SEC staff, however,

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<sup>7</sup>Companies going public with a traditional IPO or direct listing are required to have audited financial statements, but a private operating company merging with a SPAC does not have to satisfy this requirement until after the merger occurs.

<sup>8</sup>See [Klausner et al. \(2022\)](#) for a more detailed discussion of this regulatory perspective.

questioned whether this regulatory arbitrage was consistent with existing law.<sup>9</sup> Furthermore, the SEC in April 2022 proposed rules aimed at eliminating any regulatory arbitrage that exists.<sup>10</sup> Critics of SPACs allege that many of the revenue and profit forecasts are based on extremely optimistic assumptions. Consistent with this criticism, [Dambra, Even-Tov, and George \(2022\)](#) document that actual revenue and profits on average are below the forecasts.

Fourth, merging with a SPAC may provide relative certainty compared to a traditional IPO. With a traditional book-built IPO, the offer price and proceeds are negotiated after conducting a roadshow and observing indications of interest from potential investors, making the terms uncertain until the very last day. SPAC merger terms, which involve agreeing on a pre-money value of the operating company, are negotiated before additional information about the market's opinion is known. Because there is still uncertainty about the redemption rate, however, operating companies negotiate the minimum cash that must be delivered as a closing condition. In the worst-case scenario when sponsors cannot deliver the minimum cash, we observe that companies can still waive this condition and go public without raising much capital.

Fifth, sponsors and underwriters may agree to reduce their compensation to prevent a merger from collapsing. When there is valuation uncertainty, the merger announcement may be greeted positively or negatively by the market. Should any positive announcement return not be reversed by the time of the merger, money is left on the table by the operating company. [Kiesel, Klingelhofer, Schiereck, and Vismara \(2022\)](#) report that the average merger announcement return for a sample of 375 U.S. SPACs between 2012 and June 2021 was 6.4%. But if it looks as if the redemption rate will be high, the sponsor (and underwriter) may take a haircut in order to salvage the deal. As with other merger agreements, contingent features, such as vesting or earnout provisions, can be negotiated. For example, sponsor shares are usually subject to lockup provisions and sometimes are also subject to vesting provisions. These contingent features provide contracting flexibility among different stakeholders for SPACs. In contrast, with a traditional IPO, if there is weak demand, the issuing firm would have to cut the price

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<sup>9</sup>See the April 8, 2021, statement from SEC Acting Director of the Division of Corporate Finance John Coates ([SEC \(2021\)](#)) in which he points out that the SEC does not define what constitutes an initial public offering. Since SPAC mergers both raise capital for a private operating company and result in it becoming listed, the merger has many functional aspects of an IPO. See [Coates \(2022\)](#) for further clarifications.

<sup>10</sup>See the SEC's press release ([SEC \(2022\)](#)).

and issue size to preserve the deal. Thus, a SPAC merger potentially offers more attractive covariance properties to the issuing firm’s shareholders than a traditional IPO.

Sixth, in general, private companies sell at a discount relative to more liquid public companies. If a SPAC can negotiate a merger based on a private market valuation of the operating company, a source of value is the increase in valuation that occurs when the merger makes the stock liquid. The negative deSPAC returns that we document, however, suggest that the valuations being negotiated are on average too high.

In panel A of [Table 2](#), we compare the characteristics of companies going public either by merging with a SPAC or by conducting a traditional IPO based on two sample periods. During 2013–2020, companies merging with SPACs tended to be larger, as measured by median sales, and older than companies doing a traditional IPO. In 2021, when the SPAC market was at its peak, these patterns reversed. The relative proportion of profitable companies flipped, even though smaller, younger, and not profitable biotech companies mostly go public via traditional IPOs.

— PLACE [TABLE 2](#) ABOUT HERE —

In panel B of [Table 2](#), we formally test how observable characteristics can predict which companies choose one over the other method of going public. Specifically, we report coefficients for the below probit model, which includes dummy variables for whether the operating company is profitable, a tech company, or a biotech company, and year fixed effects, for the companies that went public between January 2013 and December 2021.

$$\text{Merging with a SPAC}_i = a * \ln(1 + \text{sales})_i + b * \ln(1 + \text{age})_i + c * \text{Profitable}_i + d * \text{Tech}_i + e * \text{Biotech}_i + e_i \quad (1)$$

Sales, age, and profitability combined predict less than 1% of the choice, demonstrating that these observable characteristics have little predictive power. Instead, two industry dummy variables, tech and biotech, and year fixed effects explain about 24% of the variation. However, one noteworthy finding is that unprofitable companies are more likely to merge with a SPAC, suggesting that the SPAC boom in 2020 and 2021 allowed lower-quality companies to go public

via merging with a SPAC.<sup>11</sup> This pattern is consistent with the fact that deSPAC deals include severely underperforming companies. In untabulated findings, of 41 deSPAC mergers between 2012 and 2017, 12 (29%) of them had 3-year buy-and-hold returns lower than -90%, while among 756 traditional IPOs from the same period, only 66 (9%) of them produced returns lower than -90%. The higher propensity for severe underperformance among deSPACs is consistent with the [Jenkinson and Sousa \(2011\)](#) view that the “extreme incentives” that sponsors face result in acquisitions of low-quality companies that would not be able to go public via a traditional IPO process.<sup>12</sup> Consistent with the low-quality hypothesis, [Kim, Park, Peterson, and Wilson \(2022\)](#) report that operating companies that merge with a SPAC are more likely to file earnings restatements than companies that go public with a traditional IPO.

Some recent theory papers discuss the choice between merging with a SPAC and conducting a traditional IPO. [Bai, Ma, and Zheng \(2021\)](#) develop a model and predict that riskier firms tend to merge with SPACs. Similarly, [Gryglewicz, Hartman-Glaser, and Mayer \(2021\)](#) argue that merging with a SPAC is a preferred mode of funding for companies subject to severe adverse selection. Our [Table 2](#) regressions provide modest support for these predictions. As of the end of 2022, over 500 SPACs are searching or in negotiations for a merger. Future studies with more data points can revisit the question of which companies choose to merge with a SPAC to test whether the patterns have changed over time.

## 2. Data and Sample Construction

In this paper, we study 1,071 SPAC IPOs in the United States between January 2010 and December 2021 after excluding SPACs traded in over-the-counter (OTC) markets.<sup>13</sup> In the Internet Appendix, [Tables A1 and A2](#) report the number of SPAC IPOs and the capital they raised for 1990–2009 and 2010–2022, respectively. We focus on SPACs that went public in 2010 or later because the

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<sup>11</sup>In unreported results, we ran separate probit regressions for 2013–2020 (N=1,225) and 2021 (N=510). The 2021 results drive the negative coefficient for the profitability dummy that we report in panel B, but the other coefficients do not reliably vary between the two subperiods.

<sup>12</sup>We should note that for those deals, however, the SPAC shareholder redemption rates are almost always close to 100%, meaning that the actual losses of SPAC investors are minimal, and these merging companies end up going public with little capital raised.

<sup>13</sup>We exclude 15 SPAC IPOs from 2010 to 2011 traded in OTC markets because of possible unobservable differences between SPACs traded in major exchanges and OTC markets. Also, stale prices for these IPOs, especially for warrants and rights, prevent us from calculating SPAC period returns easily.



structure of SPACs fundamentally changed in 2010.<sup>14</sup> For the SPACs that went public before 2010, [Jenkinson and Sousa \(2011\)](#), [Howe and O'Brien \(2012\)](#), [Cumming, Hass, and Schweizer \(2014\)](#), [Dimitrova \(2017\)](#), and [Vulanovic \(2017\)](#), among others, provide in-depth analyses, mostly focusing on the deSPAC period common share returns.

For the SPAC period returns, we study the 458 exchange-listed SPAC IPOs from January 2010 to December 2020. We measure the SPAC period returns as of December 2021. We restrict our sample to the SPACs that went public in December 2020 or before in order to provide enough time to include both SPACs that have completed business combinations and those that have liquidated. A typical SPAC has 18 to 24 months to complete a business combination with an option to extend the deadline for up to 3 months. For the deSPAC period returns earned by public market investors, we focus on 152 business combinations completed by the end of December 2020 to give at least one year of returns for recent mergers, as we calculate the deSPAC period returns until December 31, 2021. For the deSPAC period returns earned by PIPE investors and sponsors, we use deSPAC deals by SPAC IPOs since 2015 that were completed by March 31, 2021, and include returns through March 31, 2022.<sup>15</sup>

We have three broad data sources. First, the primary data source on SPAC IPOs before 2016 and for traditional operating company IPOs is the Refinitiv (also known as Securities Data Company, or SDC Platinum, and more recently as Eikon) new issues database, augmented with data from Dealogic.

Second, we use two commercial SPAC databases: Gritstone Asset Management's OmniView (<https://www.gritstoneam.com/omniview>) and SPAC Research (<https://www.spacresearch.com>). These databases provide detailed information regarding the structure of each SPAC and its derivative securities, such as the exercise price of warrants and rights, the number of warrants and/or rights that come with each unit, and the fraction of common share that a warrant or right converts into. The data also include the prices of units, common shares, warrants, and rights; and information about SPAC sponsors, the initial trust amount, the redemption history, the identity of merging companies, and various announcement and business combination (or liquidation) dates.

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<sup>14</sup>Section A2 of the Internet Appendix discusses differences between SPACs that went public before 2009 and after 2009.

<sup>15</sup>We do not include the mergers from the SPACs that went public before 2015 to make the manual collection of data manageable. The information is mostly from SEC filings. These filings are idiosyncratic and often change from one filing to the next for the same merger due to the dynamic nature of merger negotiations.



We validate the accuracy of the data by cross-examining the two commercial SPAC databases. If we find any discrepancies or irregularities, we do further investigations using EDGAR, Capital IQ, Pitchbook, Dealogic, Bloomberg, and Refinitiv Eikon to make necessary adjustments. We extend the data by hand-collecting further information related to the deSPACing process, such as the estimate of economic benefits (i.e., promotes) that SPAC sponsors and underwriters forfeit (i.e., “haircuts”), vesting provisions, and extra inducements that sponsors and merging companies offer for nonredeeming shareholders and/or PIPE investors.

Third, for the deSPAC period common share returns, we use CRSP daily returns until December 2021. To calculate warrant returns for the same period, we collect warrant prices from Bloomberg and Refinitiv. We use Compustat, EDGAR filings, and Capital IQ to record profitability, sales, and founding dates data for merging companies.<sup>16</sup>

### **3. Returns**

In this section, we examine investor returns by breaking down the SPAC lifecycle into two periods. The first is the SPAC period, starting from the SPAC IPO date and ending on either the business combination completion date or the liquidation date. For the SPACs with completed business combinations, we define the deSPAC period as starting on the day that the SPAC starts to trade as an operating company with a new company name and ticker symbol. We document comprehensive investor returns for the two periods and discuss the cross-sectional patterns.

#### **3.1. Public market investor returns for the SPAC and deSPAC periods**

We first document returns from the SPAC period, which starts on the SPAC IPO date and ends five trading days before either a business combination completion date or a liquidation date. We report returns based on a variation of a buy and hold strategy that we term the “optimal redemption” strategy. This strategy calculates an annualized return for an investor who purchases a SPAC unit, which consists of a common share and a prespecified number of derivative securities (warrants and/or rights), at the offer price. We assume that the investor sells each component of

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<sup>16</sup>For founding dates, we exchanged our files with those used in [Bai et al. \(2021\)](#) and then reinvestigated the 10% or so of firms for which there were disagreements. This procedure resulted in both sets of authors revising approximately 5% of their founding dates to earlier years.

the SPAC unit at the closing price five trading days before the close of the business combination or liquidation. For common shares, we assume that investors redeem if the redemption value is higher than the market price and sell if the redemption value is lower than the market price.

Our strategy is based on the following observations. First, dividing the lifecycle of SPACs into SPAC and deSPAC periods makes sense as [Klausner et al. \(2022\)](#) document that more than 92% of SPAC period investors identified in 13-F filings exit before the completion of a business combination. For the investors that do not redeem, they frequently sell their shares in the market before a merger is completed. Second, we calculate returns based on the prices five days prior to the business combination or liquidation dates to make this strategy implementable considering the time it takes to redeem shares due to settlement delays, etc. Third, during most of our sample period, SPAC period returns are mostly realized at the time of and after SPACs announce business combinations, with minimum price changes before the announcement. That said, as it is not feasible to predict when SPACs would announce mergers, a realistic strategy requires investing from the IPO.<sup>17</sup> Finally, based on the authors' conversations with multiple practitioners, we confirm that buying at the IPO and selling or redeeming before a merger is completed represents the investment strategy pursued by many institutional investors. Specifically, our strategy calculates the annualized SPAC period return,  $R_{SPAC}$ , as

$$P_s/P_i = (1 + R_{SPAC})^{(Months/12)}, \quad (2)$$

where  $P_s = \max(\text{Common}_{P_{t-5}}, \text{Common}_{R_{t-5}}) + \text{Price Structure of Warrant} \times \text{Warrant}_{P_{t-5}} + \text{Price Structure of Right} \times \text{Right}_{P_{t-5}}$   $P_i = \text{IPO Price of a Unit}$ . *Months* refers to the number of months between the SPAC IPO and the business combination or liquidation, *Price structure of warrant (right)* is the fraction of a warrant (right) a SPAC unit includes. *Common<sub>P<sub>t-5</sub></sub>* is the common share price, *Common<sub>R<sub>t-5</sub></sub>* is the redemption value for a common share, *Warrant<sub>P<sub>t-5</sub></sub>* is the warrant price, and *Right<sub>P<sub>t-5</sub></sub>* is the price for a right, all measured as the closing market price five trading days prior to the business combination or liquidation date. Note that while all

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<sup>17</sup>While some SPACs do not announce business combinations within 18–24 months, some others announce them as early as within a month from the IPO. Typically, beyond the first week of trading after the IPO, there is relatively little trading volume until a merger is announced. In late 2020 and the first 2 months of 2021, many SPACs that had not announced a merger traded well above \$10 per unit, but the prices dropped in March of 2021. In 2022, most SPACs that had announced, but not completed, mergers traded at a price below the redemption value of the trust account.

common shares come with the redemption right, warrants are occasionally renegotiated to be redeemed at the time of the merger. For warrant and right prices, we calculate prices by adjusting the price structures for each SPAC. For example, if a SPAC unit includes one share of common share and one-third of a warrant, we multiply the warrant price by its price structure (one-third) as an investor purchasing a unit from the IPO would receive one-third of a warrant.<sup>18</sup> Our use of price changes generates total returns because no SPACs pay dividends.

— PLACE TABLE 3 ABOUT HERE —

Table 3 reports annualized SPAC period returns based on SPACs that went public between January 2010 and December 2020. Panel A reports annualized SPAC period returns based on the year of the SPAC IPO, equally weighting each observation. On average, SPAC period investors earned 23.9% per year based on our optimal redemption strategy.<sup>19</sup> The average first-day return of SPAC IPOs during 2010 – December 2020 was 0.5%. For investors who bought at the first-day close rather than the offer price, the annualized return was 0.3% lower, 23.6%, over the average 16 months holding period.

Panel B documents the important fact that even liquidated SPACs produce positive returns. These positive returns are because although a typical SPAC pays 2% of the proceeds as an up-front underwriting fee, sponsors purchase warrants or units and deposit a portion of the cash into the trust account, covering the underwriting fee. This is one mechanism that sponsors utilize to attract SPAC IPO investors: offering downside protection in the form of a money-back guarantee *gross of* investment banking fees. Therefore, SPACs have at least 100% of the IPO proceeds in the initial trust account, which then collects interest, delivering on average 2.0% annual returns even for the liquidated ones. Of 458 SPACs that went public between January 2010 and December 2020, 0.51% was the lowest annualized return on any SPAC IPO during the SPAC period. To

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<sup>18</sup>A SPAC can structure its unit to provide warrants worth one-third of a common share per unit in two ways. A majority of SPACs state that each unit includes one-third warrant and each full warrant gives investors the right to buy a share. Some SPACs, however, design the unit to provide one full warrant, which gives investors the right to buy one-third of a share. In this case, after a SPAC unit becomes unbundled, warrants convert into warrants that entitle the holder to buy one full share, making them identical to the first case. Regardless of which structure is used, when warrants start to trade separately, the price of the warrant reflects the warrant having the right to buy a full share. Our calculations make the appropriate adjustments.

<sup>19</sup>Using 47 completed mergers between January 2019 and June 2020, Klausner et al. (2022) report annualized SPAC period returns of 11.6%. Our average annualized return is higher primarily because the large number of SPACs in the second half of 2020 had very high SPAC period returns. As of January 2023, the large number of SPAC IPOs from 2021 (613), which are not in our sample, appear to be producing annualized SPAC period returns in the low single digits.

avoid a potential look-ahead bias, we also include 117 SPACs that went public in or prior to 2020 but had not completed a business combination or liquidated as of December 2021. We refer to them as ongoing SPACs and calculate their mark-to-market returns using prices at the end of December 2021. Panel B shows that these 117 ongoing SPACs traded at a modest premium, producing similar returns (2.3%) to SPACs that are liquidated.

Panel C reports that larger SPACs provide slightly higher returns, as the average IPO proceeds-weighted annualized return of 27.1% is higher than the EW return of 23.9%.

Given the downside protection of SPAC IPOs, we interpret the SPAC period investment as equivalent to investing in default-free Treasury Bills, along with an option to convert into the common stock of a company going public. These features make SPAC units equivalent to default-free convertible bonds. Actually, SPAC units are even better than a default-free convertible bond, in that they typically also contain a warrant to buy a fraction of an additional share, giving even more upside potential. Thus, many hedge funds, some of which are known as the “SPAC mafia,” find the risk-adjusted returns attractive.<sup>20</sup>

Next, we examine the deSPAC period investment returns. Tables 4 and 5 are based on a simple buy-and-hold strategy in which an investor purchases a merged company stock or warrant at the beginning of the first day of trading for which the SPAC has a new entity name and new stock and warrant ticker symbols.

We calculate buy-and-hold returns until the earlier of the 1- or 3-year anniversary, or the delisting date (or December 31, 2021). When the full 1- or 3-year data are not available, we calculate the returns based on available data. For example, if a merged company started to trade on March 16, 2021, and was still listed on December 31, 2021, we report the buy-and-hold returns from March 16, 2021, to December 31, 2021, as both 1- and 3-year returns. As a benchmark, we report the market return using the CRSP value-weighted index matched to the investment period of each merged company.

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<sup>20</sup>Internet Appendix Table A4 lists the largest holders of SPACs as of December 2021. Many hedge funds have used leverage when buying SPAC IPOs. Assume that a hedge fund that borrowed \$5 million at 3% per year and held \$5 million in equity could buy close to \$10 million of SPAC IPOs. If the SPAC investment produced a return of 23.9% after one year, the \$12.39 million payoff net of \$5.15 million in principal and interest would produce a net payoff of \$7.24 million on the \$5 million equity investment, a return of 44.8%.

Specifically, the 1- and 3-year buy-and-hold returns for deSPAC company  $i$ 's common share (Table 4) are defined as

$$BHRC_{i,T} = \prod_{t=1}^{\min(T, \text{delist}, \text{Dec. 31, 2021})} (1 + R_{i,t}) - 1 \quad (3)$$

where  $R_{i,t}$  is the net return in period  $t$  on deSPAC company  $i$ 's common share, compounded daily using the CRSP data.

Table 4 reports the deSPAC period percentage buy-and-hold returns on common shares for 152 business combinations consummated between January 2010 and December 2020. Table 4 shows that common shares have EW average deSPAC period one-year returns of -11.3%, underperforming the market by an average of 30.7%.<sup>21</sup> The low returns are consistent with prior studies covering SPACs that went public before 2010 (Jenkinson and Sousa (2011); Dimitrova (2017), among others), and contemporary papers studying recent SPACs, including Klausner et al. (2022) and Kiesel et al. (2022), all of which find poor deSPAC period common share returns.

— PLACE TABLE 4 ABOUT HERE —

Importantly, Table 4, panel B, demonstrates that different weighting methods yield noticeably different outcomes. For example, assume that there are two SPACs, A and B, and SPAC A raised \$400 million and SPAC B raised \$100 million from their IPOs. Both completed business combinations and the redemption ratio for SPAC A is 10% and SPAC B is 90%. If the one-year deSPAC period common share return is 10% for SPAC A and -30% for SPAC B, the EW return is -10% ( $\frac{10\% + (-30\%)}{2}$ ). However, the IPO proceeds weighted return is 2% ( $10\% \times \frac{400}{400+100} + (-30\%) \times \frac{100}{400+100}$ ). If we weight based on the SPAC IPO proceeds delivered to the merging companies (public cash), \$360 million for SPAC A and \$10 million for SPAC B, the average return is 8.92% ( $10\% \times \frac{360}{360+10} + (-30\%) \times \frac{10}{360+10}$ ).

Our optimal redemption strategy from the SPAC period investment implies that the redemption ratio is bimodally distributed: all SPAC shareholders keep (or sell) their shares if the

<sup>21</sup>In the Internet Appendix, Table A3 reports Fama-French three-factor model regression results for deSPAC period stock returns. The results are consistent with the buy-and-hold returns reported in Table 4. Table 4 ends with deSPACs in December 2020. In the first three quarters 2021, there were another 146 deSPACs, with equally weighted average one-year returns of -62.1%. If these deSPACs are included, the EW average one-year deSPAC return falls from -11.3% in Table 4 to -36.2%.

share price is higher than the redemption value and all SPAC shareholders redeem their shares if the share price is lower than the redemption value. Therefore, mergers that generate little investor enthusiasm tend to have high redemption ratios and thus little public cash is delivered to the merging companies. As SPAC investors protect themselves by exercising redemption options, panel B of Table 4 shows that the average public cash-weighted investor return of -3.0% is not as bad as the EW average of -11.3%. Later, in Table 7, we show that higher redemption ratios predict lower market-adjusted deSPAC period common share returns.

At the time of the deSPAC, operating company shareholders, frequently referred to as legacy shareholders, see their existing shares convert into the publicly traded shares of the merged company. Most if not all of the shares owned by legacy shareholders are subject to lockup provisions.<sup>22</sup> Because the timing and purchase price of these existing shares is generally not observable, we cannot compute the premerger annualized returns for legacy shareholders.

In Table 5, we report deSPAC period warrant returns for business combinations consummated between January 2010 and December 2020. Note that we only analyze 142 of the 152 business combinations during this period for warrant returns. This reduced sample size is because five SPACs did not have warrants from the beginning, and five SPACs redeemed warrants either for common shares or for cash during the deSPACing process. Additionally, the warrant price information was not available for six companies. For these cases, we assume that the warrant returns were the same as common share returns. Our qualitative results do not change if we also exclude these six cases. The 1- and 3-year buy-and-hold returns for deSPAC company  $i$ 's warrant are defined as

$$BHRW_{i,t} = \frac{P_{i\_min}(T, delist, Dec. 31, 2021)}{P_{i\_deSPAC\_date}} - 1 \quad (4)$$

where  $P_{i\_min}(T, delist)$  is the price of deSPAC company  $i$ 's warrant at time  $T$  (1- or 3-year anniversary) or the delisting date or December 31, 2021, whichever comes first, and  $P_{i\_deSPAC\_date}$  is the closing price of deSPAC company  $i$ 's warrant on the business completion

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<sup>22</sup>Operating company shareholders normally receive shares based on an assumed value of \$10, which is used to calculate the conversion ratio of legacy operating company shares into publicly tradable shares, for a given negotiated premerger valuation. Sometimes contingent payments occur (more shares if certain share price or operating targets are hit). In many cases, all operating company shares are subject to a 6-month lockup period. It is common, however, for the lockups to apply to "officers and directors and certain shareholders" or "all shareholders who own 75,000 shares or more" rather than all shareholders.

date. While we use prices for warrants because warrants do not pay dividends, we use total returns for common shares because common shares sometimes pay dividends.

Most warrants have \$11.50 as an exercise price, a 15% premium to the IPO price. A notable feature of the SPAC warrants held by public market investors is that merged companies usually have call rights for the warrants when the stock price hits a certain level, usually \$18. Thus, although the warrants typically have a 5-year post-merger maturity date, they may be called early. For example, Virgin Galactic, which went public by merging with Social Capital Hedosophia Holdings Corp. on October 25, 2019, announced on March 13, 2020, that it would redeem its warrants on a “cashless basis.” Under the Warrant Agreement, one warrant was exchanged for 0.4927 of a share of common stock, with warrant holders not paying the \$11.50 exercise price. When the warrant redemption happens, we calculate the investment returns based on the assumption that investors sell warrants on the last day of the redemption deadline, instead of becoming common shareholders. Because of the caps, the public market warrants are not as valuable as if they were uncapped. It should be noted that the private placement warrants purchased by the sponsor at the time of the IPO typically are uncapped.

— PLACE TABLE 5 ABOUT HERE —

For the deSPACs with traded warrants, panel A of [Table 5](#) reports the stark difference between investor returns on common shares and warrants for the companies that went public via SPACs: while common shares underperform the market, warrants on average substantially outperform common shares. The EW average one-year warrant return is a remarkable 72.2%.

It is important to discuss the possible reasons behind the substantial difference between common share returns and warrant returns. The COVID-19 pandemic in our sample period increased the volatility in the market, potentially leading to higher returns for the warrants in the later cohorts.<sup>23</sup> More importantly, the high market returns during 2019–2021 benefitted warrants from deSPACs in 2019–2020, which comprise over half of our sample, as shown in panel A of

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<sup>23</sup>Related to the volatility, [Blomkvist and Vulcanovic \(2020\)](#) report that from July 2003 to December 2019, SPAC IPO volume was significantly negatively related to the VIX index, a measure of stock market volatility. SPAC IPO volume skyrocketed over April 2020 to March 2021, however, a period during which the VIX index was persistently above the 2003–2019 average, suggesting that their in-sample evidence does not hold out of sample. Consistent with this observation, Table 5 of [Bai et al. \(2021\)](#), using quarterly data from July 2003 to September 2020, report that SPAC IPO volume is insignificantly related to the logged level of the VIX index.



[Table 5](#). In general, the bull market of 2009–2021 resulted in high average returns for out-of-the-money call options, whether or not they were SPAC warrants.

Another possibility is that the market may have undervalued warrants during the merging process, with this mispricing overlooked because investments in warrants are not scalable. To illustrate this point, panel A of [Table 5](#)'s Units column represents a deSPAC period investment strategy replicating the initial specification of the SPAC IPO unit. For example, assume that a SPAC unit includes a common share and half of a warrant but no rights, and the price of the common share is \$10, and the price of the warrant to buy a full share is \$1 on the first trading day as a merged company. If one-year buy and hold returns for the common share and warrant are -10% and 20%, respectively, this unit holder return would be  $-8.57\%$  ( $-10\% \times (\frac{\$10}{\$10+\$0.5}) + 20\% \times (\frac{\$0.5}{\$10+\$0.5})$ ). Panel A shows that the average unit holder investment return is higher than the common share investment return by only 3.7% over one year: deSPAC period investors still lose money and substantially underperform the market in most years.

The minimal improvement in deSPAC period unit returns shows this scaling problem. The average price of warrants on the first day of trading as a merged company is \$1.60, while it is \$10.50 for the common shares, and most units provide less than one full warrant.<sup>24</sup> Making this scaling problem worse, most high warrant returns come from the out-of-the-money warrants, many of which traded for less than \$1.00. Panel B of [Table 5](#) shows that warrants with lower prices at the time of the merger outperform warrants with higher starting prices, as the price-weighted warrant returns are lower than the EW returns. Our untabulated analysis shows that the EW average one-year buy-and-hold return on out-of-the-money warrants is 104.3%, while it is 9.5% for in-the-money warrants.

One important point to properly understand the deSPAC period returns is that, given that many of the underperforming common shares are redeemed during the deSPACing process, while warrants typically do not have redemption rights, this unit holder investment strategy reported in [Table 4](#) does not necessarily reflect the actual deSPAC period investment returns earned by the average investor. Instead, the public cash-weighted average return

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<sup>24</sup>The median number of warrants in a unit for SPAC IPOs since 2015 that completed a merger before March 2021 is one half. For SPAC IPOs in 2020 that completed a merger by March 2021, the median is one-third.



of -3.0% in [Table 4](#) for shares and the warrant price-weighted average of 13.5% in [Table 5](#) for warrants are probably the best measures.

### 3.2. Cross-sectional patterns in deSPAC period common share returns

In this section, we examine cross-sectional variations of deSPAC period common share returns. We examine the effect on deSPAC returns of the characteristics that can be observed at the time of the IPOs, specifically the quality of sponsors and SPAC IPO underwriters and the potential dilution based on the structure of SPAC units. We also use information available at the time of the merger, such as the profitability and size (as measured by sales) of the operating company, SPAC period returns, the SPAC shareholder's redemption decisions, and the time between the SPAC IPO and the business combination completion. We discuss common share returns only, as warrant returns generally show similar patterns, but with larger variations.

First, we report deSPAC returns based on a simple sort that measures two characteristics of the operating company: its annual sales and its profitability. [Table 6](#) reports the average returns in the year after listing for companies merging with SPACs and companies conducting traditional IPOs. Panel A shows deSPAC period share returns, and panel B shows traditional IPO returns from the first closing market price. Both panel A and panel B show that companies that had sales of more than \$100 million produce higher returns than their smaller counterparts. Also, companies with a positive net income for the 12 months before listing tend to perform better than companies with a negative net income.<sup>25</sup> The deSPAC returns, both on a raw and benchmark-adjusted basis, are lower than IPO returns. The [Table 6](#) patterns are consistent with the hypothesis that the operating companies choosing to go public by merging with a SPAC are of lower quality than the IPO firms.

— PLACE [TABLE 6](#) ABOUT HERE —

In [Table 7](#) we examine the cross-sectional patterns of the deSPAC period common share returns in a regression setting. We construct a dummy variable *Sponsor Expertise* to measure whether the sponsors have expertise in the businesses that merging companies conduct. The variable equals one if one or more key members of a sponsor have work experience in

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<sup>25</sup>For the IPO sample, the one-year abnormal returns for companies with less than \$100 million in sales are slightly lower for profitable firms (-8.1%) than for unprofitable firms (-5.2%). The sample size of small profitable firms is only 52 over this 9-year sample period. In unreported results, if the sample period is extended to 1990–2020, the unprofitable small firms have lower abnormal returns than the profitable small firms.

an industry that a merging company operates in, and equals zero otherwise. As the IPO literature suggests that high-quality issuers and high-quality underwriters match with each other (Carter, Dark, and Singh (1998) and Fernando, Gatchev, and Spindt (2005), among others), we also test whether the quality of underwriters can predict subsequent returns. Using underwriter reputation ranks (*Underwriter Rank*) from Loughran and Ritter (2004) based on the 1 (low) to 9 (high) prestige scale introduced by Carter and Manaster (1990), we measure the quality of the lead left bookrunner for the SPAC IPO.<sup>26</sup>

We also test how the potential dilution from the warrants affects various returns. While some SPACs do not include any derivative securities, most of them include at least one type of derivative security, usually warrants. The *Dilution per unit* measures the fraction of a common share that derivative securities included in a unit can convert into. Based on our sample, the minimum potential dilution per unit is zero, and the maximum is 1.1 when a unit includes a warrant and a right, and a warrant converts to one common share and a right converts to one-tenth of a common share.<sup>27</sup> Therefore, there is significant variation regarding the potential dilution: when exercised, warrants and rights would become common shares, diluting the ownership of existing shareholders.

In Table 7, we also examine five other variables that can be observed around the time of the merger, but not at the time of the IPO. The first variable, *SPAC period return*, measures the annualized return for SPAC IPO investors reported in Table 3 based on our optimal redemption strategy (equation (2)). Two other factors are introduced by prior studies.

— PLACE TABLE 7 ABOUT HERE —

Motivated by Jenkinson and Sousa (2011), we focus on the SPAC shareholders' redemption decisions. Specifically, Jenkinson and Sousa (2011) classify deSPAC deals into two categories: "Good SPACs," when the price for a SPAC common share is higher than the redemption value, which is the trust value per share, and "Bad SPACs," when the price for a SPAC common share is lower than the redemption value, measured at the time of shareholder voting for the proposed mergers. They find that Bad SPACs significantly underperform

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<sup>26</sup>For the complete updated list of underwriters and their ranks, see Jay Ritter's website "IPO Underwriter Reputation Rankings (1980–2022)" (<https://site.warrington.ufl.edu/ritter/ipo-data/>).

<sup>27</sup>Rights, while less common, typically have a zero exercise price. They are essentially a fraction, usually one-tenth, of a bonus share instead of a bonus warrant topping off a SPAC unit.

Good SPACs during the deSPAC period. We revisit this issue based on SPAC shareholders' redemption decisions measured by *Redemption Ratio*.

We also revisit the [Dimitrova \(2017\)](#) finding that deSPAC performance is worse for deSPAC deals announced near the end of the deadline (typically 18 to 24 months), similar to the findings in other settings, such as in private equity ([Degeorge et al. \(2016\)](#), among others). We include  $\ln(\text{Months})$ , the logarithm of the number of months between the SPAC IPO and the business combination completion (or liquidation).

Columns 1 and 4 of [Table 7](#) report regression outcomes considering information observable at the time of the IPO, while columns 2 and 5 include variables that become available at the time of the merger. Columns 3 and 6 combine all of the factors. Inspection of [Table 7](#) shows that SPACs with sponsors with relevant industry expertise and more reputable lead left underwriters tend to outperform, while more potential dilution predicts the opposite. Interestingly, the SPAC period return has a weakly negative relationship, showing the potential wealth transfer between SPAC period shareholders and deSPAC period investors embedded in the structure of SPACs. Alternatively, this relation could be an artifact of the SPAC bubble inflating and deflating.

Echoing the findings of [Jenkinson and Sousa \(2011\)](#) and [Dimitrova \(2017\)](#) from SPACs before 2010, [Table 7](#) reports that the redemption ratio and the time between the IPO and the merger are negatively associated with the market-adjusted deSPAC period common share returns. The coefficient of -0.355 in column 3 implies that a deal with a 5% redemption ratio will have a 32% better one-year return than a deal with a 95% redemption ratio, consistent with the evidence in panel B of [Table 4](#).

In our [Table 6](#) categorizations, companies with lower sales had lower deSPAC returns. In the [Table 7](#) multivariate regressions, however,  $\ln(1+\text{Sales})$  has a weakly negative coefficient. The lack of a positive coefficient for  $\ln(1+\text{Sales})$  is attributable to the higher redemption ratios that are typical for the smaller companies; the market correctly predicts that on average these companies will produce lower returns.

### 3.3. Returns for PIPE investors

As with traditional IPOs, raising capital is often important for an operating company that goes public via a deSPAC merger. As a result, deSPAC mergers almost always have a minimum cash requirement specifying the minimum amount of cash that the SPAC must deliver to the operating company. Because redemptions are uncertain, sponsors frequently line up institutional investors to provide capital as Private Investment in Public Equity (PIPE) investors in a deSPAC merger. In addition, unaffiliated PIPE investors also provide external validation of valuations in a deSPAC merger, resulting in a lower redemption ratio.<sup>28</sup>

Of the 153 exchange-listed deSPAC mergers that were completed by March 2021 based on SPACs that went public in 2015 or later, 105 included PIPE investments in common stock and, sometimes, warrants. All of these involved one or more investors, such as a private equity firm, purchasing shares at the time of the deSPAC. Some other deSPACs involved PIPE investors purchasing convertible bonds or other securities, but because these securities are typically not traded, we cannot compute returns.

PIPE investors typically buy shares or units at \$10 each, but in many cases receive transfers from the sponsor that lowers their effective cost. [Table 8](#) shows that, on average, the effective cost for PIPE investors that purchase shares is a discount of 20.1% relative to the market price at the merger closing date. For these 105 deSPACs, the average one-year return for the PIPE investors is 9.3%, substantially higher than the average one-year return of -19.8% that public market shareholders received. Note that these numbers are not directly comparable to our [Table 4](#) deSPAC return numbers earned by public market investors because here we exclude deSPACs from the early years of our sample period and include deSPACs from the first quarter of 2021, and compute returns until March 31, 2022, rather than December 31, 2021.<sup>29</sup> The difference between the average PIPE investor return (9.3%) and the public market shareholder return (-19.8%) is greater than the 20% discount received by PIPE investors at the merger closing date mainly

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<sup>28</sup>In early 2022, almost all of the PIPE investors either received concessions or were affiliated parties. Furthermore, PIPE investments switched from common stock to structured financing, such as convertible bonds. Thus, PIPE investments no longer provide the external price validation that previously occurred. PIPE shares or units usually have no lockup period, but the unregistered shares that are issued typically are not tradable until the shares are registered, a process that might take a month or more.

<sup>29</sup>The 105 deSPACs include 24 deals in the first quarter of 2021, for which the first-year returns covers the first quarter of 2022, a down market.

because of how returns are calculated. As an illustration, if a PIPE investor pays \$10 each for two deSPACs with market prices of \$10 and \$16.67, respectively, the average discount would be 20%. If both stocks go down 20%, to \$8.00 and \$13.33, respectively, the EW average return for public market investors would be -20%. For PIPE investors, however, the average return would be 6.7%. It is worth noting that even though average PIPE returns are a positive 9.3% in the year after the investment, they still underperformed the market.

— PLACE TABLE 8 ABOUT HERE —

We also categorize the PIPE deals in two ways in [Table 8](#). Our first categorization is based on the size of the PIPE investments relative to the SPAC IPO proceeds. The 52 deSPACs with a high PIPE/IPO proceeds ratio on average received a relatively large discount for the purchase price, and subsequently produced a high average one-year return of 32.4%. By contrast, the 53 deSPACs with a low PIPE/IPO proceeds ratio produced average returns of -13.4%. The next categorization is based on the redemption rate of the SPAC. The average one-year deSPAC return for PIPE investors is 15.5% for deals with low redemption ratios, higher than the 2.9% for deals with high redemption ratios. PIPE investors in these latter deals buy in at an average discount of only 6.7%, mainly because the market price at the time of the deSPAC is typically close to \$10 per share, whereas the market price for low redemption deals is typically much higher, resulting in a high average discount to the market price for PIPE investors of 33.1%.

## 4. Sponsor Compensation Renegotiations and Their Returns

In this section, we discuss the compensation of SPAC sponsors and SPAC IPO underwriters from a new angle, namely, the downward renegotiation of their compensation when the merger is being negotiated and finalized. We analyze the 153 business combinations by SPAC IPOs from 2015 or later that were completed by March 2021. We collect the relevant data from EDGAR filings and SPAC Research. Internet Appendix Section A5 provides more details.

In column 1 of [Table 9](#), we report the percentage of these deSPACs for which sponsors or underwriters take a haircut. Panel A reports that 53% of the time, the sponsor unconditionally forfeits shares. In columns 2 and 3, we split the 153 completed mergers into groups with below- and above-median redemption ratios. As a typical definitive agreement for a business

combination specifies a minimum amount of cash to be delivered to the merging company, the SPAC shareholder redemption decisions can affect the probability that a merger will be completed. Panel A shows that the average redemption ratio for the below-median redemption group is 2%, while it is 73% for the above-median group, confirming the bimodal nature of SPAC shareholder redemption decisions implied by the optimal redemption strategy. Panel A also documents that for business combinations with high redemption ratios, sponsors forfeit some of their common shares 66% of the time and warrants 39% of the time. But even business combinations with low redemption ratios see sponsors surrender some of their promote common shares in 39% of the deals and private placement warrants 21% of the time. The modest correlation between redemption rates and sponsor forfeitures reflects several factors. Forfeitures are sometimes negotiated before a merger announcement, and may reflect success in attracting third-party PIPE money, which would discourage redemptions. In other cases, forfeitures occur close to the merger date, and reflect the need of the sponsor to offer inducements in order to discourage an even higher redemption rate.

— PLACE TABLE 9 ABOUT HERE —

Panel B of Table 9 reports the magnitudes of these forfeitures, and the same pattern arises: while sponsors surrender 9% of their promote common shares on average for business combinations with low redemption ratios, they forfeit 25% of their promote common shares for high redemption deals. The percentages of forfeitures of private placement warrants are 12% and 26%, respectively, for low and high redemption groups.

Underwriters commonly receive 2% of the 5.5% underwriting commission at the time of the IPO for all shares sold, with the remaining 3.5% deferred until there is a business combination. The renegotiations of the deferred underwriter commissions show the same pattern as sponsor promotes: underwriters give up some portion of their commissions more often for higher redemption deals, although these concessions are not as frequent as sponsor haircuts.

We then focus on the extra payments that are offered to various investors to induce their investments. New capital augmenting the cash in the trust account, including both forward purchase agreement (FPA) and PIPE money, is an important component of many SPAC mergers. Panel A of Table 9 reports that 80% of the business combinations during our sample period involve

new capital. PIPE investments serve two important functions. The PIPE investment, when done by an outside entity, such as a private equity firm or a mutual fund, serves to certify that the deal is attractive, and thus discourages redemptions. In addition, if there are substantial redemptions, the PIPE investment provides capital to meet the minimum cash requirement of a merger agreement.

Investors often receive shares, warrants, or both as inducements. These inducements exist in 31% of our sample, and often come from sponsor forfeitures. We measure the magnitude of these inducements by dividing the number of common shares and/or warrants received by various parties by the number of sponsor promote common shares and/or private placement warrants. We measure these two types separately, and the average inducements are 7% for common shares and 22% for warrants.

Our interpretation is that sponsors often transfer some of the shares and warrants to PIPE investors or existing shareholders (such as hedge funds that agree not to redeem) to keep weak deals from collapsing, and underwriters forgo some of their deferred compensation for the same reason. It is noteworthy that, sometimes, the inducements are larger than the sponsor haircuts, which happens when merging company shareholders also pay part of the inducements, in the process diluting their ownership (or equivalently, reducing the premoney valuation of the operating company). Therefore, the source of an inducement depends on the bargaining power dynamics during the merger process.

Panel A of [Table 9](#) reports an average redemption ratio of 37%, and panel B reports that 41% of cash delivered is new capital, with the other 59% being cash from the trust fund, net of redemptions, deferred underwriter fees, and other fees.<sup>30</sup> Using these averages, for a \$200 million SPAC IPO, with 20 million shares issued to the public and a 5 million share promote, there would be \$126 million + interest left in the trust fund before \$7 million of deferred underwriter fees are subtracted, netting \$119 million + interest in cash (assuming that no other fees are taken out). If this \$119 million represents 59% of cash delivered, PIPE and FPA cash would be \$82 million, received for issuing 8.2 million (or slightly more shares if there were fees associated with raising this capital) new shares. After redemptions, there would be 12.6 million public shares, 5 million sponsor shares, and at least 8.2 million PIPE and FPA shares, for a total of at least 25.8 million

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<sup>30</sup>Our sample period ends with mergers completed by March 2021. For the 277 mergers completed in April 2021 – December 2022, the average redemption rate of 63% reported by SPAC Research has been dramatically higher.



"outside" shares, with \$201 million of cash delivered before other fees. If we assume \$8 million in other fees and \$2 million in trust interest, the cash delivered would be  $\$201 - \$8 + \$2 = \$195$  million, with at least 25.8 million shares issued. The cash delivered per share would therefore be  $\$195 \text{ million} / 25.8 \text{ million} = \$7.56$  or a little less, close to the mean of \$7.46 per share (\$8.13 median) reported in the last row of panel B of [Table 9](#). The mean of \$7.46 cash delivered per share is affected by several factors. If there are no redemptions and a 20% promote, the cash per share would be \$8.00 before interest is added and deferred underwriter fees are subtracted. Redemptions will lower this number, and PIPE investments at \$10 per share will increase it.<sup>31</sup>

Finally, we estimate sponsors' returns taking into account the sponsor compensation concessions documented in [Table 9](#). Sponsors typically pay \$25,000 in total for 20% of the shares outstanding after the IPO and buy warrants at \$1-\$1.50 per warrant, investing about \$7 million for a \$200 million SPAC IPO.<sup>32</sup> The sponsor warrants typically have more attractive terms than the public warrants (in particular, no upside cap due to forced exercise if the stock price hits \$18). On the other hand, as we report in [Table 9](#), the sponsor may have to forfeit some of its shares, or agree to a lengthy lockup with vesting provisions that allow early release only if the stock price achieves certain targets. Sponsors may also make a PIPE investment at the time of a merger in order to keep the deal from collapsing, substantially increasing the sponsor's investment.

Because sponsors generally cannot sell any of their shares or warrants acquired at the IPO until at least 6 months after a deSPAC, there is no purpose to decompose the sponsor returns into SPAC and deSPAC periods, as we do with public shareholders. It is in general not possible to calculate realized returns because one can only approximate the price and time at which some shares or warrants are sold. Nevertheless, using market prices at the end of the period of their analysis, [Klausner et al. \(2022\)](#) report mean sponsor returns of 549% for their sample of 47 deSPACs from January 2019 to June 2020.<sup>33</sup>

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<sup>31</sup>The average \$7.46 cash per share that is delivered in our sample is higher than the average of \$4.10 cash per share calculated by [Klausner et al. \(2022\)](#). Their lower number is due to a difference in sample periods, differences in the treatment of warrants, and differences in the treatment of other fees and the proceeds from structured financing. These issues are discussed in greater detail in Internet Appendix Section A3.1 and Section A5.1.

<sup>32</sup>This calculation is based on the initial trust fund of \$10.00. It will be \$11 million if the sponsor overfunds the trust fund to \$10.20, a practice that became common in 2022.

<sup>33</sup>J.P. Morgan, in its February 8, 2021 *Eye on the Market* newsletter, reports a mean return of 648% assuming a 25% share forfeiture for 90 SPACs that were either liquidated or completed a deSPAC between January 2019 and the beginning of 2021. Although these high returns are not annualized returns, and were calculated using a period when investor sentiment about SPACs was rising, they suggest why in 2021 the supply of



Table 10 reports the average dollar value of sponsor gains (net of at-risk capital) for the 162 deals that either merged or liquidated by March 2021 for the SPACs that went public since 2015 (the same sample period as in Table 9, with nine liquidated deals included). We calculate these gains both at the completion of a deSPAC transaction (merger or liquidation) and at the one-year anniversary of the deSPAC transaction. The sponsor investment is the amount of at-risk capital invested at the time of the IPO, and the payoff is the market value of stock and warrants retained by the sponsor (net of forfeitures). The sponsor's terminal stake in a liquidated deal is set at zero. We calculate the payoffs for two extreme scenarios: 1) locked-up shares that are subject to vesting requirements are valued the same as freely tradeable shares, and 2) locked-up shares subject to vesting requirements are worthless. We then calculate both total and annualized returns for the sponsor at the deSPAC anniversary.<sup>34</sup> In both scenarios, we assume that sponsor warrants are valued the same as public warrants.

— PLACE TABLE 10 ABOUT HERE —

The top row of Table 10 shows that one year after the deSPAC, the total return for sponsors is between 619% and 748%, depending on what one assumes about shares subject to vesting restrictions. This total return percentage is equivalent to the net TVPI (Total Value-to-Paid In capital) ratio used in private equity performance measurement. The average annualized return is between 113% and 134%.<sup>35</sup> The average net dollar gains for the sponsors are between \$73 million and \$82 million at closing and between \$51 million and \$62 million one year after the deSPAC. The numbers are lower at the one-year anniversary of the deSPAC than at the time of the deSPAC because the average return after the merger is negative.

The extremely high returns, in both dollar terms and percentages, for sponsors suggest why there was such a big increase in the supply of SPAC IPOs during 2020 and 2021. It is also worth

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new SPAC IPOs surged to unprecedented levels. See <https://privatebank.jpmorgan.com/content/dam/jpm-wm-aem/global/pb/en/insights/eye-on-the-market/hydraulic-spacing.pdf>, retrieved as of June 2022

<sup>34</sup>Part of these returns is arguably compensation for the expertise and efforts of the sponsors.

<sup>35</sup>For liquidated deals, regardless of the length of time until liquidation, we set the annualized sponsor return at -100% per year. Table 10 ends with deSPACs in March 2021. In the next two quarters of 2021, there were another 122 deSPACs (and no liquidations). If these deSPACs were included, the EW average one-year dollar gain, assuming unvested shares are counted at zero value, would fall from \$51 million in Table 10 to \$46 million, the average total return from the IPO to the one-year deSPAC anniversary would fall from 619% to 510%, and the average annualized return would fall from 113% to 110%. For these 122 deSPACs, few sponsor shares were forfeited, boosting returns, which largely offset the lower profit per share from falling stock prices after the deSPAC. Internet Appendix Table A5 updates Table 10 to include deSPACs from the April to September 2021 period.

noting that the median annualized return, while lower than the mean annualized return, is still 82% even in our most conservative calculation. These high sponsor returns provide ammunition to SPAC critics who argue that public market investor returns are low partly because the middlemen (the underwriters and sponsors) are getting too big a portion of the pie.

## 5. Out-of-Sample Return Forecasts

In our Internet Appendix Section A2, we document the recent evolution of dilution percentages (i.e., fractions of a warrant per unit) and discuss other changes in contractual terms that have occurred. Here, we explain why we expect that SPAC IPO investors, sponsors, and underwriters will be earning lower returns and fees in the near future, compared to what we document in our sample period.

In 2020–2022, the SPAC market has gone through a boom and bust cycle. The number of SPAC IPOs increased from 2 in 2010 to 248 in 2020, and then 613 in 2021. As SPAC market prices rose in 2020 and the first 2 months of 2021, average returns for all categories of SPAC investors rose. In the 18 months starting in March 2021, prices and SPAC IPO volume have fallen substantially, with only 86 IPOs in 2022.

While there is no widely agreed-on explanation for the SPAC IPO boom and bust of 2020–2022, some commentators attribute the SPAC boom to inflows from retail investors associated with the COVID-19 crisis. The hypothesis is that during 2020–2021 many individuals were at home and were not spending money on restaurant meals and in-person entertainment, among other services.<sup>36</sup> Instead, some of them were speculating in the stock market, either directly or via vehicles, such as Cathie Woods' ARK Innovation ETF (ticker ARKK), which saw large investor inflows in late 2020 and early 2021.<sup>37</sup> These inexperienced retail investors in many cases had a preference for “cool” companies. As happened in the internet bubble of 1999 to 2000, the valuations on some of these companies that had limited public floats were bid up to levels that were difficult to justify.

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<sup>36</sup>See, for example, the comments of Ortenca Alija, the M&A editor of the *Financial Times*, at <https://www.ft.com/content/1fecedf0-bf22-4e61-875a-5c185f441d12>. Retrieved in July 2022

<sup>37</sup>On October 5, 2021, the 46 stocks that ARKK held included positions of more than \$780 million in total in three deSPAC companies. See <https://ark-funds.com/wp-content/uploads/funds-etf-pdf/ARKK-holdings-1633462423-93580410428615263.pdf>, where holdings in DraftKings, Skillz, and Ginkgo Bioworks are reported. Retrieved in July 2022.

As of January 2023, 530 SPACs either were looking for a merger partner or had announced, but not completed, a merger. These SPACs, many of which went public in the first quarter of 2021, have the clock ticking, with an average time until the SPAC must liquidate of less than 12 months. Yet 2022 saw only 102 completed mergers, suggesting that 80% or so of these 530 SPACs will wind up liquidating. An 80% liquidation rate will dramatically lower both SPAC IPO investor returns and sponsor returns. In 2022, 141 SPACs liquidated. The annualized return of 23.9% earned by SPAC IPO investors in [Table 3](#) and the annualized sponsor return of 113% in [Table 10](#) are based on a liquidation rate of 6%. What makes the situation even worse for sponsors is that they have frequently been agreeing to onerous vesting restrictions on their sponsor shares in deals negotiated in late 2021 and 2022.

Underwriter compensation will also drop substantially. Underwriters will not be receiving their 3.5% of deferred underwriting fees on SPAC IPOs that wind up liquidating. Even for those that do not liquidate, underwriters may have to take haircuts to prevent the mergers from collapsing. If 500 SPACs with average IPO proceeds of \$300 million (including over-allotment options) liquidate, underwriters will miss out on over \$5 billion of deferred fees.

## 6. Conclusion

In this paper, we analyze the economic structure of SPACs and explain how the separation of merger approval and redemption decisions is designed to deal with agency problems, as is the option to redeem shares for cash and leave a SPAC with insufficient cash to complete a merger. We focus on three key participants in the market: investors, operating companies, and sponsors. We find that SPAC period investors and sponsors have been the winners, earning lucrative returns, while deSPAC period investors have earned low average returns. Between the SPAC IPO and the business combination or liquidation, we find lucrative risk-adjusted returns considering the downside protected nature of the investment. Specifically, for 458 SPAC IPOs purchased at the offer price from January 2010 to December 2020, the average annualized return during this SPAC period has been 23.9%, with all 458 returns being positive. Investing in SPAC IPOs can be viewed as investing in underpriced *default-free* convertible bonds with extra warrants.

On the other hand, investor returns in the deSPAC period on the merged companies are mixed, but poor overall. For the 152 SPACs that completed a merger with an operating company from January 2012 to December 2020, weighting each deal equally, common share investors have lost money on average, while warrant investors have earned positive returns. The EW average one-year return on the merged company shares has been -11.3%, underperforming the market by 30.7%. However, because redemption rates are high on many of the worst performing deSPACs, investor returns are not as bad as the EW numbers would suggest, with a public cash-weighted average return of -3.0%. For the 142 of 152 merged companies that had outstanding warrants, the EW average one-year post-merger return has been 72.2%, with these warrants having benefited from the bull market of 2009–2021. The price-weighted average return has been a more modest 13.5%, because many of the highest returns have been on out-of-the-money warrants. We document that PIPE investors have earned returns substantially higher than public market investors during the deSPAC period, primarily because PIPE investors have been able to buy in at an average discount of 20.1% to the market price at the time of the deSPAC. Nevertheless, PIPE investors have underperformed the market.

From a private operating company's point of view, we show that merging with a SPAC on average is much more expensive than conducting a traditional IPO. The cost to the median company of going public, as a percentage of post-merger or post-issue market cap, is 15.1% when merging with a SPAC, vs. 3.2% when using a traditional IPO. We identify the economic roles of SPAC sponsors and SPAC IPO investors and how these roles can create potential advantages of merging with a SPAC for some firms, although some of the advantages are rather marginal and have been recently challenged by the SEC.

We document that sponsors sometimes take haircuts to ensure that the SPAC has enough cash to consummate the merger. On average, sponsors give up 17% of their promote shares. Furthermore, the IPO underwriters sometimes agree to forgo some of their deferred compensation to ensure the completion of a merger. Importantly, these haircuts are state-contingent: sponsors take larger haircuts and provide more inducements, and underwriters surrender commissions more, for weaker deals. Even with these haircuts, sponsors have earned an EW average annualized return of at least 113% from the IPO to one year after the merger.

In 2020 and 2021, the SPAC market boomed, before both SPAC IPO and deSPAC transactions dropped dramatically in 2022. Market forces have resulted in SPACs adjusting their IPO terms. As of January 2023, almost 400 SPACs are searching for merger targets, with more than 150 other SPACs having announced, but not completed, mergers. Given the low rate of merger completions in 2022, unless market conditions change dramatically, most of the SPACs currently searching for targets will wind up liquidating. This dramatically higher liquidation rate suggests that current SPAC period investors and sponsors will earn much lower returns than those reported in this paper.

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**Table 1. The relative costs of going public and the speed of merging with a SPAC**

Panel A reports the costs, excluding registration, legal, and auditing fees, of three different going public methods: merging with a SPAC, a traditional IPO, or a direct listing. For both SPACs and traditional IPOs, costs are defined to be the difference between the market value of “outside” securities and the net cash received by the operating company and selling shareholders. For SPACs, outside securities are shares, warrants, and rights held by public investors, PIPE investors, and sponsors. For traditional IPOs, outside securities are the shares issued in the IPO. For direct listings, costs are the fees paid to financial advisors. For traditional IPOs, our cost measure is equivalent to the sum of underwriting commissions plus money left on the table. We use 150 SPAC mergers (after excluding 3 deals in which no cash was delivered due to high redemptions and no PIPE investment), 677 traditional IPOs, and 7 direct listings between January 2015 and March 2021. For the denominator, proceeds refer to the net cash delivered after underwriting commissions and other costs. Market cap refers to the post-merger (or post-issuance) market capitalization valued at the first closing market price. For SPAC mergers, cash delivered includes the dollar value of the trust account and the proceeds from realized forward purchase agreement (FPA) and PIPE investments. For market cap, the medians are \$646 million for SPACs and \$592 million for IPOs. For net proceeds, the medians are \$255 million for SPACs and \$108 million for IPOs. For the costs, the medians are \$92 million for SPACs and \$19 million for IPOs. For the traditional IPOs, we exclude IPOs raising more than \$500 million, those with an offer price below \$5 per share, unit offers, ADRs, closed-end funds, natural resource limited partnerships, REITs, bank and S&L IPOs, and small best efforts offers. Panel B reports average and median calendar days between merger announcements and completion of business combinations based on the year of merger announcements. The sample consists of 262 merger intent announcements between January 2017 and March 2021. There was one merger announcement in March 2021 that did not complete the business combination as of June 23, 2022. For this announcement, we include the days between the announcement and June 23, 2022.

*A. The relative costs of going public*

	SPAC (N=150)		Traditional IPO (N=677)		Direct listing (N=7)	
	Costs Proceeds	Costs Market cap	Costs Proceeds	Costs Market cap	Costs Proceeds	Costs Market cap
10th percentile	16.3%	4.4%	-4.1%	-0.8%	-	0.1%
25th percentile	29.4%	8.5%	6.9%	1.1%	-	0.1%
Median	48.3%	15.1%	21.9%	3.2%	-	0.3%
75th percentile	89.2%	27.9%	49.9%	7.1%	-	1.1%

*B. Days between merger announcements and business combinations*

Year	No. of announcements	Average days	Median days
2017	16	137	140
2018	29	164	147
2019	36	174	143
2020	94	127	120
2021(Q1)	87	173	163
<b>Total</b>	<b>262</b>	<b>153</b>	<b>147</b>

**Table 2. Characteristics of companies merging with SPACs and conducting an IPO**

Panel A compares the observable characteristics of companies merging with SPACs and companies conducting a traditional IPO (or a direct listing). The sample consists of 344 business combinations and 1,391 traditional IPOs and direct listings between January 2013 and December 2021. We break down the sample into two periods, between 2013 and 2020 as the first period (145 business combinations and 1,080 traditional IPOs) and 2021 as the second period (199 business combinations and 311 traditional IPOs). Sales are measured based on the last 12 months (LTM) revenue prior to the listing date, adjusted to January 2021 purchasing power and reported in millions. Age is calculated as the difference between the calendar year of listing and the founding year, capped at 80 years. Profitability is a (0,1) dummy variable based on the LTM pro forma net income prior to the listing date (or the previous fiscal year if the LTM net income is not available). Tech and biotech are (0,1) dummy variables following Jay Ritter’s SIC-code-based classification (see Ritter (2023)). Panel B reports results from probit models (1 = SPAC merger, 0 = IPO or direct listing) defined in Equation (1) and given by

$$\text{Merging with a SPAC}_i = a * \ln(1 + \text{sales})_i + b * \ln(1 + \text{age})_i + c * \text{Profitable}_i + d * \text{Tech}_i + e * \text{Biotech}_i + e_i$$

*A. Comparing observable characteristics*

	Firms merging with SPACs				Firms doing a traditional IPO			
	Average	25%	50%	75%	Average	25%	50%	75%
<b>2013–2020</b>								
Sales (\$M)	377	25	149	424	742	1	69	348
Age (years)	19	6	11	25	16	6	10	17
Profitable	31%				27%			
<b>2021</b>								
Sales (\$M)	333	2	64	247	422	1	108	388
Age (years)	13	6	10	15	15	6	11	18
Profitable	14%				25%			

*B. Probit regressions*

	<i>Merging with a SPAC = 1</i>			
	(1)	(2)	(3)	(4)
<i>ln(1+sales)</i>	0.035** (0.017)	-0.112*** (0.022)	0.050*** (0.018)	-0.086*** (0.023)
<i>ln(1+age)</i>	-0.021 (0.053)	0.004 (0.055)	-0.029 (0.057)	-0.031 (0.059)
<i>Profitability</i>	-0.226** (0.090)	-0.377*** (0.093)	-0.100 (0.096)	-0.268*** (0.100)
<i>Tech</i>		-0.465*** (0.084)		-0.540*** (0.091)
<i>Biotech</i>		-1.697*** (0.129)		-1.710*** (0.141)
Year FE	No	No	Yes	Yes
No. observations	1,735	1,735	1,735	1,735
Pseudo-R-sq.	.005	.120	.146	.243

**Table 3. SPAC period returns**

Panel A reports equally weighted annualized SPAC period returns for SPACs that went public between January 2010 and December 2020 and were exchange-listed based on Equation (2). We calculate annualized returns based on the optimal redemption strategy in which an investor purchases a SPAC unit at the offer price and sells (or redeems, if redemption is available and the redemption value is higher than the market price) each component of the SPAC unit at the closing price of five trading days prior to the consummation of a business combination or liquidation. To avoid any look-ahead bias in the return calculations, we include 117 ongoing SPACs as of December 31, 2021, and use market prices at the end of December 2021 for their returns. Panel B reports the average returns and duration (average months) based on the status of these 458 SPACs. Average months refers to the months between the SPAC IPO date and a business combination completion date, the liquidation date, or December 31, 2021 (for ongoing SPACs). Panel C reports annualized SPAC period returns based on equal weighting, SPAC IPO proceeds weighting, and the median for the 458 SPAC IPOs.

*A. Based on year of SPAC IPO*

Year	Number of SPACs	Annualized returns
2010	2	1.4%
2011	6	3.4%
2012	9	3.9%
2013	10	11.0%
2014	11	5.4%
2015	20	6.1%
2016	13	19.6%
2017	34	9.4%
2018	46	19.3%
2019	59	26.1%
2020	248	30.7%
<b>Total</b>	<b>458</b>	<b>23.9%</b>

*B. Based on outcomes*

Outcome	Number of SPACs	Annualized returns	Average months
Merger completed	321	33.2%	16.7
Liquidated	20	2.0%	26.5
Ongoing	117	2.3%	14.7
<b>Total</b>	<b>458</b>	<b>23.9%</b>	<b>16.6</b>

*C. Different weighting methods*

	Annualized returns
Equally weighted mean	23.9%
IPO proceeds weighted mean	27.1%
Median	5.6%

**Table 4. deSPAC period common share returns**

Panel A reports average equally weighted deSPAC period common share percentage returns based on a buy-and-hold strategy (Equation (3)) in which an investor purchases common shares of a merged company on the first day of trading as a new entity and holds them for 1 or 3 years. The year column represents the year of the merger. The sample consists of 152 business combinations consummated between January 2010 and December 2020. Returns include dividend yields and capital gains. When the full 1- or 3-year data are not available, we calculate the returns based on available data. For example, if a merged company started to trade in March 2020 and delisted in August 2020, we report the buy-and-hold returns from March 2020 to August 2020 for both one-year and three-year returns (not annualized). Returns end on December 31, 2021. The CRSP return is the total return on the CRSP value-weighted market index, matched to each investment period. Panel B reports average deSPAC period common share returns based on equal weighting, post-merger market capitalization weighting, SPAC IPO proceeds weighting, public cash weighting, and the median returns. Public cash is the actual cash delivered to the merging companies from public SPAC shareholders, defined as  $Initial\ trust \times (1 - redemption\ ratio)$ .

*A. Common shares*

Year	Number	One-year returns			Three-year returns		
		SPACs	CRSP	Diff.	SPACs	CRSP	Diff.
2010	0	-	-	-	-	-	-
2011	0	-	-	-	-	-	-
2012	1	-53.2%	20.4%	-73.6%	-98.1%	37.2%	-135.3%
2013	5	-30.1%	17.9%	-48.0%	-41.1%	28.0%	-69.1%
2014	4	-51.6%	5.7%	-57.3%	-89.6%	26.7%	-116.2%
2015	9	-19.5%	0.7%	-20.2%	87.7%	33.1%	54.6%
2016	9	-5.2%	19.0%	-24.2%	-35.1%	40.3%	-75.3%
2017	13	-11.0%	11.7%	-22.6%	-44.5%	30.3%	-74.7%
2018	23	-35.0%	8.8%	-43.8%	-8.1%	51.7%	-59.8%
2019	25	2.0%	8.8%	-6.8%	13.4%	56.2%	-42.8%
2020	63	-3.0%	32.6%	-35.6%	-19.1%	40.3%	-59.4%
<b>Total</b>	<b>152</b>	<b>-11.3%</b>	<b>19.4%</b>	<b>-30.7%</b>	<b>-12.0%</b>	<b>42.6%</b>	<b>-54.5%</b>

*B. Different weighting methods*

	One-year returns	Three-year returns
Equally weighted mean	-11.3%	-12.0%
Post-merger market cap-weighted mean	-10.7%	-25.2%
IPO proceeds weighted mean	-7.9%	-9.5%
Public-cash-weighted mean	-3.0%	-6.3%
Median	-26.1%	-39.4%

**Table 5. deSPAC period warrant returns**

Panel A reports equally weighted deSPAC period warrant returns based on a buy-and-hold strategy (Equation (4)) in which an investor purchases a merged company warrants on the first day of trading as a new entity and holds them for 1 or 3 years. The year column represents the year of the merger. Panel A reports returns on warrants for 142 of 152 business combinations that have warrants, consummated between January 2010 and December 2020. Returns end on December 31, 2021. Returns include capital gains only, as warrants do not pay dividends. The Units column represents a deSPAC period investment strategy (mix of common shares and warrants) replicating the initial specification of the SPAC IPO unit. When the full one-year or three-year data are not available, we calculate the returns based on available data. For example, if a merged company started to trade in March 2020 and delisted in August 2020, we report the buy-and-hold returns from March 2020 to August 2020 as both one-year and three-year returns (not annualized). Panel B reports deSPAC period warrant returns based on equal weighting, SPAC IPO proceeds weighting, the warrant price on the first trading day as a deSPAC company weighting, and the median. Common stock returns are from CRSP. Warrant returns are from Bloomberg and Refinitiv.

*A. Warrants*

Year	Number	One-year returns			Three-year returns		
		Common	Warrants	Units	Common	Warrants	Units
2010	0	-	-	-	-	-	-
2011	0	-	-	-	-	-	-
2012	1	-53.2%	-7.1%	-49.8%	-98.1%	-98.6%	-98.2%
2013	4	-28.7%	81.3%	-17.6%	-43.7%	35.0%	-34.8%
2014	3	-46.5%	-38.3%	-47.1%	-94.6%	-91.1%	-94.7%
2015	6	-45.6%	-40.9%	-43.9%	-10.3%	68.6%	-4.8%
2016	8	1.4%	-1.9%	3.2%	-28.8%	-0.4%	-25.2%
2017	11	-13.8%	3.3%	-13.0%	-37.5%	-20.7%	-36.7%
2018	22	-38.8%	-17.0%	-37.5%	-5.7%	94.2%	-1.5%
2019	25	2.0%	38.4%	3.3%	13.4%	122.6%	15.7%
2020	62	-1.9%	153.1%	4.3%	-18.2%	132.0%	-10.6%
<b>Total</b>	<b>142</b>	<b>-11.6%</b>	<b>72.2%</b>	<b>-7.9%</b>	<b>-15.4%</b>	<b>93.5%</b>	<b>-10.3%</b>

*B. Different weighting methods*

	One-year returns	Three-year returns
Equally weighted	72.2%	93.5%
IPO proceeds weighted	54.2%	61.1%
Warrant price at T=0 weighted	13.5%	20.6%
Median	-7.5%	-19.0%

**Table 6. Cross-sectional patterns on deSPAC common shares and traditional IPOs**

Table 6 reports equally weighted one-year deSPAC period common share returns (panel A) and traditional IPO returns (panel B) sorted by sales and profitability with sample sizes in parentheses. The sample period for 152 SPAC mergers and 1,167 traditional IPOs is between 2012 and 2020 (same as Table 4). The IPO sample uses the same screens as in Table 1, with the exception that IPOs with proceeds above \$500 million are not excluded. Sales are measured based on the last 12 months (LTM) revenue prior to the business combination consummation date or the IPO date, reported in millions of January 2021 purchasing power. We use the previous fiscal year if the LTM revenue is not available. Profitability is measured based on pro forma net income for the LTM prior to the business combination consummation date or the IPO date. We use the previous fiscal year if the LTM net income is not available. SPAC, CRSP, and abnormal returns are the same as defined in Table 4. IPO returns are measured from the first closing market price. Style adjustments use firms matched by market cap and book-to-market ratio with at least 5 years of CRSP listing and no follow-on equity issues in the prior 5 years.

*A. SPAC mergers (2012–2020)*

	One-year returns from deSPAC		
	SPAC	CRSP	Diff.
<b>Total (N = 152)</b>	<b>-11.3%</b>	<b>19.4%</b>	<b>-30.7%</b>
<b>Sales &gt; \$100 million (84)</b>	<b>-5.4%</b>	<b>16.2%</b>	<b>-21.6%</b>
Profitable (42)	-1.1%	15.0%	-16.1%
Not profitable (42)	-9.7%	17.5%	-27.2%
<b>Sales &lt; \$100 million (68)</b>	<b>-18.6%</b>	<b>23.2%</b>	<b>-41.8%</b>
Profitable (16)	-17.2%	18.9%	-36.1%
Not profitable (52)	-19.0%	24.5%	-43.5%

*B. Traditional IPOs (2012–2020)*

	One-year returns from first close		
	IPO	Style	Diff.
<b>Total (N = 1,167)</b>	<b>14.0%</b>	<b>15.7%</b>	<b>-1.7%</b>
<b>Sales &gt; \$100 million (549)</b>	<b>18.5%</b>	<b>15.9%</b>	<b>2.6%</b>
Profitable (283)	25.3%	16.8%	8.5%
Not profitable (266)	11.4%	15.0%	-3.6%
<b>Sales &lt; \$100 million (618)</b>	<b>10.0%</b>	<b>15.9%</b>	<b>-5.9%</b>
Profitable (52)	2.1%	10.2%	-8.1%
Not profitable (566)	10.7%	15.9%	-5.2%

**Table 7. Predicting deSPAC period common share returns**

Table 7 examines whether observable characteristics can predict deSPAC period common share returns. The sample consists of 152 business combinations completed between January 2012 and December 2020, the same as Table 4. The table reports output from regressions having one- and three-year market-adjusted deSPAC returns as the dependent variables. Returns and redemption ratios are measured in decimal format (e.g., a return of -30% and a redemption ratio of 90% are measured as -0.30 and 0.90). Market return is the total return on the CRSP value-weighted market index, matched to each investment period. *Sponsor Expertise* is a dummy variable equals 1 if one or more key members of a sponsor have work experience in an industry that a merging company operates in, and equals 0 otherwise. *Underwriter Rank* measures SPAC IPO underwriters' reputation following Loughran and Ritter (2004). *Dilution per Unit* measures the fraction of a common share that derivative securities included in a unit can convert into. *SPAC Period Return* uses annualized returns calculated in Table 3 corresponding to each merger. *ln(Months)* refers to the natural logarithm of the number of months between the IPO date of a SPAC and its business combination date. Standard errors are reported in parentheses. *ln(1+Sales)* is the natural logarithm measured based on the last 12 months (LTM) revenue prior to the business combination consummation date or the IPO date, reported in millions and purchasing power adjusted to the January 2021 level. We use the previous fiscal year if the LTM revenue is not available. *Profitability* is a (0,1) dummy variable based on the LTM pro forma net income prior to the listing date (or the previous fiscal year if the LTM net income is not available). \* $p < .1$ ; \*\* $p < .05$ ; \*\*\* $p < .01$ .

Dependent variable	One-year market-adjusted deSPAC common returns			Three-year market-adjusted deSPAC common returns		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Sponsor expertise</i>	0.255** (0.127)		0.139 (0.141)	0.270 (0.198)		0.218 (0.201)
<i>Underwriter rank</i>	0.018 (0.028)		0.054 (0.033)	0.0437 (0.053)		0.087* (0.049)
<i>Dilution per unit</i>	-0.519* (0.267)		-0.311 (0.236)	-0.710 (0.567)		-0.550 (0.552)
<i>SPAC period return</i>		-0.138 (0.094)	-0.184* (0.095)		-0.128 (0.101)	-0.205** (0.095)
<i>Redemption ratio</i>		-0.492** (0.200)	-0.355 (0.250)		-0.240 (0.186)	-0.020 (0.212)
<i>ln(Months)</i>		-0.537** (0.240)	-0.541** (0.227)		-0.473* (0.280)	-0.475** (0.232)
<i>ln(1+Sales)</i>		-0.015 (0.012)	-0.023* (0.013)		-0.002 (0.026)	-0.017 (0.013)
<i>Profitability</i>		0.142 (0.123)	0.212 (0.129)		0.139 (0.171)	0.258 (0.160)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	152	152	152	152	152	152
Adj. R-squared	.037	.129	.162	.075	.041	.083

**Table 8. deSPAC period PIPE returns**

Table 8 reports the performance of PIPE investments in the deSPAC period with returns through March 31, 2022. *Discounts from closing prices* are the percentage discounts that PIPE investors receive compared to the market prices of common shares and/or warrants on the business combination closing date. For example, if PIPE investors pay \$50 million for 5 million shares and receive 500,000 sponsor warrants, when the stock is trading for \$11 per share and public warrants are trading for \$2 per warrant, the discount would be \$6 million divided by \$56 million, or 10.7%. *One-year returns* for PIPEs are the returns of PIPE investments in stock and/or warrants from the total dollar investments (based on the discounted prices for PIPEs) to the market prices of the investments on the first anniversary date of the merger. For a comparison, we report one-year common shares returns and total returns on the CRSP value-weighted market index, matched to each investment period. We use a sample of 105 business combinations with PIPE investments in operating companies' stocks – a subsample of the 153 business combinations completed as of March 2021 by the SPACs that went public since January 2015 (same sample as Table 9). 48 mergers did not have PIPE investments in shares. We also split the sample in two different ways: the **PIPE/IPO** split is based on the ratio of the amount of total PIPE investments (including investments in common shares, convertible debt, and preferred shares) over the proceeds of the SPAC IPO; the **Redemption** split is based on the redemption ratio, that is, the number of SPAC IPO shares redeemed as a percentage of the total number of shares offered at the IPO. These sample splits are based on the median value of the respective ratio measured over the 105 business combinations. Observations are equally weighted. Returns are calculated with stock and warrant prices from Bloomberg.

	Number		Discounts from	One-year returns		
			Closing prices	PIPEs	Common Shares	CRSP
Full sample	105 (of 153)	Mean	20.1%	9.3%	-19.8%	19.2%
		Median	19.7%	-18.6%	-43.2%	18.8%
PIPE/IPO	Low 53	Mean	10.0%	-13.4%	-25.9%	16.7%
		Median	13.4%	-23.5%	-36.7%	16.7%
	High 52	Mean	30.3%	32.4%	-13.6%	21.8%
		Median	29.9%	-12.0%	-45.4%	22.2%
Redemption	Low 53	Mean	33.1%	15.5%	-22.8%	18.1%
		Median	33.8%	-18.0%	-50.3%	18.8%
	High 52	Mean	6.7%	2.9%	-16.8%	20.3%
		Median	5.2%	-19.9%	-34.1%	18.5%



**Table 9. deSPAC negotiations: Forfeitures, inducements, new capital, and vesting provisions**

Table 9 examines some outcome characteristics of business combination negotiations. The sample consists of 153 business combinations completed as of March 2021 by the SPACs that went public since January 2015. Panel A reports the average redemptions and the frequencies of sponsors forfeiting their promotes, inclusions of vesting (earnout) provisions on sponsor promotes, underwriters surrendering their deferred commissions, inducements (transfers), and new capital involved in the merger. Inducements include shares or warrants transferred from the sponsor, which are also included as forfeitures, and often involve warrants that are newly issued by the company. Panel B reports means and medians (in parentheses) on the magnitudes of the forfeitures, sponsor shares subject to vesting restrictions, inducements, and new capital. We report the statistics for the whole sample and the low- and high-redemption subsamples based on the median redemption ratio of 22%.

*A. Frequency of haircuts and inducements*

	Total Sample	Low Redemption	High Redemption
Average redemption ratio	37%	2%	73%
<b>Percentage of deSPAC deals in which</b>			
(1) Sponsors forfeit common shares	53%	39%	66%
(2) Sponsors forfeit warrants	30%	21%	39%
(3) Sponsor shares have vesting provisions	27%	26%	27%
(4) Underwriters forfeit deferred commissions	7%	4%	9%
(5) Provide inducements	31%	24%	38%
(6) Have new capital (e.g., PIPEs)	80%	86%	74%

*B. Magnitude of haircuts and inducements*

	Total Sample	Low Redemption	High Redemption
(1) % of sponsor common shares forfeited	17% (3%)	9% (0%)	25% (23%)
(2) % of sponsor warrants forfeited	19% (0%)	12% (0%)	26% (0%)
(3) % of sponsor shares having vesting provisions	11% (0%)	13% (0%)	9% (0%)
(4) % of underwriter deferred fees forfeited	4% (0%)	2% (0%)	5% (0%)
Conditional on nonzero forfeiture	53% (57%)	53% (59%)	53% (55%)
(5) Inducement shares as % of sponsor shares	7% (0%)	4% (0%)	11% (0%)
Inducement warrants as % of sponsor warrants	22% (0%)	16% (0%)	29% (0%)
(6) New capital as % of total cash delivered	41% (41%)	37% (40%)	45% (42%)
New capital as % of SPAC IPO proceeds	62% (40%)	84% (67%)	40% (23%)
(7) Cash delivered per share	\$7.46 (\$8.13)	\$8.59 (\$8.62)	\$6.34 (\$7.00)

**Table 10. Sponsor returns**

Table 10 reports the mean and median of sponsors' dollar gains at the closing of the deSPAC and one year after the deSPAC. The sponsor at-risk capital is the sponsor's total cash contribution, which is used to purchase either warrants or units in the private placement, at the time of the SPAC IPO. We also report the total and annualized returns one year after the deSPAC, net of sponsor at-risk capital, with returns through March 31, 2022. *Dollar gains* are the market value of the sponsor's stakes in a SPAC, including promote shares and warrants or units from private placements, minus the amount of at-risk sponsor capital. We calculate the *Dollar gains* at Closing with the stock and warrant prices from Bloomberg at the closing date of a deSPAC merger. We use the market price of the traded warrants issued to investors as the price for sponsor warrants. For liquidated deals, the market value of the sponsor's stakes is set at zero. For the calculations of the *Dollar gains* at one year, we use the market prices at the anniversary of a deSPAC merger or zero for liquidated deals. *Total one-year ret (%)* is the percentage growth of the sponsor at-risk capital (*Dollar gains* divided by at-risk capital) at the first anniversary after the deSPAC merger or liquidation. The *Annual one-year ret (%)* is the annualized return from the SPAC IPO to the anniversary of a deSPAC merger or liquidation. For example, for a merger that occurred 1.5 years after the SPAC IPO, the *Annual one-year ret (%)* would be calculated 2.5 years after the SPAC IPO using the value of the sponsor's stake at the anniversary relative to its at-risk capital investment. Both the total and annualized one-year returns for a liquidated deal are -100%. As indicated at the top of the panel, the first set of *Dollar gains* or *One-year returns (%)* are calculated with the shares (or warrants) subject to vesting requirements being counted at the full value (no shares will be forfeited), while the second set assigns a zero value to any shares or warrants that are subject to vesting requirements. The sample in this panel includes all completed business combinations or liquidations by the end of March 2021 by SPACs that went public in 2015 or later. We first report the summary statistics for the full sample (153 completed business combinations and 9 liquidations). We also report the summary statistics for the sample of the 153 completed mergers split by the median of the redemption ratios.

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			Sponsor	Vesting counted at full value				Vesting counted at zero value				
			At-risk	Dollar gain (\$M)		One-year ret (%)		Dollar gain (\$M)		One-year ret (%)		
		No.	Capital (\$M)	Closing	One year	Total	Annual	Closing	One year	Total	Annual	
Full sample		162	Mean	\$7.5	\$82	\$62	748%	134%	\$73	\$51	619%	113%
			Median	\$6.8	\$50	\$25	394%	93%	\$40	\$19	328%	82%
Redemption Rate for Completed Mergers	Low	77	Mean	\$8.7	\$131	\$100	1,107%	217%	\$117	\$83	915%	185%
			Median	\$7.5	\$99	\$63	753%	140%	\$74	\$50	650%	136%
	High	76	Mean	\$6.3	\$43	\$32	483%	77%	\$37	\$26	403%	65%
			Median	\$6.0	\$26	\$16	266%	54%	\$21	\$11	205%	42%