The Going Public Decision and Retail Investors in SPACs vs. IPOs

Debarshi Nandy Yaxuan Wen *

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Abstract

This is the first paper to document investor trading activity immediately following a firm's public market debut, via an IPO and SPAC backed acquisition. Our analysis compares firms going public through SPACs vs. IPOs and finds that SPAC backed firms tend to be younger, VC-backed, have lower current ratios, relative to IPO firms. While the average returns on SPAC common shares outperforms the market after target announcement, they generate larger losses on average, after the target firm goes public, relative to firms going public via IPOs. The popularity of SPACs among retail investors tend to be driven by their return volatility following the announcement of the deSPAC target. Overall, our results provide a methodical comparison between these alternate ways of going public, suggesting that in the long-run, SPACs might be the third leg in the going-public process after IPOs and direct listings.

JEL: G24, G32, G34

Keywords: SPAC, IPO, Public Equity Offering, retail investors

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*Nandy (corresponding author) and Wen are both at the Brandeis International Business School and can be reached at dnandy@brandeis.edu and yaxuanwen@brandeis.edu respectively. For helpful discussions and comments, we would like to thank Mitch Caplan, Stephen Cecchetti, Blake LeBaron, Anna Scherbina, Cliff Zhu, and seminar participants at Brandeis University. We would like to thank Anyi Chen and Vaishnavi Karwa for excellent research assistance. We gratefully acknowledge financial assistance from Brandeis International Business School. Any errors and omissions are the responsibility of the authors.

1 Introduction

Over the last several years, Special Purpose Acquisition Companies (SPACs) have gradually gained popularity as an alternative "going-public vehicle" for startups and entrepreneurial firms. Though SPACs or "blank check companies" have existed for decades, the financial maneuver to use them for going-public by mainstream underwriters and VC-backed private firms is more recent and dramatically took off in early 2020 with the onset of the Covid-19 pandemic and the worry about its impact on financial markets. Though the public visibility of SPACs in popular news media was obvious in 2020, the current financial structure of the SPAC and the presence of mainstream bankers, investors, and VCs in SPAC deals had gradually started to take place since 2018. Given the uncertainty and the volatility of the public markets over the last two decades and the typical time required for a firm to go public through a traditional IPO process, private firms have been much more likely to be acquired than to go public during this time: see, for example, Gao et al. (2013), who provide evidence on the dramatic reduction in IPOs in the United States over the last two decades.[1] However, the obvious drawback of an acquisition is that the founders lost the decision-making control of their products and their technology to the acquiring firm. Thus, for those entrepreneurs who wanted to retain that control, the primary approach was to remain private for as long as possible and then attempt to go public via an IPO or a direct listing.[2] It is in this environment, that SPACs provided an alternative way for such private firms to transition to the public market, by significantly shortening the "time to market" relative to a traditional IPO.

The status quo of the soft IPO market and the inclination of large number of startups to remain private for as long as possible was shaken up by the Covid-19 pandemic. In early 2020, the pandemic greatly accelerated the pace of technology adoption across various facets of our life

[1] According to the National Venture Capital Association (NVCA), there were more exits by venture capitalists through acquisitions than by IPOs in each of the last 20 years. On any given year the number of exists via acquisitions were 5x to 8x more than that of IPOs. The volume of VC-backed IPOs however started picking up from 2017. The NVCA reports that acquisitions constituted 85% of all exits of venture-backed firms in 2010 and gradually came down to 68.5% in 2020.

[2] In September 2019, about 100 private companies, along with partners from venture firms Andreessen Horowitz, Menlo Ventures, Bessemer Venture Partners, GGV and others, attended a private event to discuss alternative ways to go public rather than through the traditional PO. The sentiment of the meeting was nicely summed up by Brad Gerstner, who sponsored the SPAC, Altimeter Growth Capital: "The days of handing low-priced securities, diluting the company to a bunch of long-only shops in Boston and New York, I think those days are over." Incidentally, in mid-April 2021, Altimeter Growth Corp struck the largest SPAC merger deal agreeing to take Grab public in a $40B deal. Adapted from Bloomberg, available here: https://www.bloomberg.com/news/articles/2019-09-30/silicon-valley-calls-summit-to-disrupt-ipos-bankers-not-welcome

and in the economy, which created an unusually "hot" market for such startups, particularly for high-tech private firms, as it scaled up the product market opportunities rapidly, thus creating a need for large capital infusions and thereby a viable opportunity for them to go public (see, Chemmanur et al., 2010; Clementi, 2002; and Spiegel and Tookes, 2012). In addition to the need for capital infusion, such rapid technology adoption in the economy, also led to faster product commoditization and therefore reduced the benefits to firms for remaining private, causing them to go public earlier in their lives (Spiegel and Tookes, 2020). Similarly, in such situations, where there is rapid commoditization within a particular industry, even firms that may otherwise not require an immediate capital infusion, may go public, given similar decisions of going public by their product market competitors. This will result in IPO waves in industries which experience such rapid changes in adoption of newer products and technologies (Chemmanur and He, 2011).[3]

In some sense, SPACs provide certain features in the going public process that may be more attractive for private firms. First, in SPAC transactions, awareness from investment bank analysts on an upcoming deal is immediate and therefore might generate trading momentum earlier than in a traditional IPO. It is worth mentioning here, that throughout the paper, we will refer to the "SPAC" period and the "de-SPAC" period to correspond to before and after the initial business combination completion, respectively. Specifically, in contrast to a traditional IPO, since de-SPAC transactions are viewed as an acquisition on the part of the publicly traded SPAC entity, analysts are immediately allowed to review the proposed acquisition deal and financial projections of the target firm, and provide their analysis to prospective investors. As a result, once the target company's stock starts trading publicly, it benefits from analyst reports on its growth projections and valuation metrics, which may help stimulate liquidity of such firms in the public markets, relative to others who go public following a traditional IPO, where the quiet period is binding following the IPO. Second, the direct costs in a SPAC are typically less compared to a traditional IPO and generally

[3]This is easily seen in many industries. The EV market is one that has drawn a lot of attention recently. The market leader, Tesla, went public in June 2010, but since then the industry was really not advanced enough for any of its competitors to go public - even though there are several firms that are working on the EV and related technology. However, in 2020 the industry took a leap forward with Nikola, Hyliion, Lordstown Motors, and Lucid Motors, all announcing their intent to go public within months of each other, leading to a classic "going public" wave in the EV industry. Anecdotal evidence suggests that a high degree of product commoditization and transitioning to the public markets to maintain parity with their competitors seems to have driven this decision for the firms. Incidentally, all of these firms decided to go public by merging with a SPAC, making it possible to go public within a short period of time of each other.

borne by the SPAC entity sponsors as opposed to the company.[4] Finally, while a direct listing has many of the same advantages as going public through a de-SPAC acquisition, it may not be appropriate for smaller private firms and those where the technology and industry structure in more uncertain. A direct listing also does not allow capital infusion at the listing until a recent regulation change in late 2020, requiring a separate VC or PE deal to be completed either prior to going public or for the firm to issue equity through a seasoned equity offering right after going public - in both cases the costs involved are significantly greater, thus making it less attractive for smaller private firms.

Our study contributes to several strands of literature in empirical finance. First, this paper adds to a growing body of research on the current generation of SPACs - in particular, we are the first paper to empirically document the trading activity of investors immediately following an IPO and a SPAC transaction. In the latter case, we show how investors behave in the periods prior to the announcement of a SPAC deal, following the announcement of a deal but before the target firm starts trading, and finally after the private firm's equity trades in the public market. Second, we further the going public literature by comparing SPAC and IPO as private firms' exit options, in terms of ex ante characteristics of firms and market performance. Lastly, the paper contributes to the literature on individual investor behavior with novel evidence on retail trading activities of SPACs in 2018-2020, which is the most recent period when SPACs have grown rapidly in terms of market activity and recognition by the general public.

Our research complements three contemporaneous papers on SPACs. While we discuss the broader (and earlier) literature in the following section, it is worth mentioning here, how our paper differs from these three other contemporaneous papers, namely, Bai et al. (2020), Klausner et al. (2020), Gahng et al. (2021). Our findings add to the collective understanding of SPACs from these papers by providing new evidence on investor trading activity following SPACs and IPOs. This is the first paper to provide such evidence. Unlike the other papers, our paper also provides evidence on the going public choice between an IPO and a SPAC merger by analyzing the private firm and market specific financial characteristics, prior to going public. While we also document several common return and market outcomes following SPACs, our analysis is benchmarked against the

[4]In reality though, one would argue that these costs are internalized and passed back to the SPAC target firm, through the valuation that it receives from the sponsors.

equivalent outcomes following a traditional IPO, therefore providing a clear relative comparison with the status quo. Finally, our sample size and coverage of SPACs is also significantly larger than in these contemporaneous papers, as we have relied on manually collecting data from several SEC filings to supplement the existing databases for our analysis, particularly for the current period after 2018.

Our analysis in this paper, can be summarized as follows: We compare firms going public via SPAC versus traditional IPO in terms of (1) ex ante firm characteristics before going public, (2) common share market performance, and (3) retail investor interest. We use a long sample period from 2003-2020 and compare several sub-periods during this time to illustrate the differences and the evolution of SPAC characteristics.

Our results show that firms going public via SPAC tend to be younger, more likely to have received VC financing, have lower current ratio, and less likely to be in a high-tech industry. Between the SPAC IPO and six months after de-SPAC, SPAC common shares have the highest liquidity in the period between target announcement and the initial business combination completion - incidentally, this is also the period when the downside risk is mitigated by the redemption feature offered by SPACs. In 2018-2020, the average buy-and-hold return on SPAC common shares outperformed the market during the SPAC period, and is comparable in magnitude to the buy-and-hold return of IPO shares purchased at the IPO offer price.[5] However, after the de-SPAC merger completion, the run-up in share price does not sustain. In the de-SPAC period, the decline in share price is larger in magnitude for riskier firms, characterized by low revenues prior to going public. Compared to IPO firms, de-SPAC firm shares on average generate larger losses after going public. Retail interest in SPAC investment is weak before target announcement, but rise quickly and strongly after the merger target is identified. SPAC popularity among retail investors is primarily driven by stock price volatility and trading volume, and less so by target firm characteristics or SPAC IPO features. Compared to IPO firms, de-SPAC firms are more likely to attract investors when their stock has

[5]It is critical to note however, that barring the very recent move by Robinhood and SoFi to allow retail investors to bid in IPOs, historically this has been a market purely for institutional investors. It is unheard of retail investors receiving an IPO allocation at the offer price. On the other hand, it is relatively easy for retail investors to invest in shares of firms going public via a SPAC merger by simply buying shares of the SPAC. Thus, an appropriate comparison would be to compare the buy-and-hold returns to investors in SPACs relative to the return in IPOs bought on the first trading day. In this case the SPAC returns outperforms the IPO returns for the first 30 days from the first day of trading, but however reverses thereafter for longer durations.

high volatility.

The rest of the paper is organized as follows: Section 2 discusses related literature. Section 3 describes sample selection, data, and institutional background. Section 4 presents empirical evidence on firms' choices on the going public decision and the market performance metrics of SPAC common shares, in comparison to IPOs when relevant. Section 5 analyzes retail investments in SPACs. Section 6 concludes.

2 Related Literature

The finance literature has studied SPAC since the initial boom of SPAC activities in the 2000's. Shachmurove and Vulanovic (2017) provides a literature review on academic research in SPACs as of 2017, in which the data samples typically end in early 2010s. SPACs in recent years are distinct from those studied in earlier research. As detailed in the institutional background in Section 3, several regulatory changes encouraged the growth of the SPAC market since 2010 and the instrument has become well accepted by financial intermediaries and firms only recently.

Following the rapid resurgence of SPACs since 2018, a growing number of studies revisit SPACs and incorporate the latest data. Klausner et al. (2020) analyze the factors that affect post-merger returns of all 47 SPACs that merged between January 2019 and June 2020. They caution the high dilution to public shareholders' equity due to sponsor promote, public share redemption, and warrant issuance. Gahng et al. (2021) analyze the return on common shares and warrants of exchange-traded SPACs since 2010. They also document that sponsors and underwriters forfeit shares and warrants, or structure earn-out compensation in order to induce business combination, using a sample of 20 recent SPAC merger transactions in late 2020. Bai et al. (2020) develop a theoretical framework to explain the cyclicality of SPAC waves. Empirically, they show that SPAC activity correlates with positive sentiment in the equity markets. They argue that SPAC targets tend to be riskier firms that cannot easily go public through traditional IPO due to underwriter liabilities concerns. SPAC wave pattern is also found to be negatively correlated with market uncertainty index (VIX) and time-varying risk aversion (variance risk premium) between 2003 and 2019 (Blomkvist and Vulanovic, 2020).

This paper provides several unique perspectives not addressed by other recent studies on SPACs, including the firm choice between SPAC and IPO, retail investing in SPACs, event-window

based market performance analysis, and the financing activities of deSPAC firms after the initial business combination. We incorporate a long sample period from 2003-2020 to compare and contrast several sub-samples that represent different stages of the modern history of the SPAC market.

"Going public" is one of the most important milestone events for firms. Traditionally, after the decision to exit, firms may choose to have an IPO or be acquired by another firm. In recent years, going public via SPACs has evolved into a standard option in private firms' choice set of an "exit". This paper extends the going-public literature by analyzing SPACs as another exit option for private companies. We provide empirical evidence on the relationship between ex ante firm characteristics and its choice of the going public method. We also compare the market performance and retail investor interest between deSPAC and IPO firms.

We draw from the rich theoretical literature on the going-public decision to select relevant firm characteristics used in the empirical analyses. For example, we control for company age, industry, capital intensity, liquidity and solvency, and innovation and R&D. These features are considered relevant in several models on the going-public choice. Chemmanur and Fulghieri (1999) model the going-public decision in an environment of asymmetric information, which implies that larger and more capital intensive firms, with riskier cash flows, and those operating in industries characterized by lower information production costs are more likely to go public. Bhattacharya and Ritter (1983) and Maksimovic and Pichler (2001) argue that the decision to go public emerges from the tradeoff between the costs of the firm of releasing confidential information (helpful to competitors) at the time of IPO versus the benefits arising from raising capital at a cheaper rate in the public equity markets. These theories imply that firms with greater existing market share, and those operating in industries characterized by a lower degree of competition, are more likely to go public. Spiegel and Tookes (2007) develop a model of the relationship between product market innovation, competition, and the public versus-private financing decision in an infinite-horizon model. Their model predicts that firms will finance projects with the greatest revenue-generating ability privately, and will then go to the public markets only when more modest innovations remain.

Related to the private firm exit choice, existing empirical research has studied the choice between going public via traditional IPO and being acquired. A few papers provide U.S.-based evidence. Using a sample of firms exiting between 1995 and 2004, Poulsen and Stegemoller (2008)

study the choice between sellouts to publicly held acquirers and IPOs for firms moving from private to public ownership. Brau et al. (2012) examine how various industry, stock market, and deal characteristics affect a private firm's choice between an IPO and an acquisition by a public acquirer. Chemmanur et al. (2018) use unique U.S. census data to conduct comprehensive analysis of the three-way choice of private firms between IPOs, acquisitions by private or public acquirers, and remaining private. This paper brings in discussion on the additional option of going public via SPACs, which is mechanically a combination of an IPO and an acquisition.

Finally, this paper relates to research on the behavior of individual investors. Commission-free online trading has made stock investment highly accessible to U.S. retail investors in recent years. A rapid rise in retail investing activities has been observed in 2020, while SPAC activities reached all time high at the same time. We study how retail investors have approached SPACs as an investment opportunity using users holding data of Robinhood users in 2018-2020. We provide empirical evidence on the timing and main drivers of retail investments in SPACs. This paper joins several other recent papers on retail investor behavior and investment returns using the Robintrack dataset (see, e.g., Barber et al., 2021; Ben-David et al., 2021; Pagano et al., 2020; Moss et al., 2020; and Welch, 2020).

3 Sample Selection, Data, and Institutional Background

In this paper, we study U.S. SPACs traded on major exchanges (AMEX, NYSE, Nasdaq) and draw comparisons between firms that went public via SPAC versus traditional IPO. Our data sources include Thomson Reuters SDC Platinum, FactSet, Compustat, SEC filings, CRSP, Robintrack, Crunchbase, and VentureXpert.

3.1 SPAC and Traditional IPO Sample

We identify the universe of SPACs listed on U.S. markets from 2003-2020 using SDC New Issues Database and FactSet, from which we also collect standard information associated with an IPO, such as CUSIP, issue date, offer price, exchange, total proceeds, and underwriter identity. We then use the SDC M&A Database and FactSet to determine whether a SPAC has identified merger target(s) and completed its lifecycle. We categorize a SPAC's lifecycle status into "merger complete", "closed", or "active". A SPAC has the "merger complete" status if it has completed the initial

business combination. A "closed" SPAC ceases to exist as a blank check company through either liquidation or change of corporate charter as approved by shareholders. An "active" SPAC is still searching for a target or in the process of closing the initial business combination. Any inconsistency between SDC and FactSet are reconciled by information from SEC filings. For SPACs with "merger complete" status by the end of 2020, we collect identifiers of the deSPAC firm, target announcement date, deSPAC completion date, and details of the SPAC IPO structure.

Figure 1 reports the SPAC IPO activities from 2003 through 2020, including annual SPAC IPO counts, total proceeds, and average proceeds. SPAC IPOs activity increased leading up to the financial crisis of 2007-2008, and declined thereafter. SPAC IPOs again accelerated from 2015 and reached all-time high in terms of counts and proceeds in 2020. The growth of SPACs continues into 2021. Figure 2 shows the SPAC lifecycle status as of December 2020 by SPAC IPO year. Over time, the proportion of SPACs with a successful initial business combination has increased. This partially attributes to relaxation of exchange listing rules related to maximum redemption and shareholder approval of the business combination, which we provide more details in the recent history section below.

With a focus on comparisons between going public via SPAC vs. traditional IPO, many of our analyses are performed on the subset of SPACs with a "merger complete" status as of the end of 2020. Further, we exclude SPACs traded on OTC or pink sheet during the SPAC period and/or immediately after the initial business combination. 189 SPACs with completed merger remain after this exclusion, among which the first deSPAC event took place in 2006. For this subset of 189 SPACs, we manually collect data on the SPAC IPO offering structure from SEC filings (Table 1). Several key features of SPAC IPO structures have evolved over time. Since 2010, it has become standard practice to place at least 100% of SPAC IPO proceeds in trust account for public share redemption, despite the exchange requirement of 90% minimum. In order to cover the expenses of the SPAC IPO, such as upfront underwriting fees and legal expenses while maintaining the trust reserve level, sponsors contribute additional capital in the form of private placement purchases concurrent to the SPAC IPO. The sponsor capital/SPAC proceeds ratio is on average 3%. Until the recent few years, specialty underwriters such as EarlyBirdCapital have had a large market share in SPAC IPO underwriting. SPAC underwriting gross spread is paid in two

stages, commonly 2% at SPAC IPO and 3.5% at business combination, where the deferred 3.5% are forfeited if a SPAC liquidates. The fee deferral helps sponsors to reduce initial capital investment at the IPO by reducing upfront expenses. A SPAC unit typically consists of one common share and warrants/rights. The warrant incentive has declined over time both in terms of warrant quantity and exercise price. Since 2013, each unit consists of warrant that's convertible to half of a common share or less on average. Until 2010, warrant exercise price is commonly below the unit IPO offer price, and this has become rare thereafter.

The sample of traditional IPO is constructed from SDC New Issues Database. We start with all U.S. Common Stock IPO offerings from 2006 to 2020, then exclude offerings with offer price below $5, ADRs, units, REITs, closed-end funds, banks, ETFs, SPACs, direct listings, and stocks not included in CRSP such as OTC issues.[6] Figure 4 summarizes the yearly count of operating firms going public on major exchanges in the U.S. through SPAC and traditional IPO between 2006 and 2020. Over time, SPAC merger has become a more common method to go public for operating companies. In Figure 4, we also show the number of firms that remain listed as a public company as of May 18, 2021 by the going public year and the going public method. Unreported t-tests by year indicate that the delisting proportion are statistically similar between the deSPAC and IPO sample in all but two years. The average time from going public to delisting among inactive firms is 5.4 years for the IPO sample and 4.0 years for the deSPAC sample. As the deSPAC sample is skewed towards recent years, time will tell whether the proportions will diverge. This statistic does not distinguish firms that exit the public market through voluntary versus involuntary delisting.

3.2 Firm Fundamental Data

For operating firms going public in 2015-2020 via either SPAC or IPO, we collect company financial and employment data in the last full fiscal year prior to going public, company age when going public, and VC backing status. Table 2 lists the variables and summarizes the group means. Compustat is the main source for financial data, industry SIC codes, and employment data. However, Compustat data is not a consistent source of SPAC target company information prior to the deSPAC merger. In addition to missing data, Compustat may incorrectly record SPAC period statistics under the deSPAC firms' identifiers. We screen for these cases and manually collect the data from

[6]Table 17 in appendix reports summary statistics of the IPO sample.

the 10-K filings when necessary.[7] Company age of the IPO sample is based on the founding dates of Loughran and Ritter (2004). VC backing status of the IPO sample is based on SDC New Issues Database. Company age and VC backing status of the deSPAC sample are collected by the authors using VentureXpert, Crunchbase, and firm websites.

3.3 Robinhood Users Holding Data

We use Robinhood users holding data to examine retail investment activity in SPACs between May 2018 and August 2020. The Robinhood data is obtained from Robintrack (https://robintrack.net/), an open-access website that scrapes the number of user data through a Robinhood API.[8] Robintrack data report the number of Robinhood user holding a specific ticker on an hourly basis between May 2, 2018 and August 13, 2020.[9] For example, 637,705 users held American Airline (AAL) shares through the brokerage as of 8/13/2020 22:58 UTC.

Robintrack data identifies stock with tickers. We link Robintrack data to CRSP data by ticker and date, then use CRSP identifiers to merge with other data sources. The universe of ticker in Robintrack data includes stocks and ETFs. There are 8,595 unique tickers in the sample. Data period for each ticker varies. Because the holding quantity of each user is unknown, the data is best interpreted as a popularity measure. We analyze popularity and popularity change on a daily frequency. For every ticker, we retain last data point reported each day, based on Eastern Time (the time zone of major U.S. exchanges). Several recent research papers use the same data to study retail investor behavior and investment returns (see, e.g., Barber et al., 2021; Ben-David et al., 2021; Pagano et al., 2020; Moss et al., 2020; and Welch, 2020).

3.4 Recent History of the SPAC Market

Here we highlight several important changes in exchange regulations on SPACs and SPAC IPO offering features, which inform our choices of subsamples periods, namely 2003-2009, 2010-2017, and 2018-2020.

The first modern SPAC is known to be Millstream Acquisition Corporation, issued in August

[7] We use the first 10-K or 10-K/A after the deSPAC merger completion date. Financial data reported in foreign currencies are omitted.

[8] Robinhood shut down this API on August 13, 2020; the data no longer update henceforth.

[9] Data are missing during 2019/01/24-29 and 2020/01/07-15.

2003. Between 2003 and 2008, SPACs were only accepted to list on OTC and American Stock Exchange (now NYSE American). SPAC activities have increased year over year until 2007. Amid the financial crisis, SPAC IPO counts decreased from 66 in 2007 to 17 in 2008 and 1 in 2009; the SPAC fundraising as share of all IPO revenue decreased from 14% in 2007 to 13% in 2008 and 0% in 2009.

Concurrent to the financial crisis, two developments in the SPAC market signify a new generation of SPAC. In 2008, both Nasdaq and NYSE began to permit SPAC listings. These two major exchanges provide better liquidity and broader recognition from investors. Figure 3 shows the listing exchanges of SPAC IPOs by IPO year. Almost all SPAC IPOs have chosen to list on the three major exchanges since 2012.

Moreover, around 2008, SPACs started to widely adopt limitation on public share redemption by blockholders in IPO offerings, where the threshold is 10-20% of shares offered during IPO. Under such restrictions, SPACs reduce the risk of blockholders forcing SPAC management into negotiated sales at the time of merger. Early SPACs without such provisions were frequently targeted by so called "SPAC mafia" hedge funds, who repeatedly used this predictably profitable strategy. Such events result in lower cash at disposal for the merger transaction and negatively impact all remaining stakeholders.

In December 2010, Nasdaq adopted the tender offer rule, which allows SPACs to complete a merger without shareholder approval by offering to buy back public shares at a price pro rata of the trust value. This further increases the likelihood that a merger can be successfully pursued. When the tender rule applies, the *de facto* barrier to business combination is that SPACs must maintain at least $5 million in net tangible assets; i.e. public redemption cannot exceed the level where less than $5 million in cash is left. If this requirement is not met, public companies are subject to Rule 419, also known as the "penny stock" rule. Under Rule 419, trading of common stock and warrant are not permitted until completion of business combination, and warrants can be exercised prior to business combination and the proceeds are placed into the trust account. Because Rule 419 will completely alter how SPACs operate, most SPACs specify in the IPO prospectus that business combination will not proceed when public share redemption causes less than $5 million in cash remains in trust.

Between 2010 and 2017, NYSE listing requirements for SPACs were more restrictive than NASDAQ. In particular, the NYSE listing rules required a shareholder vote for the proposed initial business combination and imposed a maximum 40% redemption requirement. As a result, most SPACs chose to list on Nasdaq between 2010 and 2017. NYSE adopted similar tender offer rules in March 2017. Currently, the listing requirements of Nasdaq and NYSE are almost identical.

4 SPAC vs. IPO: Firm Choice and Market Performances

In this section, we first examine the choice of going public method between SPAC and traditional IPO by firms based on firm characteristics prior to going public. Regression estimations using post-2015 samples show that firms are more likely to go public via SPACs if they are younger, have received VC financing, have lower current ratios, and not in a high-tech industry. Then we examine the market performance of SPAC common shares, with regard to liquidity, buy-and-hold return, and the Sharpe ratio. We highlight that target announcement during the SPAC period is a critical event, after which trading of SPAC common share is the most active and the share price experience large but unsustainable appreciation in 2018-2020.

4.1 Firm Choice of the Going Public Method

Alternative going public methods such as SPAC and direct listing have become more common in recent years. By the end of 2020, nearly 200 companies have become listed on a major U.S. exchange through a SPAC merger, and about 6 firms went public in the U.S. through direct listing. A common view is that SPACs are used by firms that cannot successfully complete a traditional IPO. Compared to the traditional IPO process, SPAC is considered to be a speedier method, since roadshows and SEC review are not involved. From a legal liability perspective, SPACs commonly provide financial projections of the target firm to investors prior to merger completion, which is typically not found in a traditional IPO prospectus.[10]

We perform an empirical analysis of firms' choice between SPAC and IPO between 2015-2020, based on firm characteristics prior to going public. For operating companies going public in 2015-2020 via either SPAC or IPO, we collect company financial and employment in the last full fiscal

[10]The SEC is closely examining the possible regulation arbitrage related to differences in disclosure liability of SPACs compared to IPO. See SEC Public Statement issued on April 8, 2021: "SPACs, IPOs and Liability Risk under the Securities Laws".

year prior to going public, company age and industry SIC code when going public, VC backing status, and IPO/SPAC IPO underwriter rank. Financial statistics are selected to represent firm size, liquidity, profitability, and investment intensity.

We use probit models as the baseline, but also estimate logit and linear probability models to verify the results,

$$\text{Going Public via SPAC}_i = \beta_0 + \textbf{Firm Characteristics}_i \boldsymbol{\beta_1} + \alpha_1 \text{FF17}_i + \alpha_2 \text{Going Public Year}_i \quad (1)$$

Table 6 lists the definitions of firm characteristics variables. FF17 is a dummy variable for each Fama-French 17 Industry. Going Public Year is a dummy variable for each going public year. Table 4 presents the regression estimates. The estimations are repeated on the 2018-2020 (Panel A) and 2015-2020 sample (Panel B). The results are not sensitive to the sample period choice.

Several results are statistically significant in both sample periods. Firms are more likely to choose SPAC if they have low short-term liquidity, measured by current ratios. Younger and VC-backed firms are more likely to choose SPAC. Firms in a high-tech industry are less likely to choose SPAC, mainly driven by the lack of deSPAC firms in the biotech industry. The underwriter reputation is lower for SPACs. In the past, specialized underwriters have large market shares in SPAC IPO underwriting; this differential may close in the near future as major investment banks step up in SPAC IPO underwriting. Additionally, in 2015-2020, firms with more long-term debt relative to total asset are more likely to choose SPAC. In 2018-2020, firms with more total assets are more likely to choose SPAC. The company size distribution of deSPAC firms has less extreme values on both tails compared to the tradition IPO firms. As the average SPAC IPO proceeds increase over time, SPAC merger target are on average larger than traditional IPO firms.

A common view on SPACs is that this going public method is favored by smaller and riskier firms. The regression estimates partially corroborate this view, in that younger firms and firms with lower liquidity tend to choose SPAC over IPO. This may be related to the valuation certainty and quicker transaction timeline provided by SPACs.

The following sections evaluate the market performances of SPAC common shares with regard to liquidity, buy-and-hold return, and Sharpe ratio. The sample includes 189 SPACs that have completed the deSPAC initial business combination by the end of 2020. When appropriate, we

compare the deSPAC and IPO samples. We define event windows based on two milestones in a SPAC's lifecycle: target announcement during the SPAC period and the deSPAC initial business combination.

4.2 Liquidity during SPAC Lifecyle

Table 5 reports the average liquidity measures of SPAC common shares in five event windows. The event windows are (1) SPAC period, before target announcement, (2) SPAC period, after target announcement, (3) deSPAC period, the first 30-Day, (4) deSPAC period, the first 90-day, and (5) deSPAC period, the first 180-day. The averages are computed for three subsamples based on year groups: 2005-2009, 2010-2017, 2018-2020. Year group is based on the SPAC IPO year for the event windows during the SPAC period, and deSPAC year for the event windows during the deSPAC period.

Three liquidity measures are considered: the Amihud illiquidity measure, bid-ask spread, and daily turnover. The three measures show consistent conclusions. Among the three year groups, SPACs are the least liquid during 2010-2017. Across all year groups, SPAC common share is the most liquid during the SPAC period after target announcement (event window 2). We perform mean difference t-tests between the liquidity measures of event window 2 and other event windows. The higher liquidity in event window 2 is statistically significant compared to before target announcement, and 90-day/180-day after deSPAC. This indicates that trading of SPAC common share is particularly active after target announcement until the initial month as the deSPAC company, after which trading activities dwindle.

4.3 SPAC Period Buy-and-Hold Return

Then we compute the average buy-and-hold return (BHR) of SPAC common shares, using the same event windows and year-group subsample as the previous section. Table 6 summarizes the event window lengths by years. On average, target announcement takes place 1.3 years after the SPAC IPO and the merger transactions takes about 0.4 years to close. In recent years, both event windows have shortened in length.

Figure 5 summarizes the average buy-and-hold return by event window and year groups. As benchmarks, we also report the average total buy-and-hold return on the CRSP equal-weighted and

value-weighted market indices during matched investment period for each event window observation. Because large intra-day price range is frequently observed on target announcement and deSPAC dates, we use the average of highest and lowest transaction prices to calculate the returns in all buy-and-hold return analyses in the paper. We use SPAC IPO to refer to the first day of SPAC common share trading as recorded by CRSP. SPAC common shares typically start trading 30 to 90 days after the SPAC IPO when unit split becomes possible.

In all three year groups, the buy-and-hold return from the first day of SPAC common share trading to target announcement is positive (Figure 5, Panel (a)). In 2010-2017, the price appreciation is close to 0%, much lower compared to the return of CRSP indices. This year group also corresponds to relatively low liquidity, as shown in Table 5. In 2018-2020, the average SPAC return from SPAC IPO to target announcement is 9%, similar to the market performance in matched investment periods.

The return performance of SPAC common share from target announcement to deSPAC show large differentials across the three year groups(Figure 5, Panel (b)). Between 2005-2017, the return in this event window on average underperforms the CRSP indices. On the other hand, in 2018-2020, the average return during the same event window is 33%, more than 20% higher than CRSP returns in the matched investment period. As shown in the following section, the high return in 2018-2020 is not sustained after the deSPAC event.

4.4 deSPAC Period Buy-and-Hold Return

This section presents the average buy-and-hold return of SPAC common shares in the deSPAC period, in the first 30-day, 90-day, and 180-day after the deSPAC event (Figure 6). For this calculation, we assume that the investor purchases the common share on the first day of trading as the new deSPAC entity. We use CRSP data through the end of 2020; if the event window extends into 2021, an observation is dropped from the average calculation. The year groups are based on deSPAC year.

In 2006-2017, the buy-and-hold return in the deSPAC period is on average negative and the share price continues to drop over time in the first six months after deSPAC. In 2018-2020, the upward trending price momentum continues in the first 30-day after deSPAC, but reverses in the following months. For investors purchasing shares soon after deSPAC events, the average buy-and-

hold return is -7% in the first 3 months and -11% in the first six months, much lower than the corresponding market performance.

To examine if and how the BHR performance relates to company fundamentals, we calculate the average BHR separately based on the deSPAC firms' annual revenue in the fiscal year prior to going public, for the subsample of deSPAC firms that went public in 2015-2020. In 2018-2020, the average BHR between target announcement and deSPAC is 22% for firms with under $100 million in annual revenue, and 0% for firms with more than $100 million in revenue. In the first 30-day after the deSPAC event, the BHR are similar between the two sales size groups, at around 22%. However, in the following three to six months, the share price of firms with under $100 million in annual revenue experiences a much larger decline. This pattern indicates that, in 2018-2020, investors may have been overly optimistic about deSPAC firms without proven sales record initially after the target announcement, and the market adjusts to a more realistic view of the firms' prospect in a few months after the deSPAC events.

4.5 deSPAC vs. IPO: Buy-and-Hold Return after Going Public

Next, we compare the return performance of deSPAC and IPO firms. We consider two purchase price possibilities for each group. For deSPAC firms, we compute the BHR from the target announcement date and the first day trading as deSPAC. For IPO firms, we compute the BHR based on the IPO offer price and the midpoint of the IPO Day price range. Figure 8 and Figure 9 summarize the average excess BHR, using CRSP Equal Weighted Index and CRSP Value Weighted Index as benchmark respectively. BHR reported in this section subtract the CRSP index BHR in matched investment period for each observation.

In 2006-2017, the deSPAC average BHR is negative throughout the first six-month after deSPAC. In 2018-2020, through the first 30-day of deSPAC, the average BHR is 35% if an investor purchase shares on the target announcement date, and 17% if share purchase is on the first day of deSPAC firm trading. In the former scenario, the BHR exceeds that of average BHR of IPO shares purchased at IPO offer price. This provides some evidence that SPACs allows broader access to new issues at a more affordable price compared to traditional IPOs. However, in the three to six months following deSPAC events, the average BHR of deSPAC firms become negative in all year groups. BHR for IPO investors who have access to the IPO offer price still experience large positive

returns compared to the benchmarks, while IPO investors who purchase shares in the secondary market on the IPO Day reap much smaller gains.

On a risk-adjusted basis, we compare the average Sharpe ratios between the deSPAC and IPO samples (Figure 10). Both groups have low Sharpe ratios, which is expected as new issues tend to have high volatility. deSPAC firms underperform IPO firms in terms of risk-adjusted buy-and-hold returns, driven by the negative BHR after deSPAC.

4.6 deSPAC Follow-on Offerings

Firms' going-public decision is driven by their financing needs and the public company disclosure requirement trade-off. We collect data of follow-on offerings of deSPAC firms using the SDC New Issue database by matching with issuer name and CUSIP to deSPAC firms. Within the 189 deSPAC firm sample, 51 deSPAC firms have subsequently issued follow-on equity offering as of February 2021 (Table 8). Among the deSPAC firms with an SEO offering, the average time between deSPAC merger and the first follow-on is 1.4 years. In 2019 and 2020, 14 out of 89 new deSPAC firms have issued SEO, on average within 7 months after the business combination.

The follow-on proceeds has increased over time. The average first follow-on offering proceeds of deSPAC firms that went public in 2020 reaches $522 million. The overallotment exercise ratio is on average 12% for the first follow-on, which means that the shares of these firms are in demand. The first follow-on offer price can be compared to the SPAC IPO offer price. In deSPAC business combination, the deSPAC firm's common share is valued at the SPAC IPO price (commonly $10 per share in recent years). In 2020, the average follow-on offer price is $19, almost double that of the SPAC share price.

Further we break down the distribution of overallotment and follow-on offer price by underwriter reputation of the SEO. The certification effect of underwriter is prominent in deSPAC firms' SEO. During the first follow-on, both the overallotment exercise ratio and the share offer price tend to be higher if the SEO underwriter has higher reputation.

Table 8 summarizes the average buy-and-hold return of the first follow-on offering of deSPAC firms. In 2018-2020, the first follow-on offering of deSPAC firms on average has positive buy-and-hold return in the initial 6 months after the SEO.

5 Retail Investment in SPACs

SPACs are often referred to as the "poor man's private equity fund." Direct investment in merger and acquisition transactions or younger firms is traditionally only accessible to high net-worth accredited investors through private investment vehicles. SPACs provide a similar investment opportunity to the general public in that anyone can purchase shares of the pooled investment in the secondary market, at possibly close to the offer price. Advocates for SPACs often cite this as a benefit of the instrument in the democratization of investing. Recent studies on SPACs have examined institutional holdings of SPACs using 13-F data (Klausner et al., 2020), but little is known about if and when retail investors purchase SPAC shares.

We use Robinhood users as a sample to examine retail investment interest during SPAC's lifecyle. The sample in this section includes active SPACs and deSPAC firms that have gone public by the end of 2020. We find that retail investor interest in SPACs is low before target announcement. On the other hand, after target announcement, SPACs rapidly increase in popularity and some SPACs become the most popular tickers among Robinhood users. Popularity among Robinhood users is positively correlated with return volatility and trading volume of SPAC common shares. Before target announcement, SPACs with larger total proceeds tend to be more popular but this effect diminishes when merger details are revealed. Popularity is higher for SPACs whose identified targets are younger and have received VC financing. Between target announcement and the business combination completion, retail investors appear to favor smaller and riskier targets. Compared to the IPO sample, deSPAC firm popularity responds more strongly to lagged volatility, in the positive direction.

5.1 Retail Investment Popularity Measures

Robinhood is a phone-app-based zero-commission trading platform widely used by retail investors. The company's brokerage app launched to the public in 2015 and have acquired 13 million users as of 2020. We analyze data on the number of users holding a specific ticker on Robinhood between May 2, 2018 and August 13, 2020. As discussed, SPACs are not new. However, they have remained largely obscure to the general public until a few well-known business combinations in 2019. This sample covers a pivotal period of the recent SPAC market, from which we can learn about how retail investors have caught up on a new trend in the U.S. equity market.

The Robinhood users holding data is obtained from Robintrack (https://robintrack.net/), which is described in detail in Section 3. The data report the number of Robinhood user holding a specific ticker at a given time. Because the holding quantity of each user is unknown, the data is best interpreted as a popularity measure. Our analysis is based on a daily frequency. Warrant and unit trading is not supported by Robinhood during the sample period, hence the analysis on SPAC is pertinent to common share only.

Over time, Robinhood user base has grown from 6 million in 2018 to 13 million in mid-2020.[11] Figure 11 summarizes the distribution of user holdings count on Robinhood and the number of tickers traded on the platform at each month start in the sample period. The number of tickers traded on Robinhood increased from 5,890 in May 2018 to 8,156 in August 2020. The number of users holding at each percentile has grown exponentially over time. In May 2018, at the beginning of the Robintrack data sample period, the most popular ticker has 145,510 users holding, which is about 15% of the same statistic in August 2020. The user count by ticker is highly skewed in cross-section. For example, 928,491 users hold some quantity of the most popular ticker, F (Ford), on 8/1/2020 ; whereas the users holding count is only 1,706 for the median ticker, and 15,534 at the 75th percentile. This skewed pattern holds throughout the sample period.

To compare popularity of stocks in different points of time, we account for the rapid growth of Robinhood's user base during the sample period. Our main measure of popularity is Popularity Percentile Rank ("popularity rank" in short), defined as

$$\text{Popularity Percentile Rank}_{it} = \frac{\text{Descending Rank of Number of User}_{it}}{\text{Total Number of Tickers}_t},$$

for ticker i and day t. The Popularity Rank ranges between 0 and 1 and indicates how popular a ticker i is relative to all other tickers recorded on day t. The most popular ticker on a certain day has a Popularity Rank of 1.

We link Robintrack data to CRSP data by ticker and date. CRSP provides price, trading volume, daily return, and other security-level market data. Using CRSP identifiers, we merge Robintrack to other data sources. 245 tickers associate with a SPAC (either before or after the

[11] Robinhood's 13 million users as of May 2020 is more users than Schwab or E-Trade had at the end of 2019 (12.7 and 5.5 million, respectively).

business combination) are in the Robintrack sample, which include 137 SPAC and 108 deSPAC firms.[12] Transition from SPAC to deSPAC is captured for 21 SPACs, where Robintrack data are available for both tickers.[13]

Figure 12 shows the counts and average popularity of SPAC and deSPAC tickers at month start in the data. The number of SPAC and deSPAC firms both trends up over time, which is consistent with increased activity of SPACs. Throughout the sample period, SPACs on average are below median in popularity percentile rank. Until the end of 2019, SPACs on average consistently rank at the bottom 10% of all tickers traded on Robinhood in terms of number of users holding. On the other hand, the average popularity rank of deSPAC firms are between 0.5 and 0.6 throughout out the 28-month sample period, which is in line with the average of 0.5 for all tickers. With respect to this statistics, deSPAC firms do not appear to be distinctive from other traded securities.

Several other Robinhood popularity measures are used in later analyses, including Popularity Percentile Rank Change, Users Increase, and Users Growth, whose definitions are detailed below.

To measure change in Popularity Percentile Rank, we define

$$\text{Popularity Percentile Rank Change}_{it} = \text{Popularity Percentile Rank}_{it} - \text{Popularity Percentile Rank}_{i,t-1},$$

for ticker i and day t. A positive Popularity Percentile Rank Change means that a ticker is more popular on Robinhood in terms of count of users holding compared to the previous day. The distribution of Popularity Percentile Rank Change is concentrated around 0. In other words, popularity remains stable over time for most observations.

We also compute change in users holding count for every ticker-date observation, in both level change and percentage growth:

$$\text{Users Increase}_{it} = \text{Number of User}_{it} - \text{Number of User}_{i,t-1};$$

$$\text{Users Growth}_{it} = \frac{\text{Number of User}_{it}}{\text{Number of User}_{i,t-1}} - 1.$$

[12] deSPAC count include firms that have changed ticker again after the initial business combination, but continued to associate with the same CRSP PERMNO.

[13] Some SPACs that completed business combination during the sample period is not in the Robintrack data. For example, Social Capital Hedosophia Holdings Corp (IPOA) started trading as Virgin Galactic(SPCE) on October 27, 2019. Robinhood user data on IPOA are unavailable.

5.2 Target Announcement Effect on Popularity during SPAC Period

In this section, we analyze how Robinhood retail investors respond to SPAC target announcements in the SPAC period. We show that SPACs are not favored by retail investors before target announcement; however, when a target is identified, SPACs potentially become the most popular stocks among Robinhood investors.

We compare the average popularity percentile rank, number of users holding, user increase, and user growth, before and after a target announcement during the SPAC period, where each ticker-date is one observation. Table 9 summarizes the t-test results. Before target announcements, SPACs are among the least popular tickers on Robinhood, with an average popularity rank of 0.11 (i.e. approximately the bottom 1,000 out of all 8,595 tickers). There is very little change in the number of users holding SPAC during the period before target announcement. On average, the pre-announcement daily user count change is only 3 users, which means that the users holding count of SPACs investor is both low and stable.

On the other hand, SPACs significantly increase in popularity after target announcement. The average user holding count increase from 45 before target announcement to 2,167 after announcement. The percentage growth in user counts is on average 33% per day after target announcement, which means that SPACs continuously attract new investors after the announcement, compounding at 1.33 times each day. While the average SPAC experiences a moderate improvement in popularity rank, the increase is considerable among top movers. For example, the largest change in popularity rank is within one day of Diamondpeak Holding (DPHC)'s announcement of Lordstown Motors (RIDE) as the target. Upon the news, DPHC moves from the 20th percentile to the 94th percentile in terms of users holding count in a single day.

The target announcement effect is also realized very quickly. Among 56 SPACs that announced a target during the sample period, the largest one-day change in popularity rank occurs within 2 days post-announcement for 28 cases (Table 10). The magnitude of one-day increase in popularity rank is also on average higher when the reaction time is shorter.

5.3 Effect of Market Variables on Popularity during SPAC Period

We use panel regressions to estimate the relationship between Robinhood popularity and market variables, while controlling for target announcement status,

$$\text{RH Popularity Rank}_{it} = \beta_0 + \textbf{Market Variables}_{it}\beta_{\mathbf{1}} + \beta_2 \text{POST\_ANN.}_{it} + \alpha_i + \gamma_i \qquad (2)$$

Table 11 reports the linear regression estimation results. The dependent variable is the Robinhood popularity rank. Market variables include market capitalization, lagged return, lagged volatility, trading volume moving average, and the Amihud illiquidity measure.[14] Both ticker (α) and year-month (γ) fixed effects are controlled for. SPAC popularity increases when lagged volatility, trading volume, and liquidity are high. The increase in popularity after SPAC target announcement remains large in magnitude and statistically significant.

5.4 Effect SPAC Features on Popularity during SPAC Period

SPAC common shares have similar intrinsic value lower bounds prior to the deSPAC event, as shares can be redeemed at the pro rata trust value. Still, there is variability of SPAC common share popularity among retail investors on Robinhood, even before target announcement. In this section, we investigate how SPAC IPO features affect retail investor interests.

How do retail investors choose which SPACs to invest in? In practice, investors often consider sponsor qualifications and track records to gauge the upside potential of the share price. Because sponsor qualities are highly idiosyncratic and difficult to measure, we use SPAC IPO underwriter reputation as a proxy, under the assumption that reputable underwriter are more likely to work with better sponsors due to either network effects or screening during the due diligence process.

The identity of SPAC IPO lead underwriter(s) is from the SDC New Issue data base. To quantify underwriter reputation, we use the underwriter rank maintained by Loughran and Ritter (2004). The rank is based on a 1 to 9 scale (9 being the most reputable) and first introduced in Carter and Manaster (1990). Underwriter rank tends to be stable over time; however, when there is change in rank over time, we take the time average rank. When there are multiple lead underwriters, we take the rank of the highest-ranking joint bookrunner, following Loughran and

[14] See variable definitions in Table 6.

Ritter (2004). Underwriter rank greater than 5 is defined as the high rank group in the following analyses.

Table 12 shows the difference in the average popularity measures for high and low underwriter reputation groups. SPACs with higher underwriter reputation are more popular in terms of Robinhood popularity rank and users holding, both before and after target announcement. The target announcement effects are also larger for SPACs with higher-ranked underwriters. This implies that SPACs with more reputable underwriters, and by proxy more reputable sponsors, are more likely to strike merger agreements that attract retail investors.

We further examine the impact of SPAC features on popularity in a regression framework. We consider three SPAC features: underwriter rank, SPAC proceeds raised, and overallotment option exercise ratio at SPAC IPO. Underwriter rank is a proxy of SPAC sponsor quality and potential to negotiate a desirable merger agreement. SPAC IPO proceeds raised measures the size of the investment vehicle. Overallotment option exercise ratio indicates the initial demand of the SPAC IPOs. While the intrinsic values of SPAC units vary from offerings due to the quantities of warrants and rights attached, the valuation of SPAC common share is more straightforward. Before business combination, SPAC common shares are essentially convertible notes, where each share has claim to the pro rata trust value and earns risk-free rate. Demand in SPAC common shares should be based on expectation of the future business combination. Another SPAC feature relevant to the common share valuation is percentage of SPAC proceeds reserved in trust. In recent years, SPAC trust typically has enough reserve to cover at least 100% of public share redemption. Hence, there is little variation in SPAC's ability to redeem public share in this sample.

In pooled linear regressions, we estimate the effects of underwriter rank, log SPAC IPO proceeds, and IPO overallotment exercise ratio on popularity (Table 13),

$$\text{RH Popularity Rank}_i = \beta_0 + \mathbf{SPAC\ Features}_i\beta_{\mathbf{1}} + \mathbf{Market\ Variables}_i\beta_{\mathbf{2}} + \gamma_i \tag{3}$$

Control variables include year-month dummy variables (γ) and all the previously used market variables except for market capitalization, which is inherently correlated with the SPAC proceeds during the SPAC period. The estimation is repeated on three samples:(1) the full sample of SPAC tickers in the Robintrack data (Columns 1-2), (2) "before target announcement" subsample (Columns 3-4),

(3) "after target announcement" subsample (Column 5).

In the full sample, popularity is mainly driven by the market variables and target announcement status. Coefficient estimates on underwriter reputation and SPAC proceeds size are small in magnitude and not statistically significant. Overallotment is negatively correlated with popularity. Before target announcement, SPACs with larger IPO proceeds are more popular, but this effect no longer exists after target announcement. This is sensible because the merger transaction size can be much larger than the initial SPAC proceeds through private placements at the merger. The coefficient estimate on lagged volatility is large and statistically significant in the full sample and the post-announcement period, but not before target announcement.

5.5 Effect of Target Company Characteristics on Popularity during SPAC Period

After the definitive merger agreement, SPAC common share price changes based on the market's evaluation of the target company and the transaction terms. In this section, we examine whether retail interest in SPACs relates to characteristics of the target companies.

We merge the Robintrack data with the ex ante firm characteristic data. Figure 13 shows the average Robinhood popularity of SPACs by quartiles of target firm total asset, total revenue, and net income in the fiscal year prior to going public. Quartiles are determined by firms that went public through either IPO or deSPAC in 2015-2020. Before target announcement, popularity ranks are low and (unsurprisingly) similar across the fundamental quartiles, which demonstrates that target characteristics cannot be predicted collectively by the crowd. Between target announcement and deSPAC, SPACs whose target have below median asset, sale, and net income are on average more popular. In the deSPAC period, the popularity of the below median firms drop. Previously, we have shown that the buy-and-hold return between target announcement and deSPAC is higher for lower-revenue targets than higher-revenue targets, but quickly reverses after deSPAC (See Figure 7 in Section 4). The popularity comparison across quartiles is another indicative evidence that, for a short period of time, investors are enthusiastic about firms without strong track records in fundamentals, but possibly show high future growth potential.

To control for market variables and SPAC features, we estimate the impact of firm character-

istics on popularity using the post-announcement subsample in pooled linear regressions,

$$\begin{aligned}\text{RH Popularity Rank}_i = \beta_0 + \textbf{Target Firm Characteristics}_i\beta_{\mathbf{1}} + \textbf{SPAC Features}_i\beta_{\mathbf{2}} + \\ \textbf{Market Variables}_i\beta_{\mathbf{3}} + \gamma_i + \delta_i\end{aligned} \tag{4}$$

Table 14 reports regression estimates. The control variables include SPAC IPO features and market variables, year-month dummy variables (γ), and FF17 industry dummy variables (δ). We first consider the dummy variable "Popularity Above Median" as the dependent variable, where the indicator is equal to 1 if the company's popularity is higher than the median of this subsample (Columns 1-2). A SPAC's popularity is more likely to be above median when its target is larger in size (measured by log total asset or log total sales), younger, and has received VC financing. Target company recent year profitability (measured by net income/asset) does not impact SPAC popularity. Then, we use the popularity rank as the dependent variable (Column 3-4). In this specification, none of the target company characteristics have statistically significant impact on SPAC's popularity among retail investors. The market variables remain as robust determinants of the popularity rank, where coefficient sign/magnitude and statistical significance are similar to previous regressions. Between target announcement and the deSPAC event, SPAC shares are more popular when lagged trading volume, volatility, and liquidity are high.

5.6 Popularity after Going Public: deSPAC vs. IPO

Lastly, we compare the RH popularity after firms go public, through either SPAC or IPO. With SPAC being a buzzword in the financial market during the sample period, the deSPAC status is potentially attention-inducing for retail investors. We examine how the going public method may affect retail investor interests in pooled linear regressions using the sample of firms that went public via SPAC or IPO in 2016-2020,

$$\begin{aligned}\text{RH Popularity Rank}_i = \beta_0 + \beta_1\text{DESPAC}_i + \textbf{DESPAC*Target Firm Characteristics}_i\beta_{\mathbf{2}} + \\ \textbf{DESPAC*SPAC Features}_i\beta_{\mathbf{3}} + \textbf{DESPAC*Market Variables}_i\beta_{\mathbf{4}} + \\ \textbf{Target Firm Characteristics}_i\beta_{\mathbf{5}} + \textbf{SPAC Features}_i\beta_{\mathbf{6}} + \textbf{Market Variables}_i\beta_{\mathbf{7}} + \gamma_i + \delta_i\end{aligned} \tag{5}$$

The DESPAC indicator variable is 1 if firm i went public via SPAC. Then we include target firm characteristics, SPAC features, and market variables, as well as interaction terms with the DESPAC

indicator. Year-month dummy variables (γ) and FF17 industry dummy variables (δ) are included as control variables. Table 15 reports the estimates. We repeat the estimation on five periods after going public, from the first 90 days to the first 2 years, and the full sample with Robintrack data. In general, the going public method does not affect the RH popularity rank. Overall, retail investors favor newly public firms with lower ex ante profitability (as measured by net income/total assets), higher revenue (sales/total assets), lower R&D expenses (R&D/total assets). Trading volume positively correlate with popularity. Interestingly, return volatility does not increase retail interest for the IPO firms, but does so strongly for the deSPAC firms.

Thus far, return volatility is consistently positively correlated with SPAC popularity during both the post-announcement SPAC period and the deSPAC period. We estimate determinants of return volatility in the same sample and pooled regression framework as in the previous equation,

$$\begin{aligned}\text{Return Volatility}_i = {} & \beta_0 + \beta_1 \text{L.RH Popularity}_i + \beta_2 \text{DESPAC}_i + \\ & \textbf{DESPAC*Target Firm Characteristics}_i \boldsymbol{\beta_3} + \\ & \textbf{DESPAC*SPAC Features}_i \boldsymbol{\beta_4} + \textbf{DESPAC*Market Variables}_i \boldsymbol{\beta_5} + \\ & \textbf{Target Firm Characteristics}_i \boldsymbol{\beta_6} + \textbf{SPAC Features}_i \boldsymbol{\beta_7} + \textbf{Market Variables}_i \boldsymbol{\beta_8} + \gamma_i + \delta_i \end{aligned} \tag{6}$$

Table 16 reports the estimates. In the first two years of going public, deSPAC firms exhibits higher volatility than the IPO firms. Coefficients on the firm characteristics variable show that, for newly public firms, return volatility is higher when the firm ex ante has lower total assets, higher profitability, lower revenue, is younger and backed by VC capital. Within the first year of going public, lagged Robinhood popularity rank positively correlates with return volatility. This indicates that retail investor attention has the potential to generate significant market movement for shares of newly public companies.

6 Conclusion

SPACs have recently become a common alternative to the traditional IPO process for firms to go public. We compare firms going public via SPAC versus traditional IPO in terms of (1) ex ante firm characteristics before going public, (2) common share market performance, and (3) retail investment interest. We use a long sample period from 2003-2020 and compare several sub-samples throughout different stages of the modern history of the SPAC market.

Firms going public via SPAC tend to be younger, more likely to have received VC financing, have lower current ratio, and less likely to be in a high-tech industry. Between SPAC IPO and six months after deSPAC, SPAC common shares have the highest liquidity in the period between target announcement and the initial business combination completion. In 2018-2020, the average buy-and-hold return on SPAC common share outperform the market during the SPAC period, and is comparable in magnitude to the buy-and-hold return of IPO shares purchased at IPO offer price. After the deSPAC merger completion, the run-up in share price does not sustain. In the deSPAC period, the decline in share price is larger in magnitude for riskier firms, characterized by low revenue prior to going public. Compared to IPO firms, deSPAC firm shares on average generate larger losses after going public. Retail interest in SPAC investment is weak before target announcement, but rise quickly and strongly after the merger target is identified. SPAC popularity among retail investors is primarily driven by stock price volatility and trading volume, less so by target firm characteristics or SPAC IPO features. Compared to IPO firms, deSPAC firms are more likely to attract investors when their stock has high volatility.

The SPAC market continues to grow and evolve in real time. In 2021, new SPAC IPO counts and proceeds exceeded the total of 2020 in just three month's time. While new issues have slowed down in the second quarter of 2021, over 300 SPACs are active in the pipeline to bring more companies public. Many private companies will be approached by SPACs seeking to complete a merger before the deadline. Based on evidence through 2020, it is clear that going public via SPAC merger has become a standard option as private firms consider an exit. While the negotiation with SPAC sponsors appears to be a simpler process the traditional IPO, firms should first and foremost determine if they are ready to become a public company, before engaging in a SPAC transaction. We show that SPAC investing is associated with high volatility and risk-seeking behavior of investors in 2018-2020. To support share prices, newly public companies need to carefully manage investor expectation. To the contrary, many SPACs have issued overly optimistic projections at the time of the merger and later fail to meet expectations. We anticipate that, over time, both investors and deSPAC firms will become more rational and realistic, such that the market will develop into a more sustainable state.

Figure 1: SPAC IPO Activities 2003-2020

Figure 1 reports the SPAC IPO activities from 2003 through 2020. The sample includes all SPACs listed in U.S. exchanges, including OTC and Pink Sheets.

The orange bars show the total proceeds of SPAC IPO (in $ billion) each year. The purple line shows the number of SPAC IPO each year. The gray line shows the average SPAC IPO proceeds (in $ million) in each year. Proceeds include overallotment.

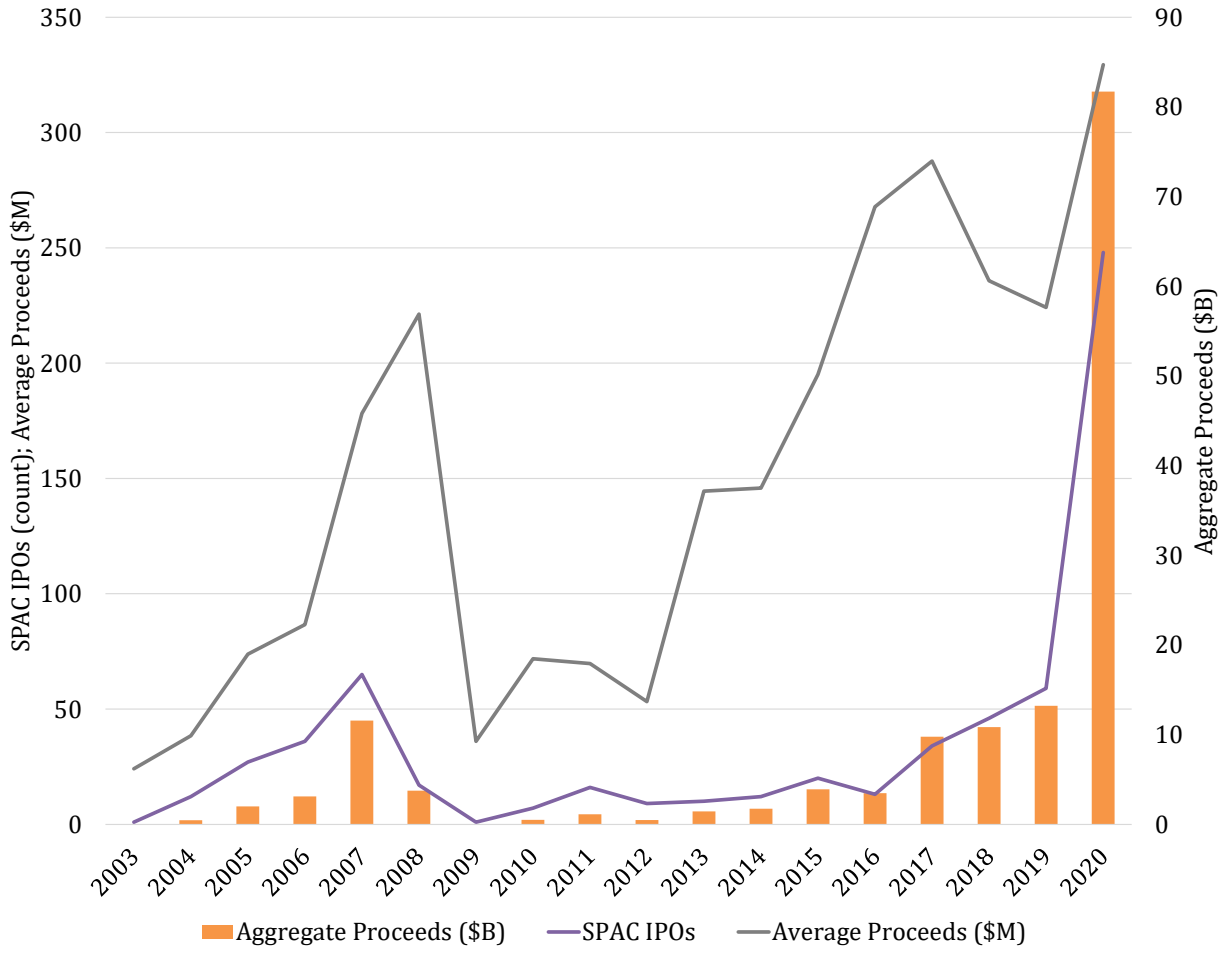


Figure 2: SPAC Lifecycle Status by IPO Year

Figure 2 reports the SPAC status by IPO year. Status is as of December 31, 2020. The sample includes all SPACs listed in U.S. exchanges, including OTC and Pink Sheets. "Merger complete" refers to SPACs that have completed a deSPAC initial business combination. "Closed" refers to SPACs that have liquidated or otherwise ceased to exist as a blank check company. "Active" refers to SPACs that are searching for business combination targets.

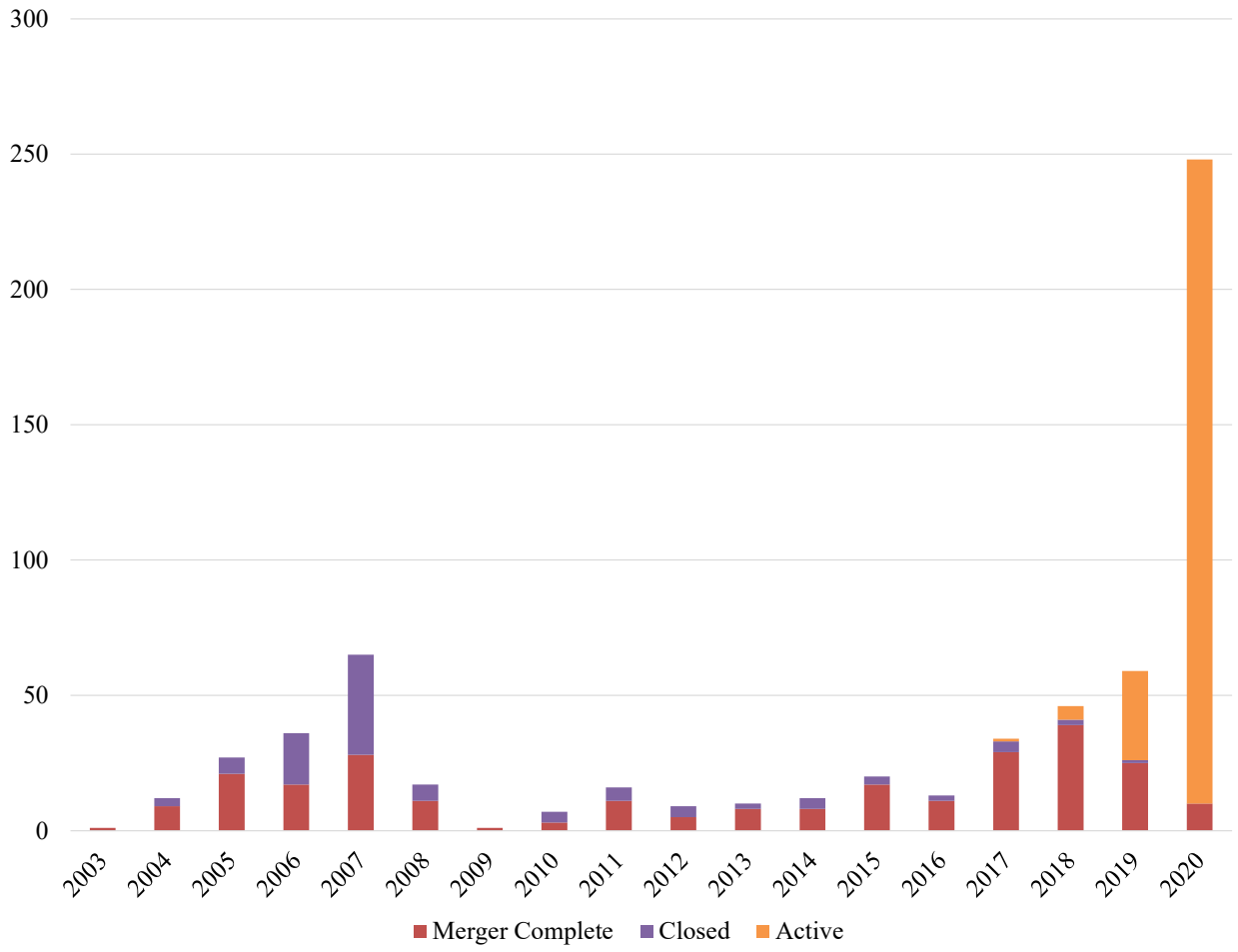


Figure 3: SPAC Listing Exchange by IPO Year

Figure 3 reports the listing exchange of SPACs at the time of SPAC IPO by IPO year. The sample includes all U.S. listed SPACs issued through 2020.

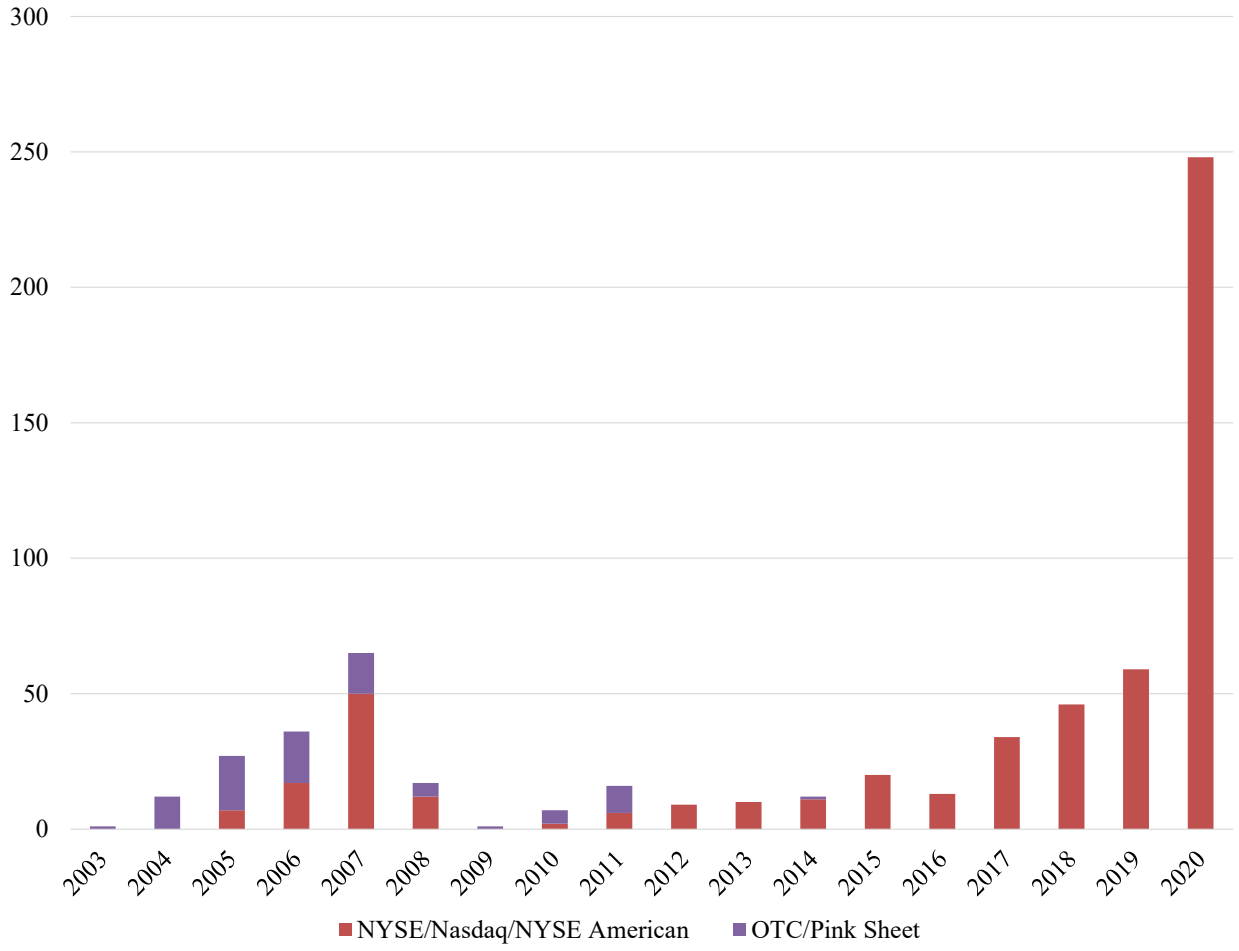


Table 1: Characteristics of SPAC IPOs

Table 1 summarizes the SPAC IPO features for the sample of 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination by the end of 2020.

IPO proceeds include over-allotment exercise option. Sponsor capital refers to the upfront cash investments made by SPAC sponsors, which is intended to cover initial underwriting fees and other operating costs while maintaining trust value. Warrant per unit refers to the number of common shares issuable upon exercise of public warrants included in a SPAC unit. "In-the-money" warrant means that the exercise price of the warrant for one common share is lower than the unit offer price.

Summary Statistics by SPAC IPO Year							
	Count	Average					Proportion
Year	by SPAC IPO Year	IPO Proceeds ($M)	Sponsor Capital /Proceeds	Underwriter Rank	% of Proceeds in Trust	Warrant Per Unit	Warrant In-the-Money
2005	6	84	0%	4	93%	1.17	100%
2006	6	202	2%	6	95%	1.33	100%
2007	18	279	2%	8	98%	0.97	100%
2008	6	213	3%	7	98%	1.00	100%
2009	0						
2010	1	46	5%	3	101%	1.00	100%
2011	3	104	4%	7	101%	1.00	0%
2012	5	49	6%	6	102%	1.00	40%
2013	7	170	5%	6	102%	0.50	14%
2014	8	160	4%	7	100%	0.44	0%
2015	17	211	4%	7	101%	0.52	0%
2016	11	281	4%	7	101%	0.59	0%
2017	28	283	3%	6	100%	0.51	0%
2018	39	251	3%	6	100%	0.69	0%
2019	24	221	3%	6	100%	0.51	0%
2020	10	343	3%	8	100%	0.38	0%
2005-2009	36	223	2%	7	97%	1.07	100%
2010-2017	80	221	4%	7	101%	0.57	5%
2018-2020	73	254	3%	7	100%	0.59	0%

Figure 4: Number of Firms Going Public via IPOs and SPACs, 2006-2020

Figure 4 reports the yearly count of operating firms going public in the U.S. through traditional IPO and SPAC between 2006 and 2020. The sample includes companies traded on three major exchanges - NYSE, Nasdaq, or AMEX (NYSE American). The IPO sample excludes offerings with offer price below $5, ADRs, units, REITs, closed-end funds, banks, ETFs, SPACs, direct listings, and stocks not included in CRSP such as OTC issues.

A firm is considered active if the company has a current ticker in the EDGAR database as of May 18, 2021. The average time from going public to delisting among inactive firms is 5.4 years for the IPO sample and 4.0 years for the deSPAC sample.

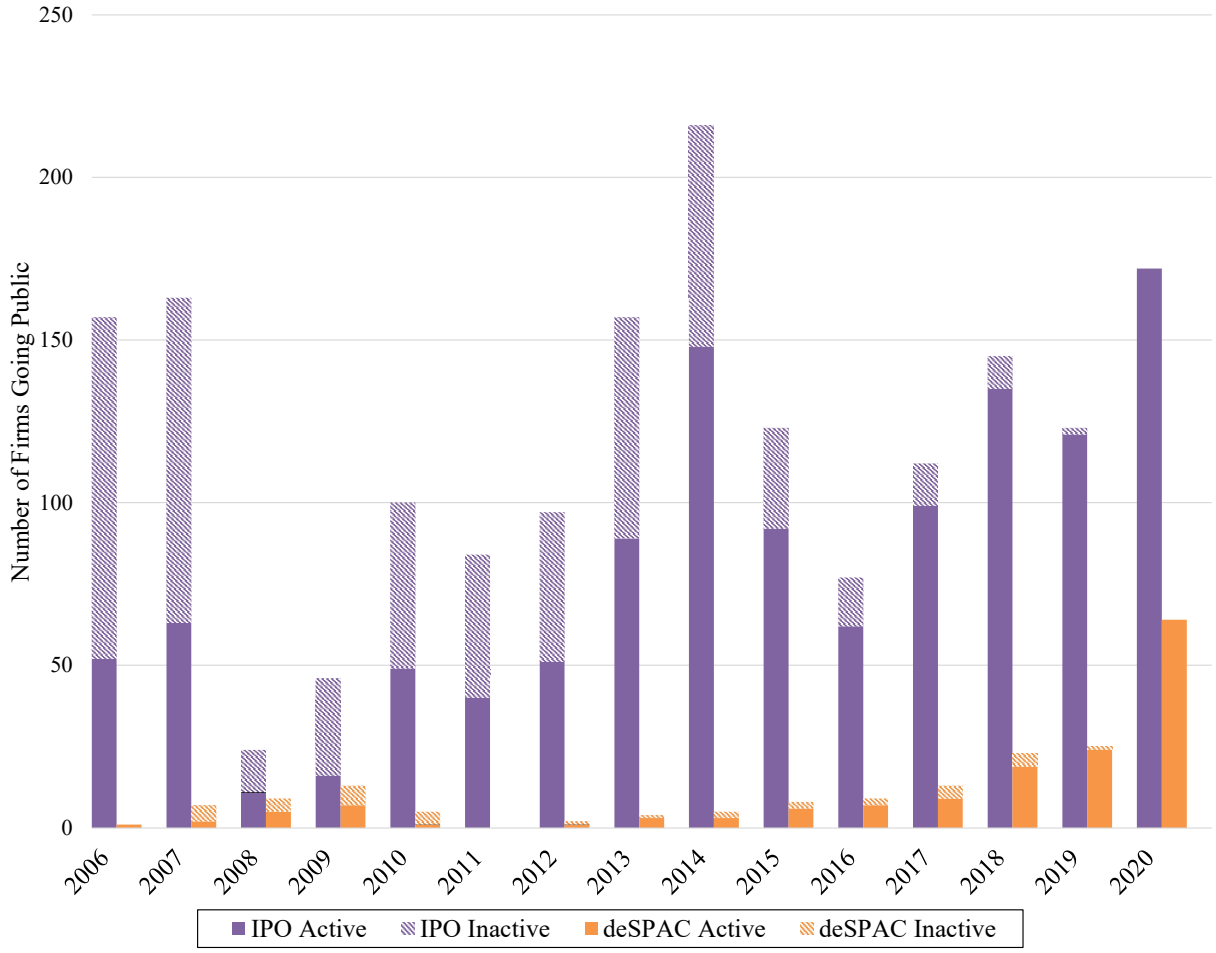


Table 2: Characteristics of IPO and deSPAC Firms Before Going Public, 2015-2020

Table 2 summarizes characteristics of firms that went public via traditional IPO or deSPAC in 2015-2020. Financial data are annual figures in the fiscal year immediately prior to going public. Financial data, industry SIC codes, and employment data are from Compustat and company 10-K filings. Industry categories are based on SIC codes, following definitions in Puri and Zarutskie (2012). Company age of the IPO sample is based on the founding dates of Loughran and Ritter (2004). VC backing status of the IPO sample is based on SDC. Company age and VC backing status of the deSPAC sample are collected by the authors using VentureXpert, Crunchbase, and firm websites.

	IPO			deSPAC			IPO - deSPAC	
	Count	Mean	Std Dev	Count	Mean	Std Dev	Mean Diff	
Firm Characteristics								
Total Assets ($M)	744	1,268	9,525	129	787	2,767	481	
Total Current Assets ($M)	709	235	725	118	124	291	111	
Total Liabilities ($M)	744	1,056	8,797	129	675	2,522	381	
Total Current Liabilities ($M)	709	175	628	118	123	231	52	
Long-Term Debt ($M)	741	377	1,623	122	266	722	111	
Total Revenue ($M)	737	576	2,805	130	390	845	186	
Net Income ($M)	737	-15	145	129	-20	73	5	
Capital Expenditure ($M)	737	26	91	129	18	42	8	
R&D Expenditure ($M)	574	33	90	52	17	28	16	
Current Ratio	709	4.4	7	118	1.9	3	2.5	***
Long-Term Debt/Total Assets	739	0.3	1	121	0.3	0	0.0	
R&D/Total Assets	574	0.8	5	51	1.9	10	-1.1	
Net Income/Total Assets	737	-1.1	8	127	-2.9	29	1.8	
Capx/Total Assets	737	0.04	0	127	0.05	0	-0.01	
Employement (000's)	399	3	15	103	1	3	1	
Company Age	739	15.9	21	142	16.4	22	-0.5	
VC Backed	747	49%		142	37%		11%	**
Industry Distribution								
1 Computer	749	19%		142	17%		2%	
2 Biotech/Medical	749	48%		142	11%		38%	***
3 Electronics	749	2%		142	4%		-1%	
4 Telecom	749	1%		142	1%		0%	
5 Consumer Goods	749	4%		142	4%		0%	
6 Finance	749	6%		142	9%		-3%	
7 Business Services	749	0%		142	1%		-1%	
8 Industrial Goods	749	9%		142	21%		-12%	***
9 Other	749	9%		142	32%		-22%	***
High Tech Industry (1-4)	749	71%		142	32%		38%	***

Table 3: Definitions of Regression Variables

Table 6 describes definitions of regression variables.

Variable Name	Definition
	Panel A: Firm Characteristics
LN_TOTAL_ASSET	ln(total asset in $M)
LN_SALES	ln(total revenue in $M)
CURRENT_RATIO	current asset/current liability
LT_DEBT/ASSET	long term debt/total asset
NET_INCOME/ASSET	net income/total asset
CAPX_/ASSET	capital expenditure/total asset
AGE	company age in the going public year
R&D_I	indicator variable that R&D expenditure statistics are available
R&D/ASSET	R&D expenditure/total asset. =0 if R&D_I==0.
HIGH_TECH	=1 if high-tech industry. Dummy variable based on SIC codes, following definitions in Puri and Zarutskie (2012).
VC_BACKED	=1 if company has received VC financing prior to going public
UWRANK	IPO or SPAC IPO bookrunner rank. Rank values follow Loughran and Ritter (2004).
Notes:	
Variables are winsorized at 1% and 99% before log transformation.	
Ratios are winsorized at 1% and 99%.	
	Panel B: Market Variables
LN_MARKET_CAP	ln(market capitalization in $M)
LN_RET	ln(1+return)
VOLATILITY	standard deviation of the most recent 20-day log returns
LN_MA_VOL	ln(1+20-day moving average trading volume)
LN_AMIHUD_ILLQ	ln(Amihud illiquidity measure of the calendar month)
POST_ANN.	=1 if after target announcement
	Panel C: SPAC IPO Features
LN_SPAC_PROCEEDS	ln(SPAC IPO Proceeds in $M)
OVERALLOTMENT	IPO overallotment option exercise ratio

Table 4: Probability of Going Public via IPO vs. SPAC

Table 4 reports regression results of probability of going public through either IPO or SPAC merger on firm characteristics. Panel A sample includes firms that went public in 2018-2020; Panel B sample includes firms that went public in 2015-2020.

Panel A: 2018-2020	Dependent Variable: Going Public via SPAC=1									
	(1) Probit	(2) Probit	(3) Probit	(4) Probit	(5) Probit	(6) Probit	(7) Probit	(8) Probit	(9) Logit	(10) Linear
LN_TOTAL_ASSET	0.012		-0.008	-0.008	-0.018	0.148**	0.139**	0.146**	0.294**	0.033**
	(0.28)		(-0.19)	(-0.18)	(-0.40)	(2.34)	(2.13)	(2.34)	(2.32)	(2.48)
LN_SALES		0.066*								
		(1.78)								
CURRENT_RATIO	-0.073**	-0.058*	-0.045*	-0.038	-0.055*	-0.038*	-0.048*	-0.041*	-0.088	-0.004**
	(-2.22)	(-1.75)	(-1.74)	(-1.50)	(-1.93)	(-1.68)	(-1.89)	(-1.76)	(-1.46)	(-2.19)
LT_DEBT/ASSET	0.191	0.133	0.081	0.118	0.111	0.178	0.273	0.238	0.493	0.047
	(1.06)	(0.74)	(0.46)	(0.67)	(0.59)	(1.07)	(1.56)	(1.46)	(1.53)	(1.30)
NET_INCOME/ASSET	0.125*	0.082*	0.065	0.050	0.048	0.093	0.049	0.021	0.085	0.015
	(1.86)	(1.72)	(1.16)	(0.92)	(0.79)	(1.39)	(0.70)	(0.31)	(0.63)	(1.38)
CAPX/ASSET	-0.432	-0.367	-0.925	-1.050	-1.255	0.128	-0.662	0.012	-1.401	-0.120
	(-0.38)	(-0.31)	(-0.79)	(-0.89)	(-1.04)	(0.10)	(-0.50)	(0.01)	(-0.54)	(-0.45)
AGE	-0.009*	-0.011**	-0.011**	-0.013**	-0.008	-0.012**	-0.011**	-0.014**	-0.020*	-0.003**
	(-1.86)	(-2.30)	(-2.14)	(-2.48)	(-1.62)	(-2.29)	(-1.98)	(-2.48)	(-1.81)	(-2.24)
R&D_I			-1.093***	-0.725***	-1.284***	-0.907***	-0.827***	-0.698***	-1.482***	-0.214***
			(-5.51)	(-3.33)	(-6.04)	(-4.48)	(-3.47)	(-3.27)	(-3.33)	(-3.26)
R&D/ASSET			0.010	0.033	-0.057	0.170	0.107	0.124	0.234	0.044
			(0.06)	(0.20)	(-0.30)	(0.99)	(0.61)	(0.78)	(0.78)	(1.52)
HIGH_TECH				-0.949***			-0.962***	-0.976***	-1.657***	-0.262***
				(-3.90)			(-3.38)	(-4.58)	(-3.08)	(-3.14)
VC_BACKED					0.590***		0.903***	0.794***	1.689***	0.164***
					(3.17)		(4.07)	(3.97)	(4.03)	(4.64)
UWRANK						-0.244***	-0.252***	-0.236***	-0.472***	-0.061***
						(-4.60)	(-4.48)	(-4.53)	(-4.27)	(-4.53)
FF17 Industry FE	x	x	x	x	x	x	x		x	x
Going Public Year FE	x	x	x	x	x	x	x	x	x	x
Constant	-0.311	-0.580	0.142	0.120	0.106	1.004*	0.976*	0.697**	1.662*	0.713***
	(-0.65)	(-1.17)	(0.30)	(0.25)	(0.22)	(1.93)	(1.86)	(1.96)	(1.80)	(4.31)
Observations	486	486	486	486	486	477	477	486	477	486
Pseudo R^2	0.143	0.148	0.221	0.254	0.245	0.285	0.349	0.314	0.351	
Adjusted R^2										0.336

Panel B: 2015-2020	Dependent Variable: Going Public via SPAC=1									
	(1) Probit	(2) Probit	(3) Probit	(4) Probit	(5) Probit	(6) Probit	(7) Probit	(8) Probit	(9) Logit	(10) Linear
LN_TOTAL_ASSET	-0.026		-0.054	-0.059	-0.055	0.075	0.088	0.104*	0.186*	0.014
	(-0.65)		(-1.36)	(-1.46)	(-1.35)	(1.46)	(1.58)	(1.95)	(1.74)	(1.42)
LN_SALES		0.014								
		(0.39)								
CURRENT_RATIO	-0.078**	-0.074**	-0.047*	-0.042	-0.057*	-0.041*	-0.051*	-0.049*	-0.102	-0.003***
	(-2.24)	(-2.02)	(-1.75)	(-1.60)	(-1.95)	(-1.68)	(-1.93)	(-1.92)	(-1.51)	(-2.59)
LT_DEBT/ASSET	0.300**	0.268*	0.262	0.250	0.325*	0.341**	0.421**	0.374**	0.720**	0.063**
	(1.97)	(1.75)	(1.63)	(1.61)	(1.86)	(2.21)	(2.57)	(2.37)	(2.34)	(2.15)
NET_INCOME/ASSET	0.178**	0.141**	0.091	0.087	0.071	0.112	0.082	0.046	0.169	0.019**
	(2.14)	(2.00)	(1.42)	(1.34)	(1.03)	(1.63)	(1.04)	(0.68)	(1.05)	(1.97)
CAPX/ASSET	-0.482	-0.451	-0.909	-0.992	-1.046	-0.317	-0.633	-0.405	-1.372	-0.128
	(-0.53)	(-0.49)	(-0.97)	(-1.06)	(-1.08)	(-0.33)	(-0.62)	(-0.42)	(-0.72)	(-0.66)
AGE	-0.005	-0.006	-0.005	-0.006	-0.004	-0.007	-0.006	-0.007	-0.012	-0.002
	(-1.11)	(-1.37)	(-1.11)	(-1.22)	(-0.84)	(-1.35)	(-1.20)	(-1.53)	(-1.29)	(-1.56)
R&D_I			-1.037***	-0.872***	-1.193***	-0.901***	-0.926***	-0.757***	-1.707***	-0.221***
			(-6.00)	(-4.66)	(-6.41)	(-5.08)	(-4.55)	(-4.19)	(-4.11)	(-4.41)
R&D/ASSET			-0.046	-0.020	-0.125	0.072	0.007	0.029	0.072	0.022
			(-0.26)	(-0.11)	(-0.64)	(0.44)	(0.04)	(0.18)	(0.20)	(1.02)
HIGH_TECH				-0.551***			-0.605***	-0.841***	-1.081**	-0.162***
				(-2.67)			(-2.63)	(-4.48)	(-2.46)	(-2.78)
VC_BACKED					0.551***		0.793***	0.787***	1.511***	0.148***
					(3.42)		(4.30)	(4.46)	(4.28)	(5.27)
UWRANK						-0.204***	-0.227***	-0.226***	-0.424***	-0.049***
						(-4.74)	(-4.96)	(-5.14)	(-4.71)	(-4.99)
FF17 Industry FE	x	x	x	x	x	x	x		x	x
Going Public Year FE	x	x	x	x	x	x	x	x	x	x
Constant	-0.856**	-1.031**	-0.341	-0.319	-0.379	0.511	0.584	0.397	1.028	0.649***
	(-2.03)	(-2.38)	(-0.74)	(-0.70)	(-0.80)	(1.05)	(1.17)	(1.07)	(1.07)	(5.19)
Observations	804	804	804	804	804	793	793	798	793	798
Pseudo R^2	0.194	0.194	0.263	0.274	0.283	0.306	0.347	0.311	0.349	
Adjusted R^2										0.273

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Average Liquidity Measures During SPACs Lifecycle

Table 5 reports the average liquidity measure of SPACs during five event windows of the SPAC lifecycle. The sample consists of 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination (IBC) through 2020. Mean difference t-tests use period (2) "SPAC period, after target announcement" as the comparison benchmark.

	Event Window Mean					Mean Difference Between Event Windows							
	SPAC after Target Ann.	SPAC after Target Ann.	deSPAC 30-Day	deSPAC 90-Day	deSPAC 180-Day								
Year	(2)	(1)	(3)	(4)	(5)	(2)-(1)		(2)-(3)		(2)-(4)		(2)-(5)	
Panel A: Amihud Illiquidity (x10^5)													
2005-2009	3.36	10.22	2.01	7.45	10.92	-6.85	***	1.35		-4.08		-7.6	
						(-3.69)		(0.97)		(-1.29)		(-1.21)	
2010-2017	52.41	68.61	70.96	99.82	72.36	-16.20		-18.55		-47.41		-20.0	
						(-1.07)		(-0.48)		(-0.99)		(-0.56)	
2018-2020	1.28	22.77	10.24	7.65	8.03	-21.49	***	-8.96		-6.36		-6.8	
						(-6.30)		(-1.41)		(-1.50)		(-1.34)	
Panel B: Bid-Ask Spread													
2005-2009	0.04	0.06	0.08	0.08	0.08	-0.01	***	-0.03	***	-0.04	***	-0.03	***
						(-2.66)		(-4.20)		(-4.85)		(-4.35)	
2010-2017	0.23	0.39	0.44	0.49	0.34	-0.16	**	-0.21		-0.26	*	-0.11	
						(-2.51)		(-1.59)		(-1.68)		(-1.09)	
2018-2020	0.07	0.15	0.77	0.48	0.32	-0.08	***	-0.70		-0.40	*	-0.25	**
						(-3.58)		(-1.36)		(-1.90)		(-2.28)	
Panel C: Daily Turnover													
2005-2009	0.011	0.003	0.005	0.004	0.004	0.008	***	0.006	***	0.007	***	0.007	***
						(4.76)		(2.69)		(3.68)		(3.73)	
2010-2017	0.009	0.002	0.005	0.004	0.004	0.007	***	0.004		0.004	*	0.005	**
						(4.17)		(1.39)		(1.78)		(1.99)	
2018-2020	0.039	0.004	0.040	0.016	0.015	0.034	***	-0.001		0.023	***	0.024	***
						(5.54)		(-0.06)		(2.67)		(3.11)	

* p<0.10, **p<0.05, *** p<0.01. Mean difference test t statistics in parentheses. Definitions: For SPAC i in a holding period of T trading days,

$$\text{Amihud Illiquidity Measure}_i = \frac{1}{T}\sum_{t=1}^{T}\frac{|\text{Daily Return}|_t}{\text{Price}_t * (1+\text{Trading Volume})_t}; \text{Bid-Ask Spread}_i = \frac{1}{T}\sum_{t=1}^{T}(\text{Ask}_t - \text{Bid}_t); \text{Daily Turnover}_i = \frac{1}{T}\sum_{t=1}^{T}\frac{\text{Trading Volume}_t}{\text{Shares Outstanding}_t}$$

Table 6: Average Time to Major Events during the SPAC Period

Table 6 summarizes the average time taken by a SPAC to announce merger agreement and complete the initial business combination. The sample is 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination (IBC) through 2020.

	Count		Average Years Between (by SPAC IPO Year)		
Year	by SPAC IPO Year	by deSPAC Year	SPAC IPO and Target Announcement	Target Announcement and deSPAC	SPAC IPO and deSPAC
2005	6	0	1.5	0.7	2.2
2006	6	1	1.3	0.3	1.5
2007	18	8	1.2	0.4	1.7
2008	6	9	1.3	0.4	1.7
2009	0	13	-	-	-
2010	1	5	1.7	0.3	2.0
2011	3	0	1.4	0.3	1.7
2012	5	2	1.4	0.3	1.7
2013	7	4	1.3	0.3	1.6
2014	8	5	1.4	0.4	1.8
2015	17	8	1.6	0.5	2.1
2016	11	9	1.5	0.4	1.9
2017	28	13	1.3	0.5	1.8
2018	39	23	1.4	0.4	1.8
2019	24	25	1.0	0.4	1.4
2020	10	64	0.4	0.3	0.6
2005-2020	189	189	1.3	0.4	1.7

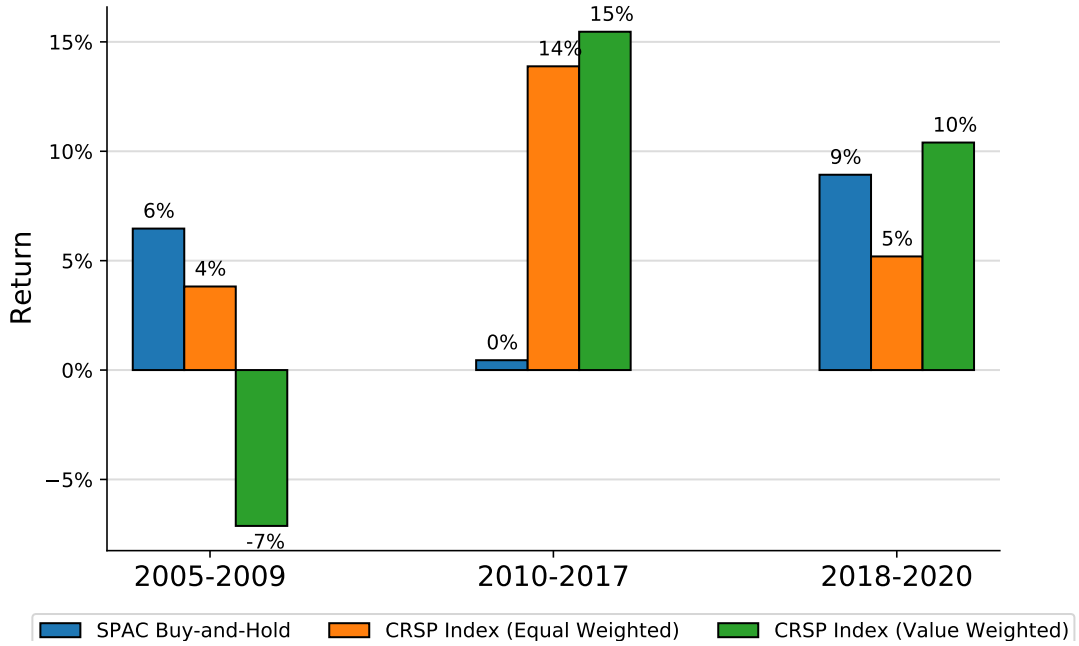
Figure 5: Common Share Buy-and-Hold Return during the SPAC Period

Figure 6 summarizes the SPAC common share average buy-and-hold return during three event windows of the SPAC period. Total return includes capital gain and ordinary dividend. The sample consists of 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination through 2020. Year groups are based on SPAC IPO year.

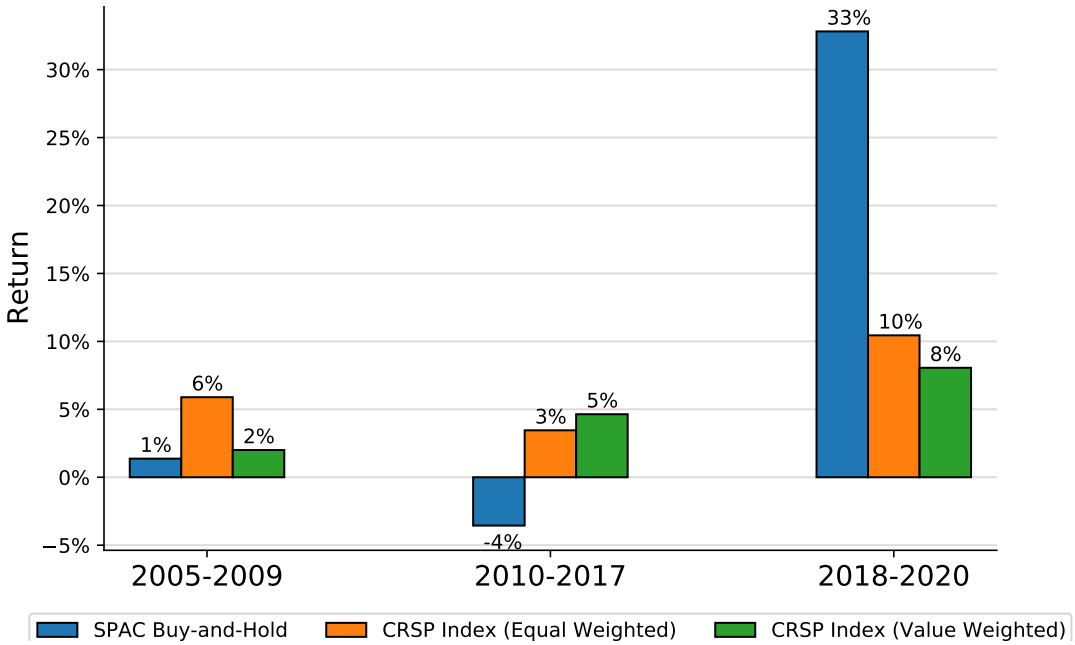
The buy-and-hold returns are calculated based on the average of the highest and lowest trading prices on the event start and end date. Large intra-day price range is frequently observed on event dates of this sample; hence, intra-day average is more representative than the end-of-day price to estimate the return of investors who trade upon the events.

The SPAC IPO is assumed to be the first day of record in the CRSP database for buy-and-hold return calculation. CRSP data are only available for SPAC common shares. SPAC common shares typically start trading 30 to 90 days after the SPAC IPO when unit split becomes possible. The benchmark CRSP returns are the total return on the CRSP equal-weighted and value-weighted market indices during matched investment period for each event window observation.

(a) SPAC IPO to target announcement, average holding period = 1.3 years



(b) Target announcement to deSPAC initial business combination, average holding period = 0.4 years



(c) SPAC IPO to deSPAC initial business combination, average holding period = 1.7 years

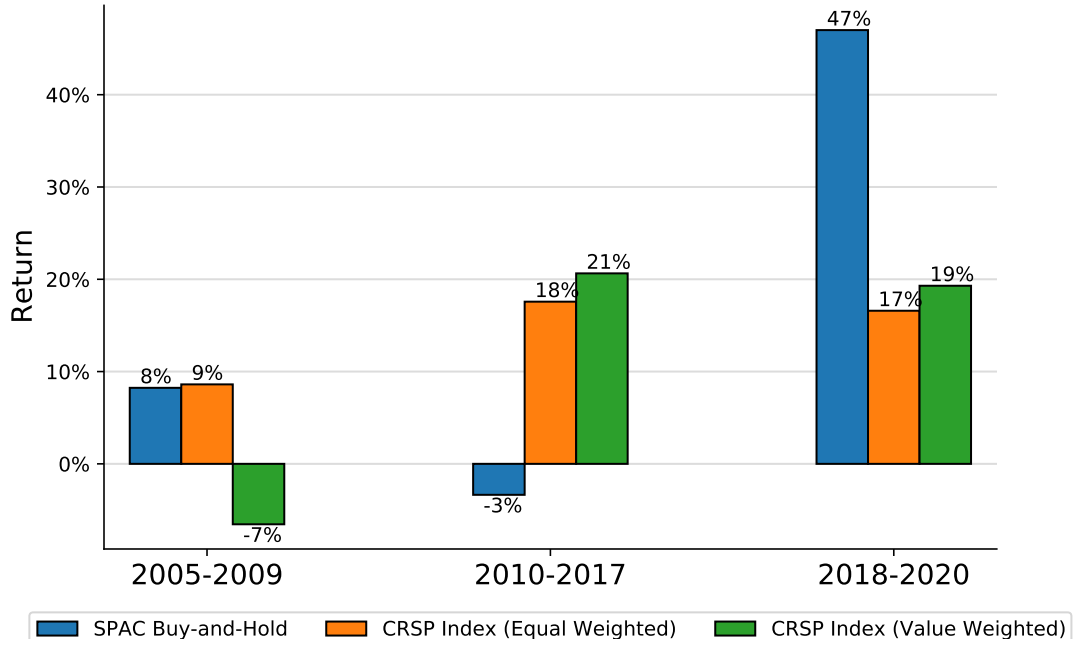
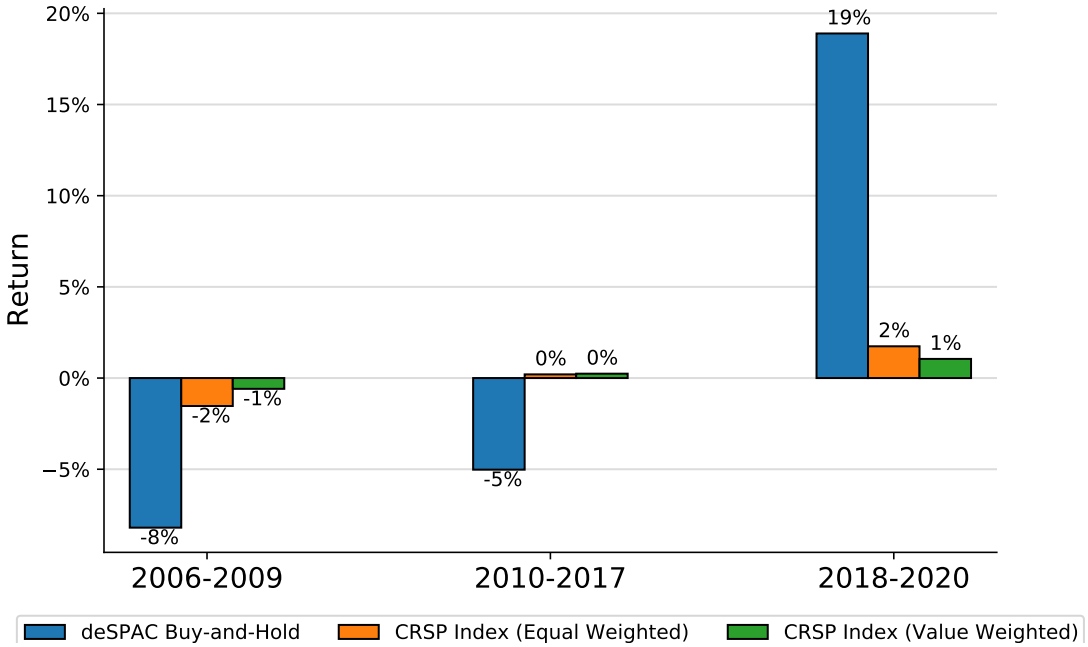


Figure 6: Common Share Buy-and-Hold Return during the deSPAC Period

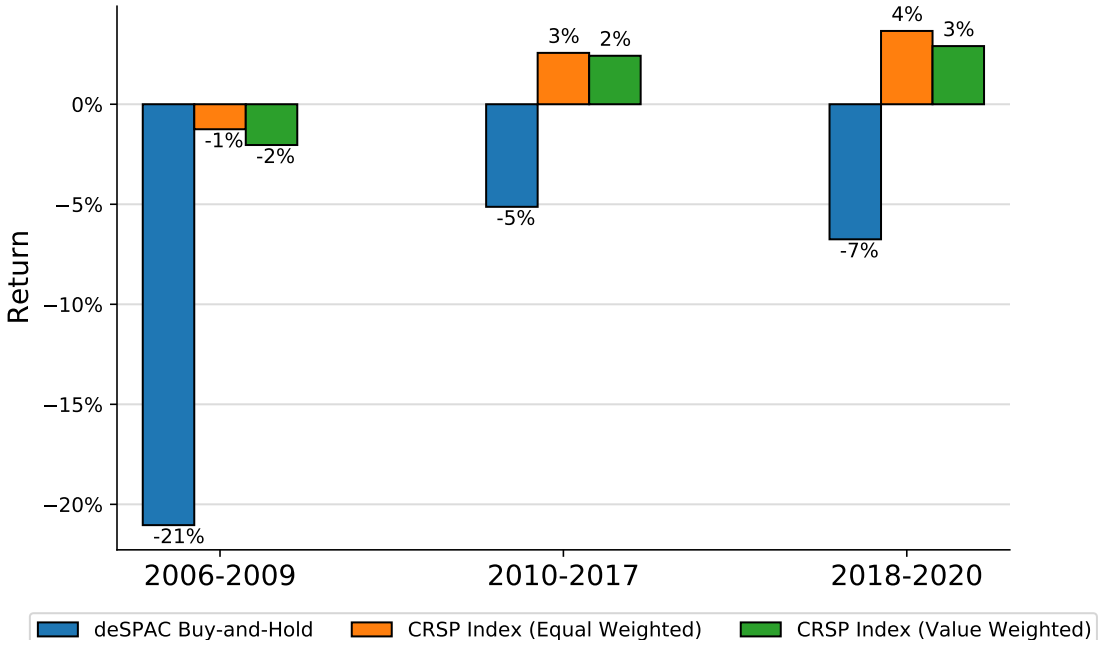
Figure 6 reports the deSPAC common share average buy-and-hold return during the first 30-day, 90-day, and 180-day periods, for investors who purchase the deSPAC company common share on its first day of trading as the new entity and hold through the respective period. Total return includes capital gain and ordinary dividend. The sample includes 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination through 2020. Year groups are based on deSPAC year.

The buy-and-hold returns are calculated with the average of the highest and lowest trading prices on the holding period start and end date. We use CRSP data through the end of 2020; if the event window extends into 2021, an observation is dropped from the average calculation. The benchmark CRSP returns are the total return on the CRSP equal-weighted and value-weighted market indices during matched investment holding period for each event window observation.

(a) Holding period: first 30 days after deSPAC



(b) Holding period: first 90 days after deSPAC



(c) Holding period: first 180 days after deSPAC

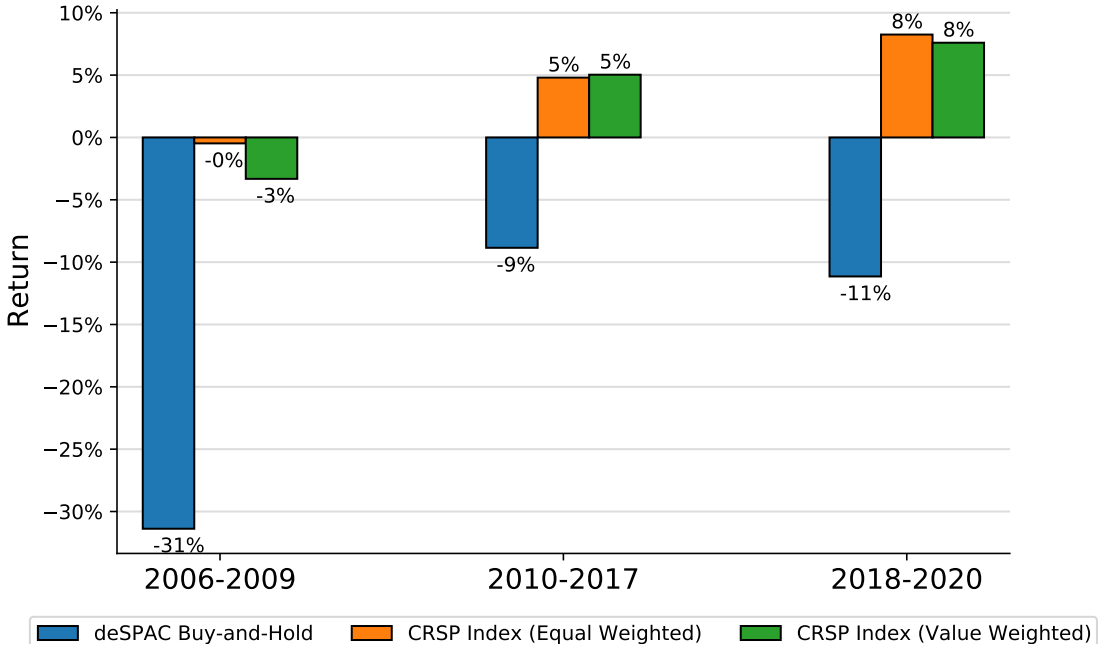
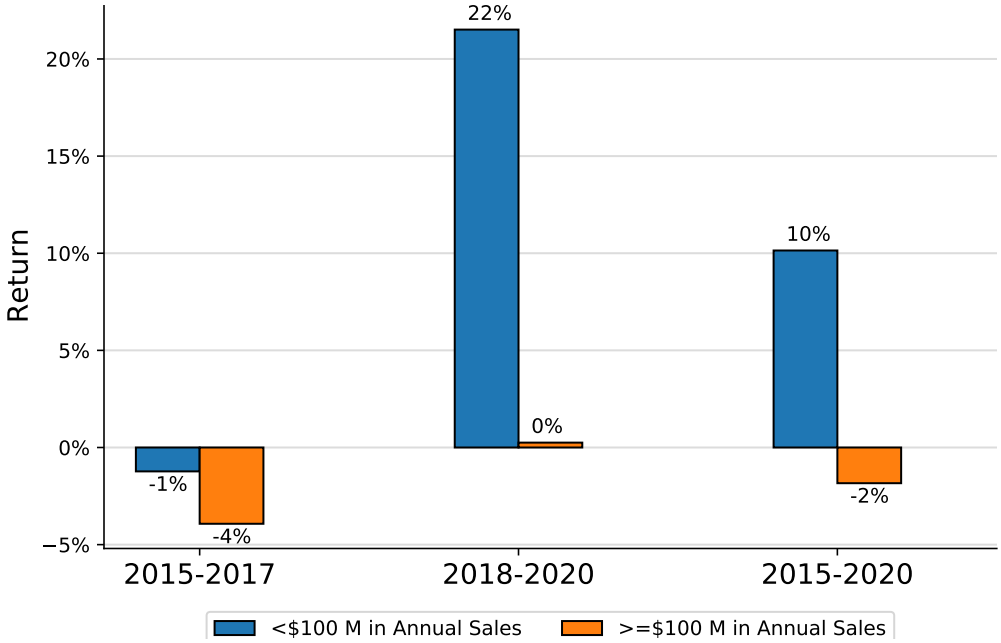


Figure 7: SPAC Common Share Buy-and-Hold Return by Annual Sales

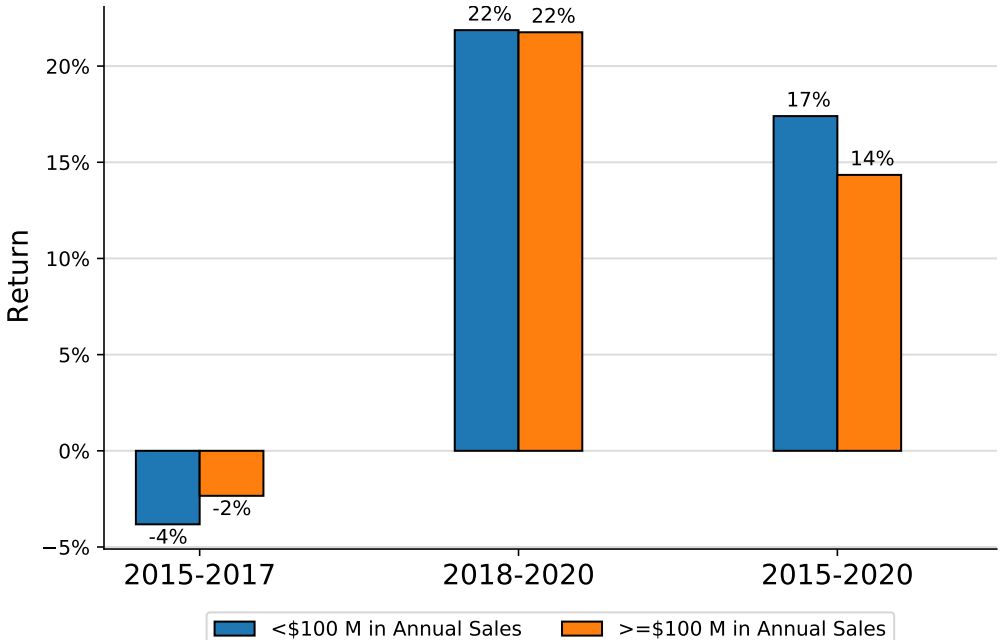
Figure 7 reports the average SPAC buy-and-hold return relative to CRSP equal-weighted index by the annual sales of the target firm in the fiscal year prior to going public. Returns for four holding periods are reported. The sample includes 130 SPACs traded on major exchanges that have completed the deSPAC initial business combination between 2015-2020, for which annual sales data are available from Compustat or 10-K filings. Year groups are based on deSPAC year.

The buy-and-hold returns are calculated with the average of the highest and lowest trading prices on the holding period start and end date. The benchmark CRSP returns are the total return on the CRSP equal-weighted index during matched investment holding period for each event window observation.

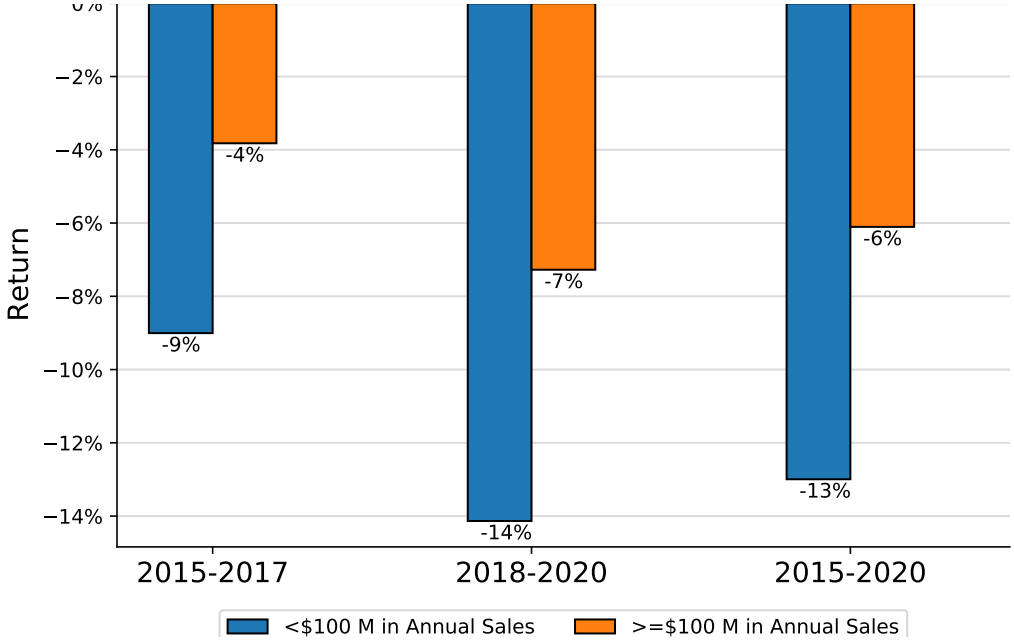
(a) Holding period: Target Announcement to deSPAC



(b) Holding period: first 30 days after deSPAC



(c) Holding period: first 90 days after deSPAC



(d) Holding period: first 180 days after deSPAC

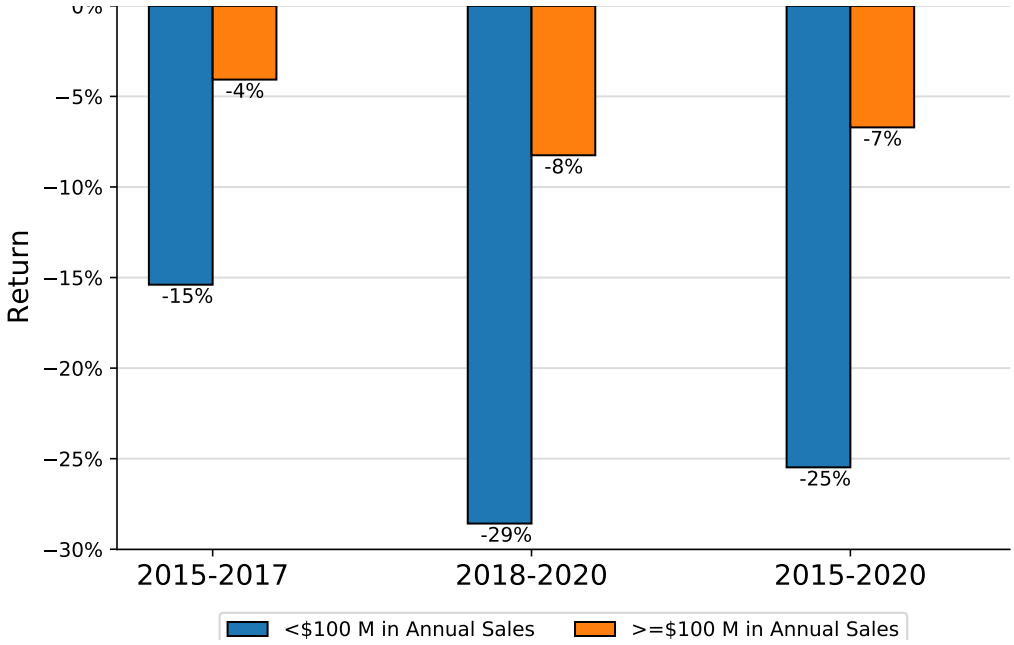
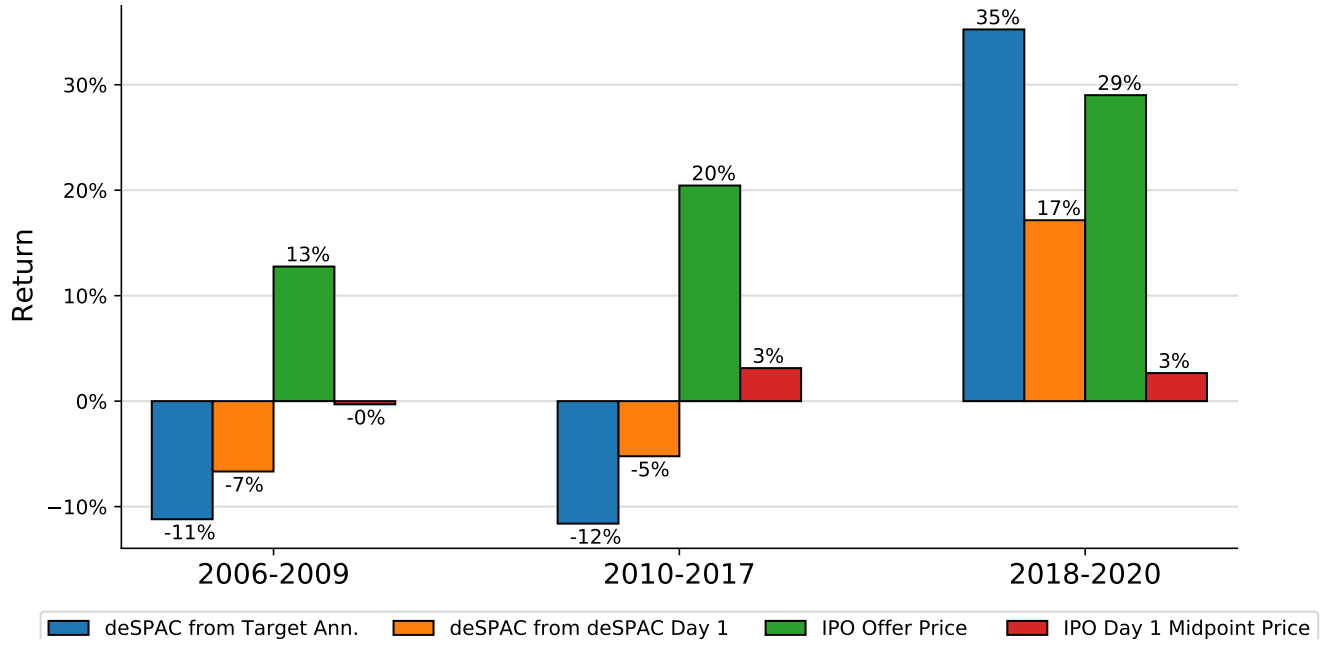


Figure 8: Buy-and-Hold Excess Return of Newly Public Companies Common Stock: SPAC vs. IPO, Relative to CRSP Equal Weighted Index

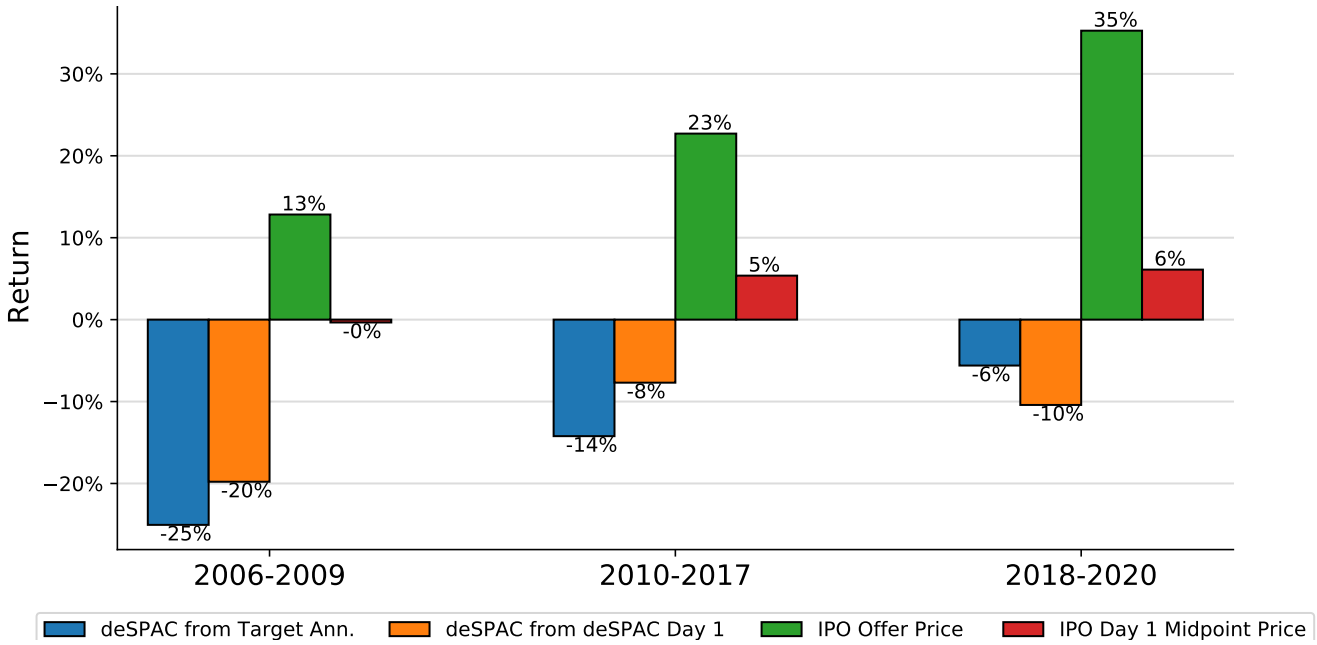
Figure 8 compares the buy-and-hold excess return of newly public stocks of companies that went public via SPAC and traditional IPOs during 2006-2020. The excess return is defined as the SPAC or IPO buy-and-hold return (BHR) minus that of CRSP Value Weighted Index in matched investment period.

The deSPAC sample returns are calculated based on the purchase price on the target announcement date and the first deSPAC trading day. The IPO sample returns are calculated based on both offer price and the average of the highest and lowest trading prices on the first trading day. Year groups are based on deSPAC year for the SPAC sample, and IPO year for the IPO sample.

(a) Holding period: through the first 30 days after going public, excess return relative to CRSP Equal Weighted Index



(b) Holding period: through the first 90 days after going public, excess return relative to CRSP Equal Weighted Index



(c) Holding period: through the first 180 days after going public, excess return relative to CRSP Equal Weighted Index

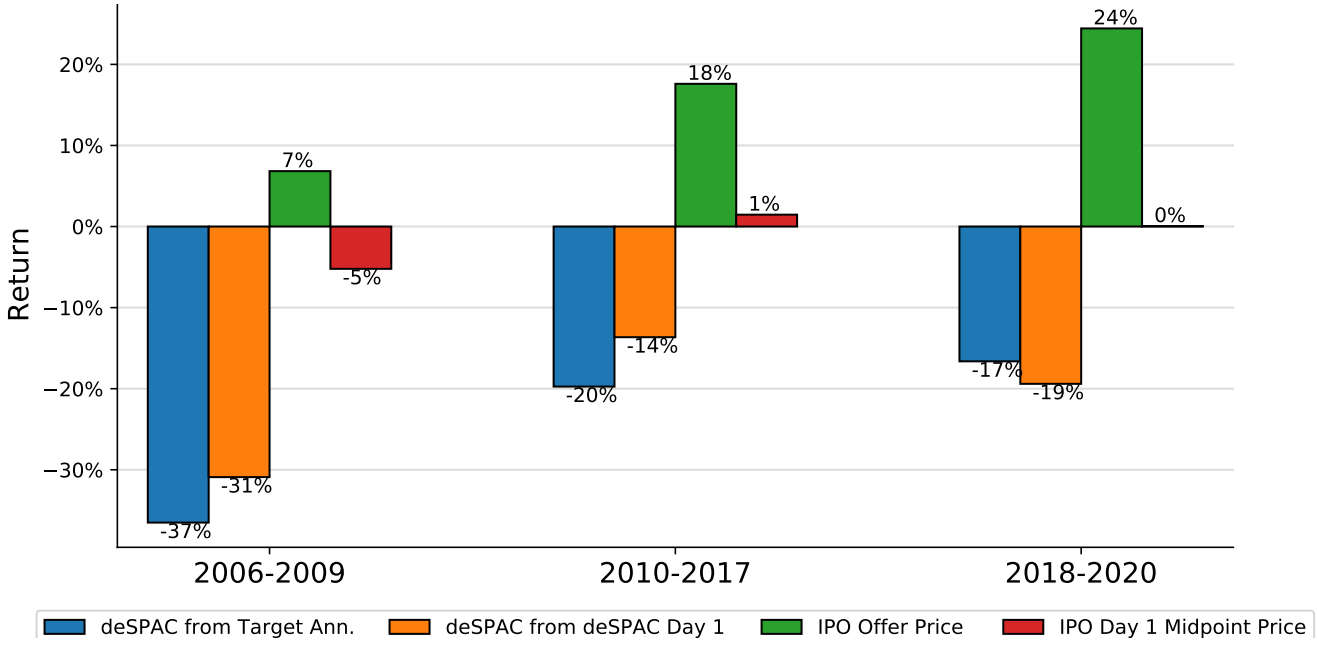
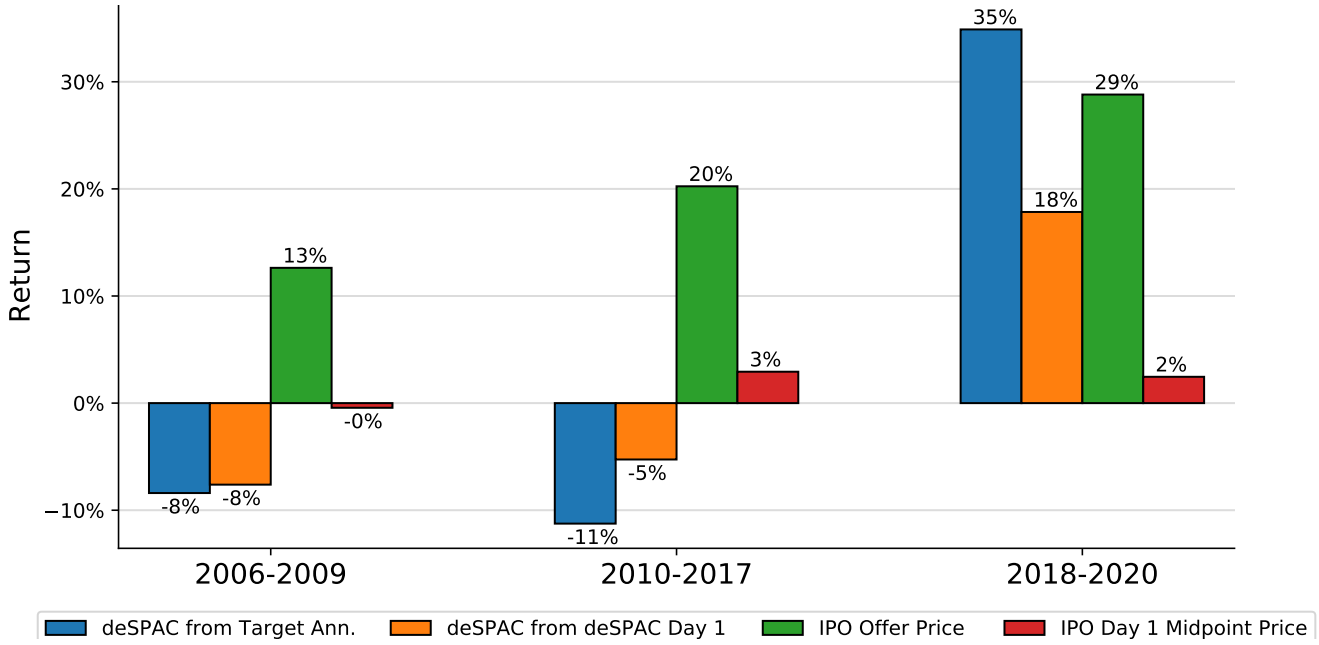


Figure 9: Buy-and-Hold Excess Return of Newly Public Companies Common Stock: SPAC vs. IPO, Relative to CRSP Value Weighted Index

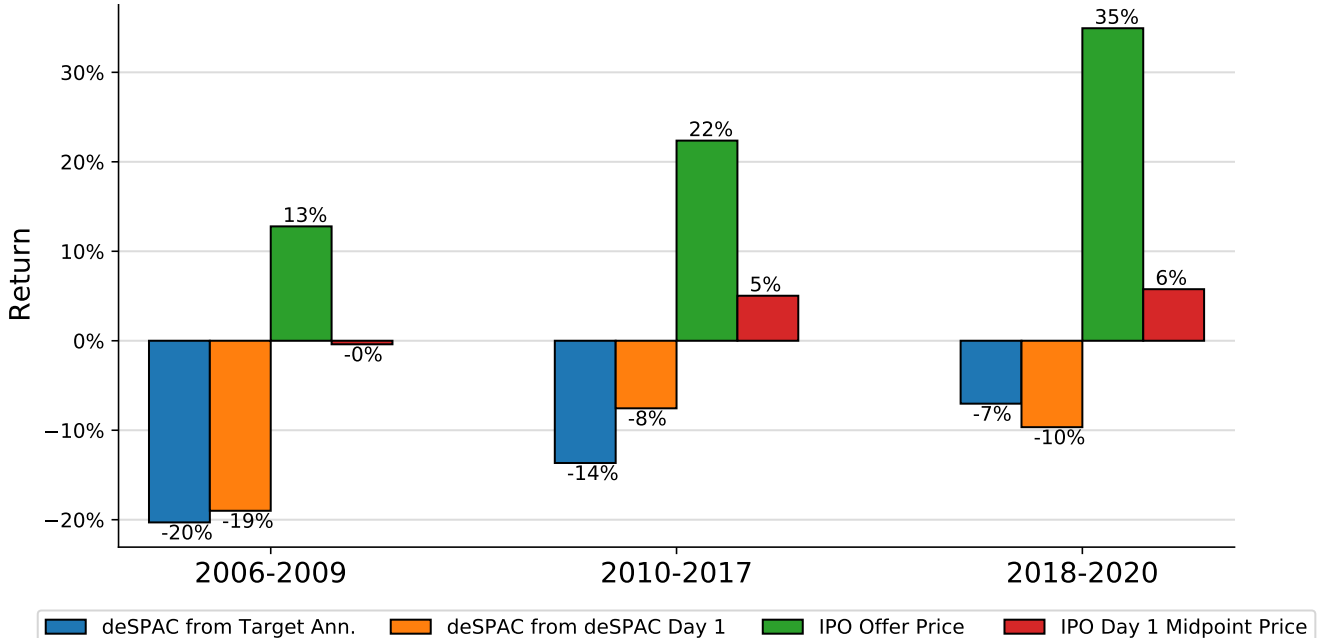
Figure 9 compares the buy-and-hold excess return of newly public stocks of companies that went public via SPAC and traditional IPOs during 2006-2020. The excess return is defined as the SPAC or IPO buy-and-hold return (BHR) minus that of CRSP Value Weighted Index in matched investment period.

The deSPAC sample returns are calculated based on the purchase price on the target announcement date and the first deSPAC trading day. The IPO sample returns are calculated based on both offer price and the average of the highest and lowest trading prices on the first trading day. Year groups are based on deSPAC year for the SPAC sample, and IPO year for the IPO sample.

(a) Holding period: through the first 30 days after going public, excess return relative to CRSP Value Weighted Index



(b) Holding period: through the first 90 days after going public, excess return relative to CRSP Value Weighted Index



(c) Holding period: through the first 180 days after going public, excess return relative to CRSP Value Weighted Index

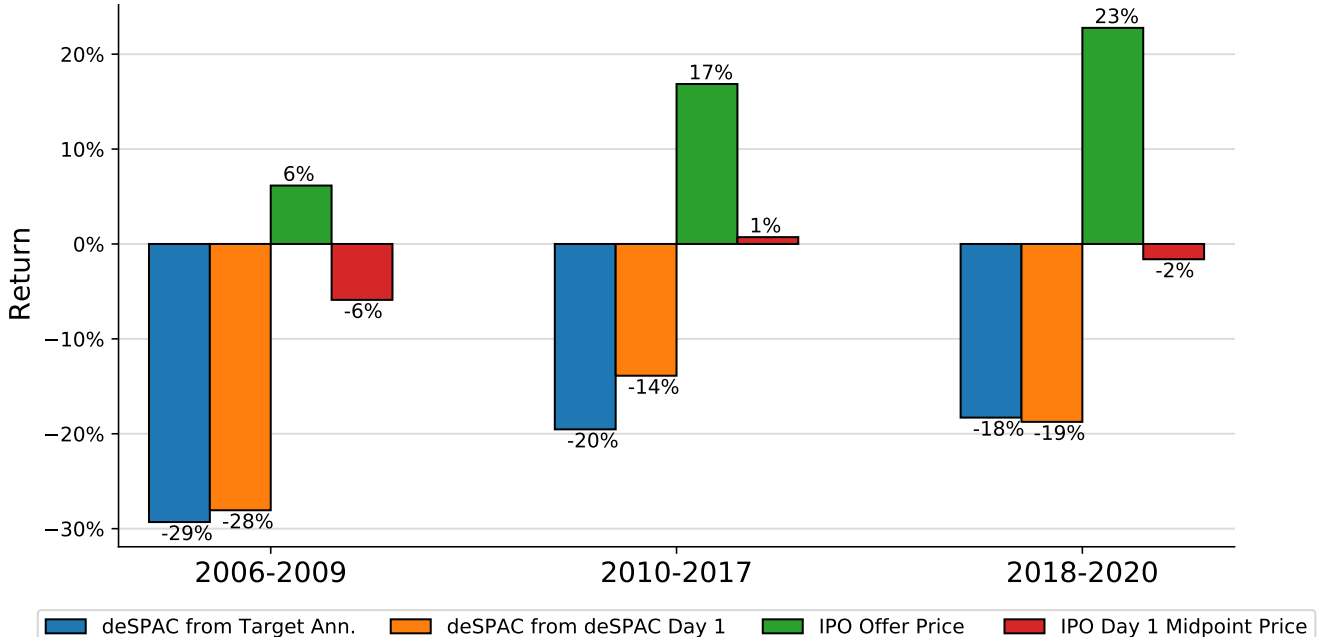


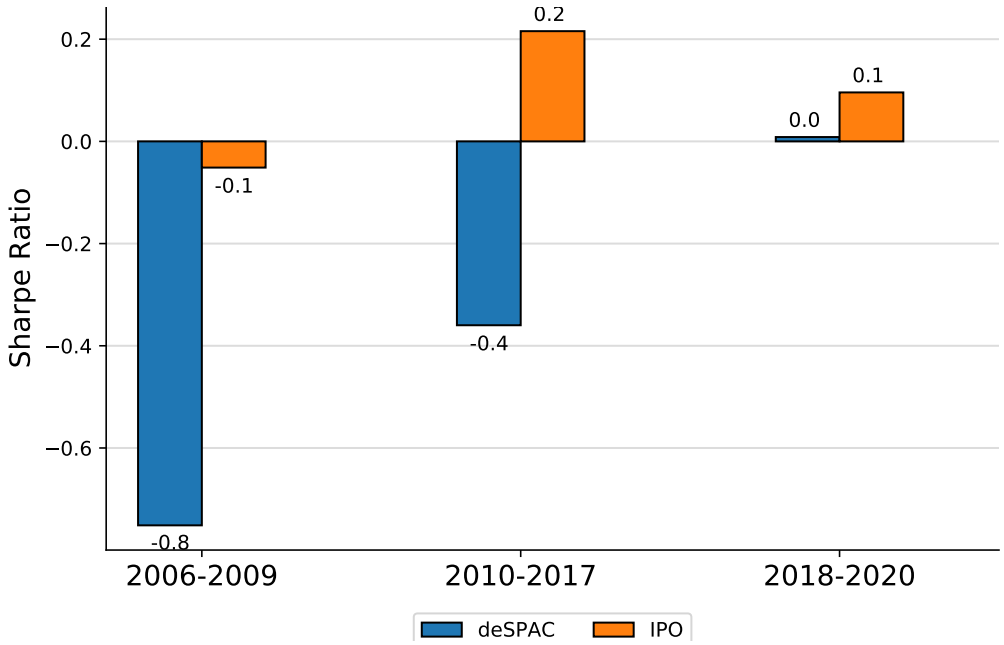
Figure 10: Average Sharpe Ratio of SPACs and IPOs

Figure 10 compares the average Sharpe ratios of deSPAC and IPO buy-and-hold return from the first day of going public. The SPAC sample consists of 189 SPACs traded on major exchanges that have completed the deSPAC initial business combination (IBC) through 2020. The IPO sample consists of traditional IPOs between 2006 and 2020.

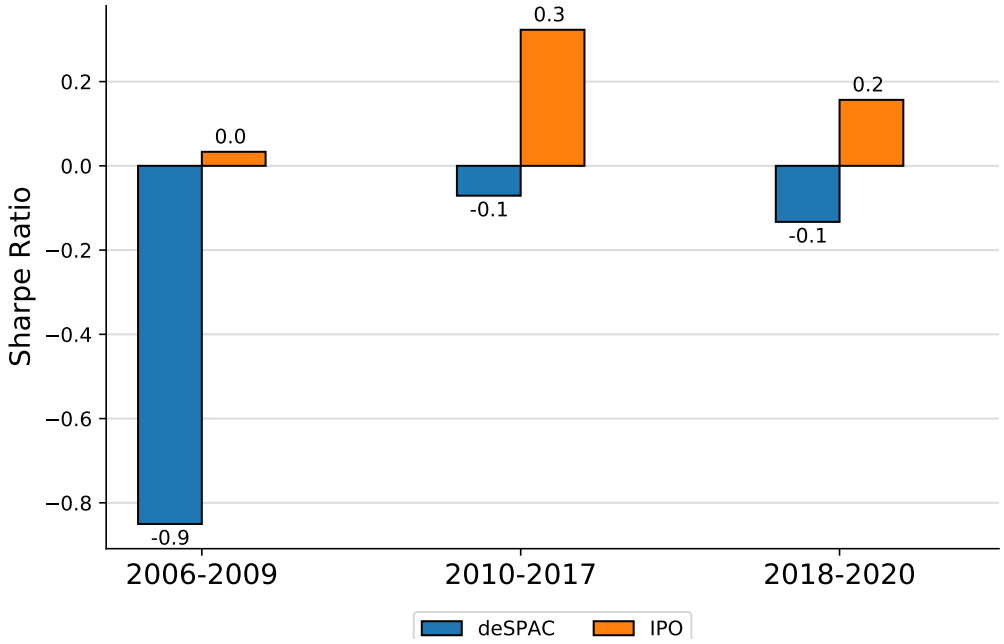
$$\text{Sharpe Ratio} = \frac{\text{SPAC or IPO BHR - } R_f}{\sqrt{\text{T}} * \text{Holding Period Realized Daily Volatility}},$$

where T is the number of trading days during the holding period; R_f is the risk free return during the holding period. Year group is based on going public year. IPO return assumes the purchase price to be the midpoint of first-day trading price range.

(a) Holding period: first 30 days after going public



(b) Holding period: first 90 days after going public



(c) Holding period: first 180 days after going public

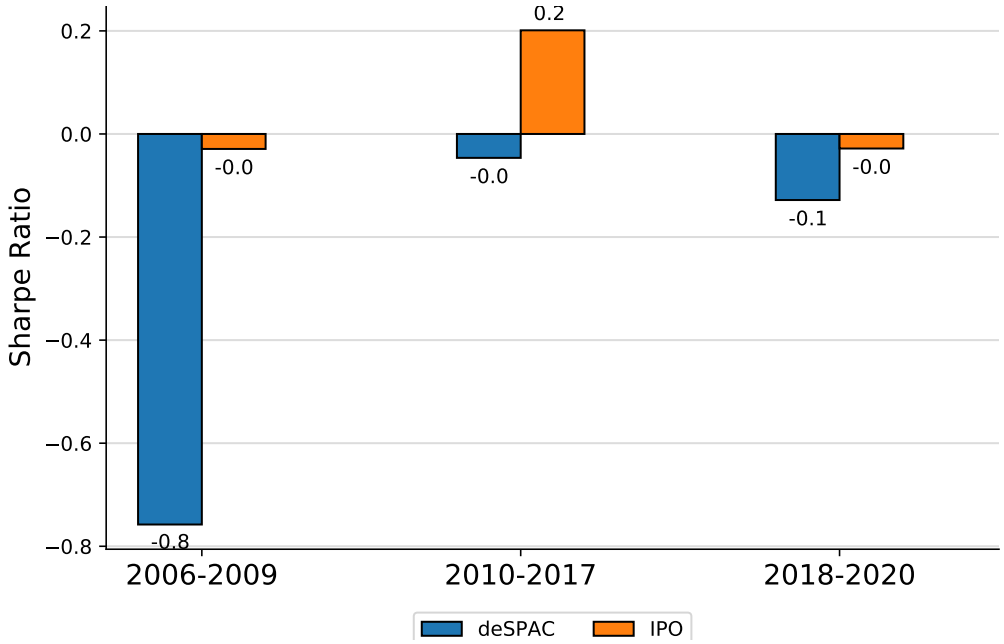


Table 7: Follow-on Equity Offering of deSPAC Firms

Table 7 summarizes the follow-on equity offering activity of deSPAC firms. By Feberury 2021, 51 of the 189 firms that went public via SPAC through 2020 have issued a follow-on equity offering. On average, higher SEO underwriter reputation is related to larger follow-on equity offering size, higher follow-on demand as measured by overallotment exercise ratio, and higher follow-on offer price. The follow-on offering sample is contructed from the SDC New Issues Database, based on name and CUSIP matching of the deSPAC firms.

			1st Follow-On Equity Offering								
		Count	Average	All			High UW Reputation			Low UW Reputation	
		deSPAC	Time after	Average		Proportion	Average		Proportion	Average	Proportion
Year	deSPAC Merger	Firm w/ FO	deSPAC (Years)	Proceeds ($M)	Over-allot.	Offer Price FO>SPAC	Proceeds ($M)	Over-allot.	Offer Price FO>SPAC	Proceeds ($M)	Over-allot.	Offer Price FO>SPAC
2006	1	0	-									
2007	7	2	3.9	18	1%	0%				18	1%	0%
2008	10	5	3.7	47	3%	0%	71	8%	0%	30	0%	0%
2009	13	5	1.6	79	6%	20%	79	6%	20%			
2010	5	1	0.5	36	0%	0%	36	0%	0%			
2011	0	0	-									
2012	2	0	-									
2013	4	3	2.2	27	7%	33%	31	11%	50%	21	0%	0%
2014	4	0	-									
2015	8	1	0.3	47	15%	100%	47	15%	100%			
2016	10	5	1.6	167	7%	50%	238	7%	50%	25	8%	50%
2017	13	9	1.4	62	3%	44%	76	4%	57%	14	0%	0%
2018	24	6	0.9	99	7%	33%	97	6%	40%	110	10%	0%
2019	24	9	0.7	161	8%	67%	202	10%	86%	19	0%	0%
2020	64	5	0.4	522	12%	60%	646	15%	75%	25	0%	0%

Definitions:
Low underwriter reputation: Lead underwriter rank <5.
High underwriter reputation: Lead underwriter rank >=5.

Table 8: Average Buy-and-Hold Return of deSPAC Firm Follow-On Equity Offering

Table 8 reports the average buy-and-hold return of the first follow-on equity offering of deSPAC firms. Total return includes capital gain and dividends. Return is calculated assuming purchase price at the follow-on offer price.

		Average Buy-and-Hold Return 1st Follow-On Equity Offering			
deSPAC Year	deSPAC Firm w/ FO	1st Day	30-Day	90-Day	180-Day
2006	0		-	-	-
2007	2	3%	6%	-9%	43%
2008	5	1%	23%	12%	-9%
2009	4	2%	-4%	9%	13%
2010	1	-5%	-27%	-24%	-28%
2011	0		-	-	-
2012	0		-	-	-
2013	3	7%	16%	21%	0%
2014	0		-	-	-
2015	1	2%	-13%	-17%	-24%
2016	6	9%	-5%	-7%	-15%
2017	9	8%	9%	-10%	-7%
2018	6	6%	5%	2%	-4%
2019	9	4%	18%	25%	69%
2020	5	-4%	-3%	9%	27%

Figure 11: Robinhood Users Holding Monthly Statistics

Figure 11 highlights two growth dimensions of the Robinhood platform during the sample period May 2018-August 2020. First, the number of user holding each ticker has increased. Second, the number of ticker present on Robinhood has increased.

On the first day of each month in the sample, we rank all tickers based on the number of users holding. The blue lines show the number of users holding at the mean and various percentiles over time; the axis is on a log scale (see the primary axis on the left). The gray bars show the number of tickers present in the Robintrack data (see the secondary axis on the right). The universe of tickers include common stock and ETFs.

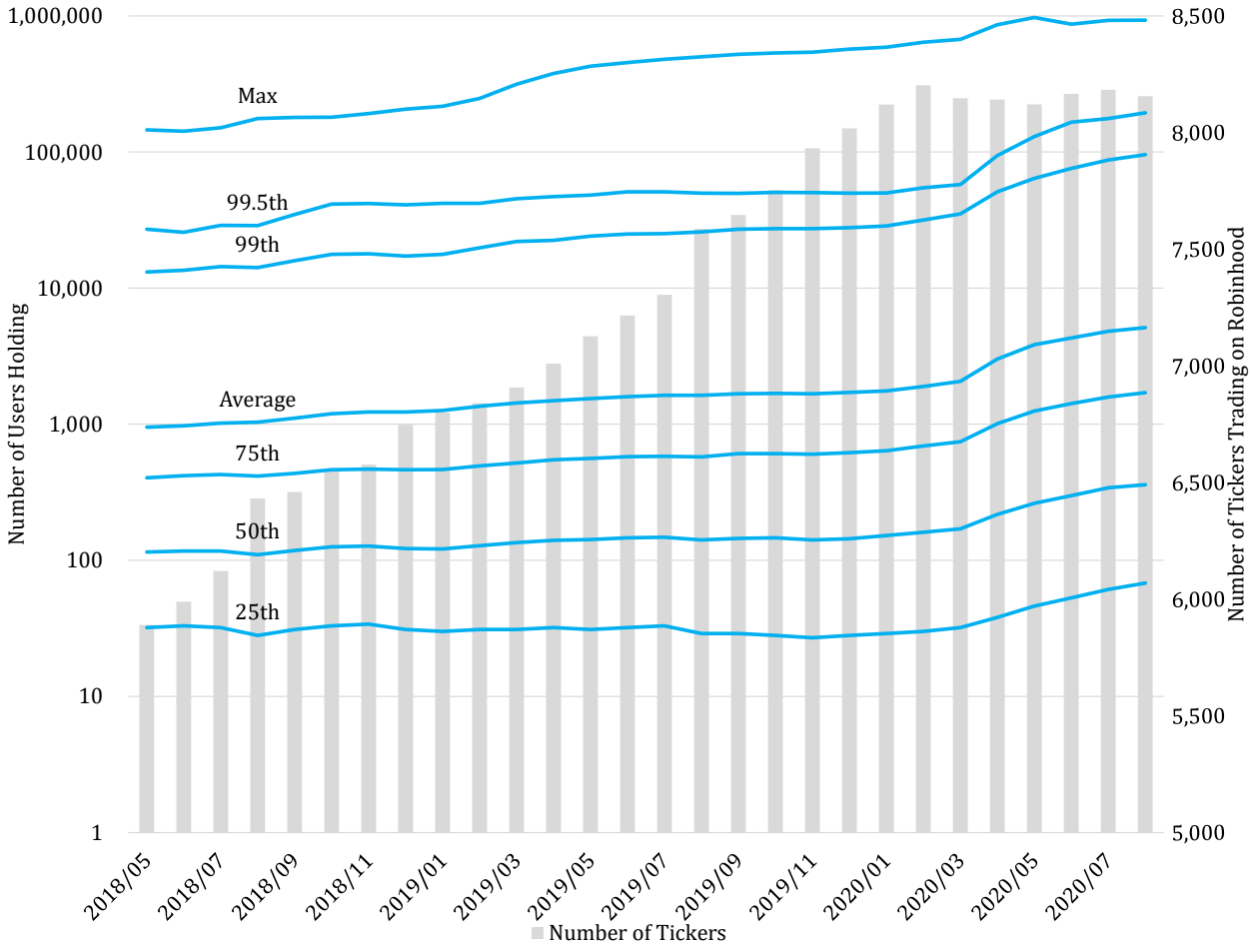


Figure 12: Summary of SPAC-Related Tickers in the Robintrack Sample at Month Start

Figure 12 reports the number of SPAC-related tickers in the Robintrack data as of the start of each month and their average popularity rank. The grey bars report the number of SPAC and deSPAC tickers available each month start in the Robintrack data. The blue lines report the average popularity percentile rank of the SPAC and deSPAC tickers at each month start.

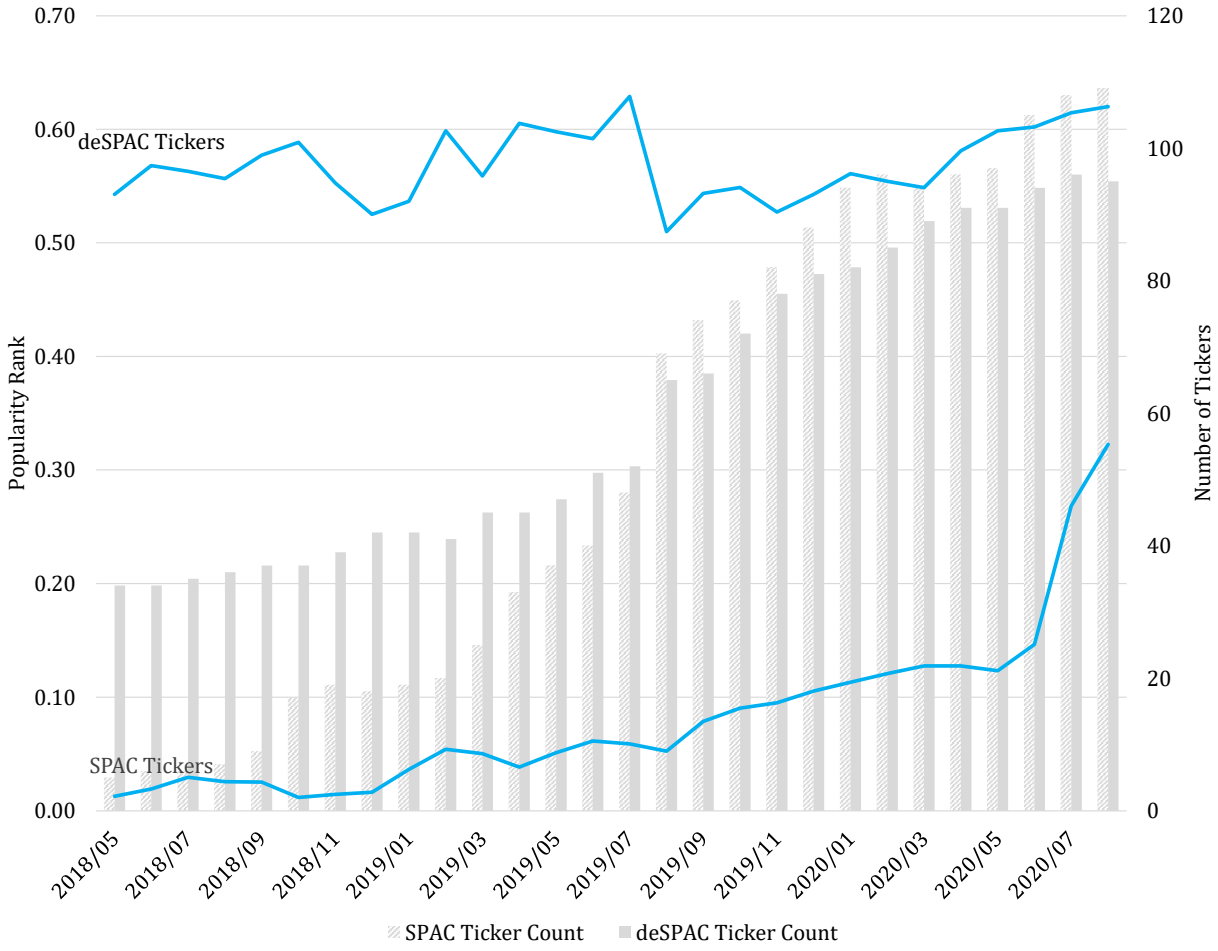


Table 9: Means Tests of SPACs Robintrack Popularity Measures: Before vs. After Target Announcement

Table 9 compares the average popularity of SPACs among Robinhood users before and after the target announcement, during the SPAC period. Four popularity measures are used. The three panels differ in the "before" group. The average time between target announcement and deal completion is 133 days for SPAC mergers through 2020, hence the sample choice for Panel C. User growth rate comparisons exclude observations where users holding$_{t-1} = 0$.

Panel A: Full Sample				
	Target Announcement			
Mean	Before	After	After-Before	p-value
Relative Popularity Rank	0.11	0.27	0.16	0.00
N	23,564	4,036		
Users Holding	45	2,167	2,122	0.00
N	23,564	4,036		
Users Increase ((Δ)	3	72	69	0.00
N	23,443	4,029		
Average Users Growth (%)	4%	33%	30%	0.00
N	20,410	3,948		

Panel B: Exclude SPACs without Target Announcement				
	Target Announcement			
Mean	Before	After	After-Before	p-value
Relative Popularity Rank	0.09	0.27	0.179	0.00
N	10,360	4,036		
Users Holding	21	2,167	2,146	0.00
N	10,360	4,036		
Daily Users Increase (Δ)	5	72	68	0.00
N	10,314	4,029		
Daily Users Growth (%)	3%	33%	30%	0.00
N	9,027	3,948		

Panel C: Exclude SPACs without Target Announcement "Before" period: up to 133 days prior to deal announcement				
	Target Announcement			
Mean	Before	After	After-Before	p-value
Relative Popularity Rank	0.12	0.27	0.155	0.00
N	3,950	4,036		
Users Holding	43	2,167	2,124	0.00
N	3,950	4,036		
Users Increase ((Δ)	12	72	61	0.00
N	3,938	4,029		
Users Growth (%)	5%	33%	28%	0.01
N	3,466	3,948		

Table 10: Reaction Time Distribution of Largest Popularity Change After SPAC Target Announcement

We calculate the daily change in popularity rank for each SPAC after target announcement. Table 10 summarizes when the largest daily change in popularity rank occurs.

The target announcement effect is realized very quickly. Among 56 SPACs that announced a target during the sample period, the largest one-day change in popularity rank occurs within 2 days post-announcement for 28 cases. The magnitude of one-day increase in popularity rank is also on average higher when the reaction time is shorter.

Days Since Announcement	Frequency	%	Cumulative %	Average Largest One-Day Popularity Rank Change
0	8	14%	14%	0.32
1	16	29%	43%	0.26
2	4	7%	50%	0.22
3-10	2	4%	54%	0.04
11-100	11	20%	73%	0.11
101-400	15	27%	100%	0.11
Total	56	100%		

Table 11: Regression Estimation of SPAC Robinhood Popularity and Market Variables Relationship

Table 11 reports the linear regression estimation results of SPAC Robinhood popularity on prices, market capitalization, return volatility, trading volume, and target announcement status. Estimations exclude observations with zero trading volume.

Dependent Variable:	Robinhood Popularity Rank		
	(1)	(2)	(3)
LN_MARKET_CAP	0.0419	0.0329	0.0493
	(1.22)	(1.00)	(1.09)
L.LN_RET	0.0752	0.0960	0.122
	(0.43)	(0.64)	(0.89)
L.VOLATILITY	2.034**	1.779**	1.684**
	(2.58)	(2.62)	(2.41)
L.LN_MA_VOL	0.0197***	0.0142**	0.0210**
	(2.79)	(2.33)	(2.37)
LN_AMIHUD_ILLIQ	-0.0156***	-0.0120***	-0.0119***
	(-5.58)	(-4.88)	(-2.80)
POST_ANN.		0.136***	0.0995***
		(3.91)	(3.35)
Ticker Fixed Effects	x	x	x
Month Fixed Effects	x	x	x
Constant	-0.771*	-0.579	-0.861
	(-1.78)	(-1.44)	(-1.54)
Observations	13,198	13,198	7,152
Adjusted R^2	0.752	0.775	0.784
Adjusted R^2 (within)	0.327	0.390	0.392

* p<0.1, ** p<0.05, *** p<0.01.
t statistics are reported in parentheses. Standard errors are double-clustered at the stock and month levels. Column 3 excludes SPACs that have not announced target by the end of the sample period.

Table 12: Means Tests of SPACs Robintrack Popularity Measures: High vs. Low Underwriter Reputation

Table 12 compares Robinhood popularity measures of SPACs with high and low underwriter reputation.

	Underwriter Reputation			
	Low	High	High-Low	t-test p-value
Before Target Announcement				
Average Popularity Rank	0.08	0.12	0.05	0.00
Average Users Holding	16	55	40	0.00
N	6,145	17,419		
After Target Announcement				
Average Relative Popularity Rank	0.20	0.30	0.10	0.00
Average Users Holding	488	2,859	2,372	0.00
N	1,178	2,858		

Definitions:
Low underwriter reputation: Lead underwriter rank <5.
High underwriter reputation: Lead underwriter rank >=5.

Table 13: Regression Estimation of SPAC Robinhood Popularity and SPAC Features

Table 13 reports the linear regression estimation results of Robinhood popularity on SPAC IPO features, conditional on market variables and target announcement status. Estimations exclude observations with zero trading volume.

Columns 1 and 2 uses the full sample of SPAC tickers in the Robintrack data. Column 3 uses the "before target announcement" subsample. Column 4 uses the "before target announcement" subsample, while excluding SPACs without a target announcement by the end of the sample period. Column 5 uses the "after target announcement" subsample.

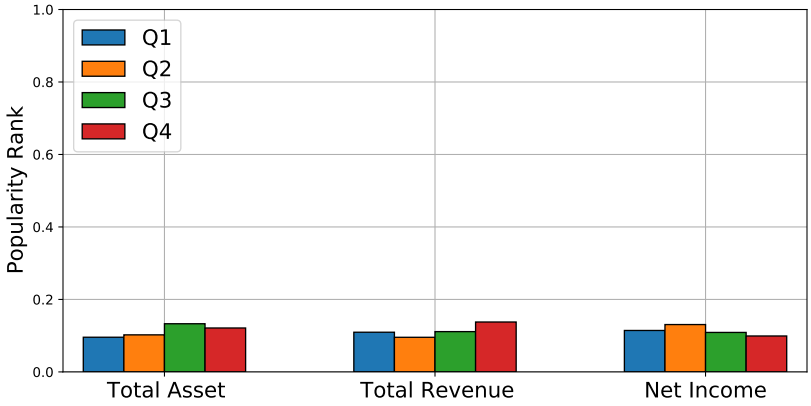
Dependent Variable:	Robinhood Popularity Rank				
	Full Sample (1)	Full Sample (2)	PA=0 (3)	PA=0 target!=. (4)	PA=1 (5)
UWRANK	0.00312	-0.000877	-0.00197	-0.00489	0.00395
	(0.89)	(-0.19)	(-0.44)	(-0.73)	(0.33)
LN_SPAC_PROCEEDS		0.0186	0.0335*	0.0480**	-0.0350
		(1.07)	(1.84)	(2.44)	(-1.26)
OVERALLOTMENT		-0.221*	-0.267**	-0.254	0.118
		(-1.88)	(-2.24)	(-1.62)	(0.41)
POST_ANN.	0.0582**	0.0665***			
	(2.52)	(3.05)			
L.LN_RET	0.0939	0.102	0.0883	0.227	0.225**
	(0.47)	(0.51)	(0.66)	(1.14)	(2.49)
L.VOLATILITY	2.256***	2.257***	0.798	0.206	3.714***
	(2.82)	(2.88)	(1.68)	(1.20)	(7.24)
L.LN_MA_VOL	0.0218***	0.0200**	0.00435	0.00312	0.0466***
	(3.32)	(2.74)	(0.76)	(0.71)	(4.14)
LN_AMIHUD_ILLIQ	-0.0201***	-0.0194***	-0.0188***	-0.00334	-0.0157**
	(-5.59)	(-5.22)	(-3.52)	(-0.96)	(-2.23)
Month Fixed Effect	x	x	x	x	x
Constant	-0.366***	-0.392***	-0.276***	-0.169*	-0.390***
	(-4.45)	(-5.13)	(-3.74)	(-1.98)	(-3.18)
Observations	13,198	13,198	10,706	4,660	2492
Adjusted R^2	0.565	0.571	0.409	0.393	0.731
Adjusted R^2 (within)	0.441	0.448	0.254	0.155	0.577

* p<0.1, ** p<0.05, *** p<0.01.
t statistics are reported in parentheses. Standard errors are double-clustered at the stock and month levels. Exclude observations with zero trading volume.

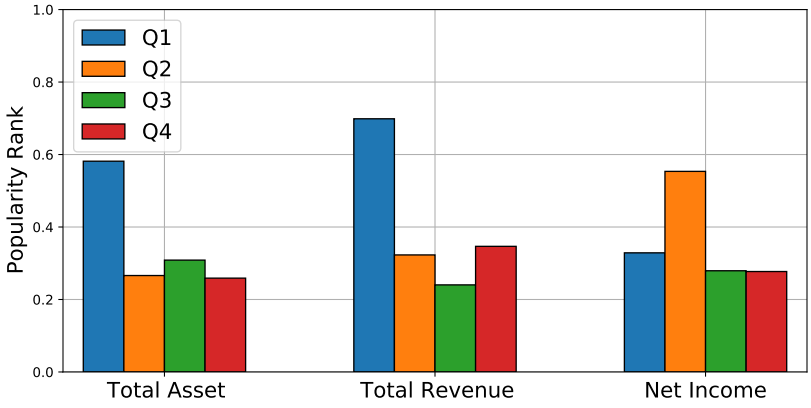
Figure 13: SPAC Average Robinhood Popularity Rank by Target Firm Fundamental Quartiles

Figure 13 shows the average Robinhood popularity of SPACs by quartiles of target firm fundamentals in the fiscal year prior to going public. Quartiles are determined by firms that went public through either IPO or deSPAC in 2015-2020, for which fundamental data are available. The sample includes SPACs with completed business combination through 2020.

(a) Sample period: before target announcement



(b) Sample period: between target announcement and deSPAC



(c) Sample period: the first 180 days since deSPAC

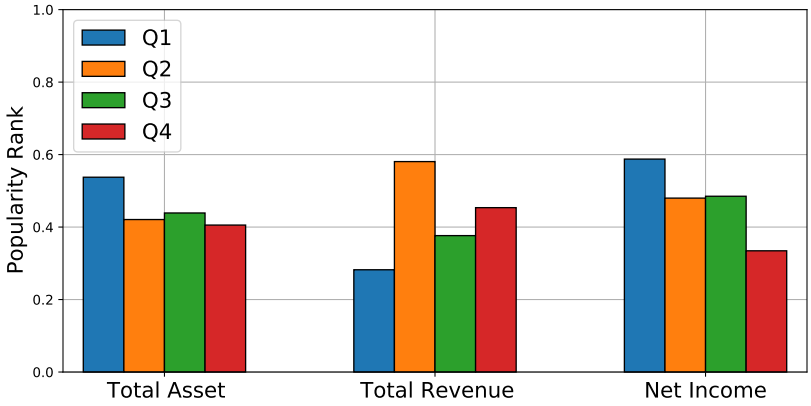


Table 14: Regression Estiamtion of SPAC Robinhood Popularity on Target Firm Characteristics

Table 14 reports regression results of popularity of SPACs on target firm features during the post-announcement period, controlling for SPAC characteristics and market variables. The sample includes SPACs with completed business combination through 2020.

Dependent Variable:	Popularity Above Median		Popularity Rank	
	(1)	(2)	(3)	(4)
LN_TOTAL_ASSET	0.0711*		-0.0384	
	(1.82)		(-1.45)	
LN_SALES		0.0707*		-0.0346
		(1.99)		(-1.68)
NET_INCOME/ASSET	-0.00492	-0.0957	-0.0553	-0.0364
	(-0.05)	(-1.18)	(-0.62)	(-0.45)
SALES/ASSET	-0.0241		-0.0768	
	(-0.28)		(-1.40)	
R&D_I	-0.245***	-0.252***	-0.0738**	-0.0813**
	(-3.47)	(-3.38)	(-2.32)	(-2.26)
R&D/ASSET	0.0187	-0.231	-0.212	-0.132
	(0.08)	(-1.21)	(-0.96)	(-0.74)
AGE	-0.00704***	-0.00701**	-0.000354	-0.000580
	(-3.15)	(-2.77)	(-0.57)	(-0.65)
HIGH_TECH	0.0584	0.0915	-0.0912	-0.0825
	(0.62)	(0.91)	(-1.17)	(-1.06)
VC_BACKED	0.268***	0.211**	0.0349	0.0346
	(3.02)	(2.24)	(0.51)	(0.53)
UWRANK	-0.0151	-0.0192	-0.00119	0.000185
	(-0.68)	(-0.83)	(-0.09)	(0.01)
OVERALLOTMENT	1.007	0.550	0.568	0.624
	(1.51)	(0.74)	(1.29)	(1.35)
LN_MARKET_CAP	0.0754	0.0670	0.0717	0.0833
	(1.28)	(0.95)	(1.31)	(1.39)
L.LN_RET	0.161	0.142	0.134	0.119
	(1.04)	(0.86)	(1.31)	(1.13)
L.VOLATILITY	3.958***	3.666***	3.352***	3.424***
	(3.84)	(3.23)	(5.53)	(5.43)
L.LN_MA_VOL	-0.00287	-0.00972	0.0391**	0.0366**
	(-0.11)	(-0.36)	(2.75)	(2.61)
LN_AMIHUD_ILLIQ	-0.0215**	-0.0215***	-0.0112**	-0.0116**
	(-2.84)	(-2.86)	(-2.46)	(-2.69)
FF17 Industry FE	x	x	x	x
Month FE	x	x	x	x
Constant	-1.042*	-0.730	-0.978**	-1.223**
	(-1.99)	(-1.16)	(-2.10)	(-2.09)
Observations	1751	1751	1751	1751
Adjusted R^2	0.743	0.734	0.841	0.840
Adjusted R^2 (Within)	0.424	0.403	0.539	0.535

* p<0.10, **p<0.05, *** p<0.01. t statistics in parentheses. Standard errors are double-clustered at the stock and month levels. Exclude observations with zero trading volume.

Table 15: Regression Estimation of Robinhood Popularity: IPO vs. deSPAC Firms

Table 15 reports the linear regression estimation results of Robinhood popularity on firm's going public method. The sample includes IPO and deSPAC firms that went public between 2016 and 2020.

Dependent Variable:	Robinhood Popularity Rank				
	Days Since Going Public				
	90 Days	180 Days	1 Year	2 Years	Full Sample
	(1)	(2)	(3)	(4)	(5)
DESPAC	0.326	0.394	0.354	0.492**	0.661***
	(1.29)	(1.49)	(1.36)	(2.52)	(3.06)
LN_TOTAL_ASSET	0.0110	0.00484	0.000358	-0.00407	-0.00939
	(1.13)	(0.57)	(0.05)	(-0.64)	(-1.56)
DESPAC=1 × LN_TOTAL_ASSET	0.0157	0.0213	0.0254	0.0127	0.0174
	(0.57)	(0.73)	(1.07)	(0.65)	(0.87)
NET_INCOME/ASSET	-0.0223**	-0.0277***	-0.0223***	-0.0189***	-0.0148**
	(-2.70)	(-4.50)	(-3.72)	(-3.28)	(-2.72)
DESPAC=1 × NET_INCOME/ASSET	-0.0936	-0.0646	-0.0452	-0.0150	0.0138
	(-1.52)	(-1.02)	(-0.77)	(-0.30)	(0.26)
SALES/ASSET	0.0363***	0.0407***	0.0287***	0.0214***	0.0180**
	(3.73)	(4.42)	(3.20)	(2.77)	(2.61)
DESPAC=1 × SALES/ASSET	-0.0104	0.00912	0.0161	0.0126	-0.00877
	(-0.29)	(0.32)	(0.62)	(0.76)	(-0.49)
R&D_I=1	0.0147	0.00529	0.00155	0.0160	0.00134
	(0.52)	(0.19)	(0.06)	(0.68)	(0.06)
DESPAC=1 × R&D_I=1	-0.0203	0.0333	0.0604	-0.0130	0.0109
	(-0.34)	(0.53)	(1.06)	(-0.33)	(0.26)
R&D/ASSET	-0.0192	-0.0300**	-0.0215	-0.0239*	-0.0291**
	(-1.18)	(-2.09)	(-1.59)	(-1.95)	(-2.41)
DESPAC=1 × R&D/ASSET	-0.0406	-0.0209	-0.00258	0.0145	0.0513
	(-0.46)	(-0.25)	(-0.03)	(0.19)	(0.57)
AGE	-0.000614	-0.000412	-0.000508	-0.000602	-0.000485
	(-1.32)	(-0.93)	(-1.16)	(-1.50)	(-1.29)
DESPAC=1 × AGE	-0.00132	0.0000535	0.00151	0.00122	0.000442
	(-0.73)	(0.03)	(0.96)	(1.22)	(0.68)
HIGH_TECH=1	0.0667	0.0591	0.0491	0.0631**	0.0642**
	(1.66)	(1.54)	(1.33)	(2.13)	(2.31)
DESPAC=1 × HIGH_TECH=1	-0.0884	-0.0569	-0.0654	-0.0612	-0.0593
	(-1.13)	(-0.87)	(-1.16)	(-1.29)	(-1.13)
VC_BACKED=1	0.0126	0.0251	0.0157	0.00993	0.0246*
	(0.64)	(1.30)	(0.89)	(0.66)	(1.82)
DESPAC=1 × VC_BACKED=1	0.133*	0.0826	0.0734	0.0627	0.0504
	(1.79)	(1.14)	(1.10)	(1.25)	(1.04)
UWRANK	-0.00643	-0.00497	-0.00120	0.00182	0.00398
	(-0.99)	(-0.84)	(-0.22)	(0.37)	(0.97)
DESPAC=1 × UWRANK	-0.0218	-0.0147	-0.0184	-0.00574	-0.00223
	(-1.55)	(-1.11)	(-1.47)	(-0.52)	(-0.21)
LN_MARKET_CAP	0.00492	0.0156	-0.00416	-0.0207**	-0.0211***
	(0.37)	(1.29)	(-0.43)	(-2.75)	(-2.97)
DESPAC=1 × LN_MARKET_CAP	-0.00835	-0.0188	-0.0111	-0.00929	-0.0305
	(-0.35)	(-0.83)	(-0.54)	(-0.54)	(-1.62)
L.LN_RET	0.00730	-0.0110	-0.00555	0.00727	0.00993
	(0.22)	(-0.69)	(-0.46)	(0.71)	(1.08)
DESPAC=1 × L.LN_RET	0.0322	0.0489	0.0527	0.0380	0.0626***
	(0.74)	(1.66)	(1.63)	(1.58)	(3.02)
L.VOLATILITY	0.580	0.553**	0.201	-0.173	-0.261**
	(1.53)	(2.48)	(1.40)	(-1.63)	(-2.73)
DESPAC=1 × L.VOLATILITY	0.551	0.345	0.608*	0.816***	0.880**
	(0.97)	(0.95)	(1.93)	(2.96)	(2.57)
L.LN_MA_VOL	0.101***	0.0848***	0.0935***	0.103***	0.106***
	(6.87)	(8.34)	(11.01)	(14.59)	(16.14)
DESPAC=1 × L.LN_MA_VOL	-0.0444	-0.0474**	-0.0482***	-0.0447***	-0.0464***
	(-1.60)	(-2.60)	(-3.09)	(-3.06)	(-3.10)
LN_AMIHUD_ILLIQ	-0.00469	-0.00739	-0.00710	-0.00686	-0.00121
	(-0.36)	(-0.80)	(-1.01)	(-1.14)	(-0.19)
DESPAC=1 × LN_AMIHUD_ILLIQ	-0.0135	-0.0132	-0.00937	-0.000847	-0.00737
	(-0.69)	(-1.07)	(-0.93)	(-0.09)	(-0.66)
FF17 Industry FE	x	x	x	x	x
Month FE	x	x	x	x	x
Constant	-0.922***	-0.860***	-0.655***	-0.535***	-0.445***
	(-10.25)	(-10.91)	(-9.41)	(-8.75)	(-7.57)
Observations	9539	23176	50253	99734	155909
Adjusted R^2	0.671	0.629	0.625	0.608	0.568
Adjusted R^2 (Within)	0.603	0.572	0.569	0.561	0.523

* p<0.1, ** p<0.05, *** p<0.01.
t statistics are reported in parentheses. Standard errors are double-clustered at the stock and month levels.

Table 16: Regression Estimation of Return Volatility and Robinhood Popularity: IPO vs. deSPAC Firms

Table 16 reports the linear regression estimation results of return volatility on Robinhood popularity, conditional on firm's going public method, firm features, and other market variables. The sample includes IPO and deSPAC firms that went public between 2016 and 2020.

Dependent Variable:	Return Volatility				
	Days Since Going Public				
	90 Days	180 Days	1 Year	2 Years	Full Sample
	(1)	(2)	(3)	(4)	(5)
L.RH Popularity Percentile Rank	0.0313***	0.0220***	0.0120***	0.000920	-0.00199
	(3.41)	(3.44)	(2.90)	(0.29)	(-0.56)
DESPAC	0.109***	0.101***	0.0534**	0.0354*	0.0296
	(3.50)	(4.05)	(2.59)	(1.92)	(1.54)
LN_TOTAL_ASSET	-0.00544***	-0.00501***	-0.00445***	-0.00471***	-0.00441***
	(-3.70)	(-4.73)	(-6.79)	(-8.26)	(-9.05)
DESPAC=1 × LN_TOTAL_ASSET	0.00220	0.00424	0.00258	0.00182	0.00251
	(0.41)	(1.34)	(1.12)	(1.10)	(1.61)
NET_INCOME/ASSET	0.00300**	0.00256*	0.00198**	0.00246***	0.00235***
	(2.19)	(1.85)	(2.32)	(4.87)	(4.99)
DESPAC=1 × NET_INCOME/ASSET	0.00866	0.00457	0.00199	-0.000819	-0.00200
	(0.81)	(0.76)	(0.53)	(-0.22)	(-0.59)
SALES/ASSET	-0.00587***	-0.00554***	-0.00464***	-0.00403***	-0.00268***
	(-3.96)	(-4.44)	(-5.11)	(-4.96)	(-4.36)
DESPAC=1 × SALES/ASSET	0.00595	0.00446*	0.00525***	0.00482***	0.00327**
	(1.42)	(1.83)	(3.10)	(3.22)	(2.18)
R&D_I=1	-0.00519	-0.00306	-0.00264	-0.00417**	-0.00202
	(-1.34)	(-0.99)	(-1.40)	(-2.31)	(-1.20)
DESPAC=1 × R&D_I=1	0.00326	0.00351	-0.00137	0.00123	0.00446
	(0.36)	(0.50)	(-0.29)	(0.37)	(1.35)
R&D/ASSET	0.000950	0.00291	0.00133	0.00191*	0.00177*
	(0.44)	(1.21)	(0.86)	(1.91)	(2.03)
DESPAC=1 × R&D/ASSET	0.0125	0.0147**	0.00924*	0.00259	0.00326
	(1.00)	(2.06)	(1.92)	(0.55)	(0.86)
AGE	-0.0000860*	-0.000107***	-0.0000668**	-0.0000417*	-0.0000241
	(-1.75)	(-2.89)	(-2.35)	(-1.73)	(-1.01)
DESPAC=1 × AGE	0.000176	0.000178	0.000164	0.0000896	0.0000127
	(0.77)	(1.18)	(1.36)	(1.34)	(0.25)
HIGH_TECH=1	-0.00367	0.000733	-0.00260	-0.00343	-0.00458*
	(-0.54)	(0.15)	(-0.84)	(-1.41)	(-1.96)
DESPAC=1 × HIGH_TECH=1	0.0110	0.000844	0.00480	0.00416	0.00107
	(1.07)	(0.13)	(1.09)	(1.11)	(0.29)
VC_BACKED=1	0.00487**	0.00118	0.00319**	0.00403***	0.00225*
	(2.06)	(0.59)	(2.11)	(2.78)	(1.78)
DESPAC=1 × VC_BACKED=1	0.0156	0.0148*	0.00748	0.00161	0.00346
	(1.49)	(2.05)	(1.55)	(0.49)	(1.19)
UWRANK	0.000568	0.000845	0.000966	0.000702	0.000793*
	(0.44)	(0.85)	(1.43)	(1.66)	(2.02)
DESPAC=1 × UWRANK	-0.00283	-0.00315*	-0.00269**	-0.00224***	-0.00288***
	(-1.16)	(-1.82)	(-2.68)	(-2.81)	(-3.60)
LN_MARKET_CAP	-0.0000866	-0.000576	-0.000335	-0.000147	-0.000126
	(-0.04)	(-0.39)	(-0.24)	(-0.12)	(-0.12)
DESPAC=1 × LN_MARKET_CAP	-0.00594	-0.00918***	-0.00588**	-0.00389	-0.00237
	(-1.63)	(-2.83)	(-2.28)	(-1.69)	(-0.98)
L.LN_RET	0.00886	0.0121	0.000581	0.00724	0.00607
	(0.93)	(1.52)	(0.12)	(1.20)	(0.86)
DESPAC=1 × L.LN_RET	0.0160	0.0132	0.0189	0.0149	0.0143
	(0.45)	(0.49)	(0.86)	(0.98)	(1.17)
L.LN_MA_VOL	0.0143***	0.0167***	0.0153***	0.0166***	0.0166***
	(5.39)	(10.67)	(12.78)	(12.12)	(14.17)
DESPAC=1 × L.LN_MA_VOL	-0.00251	-0.00246	-0.00145	-0.000542	0.000512
	(-0.52)	(-0.92)	(-0.63)	(-0.24)	(0.27)
LN_AMIHUD_ILLIQ	0.00974***	0.0107***	0.0105***	0.0102***	0.00991***
	(5.29)	(9.77)	(10.50)	(10.77)	(11.21)
DESPAC=1 × LN_AMIHUD_ILLIQ	0.000416	-0.00190	-0.00178	-0.000868	0.000526
	(0.14)	(-0.93)	(-0.94)	(-0.46)	(0.28)
FF17 Industry FE	x	x	x	x	x
Month FE	x	x	x	x	x
Constant	0.0653***	0.0569***	0.0676***	0.0522***	0.0454***
	(3.54)	(4.33)	(6.42)	(6.18)	(5.75)
Observations	9742	23379	50457	99938	156113
Adjusted R^2	0.447	0.445	0.431	0.441	0.456
Adjusted R^2 (Within)	0.329	0.329	0.298	0.305	0.316

* p<0.1, ** p<0.05, *** p<0.01.
t statistics are reported in parentheses. Standard errors are double-clustered at the stock and month levels.

Table 17: Appendix: IPO Sample Summary Statistics, 2006-2020

Table 17 summarizes the IPO sample used in this study. The sample of IPO is constructed from the SDC New Issues Database and . The sample includes U.S. common stock IPO offerings between 2006 and 2020, excluding offerings with offer price below $5, ADRs, units, REITs, closed-end funds, banks, ETFs, SPACs, direct listings, and stocks not included in CRSP such as OTC issues. Aggregate proceeds exclude overallotment. Amount left on the table is defined as the first-trading day market close price minus the offer price, multiplied by shares offered.

IPO Year	Count	Aggregate Proceeds ($ Bil)	Mean First-Day Return Equal Weighted	Aggregate Amount Left on the Table ($ Bil)
2006	157	27.1	12%	3.3
2007	163	29.9	14%	4.5
2008	24	22.8	15%	5.6
2009	46	13.3	11%	1.5
2010	100	30.1	9%	1.8
2011	84	26.4	13%	3.5
2012	97	31.8	18%	3.1
2013	157	38.1	21%	7.8
2014	216	43.2	15%	5.5
2015	123	22.8	21%	4.4
2016	77	12.4	14%	1.8
2017	112	23.2	14%	3.6
2018	145	33.4	18%	6.6
2019	123	39.5	22%	7.0
2020	171	62.5	39%	29.2

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