SPACs *

Minmo Gahng†
Warrington College of Business, University of Florida

Jay R. Ritter‡
Warrington College of Business, University of Florida

Donghang Zhang§
Darla Moore School of Business, University of South Carolina

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Abstract

Special Purpose Acquisition Company (SPAC) IPOs boomed starting in 2020. While SPAC IPO investors have earned 9.3% per year, returns for investors in merged companies are more complex. Depending on weighting methods, they have earned -4.0% to -15.6% in the first year on common shares but 15.6% to 44.3% on warrants. We rationalize why certain companies go public via a SPAC merger despite their high costs by identifying the economic roles of SPAC sponsors and investors. Sponsors transfer more than 30% of their compensation to other investors as inducements to complete mergers. SPACs are evolving towards a more sustainable equilibrium.

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†University of Florida, Warrington College of Business; Ph.D. Student in Finance; Tel: (352) 392-8913, Email: **minmo.gahng@warrington.ufl.edu**.

‡**Corresponding Author**: University of Florida, Warrington College of Business; Cordell Eminent Scholar and Professor of Finance; Tel: (352) 846-2837, Email: **jay.ritter@warrington.ufl.edu**.

§University of South Carolina, Darla Moore School of Business; Professor of Finance; Tel: (803) 777-0242, Email: **zhang@moore.sc.edu**.

1. Introduction

In 2020, the U.S. IPO market boomed, with 165 operating companies going public, raising $61.9 billion. IPOs by a Special Purpose Acquisition Company (SPAC) set records. A total of 248 SPAC IPOs raised $75.3 billion, more capital raised than in all previous years combined (Figure 1).[1]

A SPAC, a blank check company created by a sponsor, goes public to raise capital and then find a non-listed operating company to merge with, in the process taking the company public. 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 warrant (a call option issued by the company) entitling the holder to buy a fraction of a share at an exercise price of $11.50 with a maturity date that is five years after the completion of a merger. Importantly, the money raised in the IPO is placed in an escrow account (trust) where it earns interest. The units later become unbundled, allowing the shares and warrants to trade separately.

SPACs usually pay 5.5% of the proceeds as underwriting commissions, with 2% paid at the time of the IPO and the rest deferred – payable only upon the completion of a merger (business combination). Sponsors are typically compensated by retaining 20% of the SPAC shares, but these sponsor shares have no access to the trust account.[2] Sponsors also usually purchase private placement warrants at the time of the IPO for $1.50 each, with the millions of dollars paid for the warrants going to cover the up-front underwriting fees and future expenses, allowing the public investors to start with $10 per share in the trust account, rather than the $9.80 in net proceeds from the IPO. All of the sponsors' compensation (payoffs on their shares and warrants) and more than half of the underwriters' fees are thus contingent upon the consummation of a business combination.

[1]The operating company IPO sample includes IPOs with an offer price of at least $5.00, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, banks and S&Ls, and stocks not listed on CRSP (NYSE and NASDAQ). See Ritter (2020) (https://site.warrington.ufl.edu/ritter/files/IPO-Statistics.pdf). Both SPAC and operating company IPO proceeds exclude overallotment options.

[2]Practitioners call them "founder shares", "sponsor economics", or "promotes". Typically, the units purchased by investors include Class A shares that can vote on a merger and are redeemable. The sponsors purchase Class B shares that do not have voting privileges and are not redeemable but will convert into Class A shares, which will be subject to lockup restrictions, when a merger is completed. The sponsors typically pay a tenth of a cent for each Class B share or a similar nominal amount.

SPACs are not allowed to have pre-identified 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 investors. Once a SPAC identifies a target company and reaches an agreement for a merger, then public shareholders of the SPAC vote whether to approve the proposed business combination or not. Separately, at this time, each public shareholder decides whether to redeem their shares or not. The redemption option means that there is a money-back guaranty for SPAC 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, 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 SPACs must deliver to them. Sponsors frequently invite a PIPE (Private Investment in Public Equity) investment as a part of the business combination, providing additional cash. Sponsors themselves sometimes participate as PIPE investors.[3] These PIPE investments either offset redemptions or augment the cash that is delivered in the merger. If the merger is approved by shareholders and the SPAC still has enough cash after redemptions to meet the terms of the merger agreement negotiated with an operating company, the business combination is consummated, and the SPAC starts to trade as a newly merged company under a new ticker symbol. In the Appendix, we provide three examples of SPACs with their outcomes.

The recent rise of the SPAC market has resulted in a heated debate about SPACs among both practitioners and academics. Proponents of SPACs argue that, by giving an additional option for raising capital and listing for private companies, SPACs benefit both investors and issuers. Critics, citing poor post-merger returns, raise an incentive misalignment issue between SPAC sponsors and investors created by the fact that a sponsor receives no payoff if a merger is not completed. Furthermore, the 20% sponsor promote and 5.5% underwriting commission results in a high expense level per dollar of cash delivered, especially if many shareholders redeem their shares. Nonetheless, we have observed the market's insatiable appetite for SPACs. January 2021 saw 91 SPAC IPOs, a record pace.

[3]The 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.

— Place Figure 1 About Here —

For the empirical analysis, we first document investor returns on SPACs by dividing the lifecycle of SPACs into two periods – the SPAC period, which is between the SPAC IPO and the completion of the business combination or liquidation; and the deSPAC period, which starts from the first trading day as a merged company. To measure investor returns in the SPAC period, the first half of the life cycle of SPACs, we implement an 'optimal redemption strategy'. This strategy calculates an annualized return for an investor who purchases a SPAC unit, which generally consists of a common share and warrants and/or rights, 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.

For the 114 SPAC IPOs from January 2010 – May 2018, investors have earned on average an annualized return of 9.3%. We find that larger SPACs provide slightly higher returns, as the average IPO proceeds-weighted annualized return of 10.6% is higher than the equally weighted annualized return of 9.3%. Although SPAC period investors earn most of their returns when SPACs consummate business combinations (10.6% per year, equally weighted), even liquidated SPACs provide positive returns (2% per year, equally weighted).[4] This is because 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 9.3% an attractive average return.

Our back of the envelope calculation shows that a typical SPAC unit has been providing securities that are worth substantially more than the $10 offer price. For many years, the market did not pay attention to this 'free lunch'. We show that the market has recently become more

[4]Using 47 completed mergers in 2019 and 2020, Klausner, Ohlrogge, and Ruan (2021) report the SPAC period returns as 11.6%. We calculate returns based on SPACs that went public from 2010, including both liquidated and completed mergers. Because SPACs with completed mergers produce higher returns than liquidated SPACs, focusing only on SPACs with completed mergers overstates the SPAC period returns.

efficient, in that it has started to realize the lucrative returns of the SPAC period investment on the first day of trading rather than gradually over many months. The jumps at the opening of trading now leave less profit opportunity for investors who buy in the secondary market, the same pattern that we observe in the traditional operating company IPO market.

For the second half of the life cycle of SPACs, the deSPAC period for SPACs that consummated business combinations, 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 one or three years. We find that the average one-year buy-and-hold return of the merged companies' common shares is -15.6%, while the value-weighted CRSP return is 8.7% for the matched period. Klausner, Ohlrogge, and Ruan (2021), using a sample of 47 SPACs, document that the median SPAC only delivers $6.67 in cash per share, not $10 (the IPO price), to the merging company even after new investments from PIPE investors, because of high redemptions, underwriting fees, and the net promote. Furthermore, if the merged company is successful, the outstanding warrants are a drag on the upside returns to shareholders. Thus, it may not be surprising that the average deSPAC period market-adjusted return is substantially below zero.

We calculate the return on warrants as well and, surprisingly, find that the average one-year buy-and-hold return of the merged companies' warrants is 44.3%. We find that warrant investors have persistently outperformed common share investors, increasing the gap even more in 2020. The warrants, out-of-the-money call options in many cases, are riskier and benefit from volatility, but this large difference in average returns is puzzling.

We then focus on the dilutive nature of warrants and rights, and document that deSPAC period common shares perform worse when there are more warrants and rights outstanding. The direction of causality is an open question because it is not clear whether investors might have overlooked the dilution cost, or lower quality SPACs tend to offer more warrants and rights. 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) predict both lower SPAC and deSPAC period returns.

This paper contributes to the literature by providing a better understanding of SPACs in four ways, focusing on the economics of three key players: investors, operating (merging) companies, and sponsors; and the structure of SPACs and the evolution of the SPAC market.

First, we document investor returns in the life cycle of SPACs and interpret them based on the economic structure of SPACs. 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) and Klausner et al. (2021) 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. We also find that while the equally weighted post-merger one-year common share return is -15.6%, the public cash-weighted return is -4.0%.[5] The higher (less negative) 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 equally weighted common share returns paints a worse picture of the deSPAC period investments than what a dollar-weighted portfolio produces.

Second, from a private operating company's point of view, we find that merging with a SPAC is a much more expensive way of going public than a traditional IPO. The total cost of the median company going public via a SPAC merger between January 2019 and June 2020 was 14.1% of the post-issue market cap, while it was 4.8% for the traditional IPOs. However, we still find that many private companies choose to go public via a SPAC merger. We rationalize this choice by outlining the relative advantages of going public via merging with a SPAC over a traditional IPO. 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 negotiate a merger with an operating company in a timely manner. Moreover, in the U.S., merger law applies rather than securities issuance law for business combinations, and merger law provides a "safe harbor" provision for forecasts of future revenue and profits that security issuance law lacks, essentially providing a regulatory arbitrage opportunity for private operating companies.

[5]Public cash refers to the money that public SPAC investors leave in after redemptions, and does not include the returns on shares owned by sponsors or PIPE investors. We also call this return a dollar-weighted return.

Third, we document that sponsors give up a sizable chunk of their pre-determined compensation, making sponsor profits not as lucrative as critics suggest, especially for weak deals. On average, sponsors forfeit 34% of their common share promotes and 42% of their private placement warrants, and transfer most of them to other investors as inducements either not to redeem or to invest new capital. We document, as do Klausner et al. (2021), that not only sponsors take haircuts; underwriters surrender 24% of their deferred commissions on average. Importantly, this is the first paper to show that these haircuts are state-contingent: 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.

Finally, we document how the SPAC market is evolving. As the market has caught on to the attractive SPAC period returns, sponsors have been finding that they do not have to be as generous in order to generate sufficient demand to fully subscribe an IPO. We show that the market has been adjusting toward a more sustainable equilibrium by making the structure of the SPAC unit less attractive to the SPAC investors, but more attractive to post-merger shareholders. Specifically, we document a downward trend in the fraction of a share that the warrant component of a unit offers. If the merged company prospers and the warrants are exercised, fewer new shares will be issued, and thus there will be less dilution of the merged company's shareholders, possibly improving the deSPAC period returns.

2. 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.

2.1. The Relative Costs of Going Public

Panel A of Table 1 summarizes the costs associated with three different going public options. Merging with a SPAC includes two types of costs: direct costs payable to the SPAC IPO underwriters, and 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. The costs associated with traditional IPOs are also two-fold: the direct costs of underwriter commissions, and indirect costs from the underpricing (i.e., the money left on the table). For direct listings, the main costs are financial advisory fees that operating companies pay investment banks. For brevity, we do not consider miscellaneous costs such as SEC registration fees and legal fees for all three cases.

— Place Table 1 About Here —

For the costs associated with merging with a SPAC, we use numbers reported by Klausner et al. (2021) in their Table 5, which is based on 47 completed SPAC mergers between January 2019 and June 2020. We compute the equivalent costs for traditional bookbuilt IPOs in the U.S. over the same period. During this 18-month period there were 157 operating company IPOs (excluding units, ADRs, etc.), but some of them were much bigger than any company involved with a SPAC merger, so we screened out the 26 IPOs raising more than $500 million (Uber, Lyft, etc.) before overallotment options, resulting in 131 IPOs. For these 131 IPOs during the same time period, the proceeds-weighted average first-day return is 36.1%. For the direct listing sample, we include the six companies that went public using this method between April 2018 and October 2020.

Inspection of Panel B 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 (c.f. the median amount of cash delivered is $151.6 million for the SPAC sample, $110 million for the traditional IPO sample, and zero for the direct listing sample), and as a fraction of the post-issuance market capitalization. Merging with a SPAC is even more expensive if we compare it with direct listings.

It should be noted that the costs of merging with a SPAC that Klausner et al. (2021) calculate, and which we use in Table 1, may be too conservative, especially for strong deals. They do not include the change in the market value of the shares based on the merger announcement return, which is the equivalent of the money left on the table from a traditional IPO. For example, assume that an operating company merges with a SPAC that has $200 million in cash, with no warrants for simplicity. If the merger agreement has the operating company raising $200 million, with the SPAC holding 25 million shares (20 million public shares + 5 million sponsor promote shares) valued at $10 each and operating company shareholders receiving 50 million shares in the merged company, the implicit premoney value placed on the operating company is $500 million. If the announcement is greeted with a stock price jump from $10 to $12 per share, however, the postmoney value of the 75 million shares is $900 million, implying that the operating company should have received a premoney value of $650 million with 65 million shares. If it had, there would be 90 million shares outstanding at $10 per share rather than 75 million shares at $12 each. The difference between 50 million shares at $12 each and 65 million shares at $10 each is $50 million, and is analogous to the issuer in a traditional IPO leaving $50 million on the table.

It is important to note a possible selection issue when we compare these relative costs in Table 1. Companies choosing SPACs might be fundamentally different from companies opting for traditional IPOs, having unobservable characteristics. In other words, it is possible that companies that went public via merging with a SPAC would have experienced severe underpricing or a withdrawn deal if they had chosen traditional IPOs. Even with this caveat, however, we do not believe that selection bias can fully explain the large difference in costs between the two methods. Note that the 25th percentile of costs as a percentage of post-issue market capitalization for SPACs is 10.0%, higher than the 75th percentile for traditional IPOs of 8.7%.

Then why do certain companies select merging with a SPAC instead of a less expensive traditional IPO? 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 outline the advantages of merging with a SPAC over a traditional IPO.

2.2. 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, as the individuals behind many SPAC sponsors are industry veterans. Entrepreneurs who decide to go public via a SPAC merger often mention the benefit from sponsors' industry expertise, referring to them as business partners. Specialized sponsors can evaluate merging companies more efficiently and reach an agreement faster, which is another advantage that practitioners often mention.

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 and superior information regarding the merging companies, invest their own capital, it serves as a certification to attract PIPE investors or induce SPAC investors to not redeem their shares. Often, sponsors and their affiliates 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.

Second, having deep pockets is also important for weak deals, because merger agreements require a minimum amount of cash to be delivered as a closing condition. When most SPAC investors redeem and it is hard to find PIPE investors, deep-pocketed sponsors can invest their own money to save the deals. In this scenario, when facing a deadline, the only way to prevent their founder shares and warrants from becoming worthless is to either invest or give up some of the sponsor shares and warrants in order to consummate the merger. Therefore, 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, and the warrants are another source of possible value. This may be one reason why grossly underperforming mergers happen frequently: in untabulated results, 29% of SPAC mergers end up having common share returns

lower than -90% in the first three years after the mergers, while only 9% of traditional IPOs performed worse than -90% in the first three years after the IPOs.

SPAC sponsors are similar to private equity GPs in several ways. Both SPACs and private equity contracts between general partners (GPs) and limited partners (LPs) typically have deadlines for investing the money 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. 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 in the private equity.

The compensation structure of sponsors and GPs is similar as well. Private equity GPs are compensated with a 2% per year management fee and carried interest. Metrick and Yasuda (2010) 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 on successful deals. Both SPAC sponsors and private equity GPs nurture the operating companies by joining their boards. Phalippou, Rauch, and Umber (2018) document that GPs collect fees from portfolio companies whose boards they control. Similarly, the individuals behind SPAC sponsors will get compensation too if they become board members of the operating company. Considering these similarities, we believe that the compensation of the sponsors is not particularly outrageous when we compare it to the compensation that GPs get in private equity.

However, the analogy is not perfect. While SPAC sponsors will be searching for target companies for up to two years, private equity GPs search and then nurture the target companies for many more years. On the other hand, the sponsors are putting in their own money ($5 million or more by purchasing private placement warrants and much more if they take part in the deal as a PIPE investor), whereas if GPs invest, they are investing in the same convertible preferred shares that the LPs are investing in. Even with this incentive inducing contract, however, we still

find grossly underperforming SPAC mergers on average. We conjecture that the 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 investors are downside protected by redemption rights while private equity investors do not have the redemption rights.

Regarding SPAC IPO investors, we posit that the redemption right 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: good mergers, bad mergers, and no mergers (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 takes a haircut to induce other parties to provide cash.

Around 2010, two changes in the structure of SPAC IPOs occurred: one undermining the disciplinary role of the redemption right and the other strengthening it. First, the voting and redemption rights of public common shareholders, which had previously been bundled together, became separate decisions. Since 2010, shareholders are permitted to vote in favor of a merger and simultaneously redeem their shares, whereas previously voting in favor of a merger prevented shareholders from redeeming. If there is a liquidation, both sponsor private placement warrants and public investor warrants will be worthless. Thus, public shareholders now have an incentive to approve a bad merger and redeem their shares, whereas previously they had an incentive to vote down a bad merger so that they could redeem their shares.

The second change, however, made the redemption right more effective as a disciplinary tool. Around 2010, sponsors started to "top up" the initial trust value per share by buying more private placement warrants at the time of the IPO and putting the money into the trust, paying the up-front underwriting fees. This purchase, usually amounting to $5 million dollars or more, results in the sponsor having more "skin in the game". Furthermore, the higher value of the trust makes redemption slightly more attractive for the public investors, increasing the incentive of the sponsor to propose a good merger.

2.3. The Relative Advantages of Going Public via Merging with a SPAC

In this section, we outline six 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' underwriters, sponsors can provide advice and certification. This is similar to venture capital (VC) financing: VC funds not only bring capital to companies, but also provide mentorship. Hsu (2004) documents that startup companies take offers with 10-14% pre-money valuation discounts made by VCs with a high reputation, because many startup companies consider 'extra-financial' considerations to be important. Similarly, based on anecdotal evidence, entrepreneurs who decided to go public via merging with a SPAC often mention the business insight that sponsors can bring into their companies, mentioning that the cost was a secondary consideration.

However, 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. Moreover, it is still questionable whether these 'extra-financial' values are worth the significant dilution costs associated with merging with a SPAC. That is, instead of going public via merging with a SPAC, going public via a traditional IPO or a direct listing 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 bookbuilt IPO. Accordingly, starting in mid-2020, a series of companies in the electric and autonomous vehicle industries went public by merging with SPACs that had previously raised cash in their IPOs. We conjecture that these companies chose SPACs over traditional IPOs to swiftly take advantage of the public equity market's favorable sentiment, evidenced by the 743% increase in the stock price of Tesla in 2020. From an operating company's point of view, a typical timeline of a SPAC merger is between the initiation of a merger negotiation and its consummation. Deep-pocketed specialized sponsors can make the negotiation faster, and convince SPAC and PIPE investors who are not experts in the specific industry of the merits of the acquisition by committing their own capital, making the SPAC merger process speedier.

It is challenging, if not impossible, to measure and compare the actual time it takes to go public via merging with a SPAC and a traditional IPO. Especially for a traditional IPO, it is not clear when the starting day of the IPO process is. Is it the day that a company hires underwriters? Is it the day that a company starts to prepare audited financial statements? Even if we define it, this is private information and econometricians do not have access to it. Because it may not be clear even for corporate managers to evaluate which method is faster, we posit that the conventional wisdom that 'merging with a SPAC is faster' influences the decision making. One piece of evidence suggesting that speed is a consideration is that in 2020, the market share of biopharmaceutical companies among traditional IPOs was higher than among SPAC mergers. Because these companies typically have no revenue, a traditional IPO is presumably relatively quick, in that audited financial statements can be quickly produced.

Third, in the U.S., 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 publicly traded operating companies or a merger between a SPAC and an operating company. These projections are protected from lawsuits with a 'safe harbor' provision in U.S. laws for mergers, but not for security 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 pre-money valuations can benefit from merging with SPACs, essentially engaging in regulatory arbitrage. See Klausner et al. (2021) for a more detailed discussion of this regulatory perspective.

Fourth, merging with a SPAC may provide relative certainty compared to a traditional IPO. With a SPAC, the merger terms, which implicitly involve agreeing on a pre-money value of the operating company, are negotiated before additional information about the market's opinion is known. With a traditional bookbuilt IPO, on the other hand, 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. Because SPAC investors have redemption rights, operating companies negotiate the minimum cash delivered to them as a

closing condition. In the worst case when sponsors cannot deliver the minimum cash, we observe that companies still can waive the condition to go public without raising much capital.

When there is valuation uncertainty, the merger announcement may be greeted positively or negatively by the market. If there is a positive announcement return, money is left on the table by the operating company. But if there is a negative announcement return, the sponsor (and underwriter) can take a haircut in order to salvage the deal. In contrast, with a traditional IPO, if there is weak demand, the issuing firm would have to cut the price and issue size to preserve the deal. Thus, a SPAC merger offers more attractive covariance properties to the issuing firm's shareholders than a traditional IPO.

Fifth, as with other merger agreements, contingent features such as earnout provisions can be negotiated. For example, sponsor shares are frequently subject to lockup and vesting provisions. In Section 6, we show that sponsor compensation and SPAC IPO underwriter commissions are often renegotiated based on the post-merger performance. Operating company shares might have vesting provisions as well. On the other hand, earnout provisions are rare in traditional IPOs.

Finally, one of the important benefits of a traditional IPO is that multiple underwriters almost always provide analyst coverage. In untabulated results, we find that SPAC IPO underwriters also provide analyst coverage for merged companies, but the coverage is state-contingent. Based on the 20 most recently completed business combinations as of September 2020, we find that SPAC IPO underwriters provide analyst coverage for 12 out of 20 companies. If we divide the 20 companies into two groups: a low redemption group (strong deals) and a high redemption group (weak deals), we find that all 10 out of 10 low redemption group's SPAC IPO lead underwriters provide analyst coverage. On the other hand, only 2 out of 10 high redemption group's SPAC IPO lead underwriters provide it, a substantial difference. In Section 6, we document that SPAC IPO underwriters on average surrender 43% of their deferred underwriting commissions for the high redemption group, while they forfeit only 5% for the low redemption group. Therefore, underwriters facing weak deals and taking haircuts tend not to provide analyst coverage, while underwriters with strong deals with full compensation provide it.

To keep this paper from being too long, we do not conduct an empirical analysis of the determinants of which companies choose one over the other methods of going public. As of February 2021, hundreds of SPACs are searching for business combinations, and the SEC approved the NYSE's direct listing proposal in December 2020 that permits a simultaneous capital raise by a company conducting a direct listing. Future studies can analyze *what* types of companies prefer *which* going public options *when*. Bai, Ma, and Zheng (2021) show that riskier firms tend to merge with SPACs.

3. Data and Sample Construction

In this paper, we study 378 SPAC IPOs in the United States between January 2010 and October 2020 after excluding SPACs traded in Over-The-Counter (OTC) markets.[6] We focus on SPACs that went public in 2010 or later because the structure of SPACs fundamentally changed in 2010.[7] 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 114 SPACs that went public between January 2010 and May 2018. We restrict our sample to the SPACs that went public in May 2018 or before to provide enough time to include both SPACs that have completed business combinations and those that have liquidated. A typical SPAC has 24 months to complete a business combination with an option to extend the deadline for up to 3 months. If we include SPACs that went public after May 2018, these later samples tend to include only completed business combinations, not liquidated SPACs, overstating the SPAC period returns.

Out of 114 SPACs that went public between January 2010 and May 2018, 97 consummated business combinations as of September 2020. For the SPACs that went public in June 2018 or later, 17 consummated business combinations as of September 2020. Thus, for the deSPAC period

[6] We exclude 15 SPACs traded in OTC markets because of possible unobservable differences between SPACs traded in major exchanges and OTC markets. Also, stale prices, especially for warrants and rights, prevent us from calculating SPAC period returns correctly.

[7] The Appendix discusses differences between SPACs that went public before 2010 and after 2010.

returns, we study 114 completed business combinations, including 97 SPACs used in the SPAC period return calculations and 17 new SPACs. By coincidence, the 17 completed mergers from post-May 2018 IPOs exactly offset the 17 earlier SPACs that were liquidated.

We have three broad data sources. First, the primary data source on SPAC IPOs is the Refinitiv (also known as Securities Data Company – SDC Platinum) new issues database.

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 (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, redemption history, the identity of merging companies, and various announcements and actual business combination (or liquidation) dates.

We validate the accuracy of the data by cross-examining the two independent sources. If we find any discrepancies or irregularities, we further investigate EDGAR, Capital IQ, Pitchbook, Bloomberg, and Refinitiv Eikon to make necessary adjustments. We extend the data by hand collecting further information for a subset of deals related to the deSPACing process, such as the estimate of economic benefits (i.e., promotes) that SPAC sponsors and underwriters forfeit (i.e., 'haircuts') and extra inducements that sponsors and merging companies offer for non-redeeming shareholders and/or PIPE investors.

Third, for the deSPAC period common share returns, we use CRSP daily returns until October 2020. 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 and sales data for merging companies.

Table 2 summarizes SPAC IPOs between January 2010 and October 2020.[8] We compare them to the operating company IPOs from the same period. Our operating company IPO sample includes

[8]In the Appendix, Table A1 reports the same statistics for SPACs that went public before 2010.

IPOs with an offer price of at least $5.00, excluding ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, banks and S&Ls, and stocks not listed on major exchanges. The amount of capital raised by SPAC IPOs in 2020 by October exceeded the total in all previous years combined.

— Place Table 2 About Here —

Panel A of Figure 2 reports the SPAC IPOs activities as a fraction of the traditional IPOs. Both the number of SPAC IPOs and money raised from them have been increasing in the last few years, both in absolute numbers as we have seen in Figure 1, and relative to operating company IPOs as we have seen in Figure 2. In 2020, for the first time, SPAC IPOs outnumbered traditional IPOs, raising more capital as well. Panel B of Figure 2 shows that the average size of SPAC IPOs has grown over time. From 2015, there is virtually no difference between the average capital raised by the two.

— Place Figure 2 About Here —

4. Returns on the Life Cycle of SPACs

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 to either a business combination completion date or a liquidation date. For the SPACs with completed business combinations, we define the deSPAC period, counting from the next day of the business combination, the day that the SPAC starts to trade as an operating company with a new company name and ticker symbol. We first document comprehensive investor returns for the two periods and discuss cross-sectional variations.

4.1. Returns on SPAC and deSPAC periods

We first document returns from the SPAC period, which starts from the SPAC IPO date to 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 pre-specified number of derivative securities (warrants and/or rights), from the IPO at the offer price. We assume that the investor sells each component of the SPAC unit at the closing price five trading days before the close of the business combination or liquidation. For common shares and warrants with redemption rights, 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.

We implement this strategy based on the following reasons. First, SPAC IPOs have minimal first-day returns during our sample period – a SPAC with an offer price of $10 with a trust value of $10 per unit typically finishes the first day of trading around $10.00 - $10.05, resulting in little difference between the buy-and-hold returns measured from the offer price and the closing market price on the first day of trading, although, in January 2021, the average first-day return has increased to 6.1%. Second, dividing the lifecycle of SPACs into SPAC and deSPAC periods makes sense as Klausner et al. (2021) 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. Third, 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. Fourth, during our sample period, SPAC period returns are mostly realized 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.[9] 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 actual institutional investors' investment strategy.

Specifically, our strategy calculates the annualized SPAC period return, R_{SPAC}, as

[9]While some SPACs do not announce business combinations within 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.

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

Where

$P_s = max(Common_P_{t-5}, Common_R_{t-5}) + Price\ Structure\ of\ Warrant \times max(Warrant_P_{t-5}, Warrant_R_{t-5}) + Price\ Structure\ of\ Right \times Right_P_{t-5}$

$P_i = IPO\ Price\ of\ a\ Unit$

Months refers to the number of months between the SPAC IPO and the business combination or liquidation, *Price structure of warrant (right)* means the fraction of warrant (right) a SPAC unit includes. $Common_P_{t-5}$ is the common share price, $Common_R_{t-5}$ is the redemption value for a common, $Warrant_P_{t-5}$ is the warrant price, $Warrant_R_{t-5}$ is the redemption value for a warrant (if applicable), and $Right_P_{t-5}$ is the price for right, all measured as the closing market price five trading days prior to the business combination or liquidation date. Note that while all common shares have the redemption right, only a fraction of SPACs offers warrants the same right. 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 1/3 of a warrant, we multiply the warrant price by its price structure (1/3) as an investor purchasing a unit from the IPO would receive 1/3 of a warrant. We use the price data instead of total return data because no SPACs pay dividends.

Table 3 reports annualized SPAC period returns based on SPACs that went public between January 2010 and May 2018. 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 9.3% per year based on our optimal redemption strategy. Panel B documents an important fact that even liquidated SPACs produce positive returns. This is because although a typical SPAC pays 2% of the proceeds as an up-front underwriting fee, sponsors purchase warrants and deposit 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, delivering on average 2.0% annual returns even

for the liquidated ones. Out of 114 SPACs that went public between January 2010 and May 2018, 0.51% was the lowest annualized return. Panel C reports that larger SPACs provide slightly higher returns, as the average IPO proceeds-weighted annualized return of 10.6% is higher than the equally weighted annualized return of 9.3%.

— Place Table 3 About Here —

Given this downside protection of the SPAC period investment, we interpret the SPAC period investment as equivalent to investing in a default-free bond, such as US Treasury Note, along with an option to convert into the common stock of a new IPO company. 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. Thus, many hedge funds, also known as the 'SPAC mafia', find the risk-adjusted returns attractive.[10]

Table 4 and Table 5 report the deSPAC period investment returns based on a simple buy-and-hold strategy in which an investor purchases a merged company stock and/or warrant on the first day of trading that the SPAC shares have a new entity name and ticker symbol. We calculate buy-and-hold returns until the earlier of the one-year (three-year) anniversary or the delisting date. 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 January 2020 and delisted in August 2020, we report the buy-and-hold returns from January 2020 to August 2020 as both one-year and three-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.

Table 4 reports deSPAC period percentage returns on common shares for 114 business combinations consummated between January 2010 and September 2020, including dividend yields and capital gains. Table 5 reports returns on warrants for the same period. Both returns are based on similar buy-and-hold strategies. Specifically, the one-year and three-year buy-and-hold returns for deSPAC company i's common share (Table 4) is defined as

[10] Table A3 provides the list of 'SPAC Mafia' members.

$$BHRC_{i,t} = \prod_{t=1}^{min(T,\ delist)} (1 + R_{i,t}) - 1 \tag{2}$$

Where $R_{i,t}$ is the net return in period t on deSPAC company i's common share. The one-year and three-year buy-and-hold returns for deSPAC company i's warrant (Table 5) is defined as

$$BHRW_{i,t} = \frac{P_i_min(T,\ delist)}{P_i_deSPAC_date} \tag{3}$$

where $P_i_min(T,\ delist)$ is the price of deSPAC company i's warrant at time T (one-year or three-year) or the delisting date, whichever comes first, and $P_i_deSPAC_date$ is the closing price of deSPAC company i's warrant on the business completion date. While we use prices for warrants because warrants do not pay dividends, we use total returns for common shares because common shares pay dividends. Using the CRSP volume and return data, we inspect the first two weeks of trading as a merged company and find ample liquidity and no large average abnormal returns or price changes. This validates that our deSPAC period buy-and-hold strategy is implementable.

Although our sample for the deSPAC period common share returns consists of 114 completed business combinations, we only analyze 105 of them for warrant returns. This is because five SPACs did not have warrants from the beginning, and four SPACs redeemed warrants either for common shares or cash during the deSPACing process. For five SPACs, the warrant price information was not available. For those cases, we assume that the warrant returns were the same as common share returns. Our qualitative results do not change if we exclude these five cases.

Another notable feature of the SPAC warrant is that merged companies usually have redemption 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, announced on March 13, 2020, that it will redeem its warrants on a "cashless basis". Under the Warrant Agreement, one warrant will be exchanged for 0.4927 of a share of common stock, without 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 4 About Here —

Table 4 shows that on average deSPAC period common shares significantly and persistently underperform the market. This pattern is consistent with prior studies covering SPACs that went public before 2010 (Jenkinson and Sousa (2011) and Dimitrova (2017), among others), and a contemporary paper studying recent SPACs (Klausner et al. (2021)), all of which find poor deSPAC period common share returns.

Importantly, Table 4 Panel B demonstrates that different weighting methods yield significantly different outcomes. For example, assume that there are two SPACs, SPAC A and SPAC B, and SPAC A raised $400 million and SPAC B raised $100 million from their IPOs. Both completed business combinations and the redemption ratio for SPAC A is 10% and SPAC B is 90%. If the one-year deSPAC period common share return is 10% for SPAC A and -30% for SPAC B, the equally weighted return is -10% ($\frac{10\%+-30\%}{2}$). However, 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 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, underperforming mergers tend to have high redemption ratios and subsequently little public cash is delivered to merging companies. As SPAC investors protect themselves by exercising redemption options, Table 4 Panel B shows that actual dollar-weighted investor returns are not as bad as the equally weighted average as most other studies suggest. Later in Table 8, we show that redemption ratios predict deSPAC period common share returns.

— Place Table 5 About Here —

Table 5 Panel A shows 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. Panel A'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 right, and the price of the common share is $10, and the price of the warrant 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 2% to 3%: deSPAC period investors still lose money and substantially underperform the market.

The improvement in deSPAC period returns is marginal because 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 not all units provide one full warrant (i.e., many SPACs provide only 1/2 or 1/3 of a warrant per unit). Also, 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 equally weighted returns. However, given that most of the underperforming common shares are indeed redeemed during the deSPACing process while most of the warrants do not have redemption rights, this unit holder investment strategy does not necessarily reflect the actual deSPAC period investment returns earned by the average investor. Instead, the public cash-weighted average return of -4.0% in Table 4 and the warrant price-weighted average of 15.6% in Table 5 are probably the best measures, producing an average combined return of close to zero, which still trails the market.

It is important to discuss the possible reasons behind the substantial difference between common share returns and warrant returns. While warrants should yield higher returns because they bear higher risks, we argue that this stark (i.e., different sign) and persistent (i.e., Table 5 Panel A shows that warrants almost always outperformed common shares across different vintage years) difference cannot be solely justified by the risk component. It is possible that the market

may have undervalued warrants during the merging process. If so, an increase in warrant prices at the time of the merger should improve SPAC period returns in the future.

As we discuss more in depth in Section 6, sponsors often forfeit some promotes and transfer most of them to different shareholders, including selected non-redeeming SPAC investors and PIPE investors. Therefore, some SPAC investors who do not redeem their shares receive some compensation to offset price per share declines, making the dollar-weighted returns for SPAC investors not as bad as the raw returns suggest, and actual sponsors' returns not as lucrative as the initial contract suggests. For example, assume that a hedge fund is given 0.4 shares for every share that it does not redeem, and the redemption value was \$10.20 per share. This inducement makes the hedge fund's per share price equivalent to \$7.29 (\$10.20/1.4). Therefore, even if the market price of a share falls to \$8.00 a year later, the hedge fund's actual return is 9.74% (\$8.00/\$7.29 – 1), assuming that there is no dividend paid.

Another fact is that, although the recent deSPAC period common shares still underperform the market, the overall returns have been improving over time, along with warrant returns and SPAC period returns, as Figure 3 suggests. Furthermore, we conjecture that this uptrend in returns partly explains the recent SPAC wave, as it is widely believed that investors chase past returns (Hong and Stein (1999), among others).[11]

— Place Figure 3 About Here —

Finally, even with the overall improvements in the SPAC market, deSPAC deals still tend to include more severely underperforming companies. Specifically, out of 41 deSPAC mergers between 2012 and 2017 for which we have enough data to calculate the three-year buy-and-hold returns, 29% (12) of them had three-year buy-and-hold returns lower than -90%, while among 756 traditional IPOs from the same period, only 9% (66) of them produced returns lower than -90%. This is consistent with Jenkinson and Sousa (2011)'s view that the 'extreme incentives' that sponsors face result in acquiring low-quality companies that would not be able to go public via a traditional IPO process. However, we should note that for those deals, the SPAC shareholder

[11] See Blomkvist and Vulanovic (2020) and Bai et al. (2021) for the discussion of the recent SPAC IPO wave.

redemption rates are almost always close to 100%, meaning that the actual loss of SPAC investors is minimal, and merging companies end up going public with little capital raised.

4.2. Cross-Sectional Variations in Returns

In this section, we examine cross-sectional variations of both SPAC and deSPAC period returns, focusing on the characteristics of the merging company, the quality of SPAC IPO underwriters, the time between the SPAC IPO and the business combination completion or liquidation, and the SPAC shareholder's redemption decisions. For the deSPAC period, we discuss only common share returns, as warrants returns show mostly similar patterns with more variations. In the Appendix, Table A2 summarizes returns based on different operational aspects of merging companies.

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 investigate which investment banks underwrite SPAC IPOs. Using underwriter reputation ranks (*UWRANK*) from Loughran and Ritter (2004) based on the 1 (low) to 9 (high) prestige scale introduced by Carter and Manaster (1990), Panel A of Figure 4 reports that the average quality of SPAC IPO's lead left bookrunners has improved over time.[12] Panel B of Figure 4 shows that the three most prestigious underwriters, Goldman Sachs, Morgan Stanley, and JP Morgan, started to underwrite SPAC IPOs in 2016, and their market shares have increased substantially in 2020.

— Place Figure 4 About Here —

Table 6 reports both annualized SPAC period returns and one-year and three-year deSPAC period returns based on the underwriter ranks used in Figure 4. We divide our sample into three groups by assigning 5 and 8.5 as thresholds to make each group include approximately one-third of the sample. Inspection of Table 6 shows that SPACs with more reputable lead left underwriters tend to have both higher SPAC and deSPAC period returns, although SPACs with lead left underwriters ranked between 5 and 8.5 outperform SPACs

[12]For the complete list of underwriters and their ranks, refer to Jay Ritter's website "IPO Underwriter Reputation Rankings (1980 – 2020)" (https://site.warrington.ufl.edu/ritter/ipo-data/).

with lead left underwriters ranked over 8.5. This is because some right tail outliers with very high returns are underwritten by mid-tier underwriters.

— Place Table 6 About Here —

We then focus on how the potential dilution from the warrants impacts various returns. While some SPACs do not include any derivative securities, most of them include at least one type of derivative securities, often warrants. Most warrants have $11.50 as an exercise price, a 15% premium to the IPO price. 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. Therefore, there is significant variation regarding the potential dilution: when exercised, warrants and rights would become common shares, diluting the ownership of existing shareholders.

Table 7 reports both annualized SPAC returns and one-year and three-year deSPAC returns based on the potential dilution measure that we define. We divide our sample into three groups − top, middle, and bottom terciles based on the magnitude of potential dilution. Table 7 shows that for the SPAC period, there is no clear relation between the potential dilution and returns. However, for deSPAC period common share returns, we find a clear monotonic relation in which SPACs with higher potential dilution substantially underperform.

— Place Table 7 About Here —

Furthermore, we examine two factors introduced by prior studies associated with deSPAC period common share returns. First, 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 Good SPACs during the deSPAC period.

We revisit this question using SPAC shareholders' redemption decisions as a proxy for the quality of the proposed merger. That is, based on our optimal redemption strategy for the SPAC period investment, investors would redeem their common shares if the redemption value is higher than the market price. Therefore, a high redemption ratio means that the market price was lower than the redemption value (Bad SPACs).

Table 8 Panel A classifies shareholder redemptions into three categories: redemptions related to SPAC deadline extensions, redemptions related to liquidations, and redemptions related to business combinations. It reports that on average, SPAC shareholders redeem 68% of their SPAC common shares, consistent with the finding in Klausner et al. (2021) that actual capital delivered to merging companies is significantly smaller than the SPAC IPO proceeds. Sponsors often invite PIPE investors to meet the minimum capital requirement from the operating companies.

— Place Table 8 About Here —

Table 8 Panel B's specifications (1) and (4) show that a high redemption ratio predicts significant underperformance of deSPAC period common share returns, echoing Jenkinson and Sousa (2011)'s finding. We find the same result for the SPAC period returns, but do not report it because the relationship is somewhat mechanical – the lower the price, the more likely that redeeming is the value-maximizing investor strategy. We also revisit Dimitrova (2017)'s finding that deSPAC performance is worse for deSPAC deals announced near the two-year deadline by including *Log(Months)*, the logarithm of the months between SPAC IPO and the business combination completion (or liquidation for SPAC returns). Panel B's specifications (2) and (5) show that the longer it takes to close a business combination, the lower the subsequent deSPAC period returns. In other words, deSPAC deals rushed near the deadline underperform, confirming Dimitrova (2017)'s finding from the pre-2010 period, and similar conclusions from other markets such as Degeorge et al. (2016)'s finding from private equity secondary buyout transactions.

When we include both the *redemption ratio* and *Log(Months)* as explanatory variables, although the relationship is not statistically significant for three-year deSPAC period returns, the redemption ratio plays a more important role. We expand on Jenkinson and Sousa (2011)'s

finding that investors should listen to the market, as our optimal redemption strategy suggests that the share price is the best proxy for the redemption decision.

5. The Recent Evolution of the SPAC Market

So far, we have argued that investing in SPAC IPOs is equivalent to investing in underpriced default-free convertible bonds with extra warrants, which have generated positive abnormal returns for SPAC period investors. What should the SPAC period returns be? We provide a simple back of the envelope calculation to demonstrate why there has been an insatiable appetite for SPAC IPOs in the market recently, and how sponsors have been responding.

Assume that a five-year warrant to buy one share at an exercise price of $11.50 that can be redeemed early by the issuer once the market price of a share hits $18 (a typical feature) is worth $2.50 after the merger announcement. A unit that is composed of a redeemable share plus a warrant to purchase a full share would, after a merger announcement, be worth the max of [($10 + interest), (the share price after a merger is announced)], plus the value of the warrant. In the current low interest rate environment, $10 + interest might be worth $10.10 at redemption. Assume that the shares, conditional on not being redeemed after the merger agreement is announced, are worth $11.00. Given that on average 68% of shares are redeemed (see Table 8), the expected value of a share is 0.68×$10.10 + 0.32×$11.00 = $10.39. The units would then have an expected value of $10.39 + $2.50 = $12.89. If on average a merger took 2 years to complete, the annualized return from the $10 offer price would be about 13.5% per year. But if the unit included a warrant to buy 1/4 of a share, the value of the warrant would not be $2.50, but $0.625. Then the units would be worth $10.39 + $0.625 = $11.015, and the annualized return would be just under 5%.[13]

[13]If the SPAC IPO contained 20 million units, at $2.50 each, the warrants that entitle the holder to buy one share per warrant would be worth $50 million in aggregate. Warrants to buy ¼ of a share would presumably be worth approximately $12.5 million. If there are 25 million shares outstanding, including sponsor shares, the $37.5 million reduced value of the warrants should add $1.50 per share to the 20 million public shares and 5 million sponsor shares. Our simple back of the envelope calculations do not adjust for the difference in the price per share that would exist if the aggregate value of outstanding warrants was less.

An annualized return of 5% is still higher than the risk free rate, even though the redemption option results in no downside risk for an investor that holds until liquidation or merger completion. The redemption option, however, is generally not available until a merger announcement, exposing an investor to illiquidity and potential fire sale risk.[14] Thus, equilibrium returns should be higher than the risk free rate, but by only a modest amount, suggesting that warrants to buy a large fraction of a share are excessively generous.

Investors, especially the SPAC Mafia, have realized that SPACs provide overly generous deal terms. Recently, other investors have also been willing to buy in the market, driving up the first-day returns of the SPAC IPOs. Sponsors have responded by providing fewer warrants per unit. In Figure 5, using data from the first quarter of 2018 to the end of January 2021, we show the quarterly average SPAC IPO first-day return, and the quarterly average of the potential dilution per unit. Potential dilution per unit is defined as the fraction of a common share that derivative securities included in a unit can convert into. For example, if SPAC A's unit comes with one common share and half of a warrant, and if one warrant can convert into half of a common share, we classify SPAC A as having a 1/4 (25%) potential dilution. If SPAC B's unit comes with one common share, one warrant, and one right, and if a warrant converts to a common share and a right converts to one-tenth of a common share, we classify SPAC B as having a 1.1 (110%) dilution.

— Place Figure 5 About Here —

Figure 5 illustrates two important recent changes. First, the market has become more efficient, because it has started to realize the SPAC period abnormal returns immediately as first-day returns, rather than after a merger is announced. In January 2021, 91 SPAC IPOs occurred, with average first-day returns of 6.1%. Every single one of them increased in price on the first day of trading. Second, with the increased investor demand for SPAC IPOs, sponsors have started to structure SPAC IPOs with fewer warrants and less dilution. This change reduces the wealth transfer from operating company and deSPAC period shareholders (including the sponsor) to SPAC period investors, making SPACs less attractive for IPO investors, but more attractive for deSPAC and operating company shareholders.

[14] In March 2020, during the short-lived Covid-19 panic, many SPAC units dropped to a market price of approximately $9.50.

Making SPAC units less attractive by minimizing potential dilution per unit will make merging with a SPAC a more attractive alternative to the traditional IPO. As we have seen from Table 7, higher potential dilution per unit predicts lower deSPAC period returns. Moreover, having less dilutive warrants should minimize the incentive misalignment issue in which SPAC investors redeem their shares but still approve value destroying mergers because they hold warrants. If SPAC IPO units did not include any derivative securities, investors would not approve value destroying mergers, and this would, in turn, incentivize sponsors to select better target companies with more reasonable valuations.

In this regard, one noticeable new trend in the market is that some SPACs have started to offer 'contingent warrants'. For example, Global Partner Acquisition Corp II, which went public on January 11, 2021, provides 1/6 of a warrant to buy a share at $11.50. It also states that at the time of a proposed merger, any shareholders that do not redeem will be given an additional 1/6 of a warrant per share. So, if shareholders redeem, they keep 1/6 of a warrant, and if they don't, they will have 1/3 of a warrant per share. The first-day return for this SPAC was 3%, substantially lower than the average of 6.1% for January 2021. We view this type of SPAC structure, which discourages redemptions and favors SPAC investors less but merging company shareholders more, as illustrating another possible mechanism that the market is using to adjust towards a more sustainable equilibrium in which SPAC period IPO investors collect less economic value, allowing deSPAC period investors to capture more. In the Appendix, we provide another example of the contingent contract, focusing on the sponsor compensation.

6. Sponsor and Underwriter Compensation Renegotiation

In this section, we discuss the compensation of SPAC sponsors and SPAC IPO underwriters. For the traditional IPO, a number of papers discuss the direct costs of going public, the underwriting commissions. The indirect costs of IPOs, most notably the underpricing, have been studied extensively as well (e.g., Loughran and Ritter (2002), among others). Many other papers focus on more opaque compensation structures, especially how general partners are paid in the private equity industry (Metrick and Yasuda (2010), Chung, Sensoy, Stern, and Weisbach (2012), Robinson

and Sensoy (2013), and Phalippou et al. (2018), among others). A recent study by Phalippou (2020) shows that from 2006 onward, private equity limited partners have on average earned no abnormal returns, while general partners have earned enormous fees.

SPAC sponsors' compensation has been spotlighted as well. For example, in September 2020, then SEC Chairman Jay Clayton mentioned that the SEC was focusing on SPAC sponsors' incentives and compensations.[15] We examine sponsor promotes and underwriting commissions from a new angle – the downward renegotiation of their compensation. Our optimal redemption strategy for the SPAC period investment assumes that investors would redeem their common shares when the redemption value is higher than the share price. As our optimal redemption strategy is widely implemented in the market by practitioners, we find that the shareholder redemption decision shows a bimodal distribution. That is, when the share price is higher (lower) than the redemption value toward the business combination date, few (almost all) shareholders redeem their shares. As a typical definitive agreement for a business combination specifies a minimum amount of capital to be delivered to the merging company, sponsor's realized compensation is influenced by the SPAC shareholder redemption decisions.

In Table 9, we report the ex-post renegotiation outcome of sponsor promotes and underwriter deferred commissions by focusing on the 20 most recent business combinations as of September 2020. We collect the relevant data from EDGAR filings. When a certain business combination does not provide enough information to measure all relevant variables, we select the next business combination with a similar redemption ratio, as the renegotiation outcome significantly varies based on redemption decisions.

Sometimes SPACs include vesting provisions for sponsor promotes, typically tied to future stock prices of the merged company. For example, the SPAC IPO prospectus would state that 'sponsor will receive 1/2 of the promote shares upon the completion of the business combination, and another 1/2 when the stock price of a merged company hits $13'. For those cases, if the stock price of the SPAC reaches the hurdle price before the completion of a business combination, we treat earnout provisional compensation as earned. We verify

[15] https://www.cnbc.com/video/2020/09/24/sec-chairman-jay-clayton-on-disclosure-concerns-surround-going-public-through-a-spac.html - Retrieved as of October 2020.

that for our 20 sample cases, no SPAC that could not hit the hurdle price before the business combination date reaches it at the end of December 2020. Underwriters sometimes receive merged companies' common shares or warrants, instead of cash, for their deferred commissions. For those cases, we measure their commissions using the prices of common shares and warrants of the third trading day after the business combination completion.

— Place Table 9 About Here —

In Table 9, we split the 20 completed mergers into groups with below- and above-average redemption ratios. Table 9 shows that the average redemption ratio for the below-average redemption group is 8% while it is 87% for the above-average group, confirming the bimodal nature of SPAC shareholder redemption decisions implied by the optimal redemption strategy. Table 9 also documents that even for business combinations with low redemption ratios, sponsors on average surrender 22% of their promote common shares and 42% of their private placement warrants. For business combinations with high redemption ratios, sponsors forfeit even more of their common shares. We do not find a significant difference for the warrants because the warrant prices are close to zero for those weak (i.e., high redemption) deals, making extra forfeiture of warrants relatively unimportant.

For underwriters, it is common for them to receive 2% of the 5.5% underwriting commission at the time of the IPO for all shares sold, but the remaining 3.5% may be waived on shares that are subsequently redeemed. For low redemption deals, underwriters take only a 5% haircut of their deferred underwriting commissions. However, they give up 43% of their deferred underwriting commissions when the redemption ratio is above average. For the latter case, the total underwriting commission including the already paid up-front fee becomes 4% (2% + 3.5% x (1 – 43%)), instead of 5.5%. Our interpretation is that sponsors transfer some of the stock and warrants to PIPE investors to keep weak deals from collapsing, and underwriters forego some of their deferred compensation for the same reason.

We then focus on the extra payments that sponsors offer to various investors to induce their investments. We measure inducements by dividing the number of common shares (warrants)

granted to various parties by the number of sponsor promote common shares (warrants). In most cases, PIPE investors and non-redeeming SPAC investors receive these inducements.

It is noteworthy that, sometimes, the inducements are larger than the sponsor haircuts, meaning that merging company shareholders also pay part of the inducements, in the process diluting their ownership. In a few opposite cases, when the redemption ratio is low and the rising SPAC share price indicates that the initial business combination negotiation undervalued the merging company, merging company shareholders get inducements as well. Therefore, the inducement depends on the bargaining power dynamics during the deSPACing process (between the announcement of a definitive merger agreement and the completion of a business combination). Table 9 also reports that 85% (17 out of 20) of the business combinations include PIPEs, and 47% (8 out of 17) of them have sponsors as PIPE investors. The amount of PIPE capital contributed differs across deals, and the format also varies, as some include debt financing.

Our measure of sponsor haircuts and inducements in Table 9 should be understood as a lower bound. For example, in one PIPE deal, the sponsor paid placement agent fees that PIPE investors are supposed to pay.[16] The payment came from the sponsor's own pocket, but we do not include them as haircuts or inducements as the payment is not based on sponsor promotes or warrants. We suspect most of these types of transactions (i.e., sponsors providing benefits to PIPE investors at their own expenses) are not disclosed in EDGAR filings.

Analysis of Table 9 leads to two important conclusions that have not been emphasized in the financial press. First, the sponsor's profit is not as outrageously lucrative as it might at first appear. On average, sponsors forfeit 34% of the common shares they receive as promotes and 42% of their private placement warrants.[17] If we also consider the fact that sponsors invest their own capital for 40% (8 out of 20) of business combinations as PIPE investors, the sponsor's actual profit would be even lower for weak deals as the stock price tends to stay below the IPO price, which is usually the price that sponsors pay to purchase common shares as a PIPE

[16] *Certain offering related expenses were paid by Nebula Acquisition Corp (sponsor), including customary fees payable to the placement agents, Deutsche Bank Securities Inc. ("Deutsche Bank") and Goldman Sachs & Co., LLC ("Goldman Sachs").* https://www.sec.gov/Archives/edgar/data/1806201/000119312520150226/d921991d424b3.htm

[17] Klausner et al. (2021) also use net promotes (i.e., after forfeitures) when they discuss sponsor profits.

investor. Furthermore, their warrants would be deep out of the money and they would lose part of the promotes tied to earnout provisions.

Second, the high redemption ratios for underperforming business combinations show that the actual economic magnitude of public SPAC investors' loss is minimal. Table 8's Panel B shows that high redemption ratios predict poor deSPAC period returns, which is due to the worst performing business combinations having redemption ratios of close to 100%. This fact is consistent with our finding that the average public cash-weighted deSPAC period common share return (-4.0%) is higher (less negative) than the equally weighted return (-15.6%). As previously mentioned, SPACs going public after 2010 provide for separate redemption and business combination approval decisions, resulting in shareholders approving business combinations even with redemption rates exceeding 90%. This outcome is because common shareholders who hold warrants would redeem their common shares based on our optimal redemption strategy, but they have no incentive to veto a proposed business combination, especially as the deadline nears, because their warrants become worthless if it is not approved.

7. Conclusions

This paper studies SPACs from four different angles: investors, operating companies, sponsors, and the economic structure and evolution of the SPAC market. From an investor's point of view, 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 114 SPAC IPOs purchased at the offer price from January 2010 – May 2018, the average annualized return during this SPAC period has been 9.3%, with all 114 returns being positive. Investing in SPAC IPOs can be viewed as investing in *default-free* underpriced convertible bonds with extra warrants. Our back of the envelope calculation shows that, at the risk of oversimplifying, the SPAC IPO investors are being given free warrants. For a $200 million IPO, the 9.3% annualized return earned by these investors works out to over $25 million per deal on average, with much of this return being an abnormal return.

On the other hand, investor returns in the deSPAC period on the merged companies are mixed. For the 114 SPACs that completed a merger with an operating company from January 2012 – September 2020, common share investors have lost money on average, while warrant investors have earned positive returns. The equally weighted average one-year return on the merged company shares has been -15.6%, underperforming the market by 24.3%. However, investor returns on a dollar weighted basis are not as bad as the equally weighted numbers would suggest, because the public cash-weighted return is -4.0%. The higher average return is due to the tendency for investors to redeem many of the shares for the mergers that generate disappointing subsequent returns. For the 105 out of 114 merged companies that had outstanding warrants, the average one-year return has been 44.3%. Consequently, focusing exclusively on the equally weighted common share returns paints a worse picture of the deSPAC period investments than what a dollar-weighted portfolio produces.

From a private operating company's point of view, we show that merging with a SPAC is almost three times more expensive than a traditional IPO: the cost of the median company going public via a SPAC merger was 14.1% of the post-issue market cap, while it was 4.8% for the traditional IPOs. Then why do some companies still choose a SPAC merger over a traditional IPO? We identify the economic roles of SPAC sponsors and SPAC IPO investors and how these roles can create relative advantages of merging with a SPAC.

Specifically, for many operating companies we posit that merging with a SPAC is a quicker way to raise capital and go public than a traditional IPO. By conducting a SPAC IPO, the sponsor has a pool of equity capital that can be provided to an operating company in a subsequent merger. Importantly, the merger permits the sponsor to make forward-looking statements that fall under the safe harbor provisions of U.S. merger law, whereas a traditional IPO does not offer these safe harbor provisions. Furthermore, the redemption option that SPAC public shareholders have incentivizes the SPAC sponsor to negotiate a deal that is favorable to both the operating company and the SPAC shareholders, in order to induce the shareholders to approve the merger and not redeem their shares.

We document that the sponsors frequently take haircuts in order to ensure that the SPAC has enough cash to consummate the merger. Sponsors frequently give some of their shares (34% on

average) and/or warrants (42% on average) to some existing shareholders to induce them not to redeem, or to PIPE investors to induce them to inject cash. Furthermore, the IPO underwriters frequently agree to forego some of their deferred compensation (24% on average) to ensure the completion of a merger. Importantly, these haircuts are state-contingent: sponsors take larger haircuts and provide even more inducements, and underwriters surrender commissions more, for weaker deals. Thus, we show that average sponsor profits are not as lucrative as sometimes assumed, especially for underperforming deals.

The SPAC market has experienced rapid changes recently. In January 2021, 91 SPACs went public with an average first-day return of 6.1%. This is a significant jump from the 1.6% average in 2020, which is already higher compared to prior years. Until the end of 2020, the SPAC period return was mostly realized when the merger is announced. However, the average first-day return of 6.1% in 2021 shows that the market has started to reprice the SPAC units immediately, reducing the abnormal returns for investors who purchase SPACs in the market, similar to what we find for operating company IPOs. Faced with the strong demand, sponsors have started to react by making deal structures less attractive to SPAC IPO investors and more attractive to merging company shareholders by offering fewer warrants per unit.

On a point forward basis, there are reasons to believe that deSPAC period returns may be still disappointing, but SPACs may stay as an alternative to traditional IPOs. The 248 SPACs that went public in 2020, combined with the flood of SPAC IPOs in early 2021, raise the possibility that too many SPACs are chasing deals, increasing the valuations that operating companies are able to negotiate. The high prices paid will reduce subsequent deSPAC period returns. On the other hand, the terms of SPAC IPOs are being adjusted, with a downtrend in the fraction of shares that each warrant in a unit will buy (or a lower fraction of a warrant to buy one share), implying less dilution when a merger is consummated. This change is limiting SPAC period investors' returns by reducing the wealth transfer from deSPAC period shareholders to SPAC period unitholders. Some SPACs have started to offer contingent sponsor compensations and contingent warrants, incentivizing sponsors to find better deals and SPAC period investors not to redeem. We view the market as adjusting toward a more sustainable equilibrium.

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Figure 1. Number of SPAC IPOs and Proceeds

Figure 1 reports SPAC IPO activities between 2010 and 2020 – the number of SPAC IPOs (dotted line, left axis) and total proceeds (bar, right axis). SPAC IPOs do not include 15 SPACs that only traded in Over-The-Counter (OTC) markets. Proceeds do not include underwriter over-allotment options and are reported in billions of dollars.

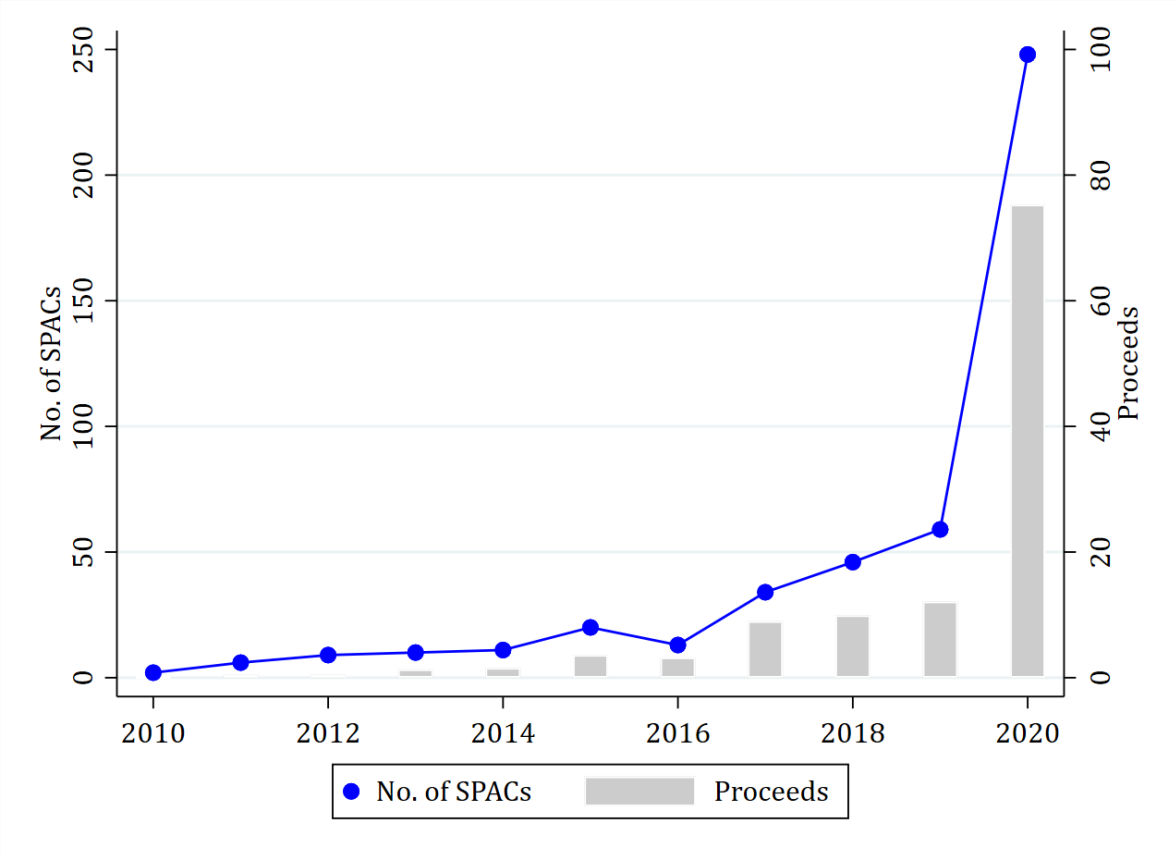
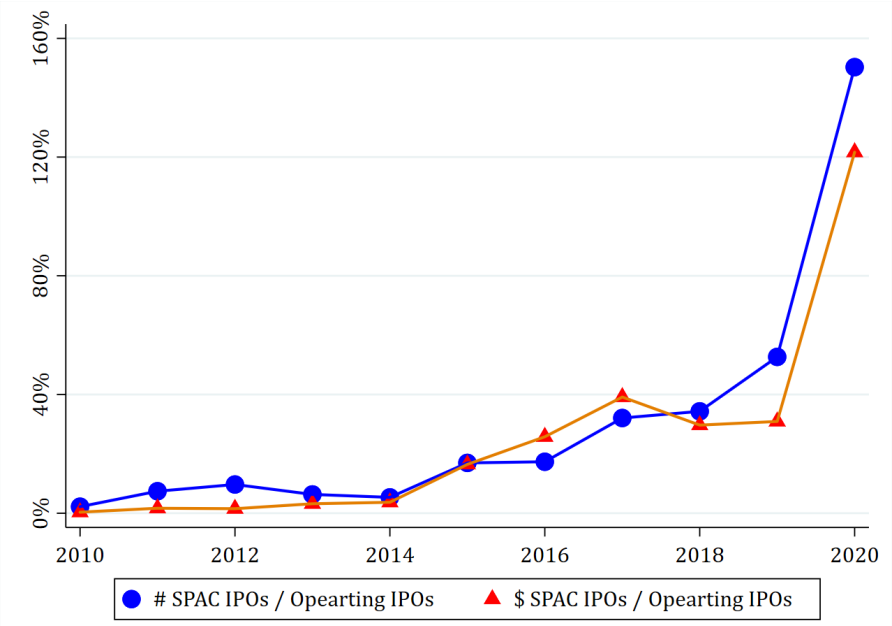


Figure 2. SPAC IPO Activities Relative to Operating Company IPO Activities

Panel A shows SPAC IPO activities relative to operating company IPO activities by year. The blue circle reports the number of SPAC IPOs divided by the number of operating company IPOs and the red triangle reports the proceeds from SPAC IPOs divided by the proceeds from operating company IPOs, both for a given year. Panel B compares the average capital raised between SPAC and operating company IPOs over time. The blue circle reports the average proceeds raised by SPAC IPOs and the red triangle reports the average proceeds raised by operating company IPOs. SPAC and operating company IPOs do not include those only traded in Over-The-Counter (OTC) markets. Operating company IPOs exclude those with an offer price below $5.00 per share, unit offers, ADRs, closed-end funds, natural resource limited partnerships, REITs, bank and S&L IPOs, and small best efforts offers. Proceeds do not include underwriter over-allotment options.

Panel A. SPAC IPOs as a fraction of operating company IPOs



Panel B. Average Proceeds ($m)

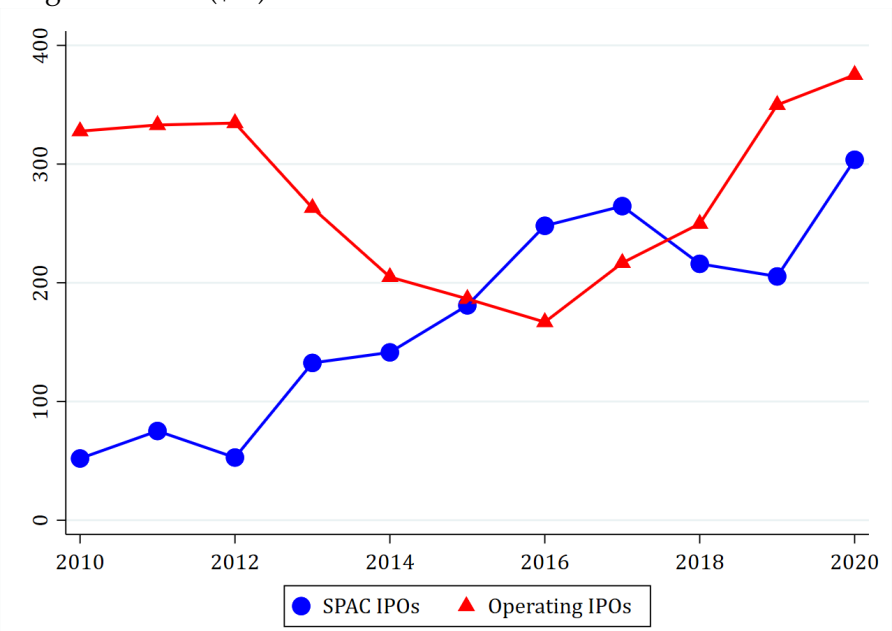
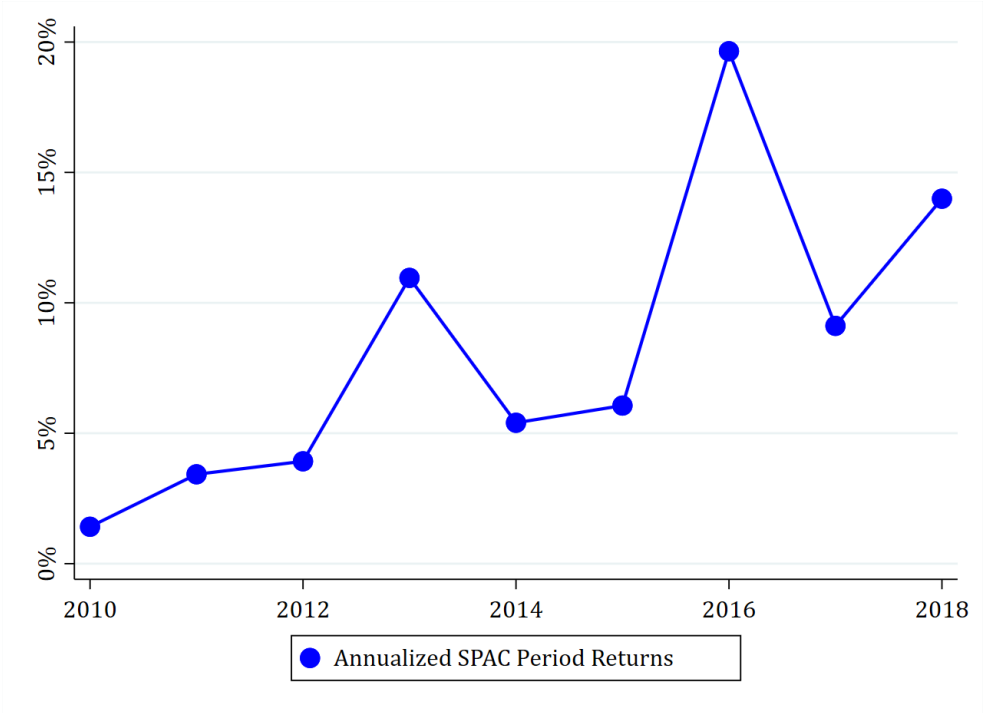


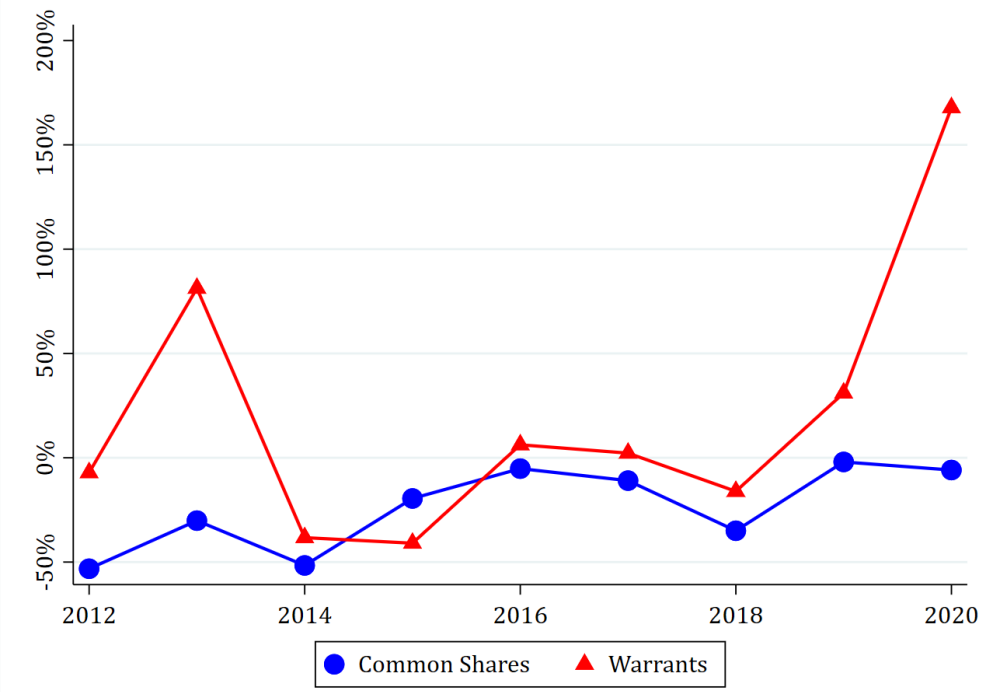
Figure 3. SPAC and deSPAC Period Returns

Panel A reports equally weighted annualized SPAC period returns for 114 SPACs based on the year that a SPAC went public. Annualized SPAC period returns are calculated based on the optimal redemption strategy in which an investor purchases a SPAC unit at the IPO 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 completion of business combination or liquidation. Panel B reports equally weighted one-year deSPAC period returns for both common shares and warrants, calculated based on a buy-and-hold strategy in which an investor purchases a merged company at the starting price of the first trading day as a merged company and holds it for one calendar year (or, until October 31, 2020 for recent mergers). For common shares, this buy-and-hold return includes both dividend yields and capital gains. The sample size is 114 for common shares and 105 for warrants. Panel C reports the relation between the SPAC period returns and the deSPAC period common share returns for 97 out of 114 SPAC IPOs between January 2010 and May 2018 that subsequently merged, with the annualized SPAC period returns on the X-axis and the one-year deSPAC period common share returns on the Y-axis, with a fitted line for a regression coefficient shown.

Panel A. SPAC Period Returns



Panel B. deSPAC Period Returns



Panel C. SPAC and deSPAC Period Returns

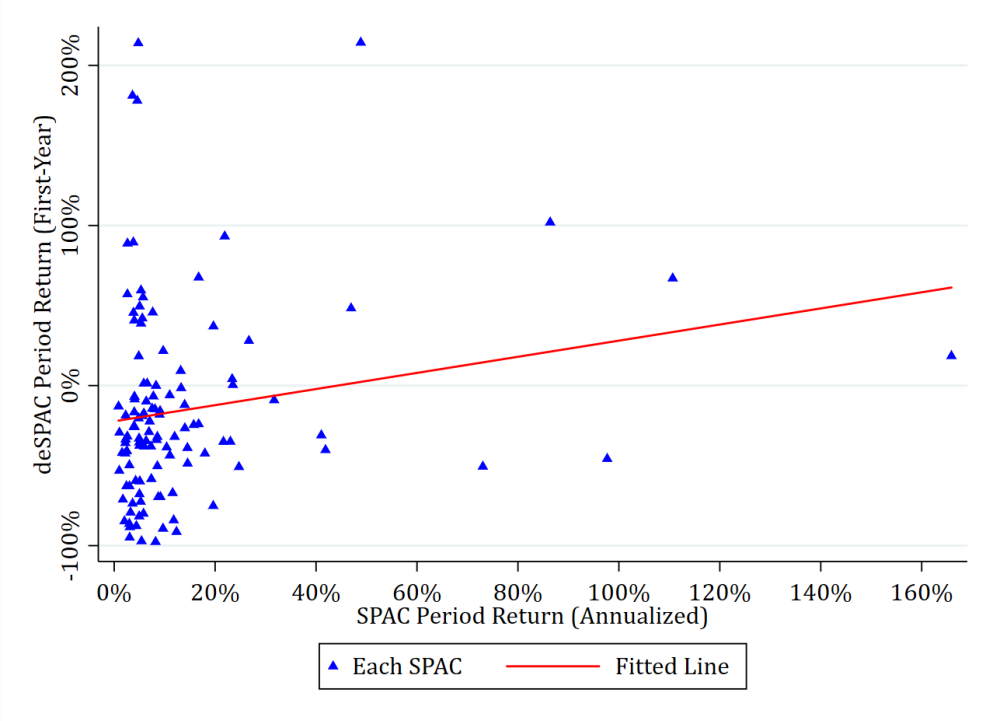
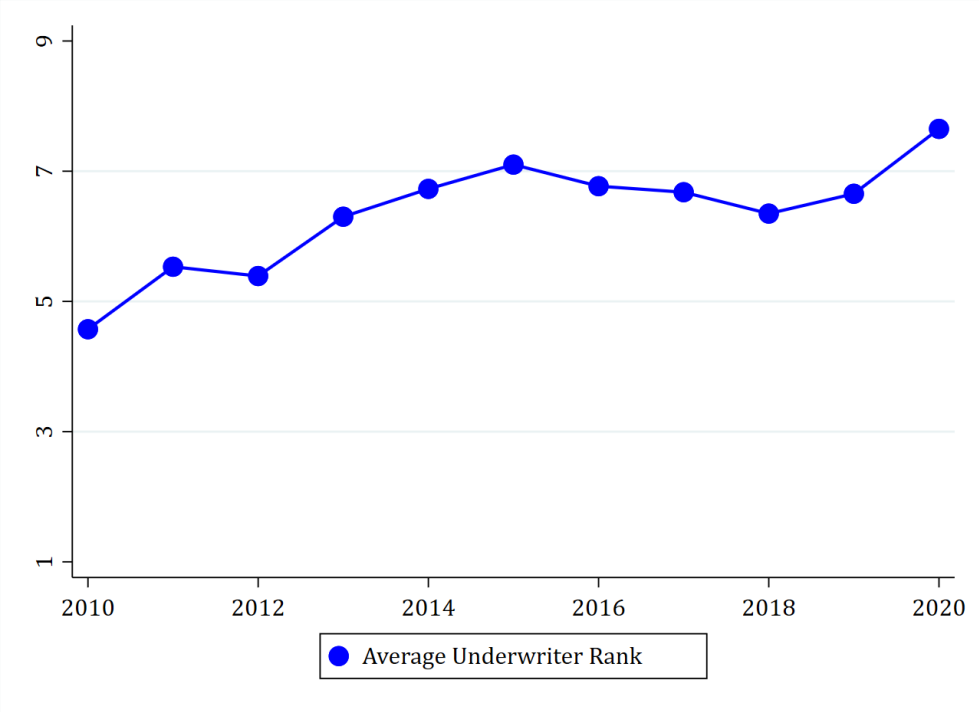


Figure 4. Underwriters

Panel A reports the equally weighted lead left underwriters' reputation ranks from Loughran and Ritter (2004), defined as the prestige rank on a 1 to 9 scale (9 for high prestige) following Carter and Manaster (1990). Panel B reports the combined market share of three most prestigious underwriters - Goldman Sachs, Morgan Stanley, and J.P. Morgan. Each IPO is weighted equally.

Panel A. Underwriter Rank Over Time



Panel B. Three Most Prestigious Underwriters

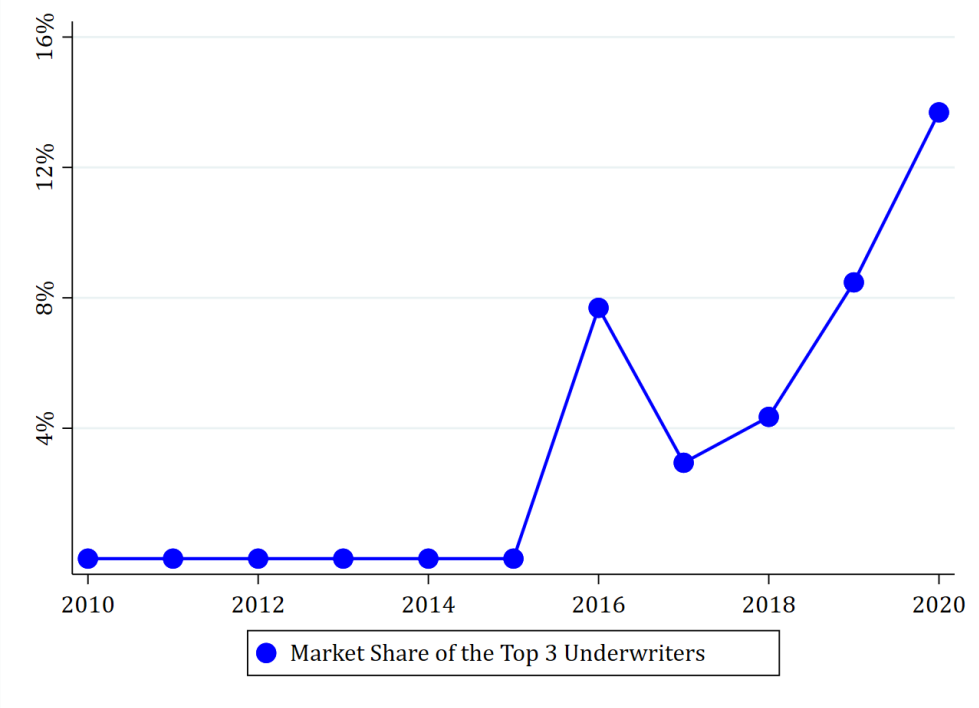


Figure 5. The Recent Evolution of the SPAC Market

Figure 5 shows the evolution of the SPAC market from the first quarter of 2018 to January 2021. Dilution per unit is the fraction of a common share that derivative securities included in a unit can convert into, expressed as a percentage of a share. For example, if SPAC A's unit comes with one common share and half of a warrant, and if one warrant can convert into half of a common share, we classify SPAC A as having a 25% dilution. If SPAC B's unit comes with one common share, one warrant, and one right, and if a warrant converts to a common share and a right converts to one-tenth of a common share, we classify SPAC B as having a 110% dilution. We report the quarterly averages of the dilution per unit (blue dots, left axis), and the first-day return defined as (the closing market price on the first-day of trading − the offer price) / the offer price (red triangles, right axis).

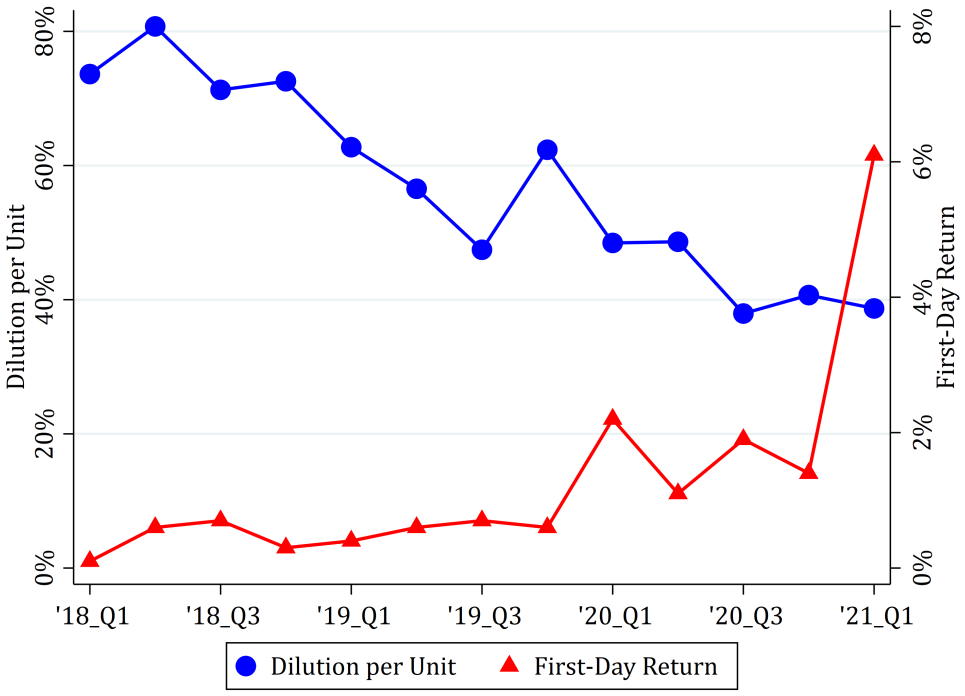


Table 1. The Relative Costs of Going Public

Panel A lists relevant costs of three different going public methods: merging with a SPAC, traditional IPO, and direct listing. Panel B shows the total costs as listed in Panel A for each method. We report the costs as a fraction of proceeds and the post-issuance market capitalization. For the SPAC mergers, we use numbers reported in Klausner et al. (2021)'s Table 5, which is based on 47 completed SPAC mergers between January 2019 and June 2020. For the traditional IPOs, we compute the costs from 131 IPOs during the same period, after excluding 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. For the direct listings, we include six companies that went public between April 2018 and October 2020.

Panel A. Costs Associated with Three Different Methods of Going Public

	Costs
SPAC	SPAC IPO Underwriter Commissions, Sponsor Promotes, Warrants and Rights
Traditional IPO	Underwriter Commissions, Money Left on the Table (Underpricing)
Direct Listing	Financial Advisor Commissions

Panel B. Comparison of the Costs

	SPAC (N=47)		Traditional IPO (N=131)		Direct Listing (N=6)	
	Costs / Proceeds	Costs / Market Cap	Costs / Proceeds	Costs / Market Cap	Costs / Proceeds	Costs / Market Cap
25th percentile	29.0%	10.0%	6.9%	1.1%	-	0.1%
Median	50.4%	14.1%	28.4%	4.8%	-	0.3%
75th percentile	261.0%	21.0%	51.5%	8.7%	-	1.1%

Table 2. SPAC and Operating Company IPOs

There are 458 SPAC IPOs between January 2010 and December 2020 (378 through October 2020) after excluding 15 IPOs from 2010-2011 only traded in Over-The-Counter (OTC) markets. For the same period, there are 1,339 operating company IPOs after excluding 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. Proceeds do not include underwriter over-allotment options and are reported in million dollars.

	Number of IPOs		Total Proceeds ($m)		Average Proceeds ($m)	
Year	SPAC	Operating	SPAC	Operating	SPAC	Operating
2010	2	91	104	29,822	52	328
2011	6	81	451	26,967	75	333
2012	9	93	475	31,112	53	335
2013	10	158	1,325	41,565	132	263
2014	11	206	1,555	42,200	141	205
2015	20	118	3,620	22,000	181	186
2016	13	75	3,224	12,518	248	167
2017	34	106	8,996	22,979	265	217
2018	46	134	9,935	33,467	216	250
2019	59	112	12,115	39,182	205	350
2020	248	165	75,300	61,900	304	375
Total	**458**	**1,339**	**117,099**	**363,711**	**256**	**272**

Table 3. SPAC Period Returns

Panel A reports equally weighted annualized SPAC returns for SPACs that went public between January 2010 and May 2018. We calculate an annualized return based on the optimal redemption strategy in which an investor purchases a SPAC unit from the IPO 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. Panel B reports that out of 114 SPACs we study, 97 completed the business combination, and 17 liquidated. Average months refer to the months between the SPAC IPO and either a business combination completion or liquidation. Panel C reports SPAC period returns based on equally weighting, SPAC IPO proceeds weighting, and the median.

Panel 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	30	9.1%
2018 (–May)	13	14.0%
Total	**114**	**9.3%**

Panel B. Based on Outcomes

Outcome	Number of SPACs	Annualized Returns	Average Months
Merger Completed	97	10.6%	21.6
Liquidated	17	2.0%	28.4
Total	**114**	**9.3%**	**22.6**

Panel C. Different Weighting Methods

	Annualized Returns
Equally Weighted	9.3%
IPO Proceeds Weighted	10.6%
Median	4.9%

Table 4. deSPAC Period Common Share Returns

Panel A reports average equally weighted deSPAC period common share returns based on a buy-and-hold strategy 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 one year or three years. The year column represents the year of the merger. The sample consists of 114 business combinations consummated between January 2010 and September 2020. The returns include dividend yields and capital gains. 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 for both one-year and three-year returns. 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 equally weighting, SPAC IPO proceeds weighting, and public cash weighting, and the median return. Public cash is the actual cash delivered to the merging companies from public SPAC shareholders, defined as *Initial Trust* $\times$ *(1* $-$ *Redemption Ratio)*.

Panel A. Common Shares

		One Year Returns			Three Year Returns		
Year	Number	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%	-46.5%	29.0%	-75.5%
2018	23	-35.0%	8.8%	-43.8%	-37.7%	18.4%	-56.1%
2019	25	-2.0%	5.0%	-7.0%	2.2%	10.6%	-8.4%
2020	25	-5.9%	7.9%	-13.8%	-5.9%	7.9%	-13.8%
Total	**114**	**-15.6%**	**8.7%**	**-24.3%**	**-15.4%**	**19.4%**	**-34.7%**

Panel B. Different Weighting Methods

	One Year Returns	Three Year Returns
Equally Weighted	-15.6%	-15.4%
IPO Proceeds Weighted	-11.5%	-15.7%
Public Cash Weighted	-4.0%	-9.9%
Median	-29.2%	-34.5%

Table 5. deSPAC Period Warrant Returns

Panel A reports equally weighted deSPAC period warrant returns based on a buy-and-hold strategy in which an investor purchases a merged company warrants on the first day of trading as a new entity and holds them for one year or three years. The year column represents the year of the merger. Panel A reports returns on warrants warrants for 105 out of 114 business combinations that have warrants, consummated between January 2010 and September 2020. Returns include capital gains only, as warrants do not pay dividends. 'Units' column represents a deSPAC period investment strategy 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. Panel B reports deSPAC period warrant returns, based on equally weighting, SPAC IPO proceeds weighting, the warrant price at the first trading day as a deSPAC company weighting, and the median.

Panel A. Warrants

		One Year Returns			Three Year Returns		
Year	Number	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%	-45.9%	-10.3%	68.6%	-5.5%
2016	8	1.4%	6.2%	1.6%	-28.8%	-16.6%	-28.6%
2017	11	-13.8%	2.2%	-12.7%	-40.0%	-29.3%	-39.1%
2018	22	-38.8%	-16.1%	-37.8%	-37.1%	22.5%	-33.2%
2019	25	-2.0%	31.0%	-1.4%	2.2%	44.8%	2.3%
2020	25	-5.9%	168.1%	0.0%	-5.9%	168.1%	0.0%
Total	**105**	**-16.9%**	**44.3%**	**-14.6%**	**-20.9%**	**52.8%**	**-18.0%**

Panel B. Different Weighting Methods

	One Year Returns	Three Year Returns
Equally Weighted	44.3%	52.8%
IPO Proceeds Weighted	32.9%	32.8%
Warrant Price at T=0 Weighted	15.6%	18.1%
Median	-13.6%	-26.0%

Table 6. Underwriter Prestige Ranks

Table 6 reports the relation between underwriter prestige ranks and both SPAC and deSPAC period returns. *UWRANK* is the lead (left) underwriters' reputation rank from Loughran and Ritter (2004), defined as the prestige rank on a 1 to 9 scale (9 for high prestige) following Carter and Manaster (1990). For the SPAC period returns, we use 114 SPAC IPOs between January 2010 and May 2018, following Table 3. For the deSPAC period returns, we use 114 completed business combinations between Jaunary 2010 and September 2020, following Table 4. Each observation is equally weighted.

	SPAC Period	deSPAC Period Common Shares	
	Annualized Returns	One-Year Returns	Three-Year Returns
$UWRANK < 5$	7.0%	-32.0%	-41.9%
$5 \leq UWRANK < 8.5$	11.2%	-11.3%	2.0%
$8.5 \leq UWRANK$	9.9%	-7.8%	-9.6%

Table 7. Potential Dilution per Unit

Table 7 reports the relation between potential dilution per unit and investor returns on units during the SPAC period and common shares during the deSPAC period. We first calculate the fraction of a common share that derivative securities included in a unit can convert into. For example, if SPAC A's unit comes with one common share and half of a warrant, and if one warrant can convert into half of a common share, we classify SPAC A as having a 1/4 dilution. If SPAC B's unit comes with one common share, one warrant, and one right, and if a warrant converts into a common share and a right converts to one-tenth of a common share, we classify SPAC B as having a 1.1 dilution. We report SPAC period and deSPAC period common share returns for low, middle, and high dilution groups based on this measure. For the SPAC period returns, we use 114 SPAC IPOs between January 2010 and May 2018, following Table 3. For the deSPAC period returns, we use 114 completed business combinations between Jaunary 2010 and September 2020, following Table 4. Each observation is equally weighted.

	SPAC Period	deSPAC period Common Shares	
	Annualized Returns	One-Year Returns	Three-Year Returns
$Dilution \leq 1/3$	14.0%	12.7%	22.7%
$1/3 < Dilution \leq 2/3$	7.0%	-21.2%	-15.6%
$2/3 < Dilution$	9.1%	-27.2%	-42.2%

Table 8. Redemptions and Time between SPAC IPOs and Business Combinations

Table 8 examines whether SPAC shareholder redemption decisions and the time between SPAC IPOs and business combination completions predict deSPAC period returns. Panel A classifies shareholder redemptions into three categories: redemptions occurring at the time of SPAC deadline extensions, liquidations, and/or business combinations. It shows that 68% of capital raised by the SPAC IPOs in aggregate is redeemed. Panel B reports output from a regression having one-year and three-year deSPAC returns as dependent variables. *Log_Months* refer to the natural logarithm of the number of months between SPAC IPO dates and business combination dates. Standard errors are reported in parentheses. Statistical significance levels: *** p-value$<$0.01, ** p-value$<$0.05, * p-value$<$0.10.

Panel A. Redemption Types

	% of Initial Trust
Extension	21%
Liquidation	11%
Business Combination	37%
All Redemptions	**68%**

Panel B. Redemption and deSPAC Period Returns

Dependent Variable	*One-Year deSPAC Common Returns*			*Three-Year deSPAC Common Returns*		
	(1)	(2)	(3)	(4)	(5)	(6)
Redemption Ratio	-0.477***		-0.383**	-0.414**		-0.286
	(0.161)		(0.156)	(0.191)		(0.185)
Log_Months		-0.428**	-0.267		-0.486	-0.365
		(0.195)	(0.196)		(0.322)	(0.337)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N. Observations	114	114	114	114	114	114
Adj. R-Squared	0.070	0.040	0.081	0.055	0.058	0.057

Table 9. Mean Sponsor Promote Haircuts and Inducements

Table 9 reports the average promotes that sponsors forfeit, the inducement that various investors receive, and the deferred underwriting commissions that underwriters surrender. The sample consists of twenty most recently completed business combinations as of October 2020. We divide the sample into two groups based on the redemption ratios, ten companies per each group. Sponsor economics forfeited is measured as the number of forfeited common shares divided by the number of original founder promote shares for common shares, and as the number of forfeited warrants divided by the number of warrants that sponsors purchase at the time of the IPO (i.e., private placement warrants) for warrants. Inducement is measured as the number of common shares (warrants) that are granted to PIPE investors, non-redeeming SPAC investors, and other parties not affiliated with sponsors, divided by the number of original founder common shares (private placement warrants). Underwriter deferred commission forfeited is measured as the forfeited deferred commissions divided by the original deferred commissions. Having PIPE investors indicates the percentage of business combinations that include PIPE investments as a part of the deal. Having sponsors as PIPE investors measures how often sponsors invest their own capital as PIPE investors, conditional on having PIPE investments.

	Total Sample	Low Redemption	High Redemption
Average Redemption Ratio	47%	8%	87%
Sponsor Economics Forfeited: Common Shares	34%	22%	46%
Sponsor Economics Forfeited: Warrants	42%	42%	42%
Inducement: Common Shares	26%	1%	51%
Inducement: Warrants	23%	14%	31%
Underwriter Deferred Commission Forfeited	24%	5%	43%
Having PIPE investors	85%	90%	80%
Having sponsors as PIPE investors	47%	56%	38%

Appendix

A1. The Life Cycle of SPACs based on Examples

The complicated structure of SPACs can be best understood with examples. We provide three cases – Social Capital Hedosophia, which merged with Virgin Galactic Holdings, as a successful SPAC, and Barington/Hilco Acquisition and Allegro Merger, two SPACs that announced business combinations but liquidated in the end, as examples of unsuccessful SPACs.

A1.1. Social Capital Hedosophia (currently Virgin Galactic)

Social Capital Hedosophia Holdings Corp. (SCH), which is now traded as Virgin Galactic, was launched as a partnership between two venture capital firms – Social Capital, which was founded by Chamath Palihapitiya, and Hedosophia, which was founded by Ian Osborne. SCH went public on September 14, 2017, offering 60 million units at the price of $10 per unit, raising $600 million (69 million units and $690 million, including the the full exercise of the underwriter over-allotment option). Credit Suisse was the sole underwriter. SCH set 24 months as a deadline to complete a business combination.

Each unit of SCH consists of one Class A common share, and one-third of one warrant, with each whole warrant allowing the purchase of one Class A common share at $11.50, conditional on the consummation of a business combination and exercisable within five years from the business combination date. Units were scheduled to be traded separately as common shares and warrants on the 52nd day following the IPO, but at the discretion of the underwriter (Credit Suisse), units became unbundled on September 29, 2017.

On July 9, 2019, about 22 months after its IPO, SCH announced a definitive agreement outlining a business combination with Virgin Galactic, Virgin Group's spaceflight company. However, SCH could not close the announced merger before its initial 24 months deadline, which was September 2019. SCH sought a three-month extension of a deadline, giving shareholders an option to redeem their shares if they do not agree with the proposed charter extension.

As a result, 3.7 million shares, which is 5.5% of the total shares, were redeemed at $10.37 per share. Upon the business combination, SCH gave shareholders another option to redeem their shares. This time, 12.1 million shares, or 17.5% of the total shares, were redeemed at $10.33. The deal was completed on October 25, 2019, set to start trading as a new entity 'Virgin Galactic Holdings Inc' on the next trading day, October 28, 2019 (Monday).

Sponsors, both Social Capital and Hedosophia, did not forfeit any founder shares or warrants. Instead, Chamath Palihapitiya, the founder of Social Capital and SCH, provided extra capital as a PIPE investor, investing $100 million by purchasing 10 million common shares at $10 per share. SCH also invited Boeing as a second PIPE investor, receiving a $20 million investment by issuing 1,924,402 common shares at a price of $10.40 per share.

Based on the optimal redemption strategy of purchasing units in the IPO and selling or redeeming common shares and derivative securities five trading days prior to the business combination (to avoid settlement complications or inducing a look-ahead bias), a SPAC investor who bought one unit of SCH, consisting of one common share and one-third of one warrant, on the IPO date at $10.00, would cash out at $11.23, earning a 5.72% of annualized return.

The stock price of Virgin Galactic peaked at $33.87 on February 17, 2020, just before the COVID-19 pandemic hit the market. It was traded at $18.29 on October 27, 2020, the last day of the one-year investment period. Based on our deSPAC period buy-and-hold investment returns, an investor who bought one share of Virgin Galactic at the first trading date price of $11.79 would have earned 55% for the first year, while the value-weighted CRSP return for the same period was 14%, resulting in a 41% abnormal return. For the same period, a warrant investor would have earned 140%.

A1.2. Barington/Hilco Acquisition and Allegro Merger (Both Liquidated)

Barington/Hilco Acquisition Corp (BHAC) went public on February 6, 2015, offering 4 million units at a price of $10 per unit, raising $40 million (4.29 million units and $42.9 million, including the partial exercise of the underwriter over-allotment option). Early Bird Capital was the lead bookrunner. BHAC set 18 months as an original deadline to consummate a business combination.

However, BHAC extended the charter six times total before it finally liquidated on October 31, 2018, almost 45 months after its IPO on February 6, 2015.

BHAC announced two unsuccessful definitive agreements during its life span. The first target was Oomba, an online social networking and tournament gaming platform, announced on May 16, 2017. However, on November 30, 2017, BHAC announced that it has terminated the definitive merger agreement it entered into with Oomba, because *'Oomba breached several of its obligations under the Merger Agreement, including, but not limited to, its obligation to deliver to the Company audited financial statements'*.[18] About three months later, BHAC announced that it entered into a letter of intent with Specialty Brands Holdings. Specialty Brands would spinoff its Papa Gino's Pizzeria by merging it with BHAC on February 14, 2018. However, on April 25, 2018, BHAC announced the termination of the agreement because *'the proposed purchase price for the Company was not in its best interest or that of BHAC. . . . the parties were unable to agree upon a revised purchase price. . . '*.[19] BHAC eventually announced its liquidation on October 31, 2018.

Allegro Merger (Allegro) went public on July 3, 2018, offering 13 million units at the price of $10 per unit, raising $130 million (14.95 million units and $149.5 million, including the full exercise of the underwriter over-allotment option). Cantor Fitzgerald was the lead bookrunner. Allegro set 18 months as an original deadline to finish a business combination and extended it once before liquidating on March 31, 2020, about 21 months after its IPO on July 3, 2018.

Allegro announced a definitive agreement with TGI Fridays (TGIF) on November 8, 2019. The agreement included specific closing conditions such as requiring that Allegro would deliver at least $30 million in cash and assume TGIF's $350 million of net debt. However, as the COVID-19 pandemic hit the market, the deal was cancelled. On March 31, 2020, Allegro and TGIF mutually determined to terminate the deal because of *'extraordinary market conditions and the failure to meet necessary closing conditions, to terminate their previously announced merger agreement'*.[20] Allegro announced its liquidation from the same filing.

Although both BHAC and Allegro failed to complete business combinations and eventually liquidated, SPAC stage investors earned annualized returns of 3.06% and 1.82% from BHAC

[18] See https://www.sec.gov/Archives/edgar/data/1622175/000161577417007044/0001615774-17-007044-index.htm
[19] See https://www.sec.gov/Archives/edgar/data/1622175/000161577418002903/0001615774-18-002903-index.htm
[20] See https://www.sec.gov/Archives/edgar/data/1720025/000121390020008287/0001213900-20-008287-index.htm

and Allegro, respectively, based on our optimal redemption strategy. It is noteworthy that Allegro decided to liquidate in late March 2020 and returned the capital to its investors in early April 2020, when the US stock market suffered a significant drop from the COVID-19 pandemic. That is, even in the middle of the market crash, Allegro returned all the proceeds to investors with interest.

A1.3. The Evolution of the SPAC Structure: From the 'SPAC 1.0 & 2.0' to the 'SPAC 3.0'

Practitioners frequently refer to the period between 1993 and 1999 as 'SPAC 1.0', and the period between 2000 and 2009 as 'SPAC 2.0', and from 2010 as 'SPAC 3.0', in general.[21] Here, we summarize five key differences between SPACs that went public before 2010 (SPAC 1.0 and 2.0) and in 2010 or later (SPAC 3.0). Note that the below differences are based on the general trend – as each SPAC is entitled to decide its own structure, the comparison may not be true for some SPACs.

First, although there were 158 SPAC IPOs between 1997 and 2008, 72, or 46%, were traded in OTC markets.[22] From 2010, only 15 SPAC IPOs out of 393, or 4%, were traded in OTC markets, and since 2011, all have been traded on organized exchanges.[23] As the comparison of Table 2 and Table A1 demonstrates, SPACs that went public in 2008 or before tend to be significantly smaller than SPACs that went public in 2010 or later.

Second, in the SPAC 3.0 period, a typical underwriting commission consists of a 2% up-front fee and a 3.5% deferred fee payable only upon the completion of a business combination. However, it used to be the case that during the SPAC 1.0 and 2.0 periods, underwriter commissions were 7% (up to 10% during SPAC 1.0), and most of them were up-front.

Third, partly because of the large up-front underwriting fee, only about 85% of the IPO proceeds were deposited into the trust account prior to 2004, gradually increasing to high-90% by 2008 (See Jenkinson and Sousa (2011) and Lakicevic and Vulanovic (2013)). It is only after 2010 that 100% of SPAC IPO proceeds were deposited into the trust account. In recent years, some SPACs have deposited more than 100% of IPO proceeds in the trust account to attract the SPAC period investors.

[21] There are different versions of the classifications, such as referring to post 2015 as SPAC 3.5 or SPAC 3.0.
[22] The first SPAC IPO occurred in 1997 and the second in 2003. There was no SPAC IPO in 2009.
[23] Five SPAC IPOs in 2010 and ten in 2011.

Fourth, SPACs going public in 2010 and later are composed of units with fewer warrants, and the exercise prices are higher. That is, prior to 2010, the exercise price of warrants was at a 15% to 30% discount to the IPO price, but it changed to a 15% premium to the IPO price from 2010 (i.e., $11.50 for a SPAC IPO priced at $10). At the same time, SPACs that went public before 2010 provided warrants that can convert into 1 - 2 shares per unit, but a typical SPAC unit from 2010 provides warrants that can convert into 1/4 - 1 shares. We see a downward trend in recent years, especially in 2020 and 2021 (See Figure 5).

Fifth, before 2010, SPAC shareholders can either vote to approve a business combination or redeem their shares by rejecting the proposed business combination. In other words, shareholders could not approve a business combination and redeem their shares. From 2010, shareholders can make these two decisions separately, allowing them to approve a deal while still redeeming their shares. Accordingly, while Jenkinson and Sousa (2011) report that 26% (15 out of 58) of the SPACs that went public between August 2003 and June 2008 were liquidated, we find that only 15% (17 out of 114) of the SPACs that went public between January 2010 and May 2018 were liquidated.

A1.4. Current Status of SPACs

Panels A and B of Figure A1 report the current status of SPACs as of October 2020, based on the SPAC IPO years, dividing it into three categories – completed business combinations, liquidated, and seeking business combinations. For example, in 2017, a total of 34 SPACs went public, and 27 (79%) of them completed business combinations; 3 (9%) of them are liquidated; and 4 (12%) of them are still seeking business combinations as of October 2020. Four SPACs that went public in 2017 are still seeking business combinations although the typical lifecycle of a SPAC is 24 months, because sponsors can ask shareholders for charter extensions. 23 out of 168 SPACs that went public in 2020 have announced a business combination, but none of them have completed it as of November 2020.

A2. Additional Cross-Sectional Variations in deSPAC Returns

Table A2 summarizes returns based on different operational aspects of merging companies. Panel A shows that operating companies with a positive net income for the twelve months before the business combination tend to perform better than companies with a negative net income. Also, companies that had sales of more than $100M produce higher returns than their smaller counterparts. This is consistent with a pattern found in traditional IPOs.[24] Panel B reports that biotech companies tend to perform better, while energy companies underperform, a pattern also documented by Renaissance Capital (2020). Note that only 6 out of 114 deSPAC deals involve biotech companies, while biotech companies account for about 40% of traditional IPOs in 2013-2020.[25] Panel C shows that foreign companies account for about 30% of deSPAC mergers, and they tend to underperform compared to domestic counterparts during the first year, but this pattern flips in a three-year window.

A3. State-Contingent Sponsor Compensation Renegotiations

It is not unusual for SPAC sponsors to have complicated state-contingent compensation structures. For example, the merger agreement between Acies Acquisition Corp ("ACAC") and PlayStudios (a mobile game developer), according to the SEC form 8-K filings, includes the following features.[26]

The sponsor will forfeit 403,594 Class B promote shares if more than 25% of public shares are redeemed, and an additional 403,594 shares will be forfeited if more than 50% are redeemed, with a proportional amount forfeited if between 25% and 50% are redeemed. Furthermore, 450,000 shares will be forfeited unless the post-merger stock price stays above $15.00 for a certain number of days, and another 450,000 shares will be forfeited unless the stock price stays above $12.50 for a certain number of days. In addition, the sellers (operating company shareholders) will be given 7,500,000 shares if the common stock price equals or exceeds $12.50 for a certain number

[24] See Table 16b from https://site.warrington.ufl.edu/ritter/files/IPO-Statistics.pdf
[25] See Table 4g from https://site.warrington.ufl.edu/ritter/files/IPO-Statistics.pdf
[26] See https://www.sec.gov/Archives/edgar/data/1823878/000110465921010465/0001104659-21-010465-index.htm

of days at least 150 days after, but within 5 year of closing; and an extra 7,500,000 shares if the common stock price equals or exceeds $15.00 for a certain number of days for the same period. The additional common shares would offset the dilutive effects from SPAC warrants.

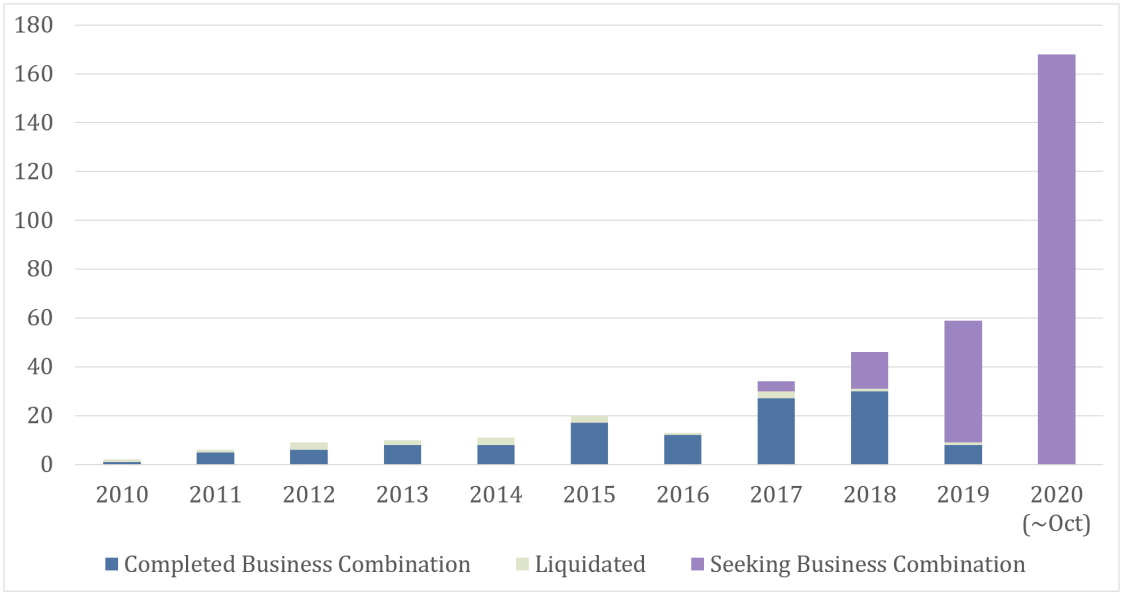
Therefore, the SPAC shareholders will be diluted if the post-merger operating company stock price goes up sufficiently, but the operating company and public SPAC shareholders will gain from the forfeiture (anti-dilutive) effect of sponsor shares being canceled if the stock price doesn't go up. The merger agreement requires the SPAC to deliver $200 million in cash (ACAC had $215 million in trust), and values the common equity of PlayStudios at $1.041 billion. The $1.041 billion pre-money valuation is based on PlayStudios stockholders receiving 89.1 million shares of ACAC common stock and $150 million in cash. $250 million has been committed from PIPE investors at $10 per share. Essentially all shares of the sponsors and PlayStudios shareholders will be subject to a 12-month lockup.

Post-merger, there would be up to 21.525 million public shares, 89.1 million Playstudios shares, 5.3 million sponsor shares, and 25 million PIPE investor shares, for a total of about 141 million shares outstanding, plus about 26 million warrants that entitle each warrant holder to buy 1/3 share at $11.50. The common stock traded at $11.35, above the redemption price, following the merger announcement, which was greeted positively by shareholders. On a fully diluted basis, there would be 141 million + 8.7 million shares from potential warrant exercise + possibly 15 million shares from the earnout.

Figure A1. SPAC IPOs by Outcome

Panel A reports the outcome of each SPAC based on the year that a SPAC went public. A closed business combination means that a SPAC consummated a merger and started to trade as a newly merged company. Liquidated denotes that a SPAC could not complete a business combination and liquidated. Seeking business combination means that a SPAC is either still searching for a target company or is finalizing a proposed merger after announcing the target company. Y-axis represents the number of SPAC IPOs. Panel B shows the same numbers as a percentage for each year. SPAC IPOs do not include those only traded in Over-The-Counter (OTC) markets. 2020 numbers and classifications are as of October 31.

Panel A. SPAC IPO Outcomes by Number



Panel B. SPAC IPO Outcomes by Percentage

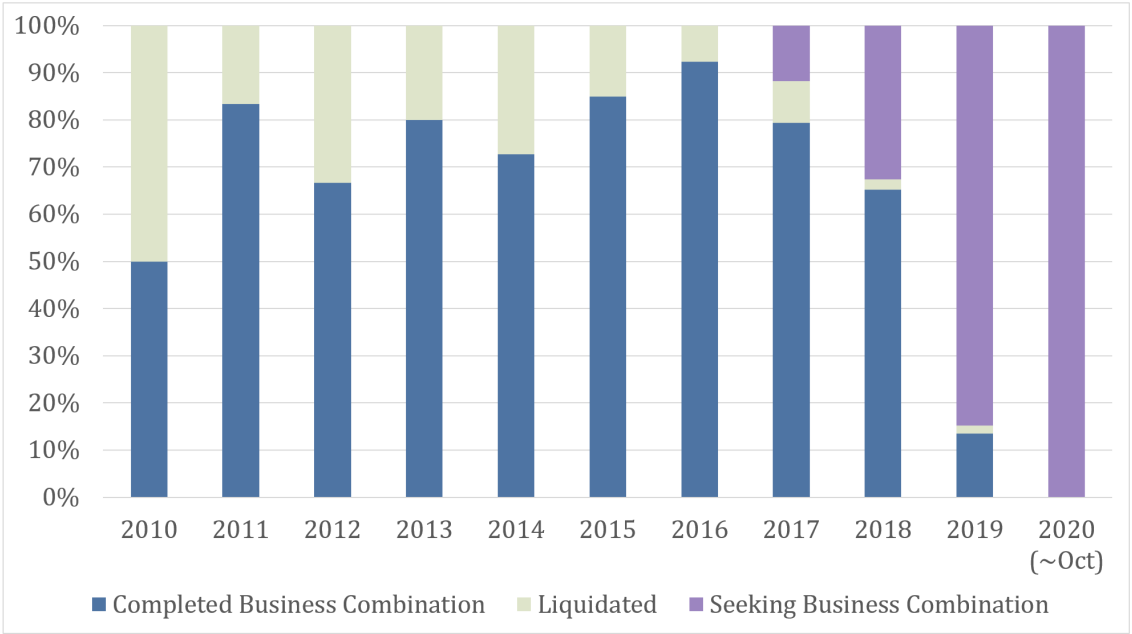


Table A1. SPAC IPOs prior to 2010

Table A1 reports the number of SPAC IPOs before 2010 with total and average proceeds. Among 158 SPACs that went public before 2010, 86 are traded in Over-The-Counter markets and 72 are traded in major stock exchanges (NYSE, NASDAQ, or AMEX). Proceeds do not include underwriter over-allotment options and are reported in million dollars.

	Major Exchanges			OTCs		
Year	No.	Tot. Proceeds	Avg. Proceeds	No.	Tot. Proceeds	Avg. Proceeds
1997	1	480	480	-	-	-
1998	-	-	-	-	-	-
1999	-	-	-	-	-	-
2000	-	-	-	-	-	-
2001	-	-	-	-	-	-
2002	-	-	-	-	-	-
2003	-	-	-	1	24	24
2004	-	-	-	12	426	35
2005	6	693	115	21	1,154	55
2006	17	2,236	132	18	777	43
2007	50	10,002	200	15	983	66
2008	12	3,475	290	5	152	30
2009	-	-	-	-	-	-
Total	**86**	**16,886**	**196**	**72**	**3,515**	**49**

Table A2. deSPAC Period Common Share Returns – Cross Sectional Variation

Panel A reports equally weighted one year and three years deSPAC period common share returns based on profitability and sales. Profitability is measured based on net income for the last 12 months (LTM) prior to the business combination consummation date (or the previous fiscal year if the LTM net income is not available). Sales are measured based on the LTM revenue prior to the business combination consummation date (or the previous fiscal year if the LTM revenue is not available), reported in millions. SPAC, CRSP, and abnormal returns are the same as defined in Table 4. Panel B reports one-year and three-year deSPAC period common share returns based on industry. For tech and biotech companies, we follow Jay Ritter's SIC code based classification for his IPO data (See Ritter (2020)). For energy companies, we include gold, mines, coal, oil, and utility industries from Fama-French 49 Industry Portfolio classification. Panel C reports one-year and three-year deSPAC period common share returns based on the operating country of merging companies. 34 out of 114 are based in foreign countries, and 15 are from China.

Panel A. Profitability and Sales

	One Year Returns			Three Year Returns		
	SPAC	CRSP	Diff.	SPAC	CRSP	Diff.
Total (114)	**-15.6%**	**8.7%**	**-24.3%**	**-15.4%**	**19.4%**	**-34.7%**
Profitable (52)	**-11.9%**	**8.0%**	**-19.8%**	**-5.0%**	**21.2%**	**-26.2%**
Sales > 100M (38)	-9.0%	6.9%	-15.9%	-15.4%	21.4%	-36.8%
Sales < 100M (14)	-19.5%	11.0%	-30.5%	23.3%	20.7%	2.7%
Not Profitable (62)	**-18.7%**	**9.3%**	**-28.0%**	**-24.1%**	**17.8%**	**-41.9%**
Sales > 100M (32)	-16.4%	6.3%	-22.7%	-10.9%	18.3%	-29.2%
Sales < 100M (30)	-21.1%	12.5%	-33.6%	-38.2%	17.3%	-55.5%

Panel B. Industry

	One Year Returns			Three Year Returns		
	SPAC	CRSP	Diff.	SPAC	CRSP	Diff.
Tech (27)	-7.2%	9.9%	-17.1%	-27.3%	17.4%	-44.7%
Biotech (6)	22.1%	11.5%	10.6%	23.3%	11.2%	12.1%
Energy (12)	-41.7%	9.1%	-50.7%	-73.9%	18.9%	-92.9%
Others (69)	-17.6%	7.9%	-25.5%	-3.9%	20.9%	-24.8%
Total (114)	-15.6%	8.7%	-24.3%	-15.4%	19.4%	-34.7%

Panel C. Country

	One Year Returns	Three Year Returns
USA (80)	-10.3%	-17.8%
Foreign (34)	-28.0%	-9.7%
China (15)	-32.5%	7.2%
Total (114)	-15.6%	-15.4%

Table A3. SPAC Mafia

This table reports the list of the largest holders of SPACs (the so-called "SPAC Mafia" members) based on the amount of capital invested in SPACs. AUM stands for "Asset Under Management". The data is from SPAC Research (https://www.spacresearch.com/) based on 13F filings on EDGAR at the end of September 2020.

Rank	Investor Name	SPAC AUM ($M)
1	Millennium Management	2,849
2	Magnetar Financial	2,574
3	Glazer Capital	1,783
4	Polar Asset Management Partners	1,526
5	Linden Advisors	1,357
6	Periscope Capital	1,249
7	Hudson Bay Capital Management	1,185
8	Bluecrest Capital Management	1,127
9	HGC Investment Management	886
10	Kepos Capital	825
11	Davidson Kempner Capital Management	793
12	Weiss Asset Management	757
13	Alberta Investment Management	717
14	Healthcare of Ontario Pension Plan Trust Fund	669
15	Alyeska Investment Group	665
16	Shaolin Capital Management	592
17	HBK Investments	587
18	Baupost Group	574
19	TIG Advisors	547
20	Radcliffe Capital Management	522
	Total	**21,784**