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SPAC Post-Merger Performance in the New Regime
- An Agency Perspective

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Abstract

SPACs are shell companies without operations created to raise capital in an IPO and subsequently identify a non-listed operating company to merge with. As of the last three years (2019-2021), the SPAC has witnessed a significant surge in popularity on the back of several tailwinds, including regulatory legitimization efforts and the participation of blue-chip sponsors and investors. While its growth and popularity is unmistakable, previous academic research has consistently shown that, following the merger, SPACs severely underperform relative the market, industry, and comparable IPOs. These researchers argue that agency problems, as an inherent issue to the SPAC structure, is to blame. However, the present-day SPAC surge is largely unexplored by academia due to its recentness, and we are yet to be provided with contemporary papers investigating agency conflicts, and its effect on share price performance, in the new regime. The apparent shift in the public and professional perception of SPACs begs the question if the vehicle has managed to jettison its issues and changed its fundamental characteristics, as defined in the prior literature. Heeding that call and with a purpose of advancing existing SPAC research – this paper aspired to illuminate on the performance of SPACs and its relationship to agency conflicts in the new regime. In doing this, we collected a sample of 189 SPACs that went public and successfully completed a merger transaction between 2015-2021 on U.S. stock exchanges. To answer our research question, we employed an event study methodology to capture both short- and long-term returns in excess of the market, which were subsequently regressed against a set of explanatory- and control variables, which enabled us to shed light on both performance and performance determinants. We find that SPACs in the new regime do not perform better than those of previous generations, and that the underperformance is apparent already after three months, and further deteriorates as time progresses – posting similar or worse market-adjusted returns after three years than what has been documented by the previous literature. In contrast to earlier findings, we report no evidence of any agency conflicts between SPAC sponsors and investors. This paper's contribution to the literature is two-fold. We validate the long-term underperformance of SPACs, as highlighted by previous researchers, but contrast its determinants.

Key words: SPACs, Special Purpose Acquisition Company, IPO, Merger, Acquisition, Business Combination, Post-merger performance, Agency conflicts, Event study

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Abbreviations

AR	Abnormal Return
BHAR	Buy-and-Hold Abnormal Return
BLUE	Best Linear Unbiased Estimator
CAR	Cumulative Abnormal Return
CEO	Chief Executive Officer
CRSP	Center for Research in Security Prices
EDGAR	Electronic Data Gathering, Analysis, and Retrieval system
IPO	Initial Public Offering
M&A	Mergers and Acquisitions
NASDAQ	National Association of Securities Dealers Automated Quotations
OLS	Ordinary Least Squares
PIPE	Private Investment in Public Equities
PE	Private Equity
SEC	Security and Exchange Commission
SIC	Standard Industrial Classification
SOX	Sarbanes-Oxley Act
SPAC	Special Purpose Acquisition Company
S&P	Standard & Poor's
VC	Venture Capital
VIF	Variance Inflation Factor
U.S	United States

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1. Introduction

This chapter presents the background, followed by a problem discussion motivating the research for our study. The purpose and research question are raised and formulated after considering the identified gaps in the previous academic literature.

In the 1980s, a “blank-check” company was an inglorious vehicle associated with fraud and abuse in the U.S. penny stock market (Castelli, 2009). After being leveraged as part of many fraudulent investment schemes, lawmakers intervened and regulated these companies, resulting in a massive purge of blank checks for much of the 1990s (Murray, 2017). However, by way of creative lawyering and financial acrobatics, the blank check made its comeback in the 2000s – now in its modern form as the SPAC – or a Special Purpose Acquisition Company, which managed to work around the new regulations without defeating the regulations’ purpose of investor protection. SPACs are public shell companies without operations or operating assets formed by a financial sponsor to raise capital, primarily through an initial public offering (IPO) and concurrent private placement (Vulanovic, 2017). The SPAC exists solely to merge with a private operational target company through a reverse merger transaction (‘de-SPAC’). (Floros & Sapp, 2011). SPACs slowly gained in popularity since its reincarnation as an alternative route for private firms to enter the public markets. However, as of recent years, SPACs have entered hyper-growth mode. In 2019, the number of SPACs as a share of U.S. IPOs rose to 30 percent from 4 percent in 2013 – surging in popularity as blue-chip investors and sponsors joined the spectacle, which further attracted owners of private firms’ interest in going public (Bellin, 2020)

Despite renewed interest and significant regulatory legitimization efforts, the distaste of blank check companies continues to live on, and the SPAC is no exception (Klausner, Ohlrogge & Ruan, 2022). The former Securities and Exchange Commission’s (SEC) Chairman, Arthur Levitt, expressed his opinion on SPACs by saying “I have never found any blank-check investment vehicle attractive. No matter what the reputation or what the sponsor might be. [...] They are the ultimate in terms of lack of transparency” (Kolb & Tykvová, 2016, p. 81). Even though the SPAC was an attempt to modernize blank check companies, regulators still seem to look through glasses of significant skepticism, and as recently as March 30, 2022, the SEC announced a set of new proposals concerning additional regulations for SPACs.

These proposals are intended to, among other things, further enhance investor protection in SPAC IPOs and de-SPAC transactions and were prompted due to the considerable rise in SPAC activity in recent years (SEC, 2022a). More specifically, they were proposed in order to address the perception held by regulators and investors of the issues related to conflicts of interest associated with the compensation and economics of SPAC sponsors and their advisors.

1.1 Background

Long-term trends, such as a decline in the number of publicly traded companies and an extended low-interest rate environment has pushed investors to alternative investments, and the SPAC is one of the most prominent and acute examples (Alois, 2022; Mackintosh, 2022). While the SPAC has its origin in the blank check corporate structure, the market has repetitively reiterated the investment vehicle in response regulatory pushback and prompted modifications that over time altered the product to grow in popularity (Tran, 2012). The re-designed blank check came to fruition as the SPAC in 2003 – an evolved blank check designed to provide investors with more security (Castelli, 2009). Even yet, the product did not significantly accelerate in terms of improved popularity until just recently (Cruz, Stabinsky, Feary, Sharma, Kelley, Rutherford, Bahri & Krasner, 2020). Over the last two decades, companies deciding to go public have in-large done so by traditional means and SPAC IPOs have only accounted for a modest percentage of the total IPO activity (Bazerman & Patel, 2021).

As of the last three years, the SPAC has witnessed significant growth (see *Figure 1*). In 2019, SPACs raised a total of \$14 billion in gross proceeds while raising over \$83 billion in 2020, significantly trumping the amount of capital raised by traditional IPOs (Shimokawa, 2022). In 2021, SPACs reached a breakneck pace of issuances, raising a record-breaking of \$160 billion from the 613 registered SPAC IPOs that took place in U.S markets. Unlike the past - in the modern SPAC frenzy, well-renowned names including bulge-bracket investment banks and blue-chip private equity firms have been joining the space as underwriters and sponsors, enhancing the legitimacy of the SPAC (Vulanovic, 2017; Harty, Clark & Dholakia, 2021) – and several household names have been targets for block-buster SPAC mergers including American Apparel, DraftKings, Virgin Galactic, and WeWork¹ (Janvier, 2020).

¹ WeWork went public through a SPAC IPO in October 2021 after its failed and heavily scrutinized IPO attempt in 2019 (Cruz et al., 2020).

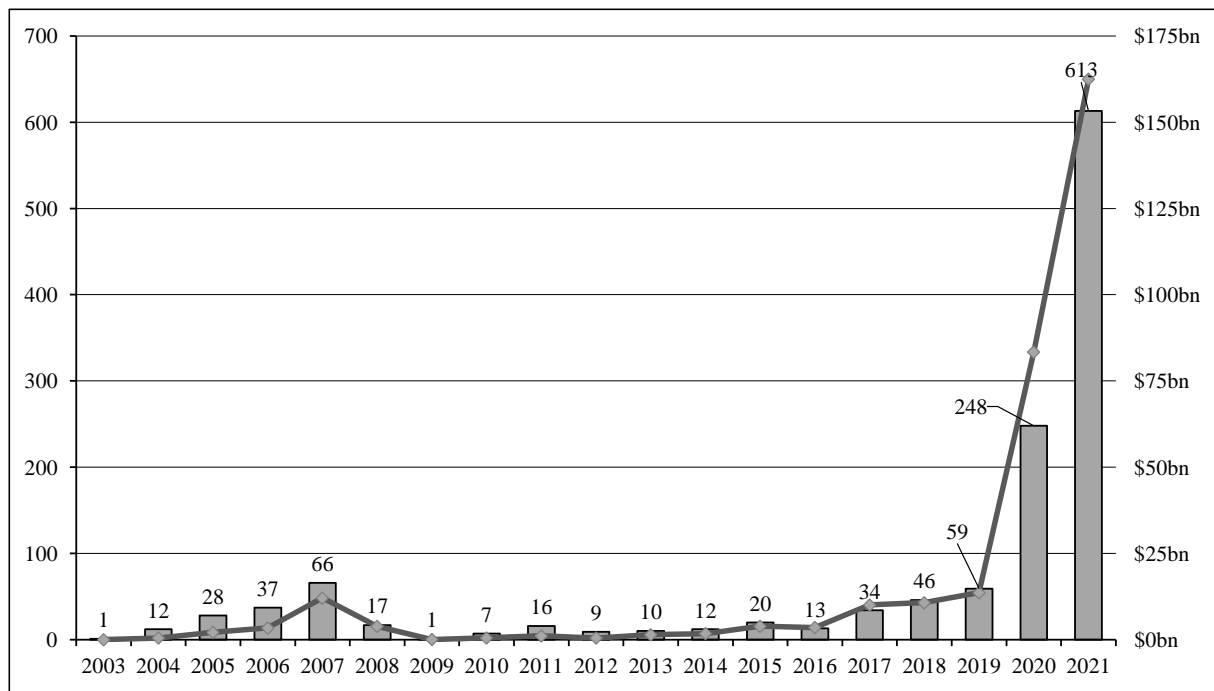


Figure 1. Number of SPAC IPOs and gross proceeds (\$m)

The SPAC-allure is reportedly a reaction to several factors – for start, it being a quicker, cheaper, and less regulatory burdensome endeavor than pursuing the traditional IPO route (Bazerman & Patel, 2021). It has come to be viewed as an alternative way for private firms to enter the public markets and provide retail investors access to early-stage growth companies with private equity-like investment managers (Mackintosh, 2022). Furthermore, the percentage of SPACs that has failed to locate a target and liquidate has been reduced significantly compared to the prior SPAC regimes, further enhancing its credibility as an investment vehicle and capacity to close deals. Between 2015 and 2020, the average percentage of SPACs that failed to execute an acquisition and was forced to liquidation was just 5.9 percent, down from 27.3 percent between 2009 and 2014 (Cruz et al., 2020). Additionally, the public perception towards the types of companies choosing the SPAC route to enter the public markets has changed (Halbhuber, 2020). While once viewed as a last resort for low quality private companies to obtain a public listing (Tse & Kim, 2021), SPACs are today considered to be used by more legitimate businesses, and the profile and nature of the companies striving to become public are different vis-à-vis SPACs of the past (Huckabee, 2021).

In relation to conventional IPOs – SPACs may offer several advantages, including price certainty, a speedier listing process, immediate liquidity, use of forward-looking statements and managerial expertise (Kolb & Tykvová, 2016). Institutional investors provide earlier feedback

on valuation to companies going public and raising capital through SPACs. Cruz et al. (2020) states that the present-day SPAC surge is largely due to this rapid market feedback mechanism, as unpredictable markets has led to a need for increased price certainty for public exits – as opposed to traditional IPOs wherein price discovery occurs after a protracted process of SEC filings and roadshows. Because the SPAC is already public, the process of a private target going public can be faster than a traditional IPO as it avoids many of its gating factors – such as early regulatory filings (Lewellen, 2009).

Furthermore, SPACs are allowed to disclose business forecasts or estimates of its target – completely at the discretion of management. Disclosing short-term financial estimates can help improve investor perceptions of the merger transaction – and this feature is especially beneficial for disruptive companies that may have had difficulties going public via a regular IPO (Huckabee, 2021). For example, Virgin Galactic’s 2019 SPAC merger with Social Capital’s Hedsophia Holdings would have been a no-go for the traditional IPO route – trying to raise public financing for a pioneer in human spaceflight and exploration, with no current revenues, would most likely fail. Instead, a SPAC process enabled the company to project long-term estimates calming investors, and the company was subsequently able to raise several hundred million dollars in cash from their SPAC IPO (Duhigg, 2021).

However – merging with a SPAC is not a panacea for private companies that are not ready for the public market. The company will after the SPAC IPO compete on equal terms with other public entities - scrutinized by public market investors, and must be compliant to the same severe, sophisticated, and costly accounting and disclosure regulations (Brown, Emami, Ventura & Levitz, 2021). As such, management teams and SPAC sponsors must ask themselves if the target is fundamentally ready to go public.

1.2 Problem discussion

The most recent SPAC frenzy has resulted in records-upon-records being broken in terms of listing activity in developed markets, raising several questions on the short- and long-term impact and outlook of these firms. Unlike other companies, the SPAC is without business model or operations – the typical foundation on which investors gauge a company’s future success (Floros & Sapp, 2011). Instead, the SPAC’s only assets are its sponsor-provided management team and the capital raised via the issuance (Rodrigues & Stegemoller, 2014). Investors

subsequently face significant uncertainty when assessing the quality of a SPAC, and Cummings, Haß and Schweizer (2014) likened the situation to “betting on a jockey”.

The first peer-reviewed paper on the performance of SPACs was published by Jog and Sun in 2007, and strikingly, the authors found that while shareholders of SPACs earned an average negative three percent annualized return between the IPO and the outcome day (i.e., the day on which the results of shareholders’ voting on the acquisition proposal is publicly released), the sponsor earned an average 1,900 percent. More recent researchers (e.g., Jenkinson & Sousa, 2011; Howe & O’Brien, 2012; Kolb & Tykvová, 2016; Dimitrova, 2017) have confirmed prior findings, and found that SPACs tend to severely underperform relative the market, industry, and comparable IPOs – and that generally lower-quality firms have used SPAC mergers as a back door to the public market.

Most papers have argued for misaligned incentives – or agency problems as the culprit to blame for the severe stock market underperformance post-merger. Popularized by Jensen and Meckling (1976) in their seminal paper on the Theory of the firm – the issue at hand is rather straightforward. If consequential decisions are not taken by people who pay for its outcome – just as bad pilots end up in the bottom of the Atlantic Ocean or assuring that SPAC managers and sponsors are disincentivized from choosing bad targets to merge with – then the system is fragile and subject to suffer from the misdoings of bad actors.

Past researchers have found evidence in support of the above theses. Jog and Sun (2007) found that SPAC value destruction can be the result of certain contractual features which provides SPAC managers with incentives to pursue any acquisition over no acquisition even though the target is of bad quality – later confirmed by Dimitrova (2017). In related findings – Jenkinson and Sousa (2011) investigated the role that SPAC managers play in the approval of bad-quality targets, and Howe and O’Brien (2012) found a significant relationship between SPACs governance and ownership structures, and its short- and long-run performance. However, we are yet to be provided with contemporary papers investigating these types of agency conflicts in the most recent SPAC regime, where increased regulations have been introduced to mitigate these types of problems, and where increasingly high-profile investors, sponsors and underwriters have started to engage in SPAC-related activity.

1.3 Study motivation and purpose

Drawing on the preceding discussion, this paper aims to shed light on the SPAC regime of 2015-2021 – also popularized as “SPAC 3.0” (Gahng, Ritter & Zhang, 2021). While past papers have highlighted significant governance issues with the SPAC structure and the post-merger performance of the combined entity, these researchers have been limited in their sample size due to the SPACs unpopularity until only very recently. Therefore, this paper’s contribution to the current literature is two-fold. Primarily, the recent mass issuances have created a research gap in which we lack visibility on the long-run performance of newly minted SPACs. Since the earlier empirical literature provide evidence of significant underperformance following the business combination, reporting billions of dollars in losses for investors in these vehicles, it is of necessity to conduct an updated study on the long-term performance of SPACs, in times where the amount of capital invested in this asset class has reached record-levels. Secondly, on the back of the significant growth in SPAC listings and mergers, the now vast amount of data available to make inference on SPAC performance will increase the reliability of past results and be confirmatory (or contradictory) to the findings of past research.

While earlier researchers have provided evidence suggesting serious agency and performance issues of SPACs (e.g., Howe & O’Brien, 2012; Kolb & Tykvová, 2016; Dimitrova; 2017), no contemporary studies covering the most recent SPAC regime of 2015-2021 have been authored through the same lens. As previously highlighted, the period in question is of particular academic interest as there has been an apparent shift in the public and professional perception of SPACs, with several key differentiators dividing the most recent regime from the scope of previous studies. These include the participation of some of the world’s most high-profile investors, sponsors, and financial advisors being involved in the making, capital raising, and issuance of SPACs (Ilone Siporski, 2021), all of whom are keen on maintaining a reputation of success, suggesting that the incentives to engage in bad acquisitions could be reduced. Furthermore, new regulatory requirements have increasingly been established since the period in which the majority of previous SPAC studies have been conducted (Huckabee, 2021). Regulations which are introduced to specifically address the agency conflicts reported in previous literature, further suggesting that the agency problem between SPAC sponsors and their investors may have changed. Additionally, this study directly heeds on prior researchers calls on additional studies on SPACs (e.g., Lin, Lu, Michaely & Qin, 2021), as there is yet limited evidence on what drives post-merger SPAC performance.

The purpose of this study is thus to advance existing research and investigate the most recent SPAC regime by conducting a long-term event study examining the post-merger performance of SPACs having IPO'd and completed a business combination on U.S. stock exchanges between 2015-2021. Furthermore, we intend to regress the post-merger performance against a set of explanatory- and control variables to shed light on post-merger performance determinants. Lastly, a short-term event study is conducted to shed light on the returns surrounding the target acquisition announcement for the most recent regime of U.S SPACs.

1.4 Research question

In agreement with the preceding discussion, the following research question has been formulated:

How does the new regime of SPACs perform as merged entities in the de-SPAC period?

2. Special Purpose Acquisition Companies (SPACs)

This chapter presents an overview of SPACs and serves the purpose of describing the vehicle's structure and form. Additionally, it focuses on the rationale behind launching a SPAC, the parties involved at the various stages of its lifecycle, as well as describes its ultimate end-goal.

2.1 Overview

Traditionally, the typical way of going public has been via an IPO - a procedure involving the listing and selling of new shares on a stock exchange, making these available for the general public (Ritter, 1991). An IPO allows corporations to raise capital from public investors and leads to a transition from the private to the public markets (Ritter & Welch, 2002). In addition to the conventional way of going public, companies are increasingly turning to non-conventional routes to access the public markets (Kolb & Tykvová, 2016). The most popular of which has been reverse mergers, allowing private firms to get listed through the acquisition by publicly owned natural- or cash shell companies (Cumming et al, 2014). These types of transactions offer private firms an expedient public listing at lower cost than through a traditional IPO, as these shell companies are already listed on public stock exchanges, leading to the private target obtaining a public status without having to engage in the lengthy IPO process (Aydogdu, Shekhar & Torbey, 2007; Kolb & Tykvová, 2016). While natural shells are publicly held firms that either have gone bankrupt or divested a substantial part of their asset base (Floros & Sapp, 2011), cash shells raise capital through a traditional IPO with the sole purpose of acquiring a private operating firm which through the acquisition becomes publicly listed (Rodrigues & Stegemoller, 2014). One such type of cash shell firm is the SPAC, which is a blank check company without operations going public through an IPO with the aim of finding and acquiring a private operating target (Dimitrova, 2017). These types of public companies emerged in 2003 and have in recent years established themselves as a new type of asset class which has become increasingly common in the global financial markets (Shachmurove & Vulcanovic, 2017).

According to the SEC, a SPAC is classified as blank check company, i.e., “a development stage company that has no specific business plan or purpose or has indicated its business plan is to engage in a merger or acquisition with an unidentified company or companies, other entity, or person” (SEC, n.d.). This means that the SPAC, by definition, is a shell company formed to raise capital (via an IPO), to acquire one (or several), at the time unknown, operating firms

through a merger, capital stock exchange, stock purchase, asset acquisition, or other similar business combination² (Jenkinson & Sousa, 2011). An acquisition must be executed within a given time frame, referred to as the liquidation window, which typically is a period of 18 to 24 months (Hale, 2007). SPACs that are unable to acquire or merge with a private target within its stated time frame are dissolved and liquidated (Lakicevic & Vulcanovic, 2013). In such an event, the capital raised from the IPO is returned to the SPAC investors (Dimitrova, 2017).

2.2 Formation

SPACs are formed and set up by a management team, known as the sponsor, which typically is made up of sophisticated and accredited investors, such as private equity (PE) firms, venture capitalists (VC), hedge funds, and/or executives and other individuals with extensive industry experience, who initially invest and support the SPAC in its pre-IPO stage (Jenkinson & Sousa, 2011; Shachmurove & Vulcanovic, 2018). The sponsor is most often a limited liability company organized to take the SPAC public through an IPO to later merge with an operating private target, and thereby complete the “de-SPAC” transaction (Klausner et al., 2022). Commonly, SPACs target the industry or region in which the sponsor have previous experience (Lewellen, 2009), and the sponsor mainly rely on its reputational capital when fundraising by offering ownership in the shell company to investors through the sale of shares in an IPO (Dimitrova, 2017). The sponsor selects officers and directors for the management of the SPAC, which in practice however tend to overlap with the sponsor itself, i.e., the sponsor is ultimately the one that also is responsible for managing the SPAC throughout its lifecycle (see e.g., Lewellen, 2009; Okutan Nilsson, 2018; Klausner et al., 2022).

Similar as traditional IPOs, the formal establishment of the SPAC begins by having underwriters filing a S-1 registration statement form with the SEC (Shachmurove & Vulcanovic, 2018), which is the initial registration form for new securities for public U.S. based companies (SEC, 2022b). The S-1 form contains information about the SPACs organization, intentions, financing needs, securities, underwriting agreements, and the risk involved from the IPO up until the completion of a business combination (Shachmurove & Vulcanovic, 2018). It also documents the details about the sponsor team, such as their professional and academic background, their compensation throughout the SPAC lifecycle, and informs investors on the SPACs corporate governance and compliance with the Sarbanes-Oxley Act (SOX) (Lakicevic

² Definition of business combination as used in the NYSE Listing Standards section 102.06.

& Vulanovic, 2013). When the S-1 form has been filed and verified by the SEC, the sponsor and its selected underwriters starts planning for the upcoming IPO.

Prior to the IPO filing, the sponsor typically purchase shares for a nominal amount of \$25,000 that are adjusted to equal 25 percent of the IPO proceeds, or equivalently, 20 percent of the total shares outstanding upon completion of the IPO (Lewellen, 2009; Jenkinson & Sousa, 2011; Vulanovic, 2017). These shares are classified as Class B shares³, also known as “founder shares” or “sponsors promote” (Lakicevic, Shachmurove & Vulanovic, 2014), that will convert into Class A shares⁴ upon completion of a successful business combination (Cumming et al., 2014). The founder shares are purchased at a reduced nominal price, usually for one fifth or tenth of a cent, and constitutes the sponsor’s compensation for forming and supporting the SPAC during its lifecycle (Klausner et al., 2022). Additionally, the sponsor may purchase heavily discounted warrants through private placements at a nominal value of approximately three percent of the IPO volume (Berger, 2008). These warrants, which generally are “in the money” (Dimitrova, 2017), contains the right to purchase shares in the SPAC at a predetermined price, but are exercisable only once an acquisition has taken place, and expires in the event of a liquidation (Okutan Nilsson, 2018). Together, these investments constitute the sponsors “at-risk capital” as both the Class B shares and warrants end up being worthless if the SPAC fails to consume a business combination throughout its lifecycle (Lakicevic & Vulanovic, 2013).

2.3. SPAC IPO event

The typical structure of SPAC IPOs involves the offering of units⁵, which are bundles of common stock and warrants⁶ that are exercisable at some future date (Hale, 2007). The common stock holds one voting right in the upcoming vote of the sponsor’s proposed business combination while warrants do not contain such rights (Berger, 2008). Shortly after the IPO,

³ Founder shares purchased by a sponsor prior to an IPO are non-redeemable with no claims on the trust distribution upon liquidation and have no voting rights in the upcoming vote of the proposed business combination.

⁴ Shares purchased by outside investors which are redeemable, have claims on the trust distribution upon liquidation, and have voting rights in the upcoming vote of the proposed business combination.

⁵ The composition of units has changed over time, from comprising one common stock and one warrant to purchase two common stocks in the future, to lately consist of one common stock and one warrant to purchase one common stock, or a fraction, e.g., $\frac{3}{4}$ or $\frac{1}{2}$ of the warrant.

⁶ A warrant is a contract that entitles the holder the right to purchase a certain number of common stocks at a certain price in the future, and typically becomes exercisable on the later of the completion of a business combination or one year after the effective date of the offering.

the units become separable, and the common stock and warrants trade separately next to the unseparated units (Jenkinson & Sousa, 2011). Several scholars provide rationales on why inherently “risky” firms, as SPACs, choose to offer units during their IPOs (see e.g., Schultz, 1993; Chemmanur & Fulghieri, 1997). The main reason provided by these researchers is that through units, companies pre-commit to sell additional stock in the future at the warrant’s exercise price, and that these types of sequential offerings thereby help reduce agency costs and information asymmetry, enabling risky firms to signal their true value to investors (Schultz, 1993). As the composition of the unit offer at the SPAC IPO has changed over time in terms of the number of common stocks and/or warrants contained in each unit, Shachmurove and Vulcanovic (2018) argue that the change represent the evolution of the SPAC asset class due to various market pressures, such as agency conflicts.

About five to ten percent of the IPO proceeds are used to cover various IPO costs, such as underwriters’ fees, regular administrative and legal expenses, the cost of registering securities, the cost of office spaces, as well as employees’ salaries (Lakicevic & Vulcanovic, 2013). The remaining proceeds are placed in an escrow account⁷ (trust fund) and are invested in short-term U.S. government securities earning the risk-free treasury bill rate during the search for an acquisition target (Hale 2007). The SPAC sponsors may first access the trust’s funds when shareholders have approved the proposed target firm in order to complete the business combination (Berger, 2008). This structure provides assurance to investors that the lion part of capital raised in the IPO is preserved independently, irrespective of whether the business combination goes through or not (Lakicevic & Vulcanovic, 2013). The large proportion of funds stored in the trust is argued to be one of the main reasons for the increasing interest in SPACs in later years (Gahng et al., 2021). First, the trust ensures that the investors' capital is secure until they approve the sponsor’s choice of acquisition target, thereby functioning as an investor protection device (Kim, 2009). Second, since the capital in the trust is invested and earns interest over time, it is likely that shareholders will receive their full, or even more, than their initial investment upon liquidation, allowing investors to earn interest on their invested capital even if the SPAC fails to complete a business combination (Berger, 2008). The large proportion of capital stored in the trust may also function as a signal to the market of the SPAC sponsor’s

⁷An escrow account is a third-party account where cash, securities, funds, and other assets are kept on behalf of two parties which are in the process of completing a transaction.

operating efficiency, as it implies that less funds are needed to cover the SPACs operating expenses when searching for its acquisition target (Cumming et al., 2014).

Besides the capital raised in the SPAC IPO, sponsors typically raise additional capital through Private Investment in Public Equities (PIPEs), which refers to a private placement of shares in an already listed company by a group of select, accredited investors (Lin et al., 2021). PIPEs allow sponsors to quickly and without scrutiny from regulators raise additional capital in excess of the SPAC IPO proceeds (Coates, 2022), as SPACs often acquire targets at valuations exceeding the funds held in the trust account (Klausner et al., 2022). PIPE funding is most often secured after the target has been identified but before the combination is publicly announced, as it represents an important block to building confidence among investors and the target in terms of the SPACs ability to execute the transaction (Gahng et al., 2021). Moreover, PIPEs serve as a signal of validation to market participants of the SPAC managers' investment thesis and valuation of the target (Klausner et al., 2022).

2.4 Exit: business combination or liquidation

The IPO date represents the first day of the SPACs corporate life, and simultaneously also determines its last day, as the final prospectus, Form 424-B, determines the length of time available for the SPAC to search for, find, and acquire its target (Shachmurove & Vulcanovic, 2018). Typically, the business combination must be executed within 18 to 24 months after the effective date of the offering (Hale, 2007), and SPACs that are unsuccessful in acquiring or merging with a target within this time frame are dissolved and liquidated (Jenkinson & Sousa, 2011). The time limit is self-imposed and assures investors that the ultimate goal of the sponsors is to complete a business combination in a relatively short period of time (Rodrigues & Stegemoller, 2014). SPACs are allowed, after the initial 18 to 24 months, to file to the SEC for an additional six months to complete the business combination, if the acquisition has been announced but a final vote cannot be performed because of regulatory requirements (Shachmurove & Vulcanovic, 2018).

During the search for a potential acquisition target, the remaining 80 percent of equity, which is not held by the sponsors, belongs to outside investors, typically consisting of institutional investors, such as hedge funds (Lewellen, 2009; Cumming et al., 2014; Dimitrova, 2016; Shachmurove & Vulcanovic, 2018). Lakicevic and Vulcanovic (2013) observed that institutional investors on average owned 78.2 percent of equity while providing almost 97 percent of all the

capital in the SPAC. The reason for the misalignment between the capital contribution and level of ownership is largely because of significant dilution (Shachmurove & Vulcanovic, 2018), where, if the business combination is approved, the outstanding warrants becomes exercisable and the founders' shares, representing approximately 20 percent of the equity, will convert into public shares, thus diluting the company's value upon completion (Jenkinson & Sousa, 2011). In addition, the value dilution may be even higher if a large portion of shareholders use their redemption rights after the vote, reducing the total number of outstanding shares, while not affecting the number of shares held by the SPAC sponsors (Okutan Nilsson, 2018).

The reason why SPACs has attracted hedge funds as their main investors is largely because of the liquidity criteria these institutional investors require in their holdings, which has restricted these from investing in PE funds as limited partners (Berger, 2008). SPAC securities, on the other hand, provide the required liquidity, allowing hedge funds to create customized portfolios of securities with PE-like exposure, as well as providing the hedge funds an important decision-making role as they are allowed to participate in the vote for the sponsor's proposed business combination (Shachmurova & Vulcanovic, 2018).

The SPAC sponsor specify in the prospectus forms filed with the SEC the industry and/or geographical area where they intend to search for a target firm (Lakicevic & Vulcanovic, 2013). Once the sponsor has identified a potential target for consummation, an announcement⁸ is made to the market in conjunction with the filing of a proxy statement with the SEC to solicit a shareholder vote (Berger, 2008). In the announcement filing and the proxy statement, the sponsors provide details on the structure of the proposed business combination as well as disclose to shareholders extensive details of the target firm (Lakicevic & Vulcanovic, 2013). For a target to be considered a viable alternative, it must have a fair market value of at least 80 percent of the SPACs net assets at the time of the business combination (Hale, 2007). If the threshold is not met, the SPAC could instead be considered an investment fund, or general corporate entity raising proceeds for general business purposes (Dimitrova, 2017). Once the announcement has been made and the proxy statement approved by the SEC, shareholders are invited to a proxy vote in which the sponsor seek investors' support for the proposed business combination (Shachmurove & Vulcanovic, 2018). All common stockholders are allowed to

⁸ SPACs typically use the 8-K form or the 425 form to notify the SEC of its proposed target and uses the press to announce the business combination to the public.

participate in the vote, and in order for the deal to be approved, a pre-specified percentage of shareholders (determined at the time of the IPO) must vote in favour of the business combination (Hale, 2007). Shareholders that disapprove of the combination (“no-voters”) may exercise their redemption rights at the pro rata⁹ share of the proceeds in the trust, and the SPAC must repurchase all relevant shares (Lakicevic & Vulcanovic, 2013). If the sponsor gains the shareholders’ approval and succeeds with the business combination, it notifies the SEC of the issuance of securities associated with the newly combined firm. The capital stored in the trust fund is made available to the sponsor to use for the business combination and any remaining capital is placed in the newly created public firm (Berger, 2008). Stockholders are allotted shares corresponding to their level of ownership in the SPAC, and the sponsor's founder shares are automatically converted into public shares at the time of the de-SPAC transaction (Gahng et al., 2021). On those occasions where the sponsor does not receive the shareholders’ approval of their proposed business combination, the SPAC is liquidated (Dimitrova, 2017). In such an event, the SPAC is dissolved, and the funds placed in the escrow account are divided among the SPACs shareholders, who are entitled funds based on their ownership in the SPAC (Lakicevic & Vulcanovic, 2013). The SPAC lifecycle is depicted in *Figure 2*.

⁹ The amount paid equals the IPO price less a pro rata share of taxes paid plus a pro rata share of interest received on the funds in the escrow account.

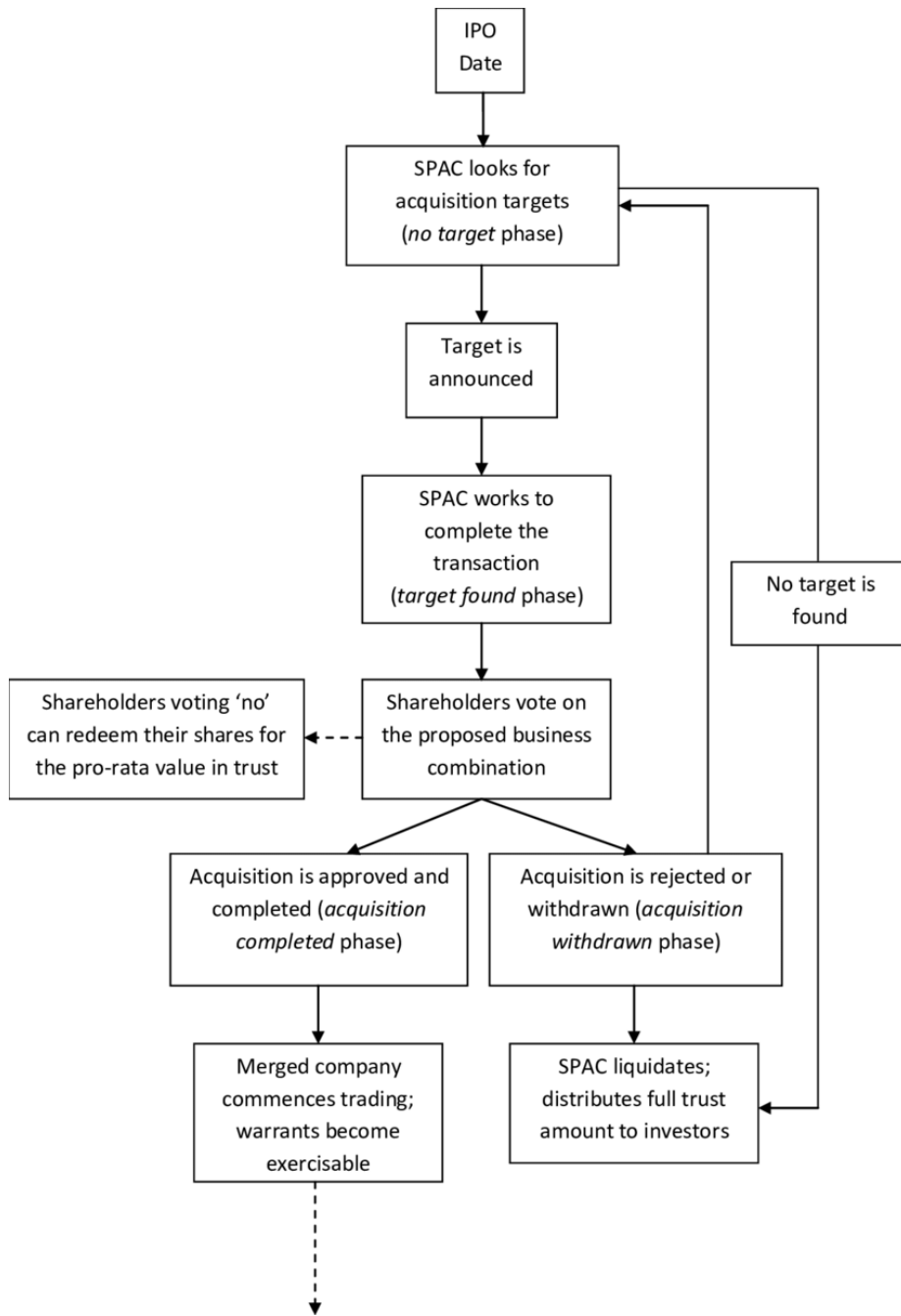


Figure 2. SPAC lifecycle

Source: Lewellen (2009)

3. Theoretical Framework and Empirical Evidence

In this chapter, the underlying theories laying the foundation for the study are presented together with a discussion of the empirical evidence from previous relevant research. The theoretical framework builds on agency theory and the remedies taken by firms to mitigate agency conflicts, with a focus on corporate governance and managerial equity-ownership. Empirical evidence documenting the performance of previous SPAC regimes are presented which function as a basis for the following hypothesis development.

3.1 Agency theory

Agency theory is a classic theory in the corporate finance literature and has been widely used to describe various issues in publicly held corporations (Grossman & Hart, 1983). The theory focuses on the contractual relationship between two utility-maximizing individuals who engage in a collaborative agreement to perform a certain task, where a principal contracts an agent to act on its behalf (Eisenhardt, 1989). This delegation of control and decision-making authority occur as the principal is lacking some ability, often knowledge or understanding, to accomplish a specific duty on their own, thus compensating the agent to perform the duty in their best interest (Jensen & Smith, 1985).

Central in agency theory is the agency problem (Jensen & Meckling, 1976), which occurs when there are conflicting interests between the principal and the agent (Ross, 1973). In a corporate setting, agency problems often manifest themselves in situations when there is a separation of ownership and control, usually between the management of a firm and its owners, and occur due to the asymmetry of incentives existing between these stakeholders (Fama, 1980; Fama & Jensen, 1983). This problem was first recognized by Berle and Means (1932), who observed that executives, while in office, have complete discretion in management. This allows for the possibility of the agent acting in ways that maximizes their own wealth rather than that of the principal, and when such incentives exist, the agent may be tempted to refrain from her duty, giving rise to agency costs (Jensen & Meckling, 1976). There exist a variety of ways in which managers may use their discretion to benefit themselves disproportionately (Shleifer & Vishny, 1997). Such examples include empire building (Hope & Thomas, 2008), failure in distributing excess cash when no profitable investment opportunities exist (Jensen, 1986), extraction of private perks, or managers entrenching themselves by making manager-specific investments that makes it costly for shareholders to replace them (Shleifer & Vishny, 1989).

One of the main reasons for the occurrence of agency costs is information asymmetry, where one party in an economic transaction, typically the agent, possesses more information and knowledge than the other (Grossman & Hart, 1983). This information advantage results in uncertainty and lack of trust between the parties and leads to a constant threat of conflict of interests (Jensen & Meckling, 1976). As both parties are utility-maximizing individuals, agents may exploit the opportunities arising from their information advantage and act opportunistically, which can either occur ex-ante, leading to a problem known as “adverse selection” or “hidden information” (Akerlof, 1970), or ex-post leading to a problem known as “moral hazard” or “hidden action” (Holmstrom, 1979). Adverse selection refers to situations where one party has an information advantage over the other party, causing inefficiencies in marketplaces, e.g., in the price and number of goods or services provided (Akerlof, 1978). Moral hazard, on the other hand, takes place when the behaviour of an individual is unobservable to the other party, and a change in behaviour occurs once the contracting parties has entered an agreement (Pauly, 1968). This problem can be prevalent in any circumstance where two or more parties have entered an agreement and incentives exist to refrain from the principles of the agreement (Holmstrom, 1979). Since it is difficult for principals to anticipate all actions that the agent might take, agency costs are incurred which are borne by the principal in the relationship (Jensen & Meckling, 1976).

The SPAC literature have identified agency conflicts as a severe problem prevalent between SPAC investors and sponsors (see e.g., Tran, 2012; Rodrigues & Stegemoller, 2014; Kolb & Tykvová; Dimitrova, 2017; Vulcanovic, 2017), arguing that the compensation structure of SPACs allows sponsors to gain disproportionate wealth at the expense of investors (Okutan Nilsson, 2018). Howe and O’Brien (2012) observe that SPACs have unique agency conflicts of two particular types. The first being that SPAC sponsors have strong incentives to find a target firm as their payoff is contingent on whether the SPAC completes their proposed business combination (Jenkinson & Sousa, 2011). As the sponsors upon liquidation would see their entire initial investment disappear, it incentivizes sponsors to complete an acquisition over no acquisition in order to be able to earn their substantial payout (Lewellen, 2009). As SPAC sponsors are granted a 20 percent equity stake in the SPAC in return for a modest initial investment, it represents a compelling alternative for industry executives to potentially earn rapid fortunes from a relatively small capital contribution (Lakicevic & Vulcanovic, 2013). Investors on the other hand, are not compensated in a similar manner as they receive an equity interest in the SPAC according to their total capital contribution (Kolb & Tykvová, 2016). As

shown by Jog and Sun (2007), the average return to SPAC sponsors was reported at 1,900 percent compared with the -3 percent annualized abnormal returns for investors, reporting evidence of a significantly skewed distribution of wealth between SPAC sponsors and their investors. Jenkinson and Sousa (2011) also found that SPAC sponsors frequently seemed to purchase large blocks of shares at the time just prior to the vote of a proposed acquisition, which the authors argue is evidence of sponsors purchasing shares from “no” voters, leading to deals being approved which otherwise would have been rejected, allowing sponsors to safeguard their initial investment and guarantee their 20 percent equity stake in the combined firm. This structure creates what Dimitrova (2017) refer to as “perverse” incentives for SPAC sponsors to pursue bad acquisitions instead of no acquisition, allowing managers to earn their promised payment even if the acquisition is value-destroying for investors.

The second unique agency problem discussed by Howe and O’Brien (2012) is that some investors have incentives to vote against an acquisition if the per-share value of the trust fund is lower than the current stock price. What this infer is that these SPAC investors, which typically are hedge funds, have the possibility to arbitrage the trust fund value by purchasing shares and vote against the SPAC sponsor’s acquisition proposals, regardless of the target’s attractiveness (Lakicevic & Vulcanovic, 2013). This strategy is known as the “yield game” and is pursued by some hedge funds where they sell warrants that are in-the-money just after the SPAC IPO, vote against the business combination, and then use their redemption right to receive the pro rata share of their capital contribution plus any accrued interest (Shachmurove & Vulcanovic, 2018). For these investors, the SPAC is essentially seen as a riskless zero-coupon bond, with an option on a future acquisition (Cumming et al., 2014). As the warrants are first exercisable when the business combination is completed, it can be considered a call option whose value goes to zero if no acquisition takes place (Shachmurove & Vulcanovic, 2018). This strategy has been used by hedge funds to generate short-term profits instead of waiting for the potential long-term gains generated after a successful business combination (Lakicevic & Vulcanovic, 2013). This behaviour harms not only the SPAC sponsors who see their capital-at-risk diminish upon liquidation, but also harms the minority retail investors who are in favour of the sponsors proposed business combination, which suffer from both types of agency problems (Howe & O’Brien, 2012). This problem has however been addressed in later years where the percentage of shareholders needed to approve a business combination has become significantly lower than for SPACs going public pre-2010 (Lakicevic & Vulcanovic, 2013; Cumming et al., 2014; Rodrigues & Stegemoller, 2014).

3.2 Corporate governance and managerial ownership as remedies to agency problems

Various countermeasures are undertaken by companies as a response to eliminate agency conflicts between owners and managers of firms. Monitoring is regarded as one such countermeasure and a potential remedy to the agency conflict as it could help align the incentives of two or more parties, reducing agency costs and the risk of moral hazard (Holmstrom, 1979). One of the most recognized types of monitoring mechanisms is corporate governance which includes the rules, practices, and processes by which a firm is directed and controlled (Shleifer & Vishny, 1997). The purpose with corporate governance is to balance the interests of a firm's different stakeholders and mitigate agency conflict stemming from information asymmetry (Jensen, 1993). A company's board of directors is the primary enforcer of corporate governance and consists of an elected group of individuals that are appointed by the shareholders of a firm and are responsible for the supervision of the activities of the organization (Hermalin & Weisbach, 2003). By having a board that is a representative of the owners and monitors the actions of management, the likelihood of opportunistic behaviour by managers is reduced (Fama, 1980; Fama & Jensen, 1983).

Beside the monitoring role of the board, the corporate governance literature has also recognized an advisory role of the board in relation to organizations strategic development, overall decision making, and risk management (Adams, Hermalin & Weishbach, 2010). As directors typically are elected based on their extensive expertise, network, and knowledge, the board also helps organizations by supporting the management in various strategic decisions, thereby having a more friendly approach to organizations beside their monitoring role (Adams & Ferreira, 2007).

Various characteristics of the board of directors are argued to determine the effectiveness of the board's ability to fulfill its monitoring and advisory duty, where the board composition with respect to size and independence is often argued to be two such factors (see e.g., John & Senbet, 1998; DeAndres & Vallelado; 2008). Size is considered an important aspect as it is linked to the board's monitoring and control activity (DeAndres, Azofra & Lopez, 2005). While some scholars have argued that the board's monitoring ability increases as more directors are added, others argue that larger boards lead to worsened control, communication, and decision making among the board members, negatively impacting their overall governing capabilities (Lipton & Lorsch, 1992). The empirical evidence on this matter supports the latter, where smaller boards

are found to both be associated with more effective monitoring as the internal coordination and decision-making among the directors is enhanced, as well as led to greater market values in those firms where smaller boards were present (see e.g., Yermack, 1996; Eisenberg, Sundgren & Wells, 1998).

The independence of the board may also impact its governing role, where the behavior and incentives of directors differ between whether they are insiders or outsiders of the firm (DeAndres et al., 2005). On the one hand, inside directors, which are board members who are either employees, managers, or direct stakeholders in the company, are argued to be beneficial as these directors typically has more experience and knowledge about the firm and its industry, thereby fulfilling an important advisory role in improving firm performance (Bhagat & Black, 1998). On the other hand, inside directors monitoring ability is considered weaker compared to outside directors which are board members being completely independent to the firm (Baysinger & Butler, 1985). Previous literature therefore describes the trade-off between the monitoring role and the advisory function of the board, as inside directors in general are argued to be better in advising firm management due to their firm-specific knowledge, while outside directors are better in fulfilling the monitoring role due to their independence of the firm and the management (Fama & Jensen, 1983; Hermalin & Weisbach, 2003; Adams et al., 2010).

Howe and O'Brien (2012) focused on the governance role of the board of directors in SPACs by specifically investigating the board independence in these firms. The authors argue that greater board independence could lead to both better and worse short- and long-term SPAC performance. As independent board members are better suited in restraining sponsors from making value-destroying acquisitions only to secure their payout, they restrict sponsor's (potentially) opportunistic behavior against investors, eliminating the main agency problem in SPACs. However, independent board members may not be as skilled in advising sponsors in identifying value-creating acquisition targets compared to inside directors, translating into a poorer long-term SPAC performance as the likelihood of selecting an unsuitable target is increased. The authors however only found limited evidence on the case, with results pointing in a direction that greater board independence in SPACs were related to better performance of the combined firm.

Executive compensation is described as another potential remedy to agency problems as it allows for compensating managers in a way that aligns their incentives with those of its

shareholders (Hart & Holmström, 1987). This view on the link between agency problems and executive compensation is known as the “optimal contracting approach” (Bebchuk & Fried, 2003), where compensation schemes are constructed to incentivize managers to maximize shareholder value (Murphy, 1999). One type of way in which managers can be compensated in such a way is by giving these equity-ownership in the firm, as a firm’s ownership structure is argued to directly affect the level of agency costs in an organization (Jensen & Meckling, 1976). Ownership structure refers to the relative amount of equity ownership held by inside managers versus outside shareholders, and supplying managers an equity stake in the firm is a well-known solution to align the interest between these parties (Himmelberg, Hubbard & Palia, 1999). The implication of which is that managerial ownership addresses the conflicts of interest between managers and shareholders which may be more or less prevalent under various ownership degrees (Denis, Denis & Sarin, 1999). Companies that have a complete manager-owner structure will most naturally not be troubled by agency problems as there will be full alignment of incentives, as the ambition to maximize the wealth of the owner is perfectly correlated with the efforts of the manager (Fama & Jensen, 1983). This further implies that if managers in public firms possess large equity holdings in the organization in which they operate, their interest will be more aligned with those of the shareholders as they strive for the same goal - to maximize firm value (Ang, Cole & Lin, 2000). However, as the ownership of a company increasingly becomes separated, the misalignment of incentives increases (Eisenhardt, 1989), and the shareholders incur agency costs, as corporate assets instead can be used to benefit the managers rather than maximizing shareholder value (Ang et al., 2000). Therefore, Jensen and Meckling (1976) argue that firms where managers hold low levels of ownership fail in maximizing shareholder wealth as these managers have incentives to rather consume private perquisites.

Another approach on executive compensation is the “managerial power approach”, which emphasizes a different link between monitoring activities and agency problems, and argues that executive compensation not only is a solution to the agency problem but also a cause to its occurrence (Bebchuk & Fried, 2003). As described by the authors, several studies highlight that there exist aspects of compensation arrangements that rather tend to reflect managerial rent-seeking instead of inducing efficient incentives (see e.g., Yermack, 1997). This further means that since monitoring activities are costly, the optimal amount of monitoring will be dependent on the marginal cost of monitoring relative to its reduction of agency costs (Jensen & Meckling, 1976).

Following the above discussion, the SPAC structure is set up to address agency conflicts between managers and investors, primarily by providing sponsors (managers) ownership in the SPAC, and thereby align the interest of inside managers and outside investors (Dimitrova, 2017). First, the 20 percent equity ownership given to the sponsor after the SPAC IPO benefit the sponsor, similar as outside investors, if the SPAC is managed successfully throughout its lifecycle as both parties gain if the SPAC's shares increase in value (Rodrigues & Stegemoller, 2011). Second, as the sponsor's initial capital contribution is placed at risk, and only recoverable if a business combination has been approved by outside shareholders, it further incentivizes the sponsor to find a promising target with which it can complete the business combination (Kolb & Tykvová, 2016). The equity participation held by sponsors is thereby argued to partially resolve the moral hazard problem as sponsors are incentivized to expend costly effort in acquiring information about potential target firms and prefer to select a target with a high expected value (Chatterjee, Chidambaran & Goswami, 2016). However, the empirical evidence on the case suggests the opposite, that the equity ownership granted to sponsors of SPACs rather seem to be the origin to the agency conflict between sponsors and investors as it incentivizes sponsors to acquire a target even if it is value-destroying for investors in order to safeguard their capital-at-risk. This implies that the managerial power approach seems to triumph the optimal contracting approach in a SPAC setting, as the primary agency conflicts seem to stem from this compensation structure (Okutan Nilsson 2018).

3.3 Empirical evidence on the performance of SPACs

Up until 2007, limited research had been conducted on SPACs, which is explained by the fact that the first SPAC, as the phenomenon we know it as today, was listed in 2003 with the IPO of Millstream Acquisition Corporation (Vulanovic, 2017). Since then, researchers have examined these entities in a variety of ways, including their institutional environment (Lakicevic et al., 2014), regulatory burden (Murray, 2017), incentives structure (Okutan Nilsson, 2018) and other factors contributing to its uprise (Chong, Zhong, Li, Li, Agrawal & Zhang, 2021). Many researchers have also focused on the performance of SPACs and have examined their performance at various stages of their lifecycle, both in the SPAC period as well as in the de-SPAC period (Shachmurove & Vulcanovic, 2018). The majority of these studies have examined the returns to common shareholders, while some studies have also studied the returns on units and warrants (see e.g., Lakicevic & Vulcanovic, 2013) as well as the returns to sponsors (see e.g., Jog & Sun, 2007). Primarily, earlier researchers have focused their attention on the performance of SPACs in relation to two major events in the SPAC lifecycle, namely

the returns around the announcement of a proposed target firm (e.g., Lewellen, 2009; Floros & Sapp, 2011; Howe & O'Brien, 2012; Tran, 2012; Rodrigues & Stegemoller, 2014) as well as the long-term post-merger returns in the de-SPAC period (e.g., Jenkinson & Sousa, 2011; Kolb & Tykvová, 2016; Dimitrova, 2017; Vulanovic, 2017).

3.3.1 Short-term target announcement returns

During the period post the SPAC IPO, the capital stored in the trust fund earns the risk-free return, and since no information regarding any potential acquisition is available at this point, the SPAC is expected to hover at its trust liquidation value until any news reaches the market (Floros & Sapp, 2011). The acquisition announcement typically constitutes the first time investors receive any new information about the SPAC since the information released in relation to the SPAC IPO, and several papers report announcement returns from this event. Lewellen (2009) presented in their study of SPACs between 2003 and 2008 some of the earliest evidence on the announcement effects of SPAC acquisitions. In the seven-day event window surrounding the acquisition announcement, the author found average cumulative abnormal returns of 2.8 percent with a monthly four factor portfolio alpha of 2.0 percent. These findings are in line with the findings later reported by Tran (2012) and Dimitrova (2017) who also found positive mean cumulative abnormal returns in their three-day event windows of 1.70 percent and 1.0 percent respectively, with Tran (2012) also reporting monthly equal weighted excess returns from after the announcement until merger completion of 1.55 percent. On the contrary, upon the announcement of merger completion, Lewellen (2009) reported a seven-day cumulative abnormal return of -0.8 percent with a monthly four factor portfolio alpha following the merger completion of -2.0 percent. This result thereby indicates that the market reaction upon a target announcement is positive, but once the actual transaction is completed, the market tends to react negatively.

Other studies reporting positive announcement returns in relation to acquisition announcements consist of Rodrigues and Stegemoller (2014), examining SPACs that announced an acquisition between 2003 and 2011. For the three-day event window used in their study, Rodrigues and Stegemoller (2014) report mean cumulative announcement returns of 3.7 percent for all announced acquisitions and 5.5 percent for the SPACs completing their proposed acquisition. The authors thereby present evidence that SPACs that went through with the proposed deal also had greater announcement returns than those that did not. Floros and Sapp (2011) also report

various announcement returns and report positive cumulative abnormal returns of 2.97, 2.55 and 3.85 percent five, 11 and 61-one days surrounding the target announcement.

Similar to previous studies, Lakicevic and Vulcanovic (2013) also reported positive announcement returns to the proposed acquisition targets but examined not only the abnormal return to common stockholders but also for units and warrants. On the announcement day, abnormal returns to common stock were reported at 0.85 percent while units and warrants experienced significantly larger positive abnormal returns of 2.42 and 10.49 percent respectively. The authors thereby presented evidence that different SPAC securities do not exhibit similar market reactions, even though all securities realized positive abnormal returns on the announcement day. Finally, a positive market reaction in relation to acquisition announcements were reported in a series of other studies, see e.g., Thompson (2010), Howe and O'Brien (2012) and Chamberlain (2021).

3.3.2 Long-term post-merger performance of the combined firm

Turning more explicitly to the de-SPAC period, several studies have also examined the long-term post-merger performance of SPACs when these have transitioned into operating firms. Jenkinson and Sousa (2011) focused on the post-acquisition share price performance of the SPACs that approved and consummated an acquisition between 2003 and 2008. The authors report significantly negative returns after the acquisition completion, and reports, on an equally weighted basis, that SPACs produce an average cumulative return of approximately -24 percent after six months following the business combination. The poor performance becomes even worse as time progresses as Jenkinson and Sousa (2011) found that the average cumulative return one year into the de-SPAC period was -55 percent. Since the negative post-merger returns constitute a dramatic reversal from the positive target announcement returns reported for SPACs in previous literature, the authors blame the SPAC structure for the underperformance of the combined firm. Since the large stakes granted at a minimal cost to managers becomes worthless if no target is found and the SPAC is liquidated, it creates incentives for SPAC managers to close a deal at any cost, leading to many value-destroying acquisitions taking place which ultimately are revealed in the de-SPAC period. The authors further argue that SPAC shareholders also consistently seem to approve these value-destroying transactions, explaining the severe underperformance post-merger.

Jenkinson and Sousa (2011) however found large differences in the long-term post-merger performance of SPACs between their different subsamples of “Good SPACs” and “Bad SPACs”, differentiating between whether investors approved the deal when the price at the decision date was higher alternatively lower than the trust value per share. For Bad SPACs, the poor performance is seen already in its first four trading weeks and continued to deteriorate as time progressed with average cumulative returns of -39 percent six months after the decision date and -79 percent after one year. In comparison, Good SPACs earned flat raw returns for the first six months after the decision date, corresponding to average cumulative returns of approximately -6.2 percent. Jenkinson and Sousa (2011) argued that the market reaction at the acquisition announcement therefore was informative, and that investors that acted against the market signal lost a significant amount of their investment compared to investors of Good SPACs, which performed in line with the market during the first six months following the business combination. Floros and Sapp (2011) also presented early evidence regarding the post-merger performance of SPACs and report even worse stock market performance when comparing returns generated by SPACs with reverse merger transactions of shell companies. For the years between 2006 and 2009, the authors report an average buy-and-hold abnormal return of -75.7 percent 18 months following the business combination.

Howe and O’Brien (2012) reported similar findings in their study of SPACs between 2003 and 2008. The authors reported somewhat better mean half-year returns than Jenkinson and Sousa (2011), however still strikingly negative for completed acquisition of -14 percent. The performance also continued to deteriorate as time progressed as Howe and O’Brien (2012) report a mean one-year return of -33 percent and a mean three-year return of -54 percent. As the authors reported positive mean target announcement returns of 1.7 percent for the 11 days surrounding the acquisition announcement, Howe and O’Brien interpret their results somewhat differently compared to Jenkinson and Sousa (2011) and rather concludes that SPAC founders are decent in identifying suitable acquisition targets, however, being less successful in managing the operating firm in the de-SPAC period.

Datar, Emm and Ince (2012) further present severe long-term underperformance of SPACs in their study when comparing both the ex-post operating performance of SPACs as well as its stock market performance with contemporary IPO firms and industry peers. The authors report that the underperformance following the business combination after their first trading year as an operating company are significantly worse than conventional IPO firms, with median SPAC

excess return of -3.48, -12.08, -27.08 and -35.76 percent for holding periods of one, three, six and 12 months, compared to contemporaneous IPO firms with returned -0.97, -2.68, -3.56, and -9.45 percent during the same holding period. Consequently, Datar et al. (2012) argued that investors should avoid participating in SPACs as they underperform relative traditional IPOs, both financially and operationally, and that the route chosen by firms to enter the public market has major implications which should be considered by investors. Kolb and Tykvová (2016) also report that SPACs severely underperform following the business combination in comparison to the market, industry, and comparable IPO firms, explaining that mainly lower-quality firms tend to use SPAC acquisitions as a back door to enter the public markets. The authors focused on the wealth effects up to 60 months following the SPAC acquisition, and for the SPACs studied between 2003 and 2015, they report buy-and-hold abnormal returns of -29, -46, -59, and -102 percent six, 12, 24 and 60 months after the merger completion.

Dimitrova (2017) also reported negative long-term performance in the de-SPAC period, with buy-and-hold abnormal returns of -39.7 and -57.7 percent for one- and two-year holding periods. In addition, Dimitrova (2017) showed that the underperformance following the business combination reflects not only on the de-SPAC period, but also the entire lifecycle of the SPACs since their IPOs, reporting average four-year buy-and-hold returns of -51.9 percent post IPO, compared with the average positive return of 8.5 percent for all other firms becoming public during the same period. Similar to previous researchers, Dimitrova (2017) blame managerial incentives for the severe stock market underperformance as the compensation structure in SPACs incentivizes sponsors to pursue any acquisition over no acquisition, resulting in bad acquisition targets oftentimes being selected. Another interesting finding reported by Dimitrova (2017) is that those SPACs that announced their target early performed better than late acquisitions announcements as SPAC sponsors became desperate to close a deal at any cost when approaching the deadline, impacting the choice of target firm. Negative post-merger returns were also reported by Vulcanovic (2017) who, similarly to Dimitrova (2017), attributed the poor post-merger performance of the combined firm on the incentives of sponsors and underwriters to engage in bad acquisitions rather than no acquisition in order to collect their equity compensation and underwriting fees.

Lastly, in more recent studies, Chamberlain (2021), Gahng et al. (2021) as well as Klausner et al. (2022) compared the post-merger returns of SPACs with various indices. Chamberlain (2021) compared the returns of SPACs with the NASDAQ index during a three-year holding

period and found that the buy-and-hold strategy on NASDAQ generated average returns of 51.50 percent compared to the returns generated to SPAC common shareholders which averaged -32.60 percent.

Gahng et al. (2021) found that the equally-weighted average one-year buy-and-hold return for common shares following the business combination was -8.1 percent, while the value-weighted CRSP return was 16.5 percent for the matched period, resulting in an average one-year market-adjusted return of -24.6 percent. For the three-year holding period, the authors report an average three-year market-adjusted return of -40.4 percent.

Finally, Klausner et al. (2022) report that SPACs, 12-months following the business combination, had positive unadjusted returns, however underperformed relative the IPO index by 50.9 percent, against the NASDAQ by 17.9 percent, and against the Russell 2000 by 4.4 percent. The authors also presented post-merger returns until November 1, 2021, constituting their last observation day, and reported average excess returns of -100.4 percent compared to the IPO index, -64.1 percent compared to the NASDAQ index, and -38.0 percent compared to the Russell 2000 index.

3.3.3 Concluding earlier empirical findings

Previous empirical findings are conclusive as to the performance of SPACs in relation to returns during target acquisition announcements as well as following the business combination. For the short-term announcement effects, researchers are consistently reporting significantly positive returns, mainly explained by sponsors exceeding the market's expectations in the selection of a target firm. However, once the de-SPAC transaction is completed, performance starts to deteriorate with a severely long-term post-merger underperformance in the de-SPAC period. The underperformance has largely been explained by a combination of lower-quality firms choosing the SPAC route as a way to enter the public markets, the incentives of SPAC sponsors to close a deal at any cost, as well as SPAC founders being unsuccessful in managing the operating company in the de-SPAC period. The results from previous empirical findings are summarized in *Table 1*.

Table 1. Summary of previous empirical literature

Table 1 summarizes the empirical findings from previous literature on the performance of SPACs. Panel A presents the short-term announcement returns surrounding the target acquisition announcement. Panel B presents the long-run returns following the business combination. The columns summarize the author(s); the time period for the study; the return in percent; notes clarifying the returns. ***, ** and * denotes significance levels of 1%, 5% and 10% respectively. Note: significance levels are reported as presented by the author(s), missing significance levels does thereby not necessarily mean that these are insignificant.

Panel A: Announcement returns

Author(s)	Time Period	Return (%)	Notes
Lewellen (2009)	2003 - 2008	CAR: 2.8; α : 2.0	7 days surrounding the announcement [-3, 3]; monthly four-factor portfolio alpha following the announcement
Thompson (2010)	2003 - 2009	CAR: 1.45***; 2.239***	3 days surrounding the announcement [-1, 1] all acquisitions; completed acquisitions
Floros & Sapp (2011)	2006 - 2009	CAR: 2.97***; 2.55**; 3.85**	5 days surrounding the announcement [-2, 2]; 11 days surrounding the announcement [-5, 5]; 61 days surrounding the announcement [-30, 30]
Howe & O'Brien (2012)	2003 - 2008	Avg. return: 1.7***	11 days surrounding the announcement [-5, 5]
Tran (2012)	2004 - 2009	CAR: 1.70***; excess return: 1.55**	3 days surrounding the announcement [-1 ; 1]; monthly equal weighted excess return from after announcement until completion
Lakicevic & Vulcanovic (2013)	2003 - 2009	AR: 0.85***; 2.42***; 10.49***	Announcement day [0] common shares; units; warrants
Rodrigues & Stegemoller (2014)	2003 - 2011	Avg, return: 3.7***; 5.5***;	3 days surrounding the announcement [-1 ; 1] for all announced acquisitions; completed acquisitions
Dimitrova (2017)	2003 - 2010	CAR: 1.0**; 1.5***	3 days surrounding the announcement [-1, 1] all acquisitions; completed acquisitions
Chamberlain (2021)	2016 - 2018	Avg. return: 0.63***	1-day return post announcement

Panel B: Post-merger returns

Author(s)	Time Period	Return (%)	Notes
Floros & Sapp (2011)	2006 - 2009	BHAR: -75.7***	18-month post-event window [31, 390]
Howe & O'Brien (2012)	2003 - 2008	BHR: -14.0**; -32.5***; -53.8***	BHR since voting day 6-months; 1-year, 3-year
Jenkinson & Sousa (2011)	2003 - 2008	Avg. return: -24.0; -55.0	Post-acquisition return 6-month; 1-year
Datar, Emm & Ince (2012)	2003 - 2008	BHR: -3.48**; -12.08***; -27.18***; -35.76***	Post-acquisition median excess return 1 month; 3 months; 6 months; 1 year
Lakicevic & Vulcanovic (2013)	2003 - 2009	CAR: -9.59***; BHR: -28.69**	7-day post-merger return; average buy-and-hold return since IPO date
Kolb & Tykvova (2016)	2003 - 2015	BHAR: -29.0***; -46.0***; -59.0***; -102.0***	Post-completion day of SPAC acquisition 6-months; 12-months; 24-months; 60-months
Dimitrova (2017)	2003 - 2010	BHR: -10.0***; -20.1***; -32.2***; -39.7***; -57.7***; -51.9***	Post-merger BHR 3-months; 6-months; 9-months; 1-year; 2-year; average 4-year BHR post IPO
Vulanovic (2017)	2003 - 2013	BHR: -3.0; -19.0; -40.0	Post-merger 1-month; 3-month; 1-year
Chamberlain (2021)	2016 - 2018	BHR: -24.59***; -32.60***	1-year return post-merger; 3-year return post IPO
Gahng, Ritter & Zhang (2021)	2010 - 2020	BHR: -24.7; -40.4	Average market-adjusted return post-merger 1 year; 3 year
Klausner, Ohlrogge & Ruan (2022)	2019 - 2020	BHAR: -50.9; -17.9; -4.4; -100.4; -64.1; -38.0	12-month excess return over IPO index; NASDAQ; Russell 2000; excess return until Nov 1, 2021 over IPO index; NASDAQ; Russell 2000

3.4 Hypothesis Development

3.4.1 Time to announcement

As seen in the preceding discussion, the time constraint that SPACs have to find and acquire a private target may incentivize the sponsor to close a deal at any cost to avoid liquidation. Previous researchers have argued that this leads to sponsors rather engaging in value-destroying acquisitions than settling for no acquisition (Okutan Nilsson, 2018). Thus, the time from the IPO to the target announcement may influence the post-merger performance as the choice of acquisition target may have been impacted by these incentives (Tran, 2012). Dimitrova (2017) found that the time taken by SPACs in announcing their proposed business combination varies significantly, and that the average SPAC uses roughly 13 months before finding a target firm. On some occasions however, as little as three months after the IPO were used while other SPAC sponsors used almost the entire lifecycle before finding and announcing their proposed acquisition.

Dimitrova (2017) further argues that the time it takes for a SPAC to find its target can either be perceived positively or negatively by the market. SPACs taking a longer time to announce a proposed acquisition might on the one hand put more time and effort into finding a suitable target, as well as engage in a more thorough due diligence process, which can be reflected in a better performance following the business combination. On the other hand, targets that are announced near the acquisition deadline may also be perceived by shareholders as the SPAC sponsors engaging in “emergency deals” and selecting whichever target with the sole purpose of avoiding liquidation, and thereby is perceived negatively by investors (Tran, 2012). The latter is further supported by Cumming et al. (2014) which found that SPAC sponsors have incentives to reduce the time to announcement with the purpose of not wanting to come too close to the end of the SPACs lifetime. Therefore, we hypothesize that a longer time to announcement would be negatively correlated with the post-merger performance in the de-SPAC period, as the likelihood of the sponsors having engaged in an emergency deal and selected whichever target is increased.

Hypothesis 1: Longer time to announcement is negatively correlated with SPAC post-merger performance.

3.4.2 Target announcement returns

The short-term target announcement return is also argued by previous researchers to be reflected in the post-merger SPAC performance. Once the sponsor has identified a potential target firm for consummation, an announcement to the public is made, and the first time the market receives information about the upcoming acquisition is during this announcement event (Kolb & Tykvová, 2016). Since the market has formed expectations prior to the target announcement, the stock market reaction to this event reflects the value that the market attributes to the proposed deal relative to its expectations (Dimitrova, 2017). Since the short-term returns following a SPAC acquisition announcement reflect investor's view regarding the acquisition value, Jenkinson and Sousa (2011) determined that this short-term return functions as a signal for the SPACs post-merger performance, and showed that investors going against this market signal lost approximately 39 percent of their investment six months following the business combination and 79 percent after one year. Therefore, the cumulative abnormal return around the target announcement may function as a proxy for the stock market's view of the quality of the target, which ultimately will be revealed later in the de-SPAC period. A positive cumulative abnormal return surrounding the target acquisition announcement can as such be interpreted as the market approving the selected target and evaluating the target decision as a good choice. On the contrary, a negative stock market reaction in the form of negative cumulative abnormal returns indicates that the proposed target is deemed by the investors as being of bad quality, or a bad choice. Therefore, the short-term cumulative abnormal return surrounding the target announcement is used as a proxy to determine if the market sentiment towards SPAC sponsor's choice of target is reflected in the post-merger performance in the de-SPAC period. Following the preceding discussion, we hypothesize that a greater cumulative abnormal return surrounding the target acquisition announcement is positively correlated with SPAC post-merger performance as it serves as an indication of the quality of the target.

Hypothesis 2: Cumulative abnormal returns surrounding the target acquisition announcement has a positive impact on SPAC post-merger performance.

3.4.3 Sponsor quality

Since the SPAC at the time of IPO is not an operating company, the only existing asset in the firm is considered to be the SPACs management team, i.e., the sponsor (Cumming et al., 2014). This means that the sponsor's professional experience, competences, and network are of great importance to investors when evaluating the attractiveness of a potential SPAC investment

(Floros & Sapp, 2011; Rodrigues & Stegemoller, 2014, Lin et al., 2021). The market price of the SPAC after the IPO is consequently argued to be determined by the value of the SPAC's trust account as well as by the perceived capabilities of the sponsor in finding and acquiring a private operating firm of good quality, which is in contrast to traditional IPOs where investors can also consider e.g., the company's operating performance when evaluating the attractiveness of a potential investment (Chatterjee et al., 2016). Drawing on this, Kim (2009) argue that compared to traditional IPO firms, the market places a greater value in SPACs managed by sponsors with a better track record and argue that sponsor quality is a key determinant with significant effects on the performance of the SPAC, both after the IPO and in the success of completing a business combination. Either failing in finding a suitable acquisition target or engaging in a value-destroying acquisition would impair the reputation of the sponsor, leading to an inability of conducting future deals (Gahng et al., 2021). This would translate into a negative correlation between sponsor quality and moral hazard as these would not want to jeopardize their reputation by engaging in emergency deals only to secure the promised payment (Lakicevic & Vulcanovic, 2013). In addition, the previous IPO literature argues that high-quality underwriters tend to match with high-quality issuers (see e.g., Carter & Manaster, 1990; Carter, Dark & Singh, 1998), which implies that underwriters, which are equally likely as the management to want to maintain a successful track-record, also bears a reputational risk if the deal was to fail (Logue, 1973; Beatty & Ritter, 1986; Titman & Trueman, 1986). Therefore, it is argued that higher-quality underwriters would assume more responsibility and take a more active role in convincing high-quality sponsors to only conduct a business combination if the target is considered appropriate (Cumming et al., 2014).

Since the number of SPACs has increased significantly in recent years, more well-known participants have also entered the SPAC market, with an increasing number of high-profile investors recruiting executives from high-profile companies for acting as sponsors in SPACs (Li, 2021). Chauviere and Tan (2020) argues that SPACs which are operator-led¹⁰ outperform their non-operator-led counterparts throughout the deal cycle as these one year into the de-SPAC period on average outperformed other SPACs by approximately 40 percent and their sectors with 10 percent. While these findings were not statistically significant, Chauviere and Tan (2020) argued that their results strongly suggest that having an operator-led SPAC still is

¹⁰ Operator-led SPACs refers to a SPAC whose leadership has former C-suite operating experience (chair or CEO), in contrast to only financial or investing experience.

relevant in the discussion of SPAC performance. The reason for their importance is that operator-led SPACs differentiate themselves in two particular ways; they take greater responsibility for the combination's success; and they specialize more effectively in the search process for a potential target. The outperformance of operator-led SPACs is further supported by Li (2021) who argues that SPACs with seasoned leaders outperform those without, mainly because the expertise of operators is crucial in the selection of a suitable target. Li (2021) describes that one-year post the merger completion, SPACs with experienced operators earned a 73 percent annualized return compared to the 14 percent loss for those SPACs not having an industry veteran in the SPAC management team. In addition, Vulcanovic (2017) found that sponsors with greater experience within the industry the SPAC is targeting increase the likelihood of SPAC post-merger survival. Drawing on this reasoning, we hypothesize that sponsor quality, measured by these being operators with former C-suite operating experience, has greater post-merger performance than non-operator-led SPACs.

Hypothesis 3: Operator-led SPACs have greater post-merger performance than non-operator led SPACs.

3.4.4 Governance and management characteristics

Governance and management characteristics have, among other things, been examined by previous researchers in order to get a better understanding on the determinants of SPACs short- and long-term performance. As SPACs are subject to extensive agency conflicts, Howe and O'Brien (2012) focused specifically on these characteristics and examined the relationship between SPAC performance and board independence as well as managerial ownership¹¹ for SPACs pre- 2010. While the authors only found weak evidence that greater board independence is positively associated with better long-term performance, it is of interest to do an updated study considering these aspects in the most recent SPAC regime where increasingly more high-profile individuals and investors has entered the space (Ilone Siporski, 2021). Following Howe and O'Brien (2012), we hypothesize that higher board independence and greater sponsor ownership leads to better post-merger SPAC performance, as independent board members can be effective in hampering SPAC sponsors from making value-destroying acquisitions, thereby functioning as a better monitoring device than inside board members (Fama & Jensen, 1983;

¹¹ In our study referred to as sponsor ownership, as the sponsor is considered the equivalent of managers of regular firms (see e.g., Lewellen, 2009; Okutan Nilsson, 2018; Klausner et al., 2022)

Hermalin & Weisbach, 2003; Adams et al., 2010). Secondly, greater sponsor ownership could incentivize the sponsors to put more effort into finding and completing a merger only if they find a desirable acquisition target, in line with Jensen and Meckling (1976) and the role of increased managerial (sponsor) ownership in decreasing managers' opportunistic behavior. Following the above discussion, we hypothesize that governance and ownership characteristics, measured by greater board independence and sponsor ownership, is positively correlated with SPAC post-merger performance.

Hypothesis 4: SPAC governance and management characteristics have a positive impact on SPAC post-merger performance.

4. Methodology and Data

This chapter describes and motivates the research design and methodology used to measure the SPAC's announcement returns and post-merger performance, as well as discusses the regression models used in testing the hypothesized relationships between long-term SPAC performance and our selected variables. It also discusses the data and selection process used to obtain the sample used for our study. Finally, the data cleaning process is presented.

4.1 Methodology

To answer our research question regarding the post-merger performance of SPACs between 2015 and 2021, we apply a long-term event study for different holding periods to capture the combined firm's performance over time. In order to shed light on the determinants of post-merger performance, four regression models follow the long-term event study, testing the hypothesized relationship between SPAC post-merger performance and (1) the time it takes for an acquisition target to be announced, (2) the short-term target announcement returns; (3) the sponsor quality in the SPACs, and (4) the ownership and governance characteristics of the SPACs. As the target announcement returns are used as an independent variable in the second regression models, a short-term event study has also been conducted to complement the long-term event study.

Fama, Fisher, Jensen, and Roll (1969) introduced the event study methodology as we know it today in late 1960s which has become the standard method of measuring the market reaction to business events and announcements (Binder, 1998). The event study methodology has been subject to marginal changes since its inception, and the framework followed in our short-term study comes from MacKinlay (1997). For the long-term event study documenting SPAC post-merger performance, we follow Kothari and Warner (1997; 2007).

4.1.1 Short-term event study

In accordance with MacKinlay (1997), we define the event study timeline to determine the period over which the security prices of the included companies will be examined, consisting of an estimation window, event window, and post-event window (see *Figure 3*). Normal stock returns are predicted in the estimation window prior to the event in order to estimate the expected returns of the SPAC. Thereafter, the expected returns are deducted from the actual returns surrounding the event window to obtain the abnormal returns (AR) from the event. A

post-event window follows the actual event window, which is a typical feature in short-term event studies (ibid).

The length of the estimation window is, as suggested by MacKinlay (1997), set to 120. The author also suggests a longer estimation window of 255 days but is not selected due to the short time limit SPACs have to search for and find a target, and several SPACs in our sample have a time to announcement of less than 255 days. For SPACs with a time to announcement of less than 120 days, the number of days prior to the acquisition announcement has been used as estimation window. Following Dimitrova (2017), a three-day event window is used as the event window length $[-1, 1]$, including the event date as well as the preceding and succeeding day. We use both the Russell 2000 Index and the FTSE Renaissance IPO Index as market benchmarks, in line with previous SPAC researchers (e.g., Kolb & Tykvová, 2016; Dimitrova, 2017; Gahng et al., 2021; Klausner et al., 2022). The Russell 2000 Index is the recognized benchmark of small-cap stocks in the U.S equity markets (FTSE Russell, 2018), and the FTSE Renaissance IPO Index is an index designed to track the activity and performance of newly public companies (FTSE Russell, 2021).

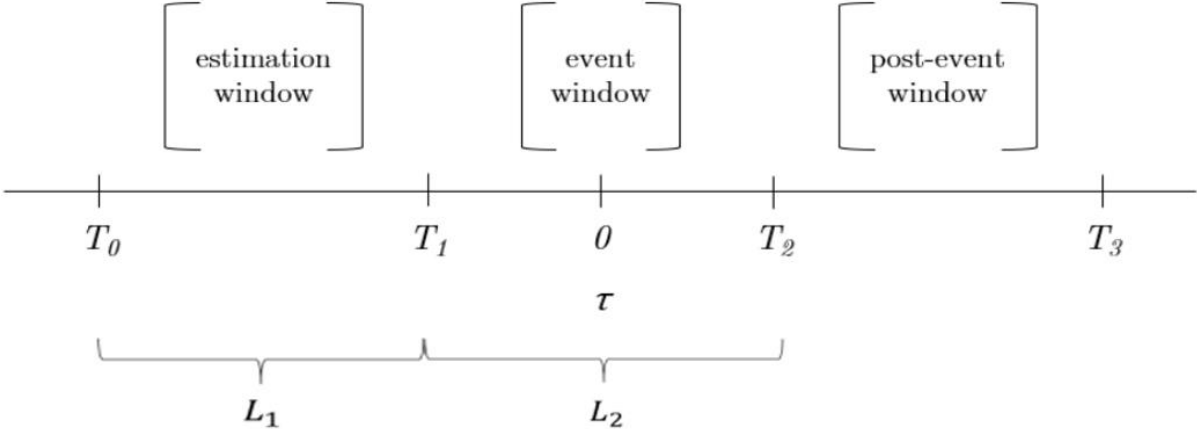


Figure 3. Event study timeline

Figure 3 presents the event study timeline. T_0 to T_1 denotes the estimation window preceding the actual event date ($t = 0$), which estimates normal returns by examining the relationship between stock prices and the market index. The event window, T_1 to T_2 , measures the abnormal returns surrounding the event date, and the post-event window, T_2 to T_3 , follows the event window to estimate the normal return model. L_1 and L_2 denotes the number of days in the estimation window and event window, respectively.

In order to determine the impact of any event, we compute AR, which is the actual ex post return of a security over the event window subtracting the expected return of the security over the same window (MacKinlay, 1997). The market model has been used for modelling the normal return which is a statistical model relating the return of any given security to the return of the market portfolio. It is widely accepted as the standard model for modelling normal returns in event studies (Campbell, Lo & MacKinlay, 1997). The normal returns are estimated as follows:

$$\begin{aligned}
 R_{it} &= \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \\
 E(\varepsilon_{it}) &= 0, \text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_i}^2
 \end{aligned}
 \tag{1}$$

Where R_{it} and R_{mt} are the period- t returns on SPAC i and the market index, respectively, and ε_{it} is the zero mean error term. α_i and β_i is the parameters of the market model, where α_i is the intercept and β_i is the volatility of R_{it} in relation to the market benchmark.

In the event window, expected normal returns \hat{R}_{it} are estimated under the assumption that the security would experience no impact from any event during this period, and is calculated as:

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt}
 \tag{2}$$

Where \hat{R}_{it} is the expected return of SPAC i during the event window if no event occurred at date t .

Abnormal returns of SPAC i , AR_{it} , is calculated as the difference between the observed return R_{it} and the expected return \hat{R}_{it} in the event window:

$$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}
 \tag{3}$$

Where AR_{it} is the abnormal return of SPAC i on date t . To be able to draw inferences for the events, AR has been aggregated into cumulative abnormal returns (CAR) in order to measure the total impact of the event:

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \quad (4)$$

To study the effect of the same type of event on multiple securities, we compute cumulative average abnormal returns (CAAR), using:

$$CAAR = \frac{1}{N} \sum_{i=1}^N CAR_i(t_1, t_2) \quad (5)$$

Testing the null hypothesis, that the cumulative abnormal return is equal to zero, we compute the test statistic using the follow equation:

$$t_{CAR} = \frac{CAAR}{S_{CAR}} \quad (6)$$

Where S_{CAR} is the standard deviation of CAR, obtained using the following equation:

$$S_{CAR}^2 = L_2 \times \frac{1}{M_i - 2} \sum_{t=T_0}^{T_1} (AR_{i,t})^2 \quad (7)$$

Where L_2 is the length of the event window ($T_2 - T_1$) with T_1 denoting the latest day of the estimation window and T_2 denoting the latest day of the event window under the notion that the estimation window ends immediately before the beginning of the event window, and M_i being the number of non-missing observations during the estimation window for SPAC i .

4.1.2 Long-horizon event study

There are several issues that must be dealt with when conducting event studies, such as the risk adjustment and expected/abnormal return modeling, the aggregation of security-specific abnormal returns, and the calibration of the statistical significance of abnormal returns (Kothari & Warner, 2007). This applies both for shorter and longer horizons. However, when it comes

to long-horizon event studies, these issues become even more important as the error when calculating abnormal performance due to errors in adjusting for risk is likely to have large impacts compared to short-horizon studies (ibid). The reason being that even minor errors in risk adjustment will have economically large differences when estimating the abnormal returns over horizons of longer periods, while similar errors would be negligible in the short term, making the precision of risk adjustment a significantly more important aspect (Kothari & Warner, 1997). In addition, the estimates of abnormal returns over long horizons are highly sensitive to the model chosen (Kothari & Warner, 2007), and as all models used for estimating expected returns are, according to Fama (1998), an incomplete description of the systematic patterns in average returns, it can lead to false indications of long-term abnormal performance.

Kothari and Warner (2007) propose two methods for assessing and calibrating post-event risk-adjusted performance, and the method used in this study has been the characteristic-based matching approach using buy-and-hold abnormal returns (BHAR). BHAR is described as “the average multiyear return from a strategy of investing in all firms that complete an event and selling at the end of prespecified holding period versus a comparable strategy using otherwise similar nonevent firms” (Mitchell & Stafford, 2000, p. 296). An attractive attribute of using this approach is that BHAR is a better reflection of investors’ actual investment experience in comparison to other approaches used to measure risk-adjusted performance (Kothari & Warner, 2007). A prerequisite for using the approach successfully is to find a matching firm or portfolio to benchmark against, and therefore, in accordance with previous research on SPACs, we use the Russell 2000 Index and FTSE Renaissance IPO Index as our benchmark indices that we measure the post-merger performance against (Kolb & Tykvová, 2016; Dimitrova, 2017; Gahng et al., 2021).

The T-month BHAR for event SPAC i is defined as:

$$BHAR_i(t_1, t_2) = \prod_{t=t_1}^{t_2} [(1 + R_{it})] - \prod_{t=t_1}^{t_2} [(1 + R_{bt})] \quad (8)$$

Where $BHAR_i(t_1, t_2)$ represents the buy-and-hold abnormal return for portfolio i throughout period t_1 to t_2 , R_{it} is the weekly return of SPAC i , and R_{bt} represents the matching weekly return of index b . A positive $BHAR_i(t_1, t_2)$ implies a better performance than the benchmark

index while the opposite would be true if obtaining a negative $BHAR_i(t_1, t_2)$ (Kothari et al., 2007).

Barber and Lyon (1997) document that long-run abnormal returns calculated using buy-and-hold reference portfolios are positively skewed, leading to negatively biased t-statistics. Therefore, instead of using the conventional t-statistic of BHAR, we use the bootstrapped skewness-adjusted t-statistic to eliminate the skewness bias, as advocated by Lyon, Barber and Tsai (1999):

$$t_{BHAR} = \sqrt{n} \left(S + \frac{1}{3} \hat{y} S^2 + \frac{1}{6n} \hat{y} \right) \quad (9)$$

Where

$$S = \frac{\overline{BHAR}_T}{\sigma(BHAR_T)}, \text{ and } \hat{y} = \frac{\sum_{i=1}^n (BHAR - \overline{BHAR}_T)^3}{n\sigma(BHAR_T)^3} \quad (10)$$

Note that \hat{y} is an estimate of the coefficient of skewness and $\sqrt{n}S$ is the conventional t-statistic.

4.2 Cross-sectional regression of determinants of BHAR

Four regression models follow the long-term event study in order to test the formulated hypotheses between the long-term post-merger performance of SPACs and selected variables. For the regression models, the variables that are hypothesized to impact the post-merger performance are set as main variables (see 4.2.2 *Independent variables*) while other variables that have been found to impact long-term returns are treated as control variables (see 4.2.3 *Control variables*). The definition of the dependent-, independent- and control variables used in the regression models follows in the next section and are summarized in *Table 2*. The regression models used in this study are the following:

Model 1.

$$BHAR_IPO = \alpha_i + \beta_1 ANNOUNCE_TIME + \beta_2 ANNOUNCE_TIME^2 + \beta_n Controls + \varepsilon$$

Model 2.

$$BHAR_IPO = \alpha_i + \beta_1 CAR_IPO + \beta_n Controls + \varepsilon$$

Model 3.

$$BHAR_IPO = \alpha_i + \beta_1 SPONS_QUAL + \beta_n Controls + \varepsilon$$

Model 4.

$$BHAR_IPO = \alpha_i + \beta_1 INDEP_BOARD + \beta_2 SPONS_OWN + \beta_n Controls + \varepsilon$$

4.2.1 Dependent variable*Buy-and-hold abnormal return (BHAR)*

The dependent variable in all four regression models is the 12-month buy-and-hold abnormal return estimated using the FTSE Renaissance IPO Index as the market benchmark (*BHAR_IPO*). *BHAR_IPO* thereby represent our selected variable for measuring the post-merger performance in the combined firm. The reason for using the 12-month BHAR as the dependent variable is to maintain a sufficiently large sample size while still being able to test our hypothesized relationship over a longer holding period. Furthermore, the choice of using the FTSE Renaissance IPO Index as our market benchmark is to be able to compare our result with those of previous researchers documenting SPAC post-merger performance which have used the same or similar market benchmark (e.g., Dimitrova, 2017; Gahng et al., 2021; Klaussner et al., 2022). The FTSE Renaissance IPO Index was also used as the de-SPAC transaction can be considered the IPO for the private target company, and thus is used for comparison between de-SPACs and traditional IPOs.

4.2.2 Independent variables*Time to announcement*

Time to announcement is measured using the variables *ANNOUNCE_TIME* and *ANNOUNCE_TIME*², and are treated as the main independent variables in our first regression model. They constitute our selected proxies for moral hazard from the SPAC sponsors to test the risk of investors being subject to sponsors opportunistic behavior by engaging in emergency deals. We argue that the sponsor's misaligned incentives to find and acquire a target will increase as the time to announcement increases and the SPAC is approaching the deadline of

which a target firm for consummation must be found. If the target is announced close to the deadline, we expect that the sponsors incentive to find whichever target increases in order to not be forced to liquidation. Thus, a longer time to announcement is assumed to have a negative correlation with SPAC post-merger performance. When included in the first regression model, the variables *ANNOUNCE_TIME* and *ANNOUNCE_TIME*² are transformed using the natural logarithm into $\log(\text{ANNOUNCE_TIME})$ and $\log(\text{ANNOUNCE_TIME})^2$, as suggested by Dimitrova (2017) (see 4.4 Data cleaning). The reason for adding the squared version for the time to announcement is to capture if the hypothesized relationship wears off at after a certain time. By including the quadratic relationship between BHAR and the time to announcement, we fit a U-shaped relationship to the data as it is possible that this variable may not have a complete linear relationship to the dependent variable BHAR.

Announcement cumulative abnormal return (CAR)

The announcement return, measured by the three-day cumulative abnormal return (CAR) surrounding the date of the acquisition announcement using the FTSE Renaissance IPO Index as market benchmark, constitutes our proxy for the market sentiment towards the selected target firm. Since the market has formed expectations prior to the target announcement, and this event represents the first time the market receives information about the upcoming acquisition, the stock market reaction to this event reflects the value that the market attributes to the proposed deal relative to its expectations (Kolb & Tykvová, 2016; Dimitrova, 2017). In line with Jenkinson and Sousa (2011), we interpret a positive CAR surrounding the target acquisition announcement as the market approving the selected target and evaluating the decision made as a good choice, and expect that a positive market sentiment towards the sponsors choice of acquisition target is positively correlated with the SPAC post-merger performance. This is captured in the variable *CAR_IPO* which is used as the main independent variable in our second regression model.

Sponsor quality

SPONS_QUAL is the main independent variable in our third regression model, being a binary variable taking the value of one if the CEO or Chairman in the SPAC has previous C-suite operating experience. The variable is therefore our proxy for sponsor quality and the reason for its inclusion is because the management team in the SPAC is considered to be the SPACs main asset (Floros & Sapp, 2011; Rodrigues & Stegemoller, 2014; Lin et al., 2021). While we recognize that other measurements of sponsor quality could have been used, e.g., if they

explicitly have an industry and/or geographical focus for their acquisition target (Lewellen, 2009), operator-led SPACs is the chosen proxy for sponsor quality in this study. If the binary variable *SPONS_QUAL* takes the value of one, we expect that this should be reflected by better performance in de-SPAC period, as operator-led SPACs are argued to take greater responsibility for the combination's success as well as specialize more effectively in the search process for a target firm (Chauviere & Tan, 2020; Li, 2021).

Independent board

Independent board (*INDEP_BOARD*) is the first main independent variable in our fourth regression model, representing a proxy for the governance quality in the SPAC. *INDEP_BOARD* is a binary variable taking the value of one if a majority of the board members (> 50 percent) is independent to the SPAC, i.e., are not one of the sponsors nor have any shareholdings in the SPAC. We argue that an independent board is positively correlated with post-merger performance as independent directors can function as an effective governance mechanism hampering sponsors from engaging in value-destroying acquisitions, in line with the reasoning by Howe and O'Brien (2012). Following the preceding discussion, we expect an independent board to be positively correlated with SPAC post-merger performance as the choice of target firm may have been impacted by this aspect.

Sponsor ownership

Sponsor ownership (*SPONS_OWN*) is the second main independent variable in our fourth regression model, where *SPONS_OWN* is the fraction of outstanding common stock held by the SPAC sponsors out of all common stock immediately after the SPAC IPO. Greater sponsor ownership is argued to incentivize the SPAC sponsors to put more effort into finding and completing a business combination only if a suitable acquisition target is found, as suggested by the role of managerial equity ownership in aligning the incentives of inside managers and outside shareholders of firms (Jensen & Meckling, 1976; Howe & O'Brien, 2012). Therefore, we expect that greater sponsor ownership would be reflected in a better post-merger performance in the de-SPAC period as the choice of target firm may have been impacted by this aspect.

4.2.3 Control variables

Following earlier studies on SPAC performance, we control for certain variables that are found to be determinants of SPAC post-merger performance. The control variables are included to

enhance the internal validity of our study by limiting the influence of confounding and other extraneous variables. The control variables are selected with a foundation in the findings of previous studies on SPACs (e.g., Floros & Sapp, 2011, Kolb & Tykvová, 2016; Dimitrova, 2017, Vulcanovic, 2017) and are divided into two categories; SPAC and deal characteristics as well as and governance characteristics.

SPAC and deal characteristics

SPAC market capitalization

The variable *SPAC_MKTCAP* refers to the market capitalization of the SPAC at the acquisition announcement, in millions of dollars. It is used as a measure for size in which the broader mergers and acquisitions (M&A) literature finds a significant negative relationship between large acquirers and returns generated to shareholders, partially because managers of larger firms tend to overpay for their acquisition targets (see e.g., Moeller, Schlingemann & Stulz, 2004). Therefore, and in accordance with previous SPAC researchers (e.g., Tran, 2012; Kolb & Tykvová, 2016; Dimitrova, 2017), we control for firm size which is expected to have a negative correlation with SPAC post-merger performance. The variable *SPAC_MKTCAP* is transformed into $\log(\text{SPAC_MKTCAP})$ when included in the regression models (see 4.4 *Data cleaning*).

Deal value

DEAL_VALUE is a variable capturing the transaction value at the time of the business combination, in millions of dollars, and is thereby an indication of the size of the target. Alexandridis, Fuller, Terhaar, and Travlos (2013) find that the size of the target has implications on the returns generated from M&A deals, and that acquisitions of larger firms tend to destroy value for shareholders despite the fact that acquirers are less likely to overpay for large targets. This, because larger targets are associated with more complexity than smaller targets, making it increasingly difficult to assume the economic benefits of the acquisition (ibid). Therefore, the size of the deal is controlled for, in line with Tran (2012), Dimitrova (2017) and Vulcanovic (2017), and larger deal sizes are expected to generate worse post-merger returns in the de-SPAC period. The variable *DEAL_VALUE* is also transformed using the natural logarithm into $\log(\text{DEAL_VALUE})$ (see 4.4 *Data cleaning*).

Relative size

The variable *REL_SIZE* is the value of the target as a fraction of the market capitalization of the SPAC, i.e., *DEAL_SIZE* as a fraction of *SPAC_MKTCAP*. Return regressions typically

control for the size of the target (or deal) relative to the size of the acquirer, however the M&A literature present contrasting findings in its relationship with returns (Moeller et al., 2004). For example, Asquith, Bruner and Mullins (1983) documents a positive relationship while Travlos (1987) finds a negative. Hence, in accordance with previous SPAC literature (e.g., Tran 2012; Dimitrova, 2017), we control for the relative size, while not having any expectations for the direction of the relationship.

Proceeds

PROCEEDS captures the capital raised in the SPAC IPO, in millions of dollars. Similar to *SPAC_MKTCAP* is *PROCEEDS* a control variable for size, the difference being that *PROCEEDS* is measured at the time of the SPAC IPO while *SPAC_MKTCAP* is measured at the acquisition announcement. This variable has also been controlled for in the previous SPAC literature (see e.g., Lewellen, 2009; Jenkinson & Sousa, 2011; Lakicevic & Vulcanovic, 2013; Vulcanovic, 2017). As with *SPAC_MKTCAP*, we expect *PROCEEDS* to be negatively correlated with SPAC post-merger performance with the same reasoning on the relationship between the size of the acquirer and returns generated to shareholders. This variable was also transformed using the natural logarithm into $\log(\text{PROCEEDS})$ (see 4.4 *Data cleaning*).

Target age

TARGET_AGE is the age of the target firm, calculated as the difference between the year of the business combination and the founding year of the target. Capron and Shen (2007) argue that there are more uncertainties involved when evaluating younger private firms than more mature firms due to the extent and quality of available information. More mature firms are argued to be better in producing more objective data about their current operations (Henderson, 1999) while younger firms have less objective data to disclose to prospective investors (Sanders & Boivie, 2004). Similarly as Gahng et al., (2021), we include a variable capturing the age of the target, and expect that *TARGET_AGE* is positively correlated with post-merger SPAC performance, as increased uncertainties exist when evaluating younger firms, increasing the risk of the SPAC sponsors choosing an inappropriate target for consummation. This variable was also transformed using the natural logarithm into $\log(\text{TARGET_AGE})$ (see 4.4 *Data cleaning*).

Governance characteristics

Board size

Earlier scholars document that the size of the board influences its efficiency (DeAndres et al., 2005), thus impacting the performance of corporations through its monitoring and advisory role of firm management. Therefore, *BOARD_SIZE*, is included as a control variable reflecting the number of board members in the combined firm immediately after the acquisition. Smaller boards are found to be associated with more effective monitoring as the internal coordination and decision-making among the directors is enhanced (see e.g., Lipton & Lorsch, 1992; Yermack, 1996; Eisenberg et al., 1998). Therefore, we expect that *BOARD_SIZE* has a negative correlation with SPAC post-merger performance.

CEO is a sponsor and CEO is a target insider

The CEO in the combined firm will most likely influence its performance as the CEO is the main executive in charge of managing the organization. Two variables are controlled for to capture whether the newly appointed CEO in the combined firm either comes from the sponsor's or the target firm's management team. The variable *CEO_SPONS* is a binary variable taking the value of one if the appointed CEO in the combined firm is a sponsor of the SPAC, and zero otherwise. Conversely, the variable *CEO_TI* is a binary variable taking the value of one if the appointed CEO in the combined firm is one of the target insiders and zero otherwise. While Dimitrova (2017) found limited evidence regarding this matter, the PE literature strongly suggests that continuing to involve PE sponsors after leveraged buyouts is associated with better performance (see e.g., Guo, Hotchkiss & Song, 2011; Cornelli & Krakas, 2013). As recent SPACs has had an increasing involvement of more sophisticated actors, we expect that a continued involvement of a SPAC sponsor in the combined firm, holding the office of CEO, will positively influence its performance.

Chairman is a sponsor and Chairman is a target insider

Similarly as the CEO have an influence of the performance of organizations, so does the Chairman of the board through her role of being the primary responsible board member ensuring that the board is effective in its principle goal to set and implement organizations direction and strategy (Van den Berghe & Levrau, 2004; DeAndres & Vallelado, 2008). Therefore, two variables are included to capture whether the newly appointed Chairman in the combined firm either comes from the sponsor's or the target firm's management team. The variable *CHAIR_SPONS* is a binary variable taking the value of one if the appointed Chairman

of the board in the combined firm is a sponsor of the SPAC and zero otherwise. Conversely, the variable *CHAIR_TI* is a binary variable taking the value of one if the appointed Chairman of the board in the combined firm is one of the target insiders and zero otherwise. As Dimitrova (2017) found greater long-run returns if one of the SPAC sponsors are appointed the role as Chairman of the board in the combined firm, we expect that the continued involvement of SPAC sponsors on board level is associated with superior post-merger performance.

Table 2. Summary of variables in the regression models

Table 2 summarizes the dependent-, independent- and control variables used in our different regression models.

Variable name	Variable description
<i>BHAR_IPO</i>	12-month buy and hold abnormal return following the business combination using the FTSE Renaissance IPO Index as market benchmark
<i>ANNOUNCE_TIME</i>	Number of days between the SPAC IPO and the acquisition announcement
<i>ANNOUNCE_TIME</i> ²	<i>ANNOUNCE_TIME</i> squared
<i>CAR_IPO</i>	3-day cumulative abnormal return surrounding the acquisition announcement using the FTSE Renaissance IPO Index as market benchmark
<i>SPONS_QUAL</i>	Binary variable taking the value of 1 if the SPAC sponsors have previous C-suite operating experience and 0 otherwise
<i>INDEP_BOARD</i>	Binary variable taking the value of 1 if a majority of the board members (> 50 percent) is independent to the SPAC and 0 otherwise
<i>SPONS_OWN</i>	Fraction of ownership held by the SPAC sponsor immediately after the SPAC IPO
<i>SPAC_MKTCAP</i>	The market capitalization of the SPAC at the acquisition announcement, in millions of dollars.
<i>DEAL_VALUE</i>	The value of the transaction, in millions of dollars
<i>REL_SIZE</i>	The value of the target as a fraction of the market capitalization of the acquirer
<i>PROCEEDS</i>	Gross proceeds raised in the SPAC IPO, in millions of dollars

<i>TARGET_AGE</i>	Number of years between the year of the business combination and the founding year of the target
<i>BOARD_SIZE</i>	Number of board member immediately after the acquisition
<i>CEO_SPONS</i>	Binary variable taking the value of 1 if the CEO of the combined firm is one of the sponsors and 0 otherwise
<i>CEO_TI</i>	Binary variable taking the value of 1 if the CEO of the combined firm is one of the target insiders and 0 otherwise
<i>CHAIR_SPONS</i>	Binary variable taking the value of 1 if the Chairman of the board of the combined firm is one of the sponsors and 0 otherwise
<i>CHAIR_TI</i>	Binary variable taking the value of 1 if the Chairman of the board of the combined firm is one of the target insiders and 0 otherwise

4.2.4 Assumptions of Ordinary Least Squares (OLS)

To be able to estimate our four regression models using Ordinary Least Squares (OLS), we must first be assured that the statistical assumptions of linear regression are not violated before drawing any inferences from the regression results. As our data is cross-sectional, four potential violations of the OLS assumptions need to be tested; non-linearity, multicollinearity, heteroscedasticity, and non-normality.

Linearity is a basic premise for OLS, addressing the functional form of the regression model. This assumption must hold in order to be able to assess the relationship between the dependent and independent variables (Berry, 1993). Non-linearity refers to situations where the relationship between the dependent and independent variables is non-linear which results in the true relationship between these variables will not be revealed. To test for non-linearity, the Ramsey RESET test has been conducted to examine whether our regression models have any omitted variables. As seen in *Appendix A-1*, we have no omitted variables in any of our regression models which means that the linearity assumption holds, and that a linear regression model is appropriate. OLS further requires no multicollinearity, i.e., an independent variable is not allowed to be a perfect linear function of other explanatory variables in the regression model (Poole & Farrell, 1971). This is because the problem with multicollinearity is that the least squares estimators of coefficients of variables involved in the linear dependencies have large variances (Mansfield & Helms, 1982). As our regression models contain more than one variable, and multicollinearity increases with the numbers of variables included, a pairwise

correlation table is examined (see *5.4.1 Pairwise correlations*). The variance inflation factor (VIF) is thereafter examined to test whether our regression models still suffer from any potential multicollinearity issues after removing variables that were highly correlated according to the pairwise correlation table. Typical thresholds used as indications of multicollinearity include 5 and 10 depending on the conservativeness of the researcher. As seen by the VIF values in *Appendix A-2*, none of our final regression models have any multicollinearity issues (see *5.4.1 Pairwise correlations* for explanation why the correlation between $\log(\text{ANNOUNCE_TIME})$ and $\log(\text{ANNOUNCE_TIME})^2$ is not a problem in our first regression model). Furthermore, OLS requires that the error term has a constant variance, i.e., no heteroscedasticity, as the standard errors would be inconsistent if heteroscedasticity is present (Breusch & Pagan, 1979). We test for heteroscedasticity using the Breusch-Pagan test (see *Appendix A-3*). As heteroscedasticity is an issue in all our four regression models, we use robust standard errors instead of regular standard errors to address this issue. Normality is another assumption of OLS which requires that the residuals should be normally distributed (Berry, 1993). To test for non-normality of the residuals, we use the Shapiro-Wilk test as this test have been found to be most powerful among the tests for normality (Razali & Wah, 2011). The result from the test is presented in *Appendix A-4*, and illustrate that in none of our models do we have normally distributed residuals. Its implications on the results are further discussed in section *6.4 Limitations*.

4.3 Data sample

We utilized a combination of resources to collect our primary data. Our SPAC sample was collected from S&P Capital IQ and delimited to all SPACs listed on U.S. exchanges between 2015-01-01 and 2021-12-31 that has announced and completed a business combination within the same time frame. To ensure that we only include SPACs as defined by the previous academic literature, we filtered our output based on the SPACs Standard Industrial Classification (SIC) code at the time of its IPO, which must correspond to 6770 to classify as a blank-check company (see Lewellen, 2009; Lakicevic & Vulcanovic, 2013; Dimitrova, 2017). The study period is motivated by our intent to coincide with the most recent SPAC regime, or “SPAC 3.0” as argued by Gahng et al. (2021). In total, this yielded 302 successful SPAC mergers in the selected time period, contrasted with 179 SPACs that have announced a target but not yet executed the transaction, and 552 SPACs that have completed their IPOs but are yet to announce a target. The divergence between the number of SPAC-related IPOs and mergers

is due to the fact that a majority of the SPACs in the most recent regime is still actively searching for a target firm.

We chose to focus exclusively on the U.S. market to achieve intra-sample comparability and enable us to contrast our findings to other studies conducted on the U.S. market, on which the absolute majority of studies have been made (e.g., Lewellen, 2009; Jenkinson & Sousa, 2011; Rodrigues & Stegemoller, 2014; Kolb & Tykvová, 2016; Dimitrova, 2017; Vulcanovic, 2017). Our data was cross-checked against several online resources containing specific SPAC related information, including SPAC Insider, SPAC Track, and SPAC Research to ensure we only include SPACs in our defined time period. Two SPACs were excluded after this step, as these proved to have completed their acquisition outside of our time frame.

To test our hypotheses, we needed to collect a significant amount of information from primary, and third-party sources. In accordance with previous research, we gathered data related to our independent- and control variables by searching the SEC's Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) database, including S-1 filings (prospectuses) and DEFM-14A filings (proxy statements). These filings contained information on managerial composition, governance, and ownership before and after a SPAC's business combination. In total, this stage of the data collection forced us to exclude 35 observations, as certain mission-critical information was unavailable in said documents. To collect security prices on our SPAC sample, we manually collected CUSIP codes from the firms' SC-13G filings available in the EDGAR database. Daily and weekly security returns, in combination with market index returns was thereafter collected from Center for Research in Security Prices (CRSP). We were unable to locate CUSIPs to a total of 28 firms. An additional 48 SPACs were excluded after CRSP was unable to generate their return share price data.

After applying our inclusion criteria, and cleaning our sample of missing data, the final sample comprised 189 SPACs. The dataset was enriched with data from additional resources, including Pitchbook and Compustat Fundamental Dataset with regards to our additional control variables, including the SPAC- and deal characteristics.

As we intend to capture the SPAC post-merger performance over time, different holding periods are employed and examined. In our study, we use three, six, nine, 12, 24 and 36 months following the business combination. As we include data on the most recent SPACs, the sample

size differ between our holding periods as several SPACs have not been trading during all these holding periods.

4.4 Data cleaning

Due to the presence of severe outliers in our data, the sample has been cleaned prior to analysis. First, we transformed the variables *ANNOUNCE_TIME*, *ANNOUNCE_TIME*², *SPAC_MKTCAP*, *DEAL_VALUE*, *PROCEEDS* and *TARGET_AGE* using the natural logarithm, in line with how previous SPAC literature have dealt with these variables (e.g., Dimitrova, 2017; Gahng et al., 2021). The reason being because these are significantly larger than our dependent variable *BHAR_IPO*, and they are also heavily skewed, meaning that transforming these variables using the natural logarithm made them closer to the normal distribution (see *Appendix B*). Furthermore, we identified that none of our continuous variables were normally distributed. While OLS do not require that the variables are normally distributed, we still chose to winsorize these to relieve the effect from extreme outliers in order to obtain a more robust result. The continuous variables are winsorized at the 1st and 99th percentile, which dealt with the most severe outliers in our sample (see *Appendix C*). This allowed us to reduce the effect of spurious outliers by setting these equal to less extreme values.

5. Results, Analysis and Discussion

In this chapter, the results from the study are presented, analyzed, and discussed. The chapter begins by discussing the characteristics of our sample which are compared with SPACs from previous regimes studied in earlier research. The following sections analyses and discusses the findings from the short- and long-term event study, the regression models, as well as their implications on the formulated hypotheses. Lastly, the results from the robustness checks are presented, where we tested whether the estimated effects of interest are sensitive to changes in model specifications.

5.1 Sample characteristics

Figure 4 shows the number of SPACs that made an IPO, announced and target, and completed a de-SPAC transaction for each of the years included in the study. From our sample of 189 SPACs, there is an increasing trend of SPAC IPOs for the years between 2015 and 2020, in line with our expectations, however with a significant decline between 2020 and 2021, from 83 SPAC IPOs to 20. The reason for the decline is because the focus of this study is the long-term post-merger performance of the combined firm which required that only SPACs that completed the business combination prior to 2021-12-31 qualified for our sample. The significant drop of SPACs doing an IPO in 2021 is therefore attributed to the fact that most of these are still in the search process for a target firm and have not yet completed a business combination as of the last observation day for this study. Further, *Figure 4* shows that there is an increasing number of acquisition announcements for each year as the number of SPACs entering the public U.S. markets experienced a significant increase from 2020 and onwards, making it likely that most of the acquisition announcements also would occur during these years with regard to the short time-period SPACs have in finding an acquisition target. The same is true for de-SPAC transactions which reveal great variations between the years, ranging from 0 in the years where the least number of de-SPAC transactions took place to 117 in the year when most de-SPAC transactions were completed. Upon closer examination, 117 of the 189 de-SPAC transactions in our sample took place in 2021, mainly due to the significant increase in SPAC activity in the latest years.

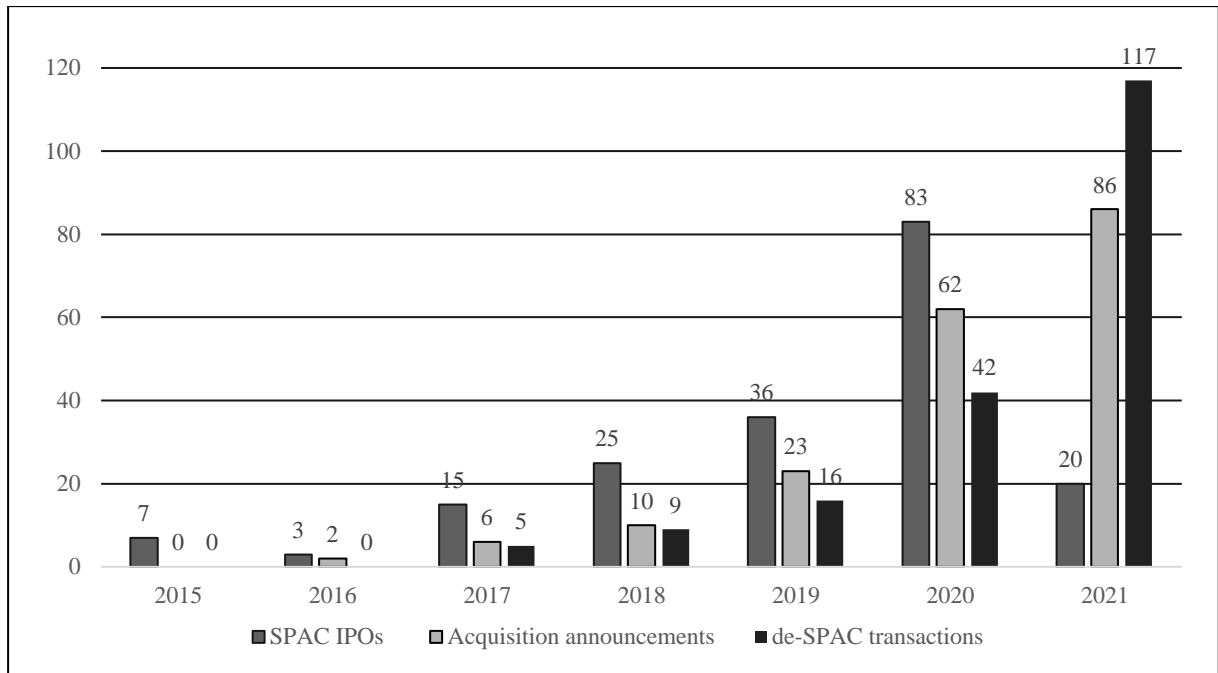


Figure 4. Number of SPAC IPOs, acquisition announcements and de-SPAC transactions per year

Table 3 presents the descriptive statistics of the variables included in this study. On average, it took approximately 312 days for our sample to announce a target firm. The number of days varies significantly within the sample, with the least number of days utilized by the SPACs being as little as 77 days while the greatest being just prior the liquidation date. The average number of days before announcing an acquisition target is similar, but somewhat lower, to the number of days reported by previous researchers. For example, Lewellen (2009), Jenkinson and Sousa (2011) and Dimitrova (2017), reported average numbers of 381, 378 and 389 days, respectively. This indicates that SPACs in the most recent regime are somewhat faster in finding and announcing a proposed target firm compared to SPACs pre-2015. Furthermore, almost half of the SPACs (48.7 percent) was operator-led, making it a suitable sample to examine whether operator-led SPACs outperform their non-operator-led counterparts, as suggested by Chauvier and Tan (2020). Similarly, 49.7 percent of our sample had an independent board, also making it a suitable sample to use for examining whether an independent board hampers SPAC sponsors from pursuing value destroying acquisition or not. Furthermore, the average percentage of common stock held by the sponsors immediately after the IPO is 20.5 percent, which is reasonable as it is in line with the incentive structure of SPACs typically granting sponsors 20 percent of the ownership after the IPO (Vulanovic, 2017; Okutan Nilsson, 2018).

Our sample had an average market capitalization at the acquisition announcement of \$328 million which is considerably larger than reported in previous studies. Dimitrova (2017) reported in their study of SPACs between 2003 and 2010 an average market capitalization of \$153 million, which suggest a dramatic increase in the size of the SPACs in recent years. However, great variations exist in our sample with the smallest SPAC having a market capitalization of only \$64 million while the largest being 13 times larger, with a market capitalization at the acquisition announcement of over \$831 million. Furthermore, as the SPAC is a shell company without assets other than the proceeds raised in the IPO, it is not surprising to find that the average proceeds raised by our sample is only slightly lower than the average market capitalization at the acquisition announcement. This, hinting that on average, the price of the traded SPAC securities increases between the SPAC IPO and date of the acquisition announcement. The average SPAC in our sample raised approximately \$257 million in its IPO which is significantly larger than documented in previous research. The earliest studies, such as Jog and Sun (2007), Boyer and Baigent (2008), and Jenkinson and Sousa (2011) all report average gross proceeds below \$100 million, while studies after that, e.g., Tran (2012), Lakicevic and Vulcanovic (2013), and Rodrigues and Stegemoller (2014) report slightly higher gross proceeds, ranging between \$120 and \$140 million. This shift is also documented by two of the most recent studies on SPACs, where Chamberlain (2021) report average gross proceeds at the SPAC IPO of \$265 million for SPACs between 2016 and 2018, and Gahng et al. (2021), reporting average gross proceeds over \$300 million for SPACs doing their IPO in 2020. Similarly, the size of the deals is significantly larger in our sample than what is reported by previous researchers. Tran (2012), Dimitrova (2017) and Vulcanovic (2017) all report average deal values between \$200 and \$300 million compared to our sample where the corresponding figure is \$1,679 million. While it is surprising that the increase is this dramatic, it is still considered reasonable as the target, in order to be considered as an option for consummation, must have a fair market value of at least 80 percent of the SPACs net assets at the time of the business combination (Hale, 2007). Since the proceeds raised from the SPAC IPO has significantly increased over the years, it is likely to see larger deal values as well. The fact that we see this significantly larger deal values among SPACs in the most recent regime is mainly explained by the fact that the relative size between the SPAC and target is considerably larger than documented in previous studies. Additionally, and as made possible by PIPE financing, we find that the average SPAC acquires a target with a value of almost 5 times the SPAC, while previous researchers present a corresponding figure of approximately 1.9 times (Tran, 2012; Dimitrova, 2017). Furthermore, we find that the average age of the target firms is 11.8 years,

however, differing significantly in our sample, from the youngest firm being founded only 2 years prior to the business combination, while the most mature firm had been operating for 37 years. This is similar to Gahng et al. (2021) which documents an average age of 12.7 years for their sample of SPACs between 2010 and 2020.

Finally, the de-SPACs in our sample has an average number of board members of 7.8 immediately after the business combination. The Chairman of the board originates from the SPAC sponsor in approximately 15 percent of cases and in 40 percent from the target firm. This is in sharp contrast to Dimitrova (2017) who reported that more than half of their sample constituted of de-SPACs where the appointed Chairman of the board originated from the SPAC sponsors management team, while 41 percent was a target insider. We therefore document a shift where target insiders, to a considerably larger degree, are appointed as the Chairman of the board in the combined firm. Secondly, our sample suggest that in 45 percent of cases, the appointed Chairman of the board was neither a sponsor nor a target insider, but rather independent to the SPAC and the target firm in terms of holding any previous management positions. This strongly suggest that de-SPACs in the most recent era, to a larger degree, appoint an outsider as Chairman of the board in the combined firm. This may have interesting implications for our study as Dimitrova (2017) found greater long-run returns for those SPACs that appointed one of the sponsors as Chairman of the board in the combined firm. Furthermore, our sample suggest that SPACs in the most recent regime almost explicitly appoints target insiders as the role of CEO in the combined firm. This is more in line with Dimitrova (2017) who also documents that target insiders are appointed to the role of CEO in the combined firm in the majority of the cases, however in our sample it is even more apparent, with target insiders being appointed to the CEO in almost 97 percent of cases.

In summarizing our sample, it becomes apparent that there has been a significant shift in the SPAC as an asset class in recent years. The capital raised in the SPAC IPO is greater, so is the size of the SPACs and the deals executed. The management and governance structure of the combined firm also differ significantly compared to what is documented in previous studies, suggesting that SPACs post-2015 are inherently different from those of previous generations.

Table 3. Descriptive statistics

Table 3 summarizes the data for the variables included in the study. Panel A presents the descriptive statistics of all the independent variables, excluding CAR (see 5.2 Announcement returns (CAR) for information about CAR). Panel B presents the descriptive statistics of all the control variables, and Panel C presents the transformed independent and control variables which are replacing these variables original form when included in the regression models. The presented statistics are based on the entire sample size, hence 189 observations per variable.

Variable	N	Mean	Median	Std. Dev.	Min	Max
Panel A: Independent variables						
ANNOUNCE_TIME (in days)	189	311.8	219	219.4	77	729
SPONS_QUAL	189	0.487	0	0.501	0	1
INDEP_BOARD	189	0.497	0	0.501	0	1
SPONS_OWN	189	0.205	0.2	0.014	0.186	0.244
Panel B: Control variables						
SPAC_MKTCAP (in \$millions)	189	327.8	277.8	200.9	64.11	831.3
DEAL_VALUE (in \$millions)	189	1678.9	1350	1377.3	102	5200
REL_SIZE	189	4.937	4.297	2.868	1.246	11.76
PROCEEDS (in \$millions)	189	257.1	240	140.9	50	600
TARGET_AGE (in years)	189	11.80	9	9.202	2	37
BOARD_SIZE	189	7.847	8	1.531	5	11
CEO_SPONS	189	0.032	0	0.176	0	1
CEO_TI	189	0.968	1	0.176	0	1
CHAIR_SPONS	189	0.148	0	0.357	0	1
CHAIR_TI	189	0.402	0	0.492	0	1
Panel C: Transformed variables						
log(ANNOUNCE_TIME)	189	5.485	5.389	0.731	4.344	6.592
log(ANNOUNCETIME2)	189	30.61	29.04	8.088	18.87	43.45
log(SPAC_MKTCAP)	189	5.591	5.627	0.672	4.161	6.723
log(DEAL_VALUE)	189	7.009	7.208	1.038	4.625	8.556
log(PROCEEDS)	189	5.378	5.481	0.629	3.912	6.397
log(TARGET_AGE)	189	2.221	2.197	0.742	0.693	3.611

5.2 Short-term target announcement returns (CARs)

Table 4 reports the results from the short-term event study for the total sample of 189 SPAC acquisition announcements. The announcement CAR, capturing the market sentiment towards the announced target firm, is positive in line with the findings reported by previous researchers (e.g., Lewellen, 2009; Floros & Sapp, 2011; Tran, 2012; Dimitrova, 2017). In the three-day event window employed [-1; 1], the average CAR is 4.74 percent compared against the Russell 2000 Index. Relative to the FTSE Renaissance IPO Index, the CAR is even greater, on average 5.22 percent. Both CARs are significant at the 1 percent level, indicating that the sentiment towards the announced target on average was favorably received by the market. As noted by Dimitrova (2017), a positive CAR surrounding the acquisition announcement should not be confused with the acquisition being a good one, but rather that it reflects the value that the market attributes to the deal relative its expectations. This means that the deal can still be viewed as value-destroying, however not as value-destroying as anticipated by the market. As such, it can be concluded that the market on average still view acquisition announcements as positive relative their expectations in the most recent SPAC regime.

Furthermore, we find CARs of larger magnitude than those documented in previous studies. Thompson (2010), Tran (2012) and Dimitrova (2017) reports average CARs of 2.24, 1.70 and 1.50 percent respectively, when employing the same event window length as in our research. One may interpret the greater abnormal returns as SPAC sponsors being able to exceed the expectations of the market to a larger degree than achieved by the SPACs examined in earlier research. As highlighted previously, past researchers have studied SPACs during times where the SPAC-route was widely regarded as a “last resort” for low quality firms to obtain a public listing. In recent years, as SPACs have grown in legitimacy among investors and regulators alike – the market sentiment has become increasingly positive, and SPACs seems to draw significant positive initial reactions from the target announcement.

Table 4. Returns surrounding the acquisition announcement (CARs)

Table 4 presents the mean and median CARs together with its respective t-statistic during the three-day event window surrounding the acquisition announcement, benchmarked against the Russell 2000 Index and FTSE Renaissance IPO Index.

Event window [-1, 1]	Mean	Median	t-statistic
CAR: Russell 2000 Index	0.0474	0.010	11.124***
CAR: FTSE Renaissance IPO Index	0.0522	0.011	12.235***

***, ** and * denotes the significance levels of 1%, 5%, and 10%, respectively.

5.3 Long-term post-merger performance of SPACs (BHARs)

Similar to previous researchers studying the post-merger performance of SPACs, the results from the long-term event study suggest that SPACs in the new regime still significantly underperform relative market benchmarks. *Table 5* presents the result from the long-term event study at different time intervals, compared against the Russell 2000 Index and FTSE Renaissance IPO Index. We document a statistically significant underperformance already after three months into the de-SPAC period, with average BHARs of -9.5 percent compared to the Russell 2000 Index, and -14.2 percent against the FTSE Renaissance IPO Index. These results during the first three months of trading are similar to those documented in previous studies, which have reported excess returns of -12.1 percent against other conventional IPO firms (Datar et al., 2012) and BHARs of -10.0 percent against the Russell 2000 Index (Dimitrova, 2017) during the same time-horizon following the business combination.

Furthermore, similar to previous studies we also document that the stock market performance continues to deteriorate as time progresses. One year following the business combination, we find average BHARs of -19.9 and -36.6 percent respectively against our benchmark indices, with the results being significant at the 5 and 1 percent significance levels. The stock market performance is strikingly negative, however in the lower levels of what previous researchers have documented after one year as a combined firm. Jenkinson and Sousa (2011) documented raw returns one year after the business combination of -55.0 percent, and Kolb and Tykvová (2016) reporting an average 12-month BHAR of -46.0 percent when compared against the Russell 2000 Index. Furthermore, the corresponding market adjusted return was reported at -39.7 percent by Dimitrova (2017), suggesting that our sample of SPACs, while still

underperforming, perform relatively better one year into the de-SPAC period than those SPACs studied by previous researchers. This is further supported by our average 12-month IPO adjusted BHAR of -36.6 percent which can be compared to the mean 12-month excess return over the IPO index of -50.9 percent reported by Klaussner et al. (2022).

Finally, for the 24- and 36-months holding periods, we document that the long-term underperformance of our sample SPACs have caught up and even exceeded those reported in previous studies. While our 24-month Russell adjusted BHAR of -38.1 percent is lower than the corresponding return documented by Kolb and Tykvová (2016) of -59.0 percent and Dimitrova (2017) of -56.3 percent, our 36-month Russell adjusted BHAR of -62.8 percent is worse than the returns documented in previous studies. For example, Howe and O'Brien (2012) reported raw returns of -53.8 percent for the same holding period, and Gahng et al. (2021) document an average three-year market-adjusted return of -40.4 percent. Our sample's underperformance after 24- and 36-months following the business combination is further supported by our IPO adjusted BHARs, at -86.9 percent and -124.9 percent, respectively. However, although statistically significant at the 5 percent level, our sample in these holding periods is considerably small, at 31 and 14 observations.

The significant underperformance of SPACs in the new regime is surprising. The apparent shift in public and industry perception of SPACs, as highlighted by several key differentiators from earlier SPACs was theorized to lead to better long-term performance, as compared to previous studies. Additional regulatory disclosure rules and requirements introduced to specifically address agency conflicts between SPAC sponsors and investors was furthermore assumed to lead to SPACs merging with targets of higher quality. As highlighted in the results of our sample's short-term abnormal returns, one would also assume that the increasingly positive CARs would have a spill-over effect on our sample's long-term performance.

While the determinants of post-merger performance are presented in the following section, we believe it is suitable to address the sample's raw returns, i.e., security returns not adjusted for market returns. Our SPAC's long-term underperformance is not attributable to severe stock-price declines per se, but rather due to considerable gains made in the benchmark indices. When comparing our sampled raw returns with those of previous researchers, we find that 12-months following the business combination, the average raw return for our sample of SPACs was a positive 1.1 percent, while the corresponding figure recorded by Dimitrova (2017) was between

-41 and -44 percent. Similarly, 24-months following the business combination, we document average raw returns of -10.9 percent, which is far less negative than the -56.3 percent reported by Dimitrova (2017) for the same holding period. Thus, the fact that our market benchmarks have gained increasingly more than in previous studies mostly explains the severe negative market-adjusted returns of our sample SPACs. For example, the raw returns of the Russell 2000 Index and FTSE Renaissance IPO Index was recorded at 21.0 and 37.6 percent respectively for a holding period of 12-months compared to the -1.3 and -19.4 percent documented by Dimitrova (2017) for the same market benchmarks. These findings suggests that SPACs in our sample have not experienced a significant stock price decline but have rather been unable to gain in the stock market relative the same extent as other securities. This implies that SPAC investors in the new regime have not lost the majority of their investments, as recorded by previous researchers, but are rather unable to generate gains from their invested capital.

Table 5. Long-term post-merger performance of SPACs (BHARs)

Table 5 presents the mean and median BHARs together with its respective t-statistic during holding periods of 3 up to 36 months following the business combination. Panel A presents the raw returns and BHARs of SPACs benchmarked against the Russell 2000 Index. Panel B presents the raw returns and BHARs of SPACs benchmarked against FTSE Renaissance IPO Index.

Period	N	SPACs		Benchmark		Difference		
		Mean	Median	Mean	Median	Mean	Median	t-statistic
Panel A: Russell 2000 Index								
Effective date: 3 months post-merger	168	-0.059	-0.170	0.035	0.032	-0.095	-0.202	-2.469**
Effective date: 6 months post-merger	134	-0.149	-0.286	0.067	0.014	-0.216	-0.299	-4.103***
Effective date: 9 months post-merger	92	-0.071	-0.256	0.137	0.110	-0.208	-0.366	-2.862***
Effective date: 12 months post-merger	79	0.011	-0.311	0.210	0.137	-0.199	-0.448	-1.998**
Effective date: 18 months post-merger	43	0.082	-0.299	0.297	0.379	-0.216	-0.678	-1.543
Effective date: 24 months post-merger	31	-0.109	-0.263	0.272	0.346	-0.381	-0.609	-2.748**
Effective date: 36 months post-merger	14	-0.313	-0.680	0.316	0.319	-0.628	0.999	-2.773**
Panel B: FTSE Renaissance IPO Index								
Effective date: 3 months post-merger	168	-0.059	-0.170	0.083	0.064	-0.142	-0.234	-3.842***
Effective date: 6 months post-merger	134	-0.149	-0.286	0.128	0.069	-0.277	-0.355	-5.317***
Effective date: 9 months post-merger	92	-0.071	-0.256	0.236	0.228	-0.307	-0.484	-4.412***
Effective date: 12 months post-merger	79	0.011	-0.311	0.376	0.356	-0.366	-0.667	-3.584***
Effective date: 18 months post-merger	43	0.082	-0.299	0.677	0.880	-0.595	-1.178	-4.302***
Effective date: 24 months post-merger	31	-0.109	-0.263	0.760	0.895	-0.869	-1.158	-6.303***
Effective date: 36 months post-merger	14	-0.313	-0.680	0.936	0.986	-1.249	-1.667	-5.640***

***, ** and * denotes the significance levels of 1%, 5%, and 10%, respectively.

5.4 Regression analysis

5.4.1 Pairwise correlation

Before running the regression models testing the hypothesized relationship between the SPAC's post-merger performance and the selected variables, a pairwise correlation table is examined as multicollinearity could be an issue in our models. Highly correlated independent variables constitute a problem as OLS requires that the variables should be independent to each other. This is because coefficient estimates will be sensitive to minor changes in the specification of the model, and multicollinearity further reduces the precision of the estimated coefficients which makes it problematic to assess the statistical significance of the independent variables (Poole & Farrell, 1971). The most common solution when addressing highly correlated variables is to remove variables that exceeds a certain degree of correlation. According to Tabachnick and Fidell (1996), independent variables with a bivariate correlation of more than 0.70 should be removed when performing multiple regression analysis.

The pairwise correlations between the variables are presented in *Table 6*. Most of the variables in the data set are weakly or moderately correlated but does not contribute to multicollinearity. However, the variable $\log(\text{SPAC_MKT CAP})$ has a correlation of 0.759 with $\log(\text{DEAL_VALUE})$ and 0.897 with $\log(\text{PROCEEDS})$ which is above the acceptable limit suggested by Tabachnick and Fidell (1996). Furthermore, $\log(\text{DEAL_VALUE})$ has a correlation of 0.730 with $\log(\text{PROCEEDS})$, and 0.678, just below the acceptable limit, with REL_SIZE . As these highly bivariate correlations can cause multicollinearity problems when performing the regression analyses, the variables $\log(\text{DEAL_VALUE})$ and $\log(\text{PROCEEDS})$ are removed prior to running the regressions. The reason for removing these particular variables is because the deal value is reflected in the variable REL_SIZE and the proceeds raised in the SPAC IPO are captured in the variable $\log(\text{SPAC_MKT CAP})$, making these the most reasonable variables to remove while maintaining most aspects of the controls. Furthermore, the high correlation between the variables $\log(\text{ANNOUNCE_TIME})$ and $\log(\text{ANNOUNCE_TIME})^2$ is not a problem in our case. Multicollinearity is only a problem when estimating the independent effect of an independent variable on the dependent variable. However, in this case, evaluating the effects separately, i.e., changing the linear variable without changing the quadratic variable, is not of interest as we are interested in the joint effect of these variables.

Table 6. Pairwise correlation table

Table 6 presents the bivariate correlations between the independent- and control variables included in the study.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1) logANNOUNCE~	1.000															
(2) logANNOUNCE2~	0.999	1.000														
(3) CAR_IPO	-0.100	-0.101	1.000													
(4) SPONS_QUAL	-0.087	-0.084	0.034	1.000												
(5) INDEP_BOARD	-0.029	-0.028	-0.012	0.005	1.000											
(6) SPONS_OWN	0.012	0.015	-0.046	0.063	0.027	1.000										
(7) logSPAC_MKTC~	-0.280	-0.279	0.291	0.038	0.112	-0.331	1.000									
(8) logDEAL_VALUE	-0.312	-0.313	0.145	-0.003	-0.042	-0.366	0.759	1.000								
(9) REL_SIZE	-0.152	-0.154	-0.069	-0.030	-0.172	-0.210	0.109	0.678	1.000							
(10) logPROCEEDS	-0.165	-0.161	0.114	0.057	0.070	-0.441	0.897	0.730	0.159	1.000						
(11) logTARGET_AGE	0.026	0.028	-0.028	0.085	0.074	0.009	0.063	0.033	0.005	0.130	1.000					
(12) BOARD_SIZE	-0.016	-0.019	0.046	-0.062	-0.059	-0.119	0.199	0.227	0.195	0.214	-0.087	1.000				
(13) CEO_SPONS	0.152	0.149	0.029	0.065	0.061	0.019	-0.033	-0.093	-0.079	-0.028	-0.132	-0.002	1.000			
(14) CEO_TI	-0.152	-0.149	-0.029	-0.065	-0.061	-0.019	0.033	0.093	0.079	0.028	0.132	0.002	-1.000	1.000		
(15) CHAIR_SPONS	0.265	0.265	-0.015	0.071	0.121	-0.038	0.043	-0.046	-0.090	0.124	0.014	0.022	0.349	-0.349	1.000	
(16) CHAIR_TI	-0.013	-0.008	-0.065	-0.086	-0.060	0.133	-0.133	-0.144	-0.083	-0.173	-0.057	-0.038	-0.087	0.087	-0.342	1.000

5.4.2 Multivariate analysis

In the multivariate analysis, we seek to explain the cross-sectional determinants of the long-term post-merger performance of our SPACs with a foundation in the hypothesized relationship between BHAR and (1) the time it takes for an acquisition target to be announced; (2) the short-term target announcement returns (CAR); (3) the sponsor quality in the SPACs; and (4) the governance and ownership characteristics of the SPACs. Similar to Dimitrova (2017), we use the IPO-adjusted BHAR as our dependent variable but use a shorter event-window length of 12-months in order to maintain a sufficiently large sample size while still being able to test our hypothesized relationships over a longer holding period. The number of observations in each regression model is 76 and fixed year and industry effects are included in each regression model except for Model 1 where the fixed year effect is excluded due to the independent variables being time related. The results are presented in *Table 7*.

Model 1 tests the hypothesized relationship between the time to announcement and the long-term post-merger performance of the combined firm. We argue that sponsors' misaligned incentives to find and acquire a target increases with the time to announcement, as the likelihood of the sponsor engaging in emergency deals is increased, having an impact on the choice of a target firm. As we are modelling the time to announcement with the quadratic variable $\log(ANNOUNCE_TIME)^2$, we fit a U-shaped relationship to the data. The sign of the coefficient of the quadratic variable, if significant, determines whether there is a regular or inverse U-shape between the variable and the dependent variable, while an insignificant result indicates that there is a linear relationship.

As seen from our results from the first regression model in *Table 7*, we find that the linear variable $\log(ANNOUNCE_TIME)$ is negatively correlated with $BHAR_IPO$, implying that SPACs exhibit worse post-merger returns when more time has been spent searching for a target firm. The quadratic term $\log(ANNOUNCE_TIME)^2$ is however positive, indicating that a U-shaped relationship exist between the variable and the 12-month $BHAR_IPO$. What this infer is that that the linear negative relationship between time to announcement and post-merger performance wears off after a certain point of time, and that more time spent on the margin is associated with better post-merger performance of the combined firm. As both the linear and quadratic variable is significant at the 5 percent level, there is enough evidence to say that the relationship between time to announcement and BHAR is negative, however not linear, as there

exists a point in time when spending more time searching for an acquisition target becomes beneficial for investors.

The result from the first regression model both supports and contradicts the expected relationship stated in Hypothesis 1. We hypothesized that a longer time to announcement would result in worse post-merger performance as it increases the risk of SPAC sponsors selecting whichever target to avoid liquidation. While this is partially true as indicated by the negative coefficient of the linear term, it does not support that SPAC sponsors tend to engage in emergency deals when approaching the deadline of which a target must be found, as the quadratic term indicate a turning point where more time used is associated with better post-merger performance of the combined firm. The fact that we find this type of relationship implies that either using considerably little or long time searching for an acquisition target is beneficial for investors. These results are the opposite to the relationship found by Dimitrova (2017) who reports an inverse U-shaped relationship, i.e., that acquisition targets that was announced either very quickly or very late perform worse as a combined firm. It also contradicts the result reported by Cumming et al. (2014) who found that SPAC sponsors have incentives to reduce the time to announcement with the purpose of not wanting to come too close to the end of the SPACs lifetime. Thus, our results support the counter argument that using more time on the margin has a positive effect on the target selection process as it results in better performance in the de-SPAC period. It further speaks in favor that the actions taken by regulators in recent years to mitigate agency related issues between SPAC sponsors and their investors may have had an effect.

Potential explanations for our results could be that using more time when searching for an acquisition target increases the probability of finding a high-quality candidate. As reported by Gao, Ritter and Zhu (2013), in the present day, the private market landscape is larger than ever before. It is therefore not unlikely that sponsors require more time and effort in selecting a suitable acquisition target for consummation. It is also likely that sponsors that spend more time in the search process also engage in more thorough due diligence processes, which could be reflected in a better performance after the business combination as it decreases the likelihood of selecting an inappropriate target firm for consummation. Why SPACs using only a small amount of time searching for an acquisition target also tend to perform better in the de-SPAC period may be multifolded. Some explanations may be provided by the findings of previous researchers. For example, both Lewellen (2009) and Lakicevic et al. (2014) investigated the

relationship between SPACs having a predetermined scope for their acquisition target and the merger approval probability. The authors argued that having a predetermined acquisition focus could more efficiently lead to these also identifying a value creating acquisition target. It is not unlikely that having a predetermined scope for the acquisition also made the SPAC sponsors more prepared for the search process for a target firm compared to sponsors without a predetermined scope, increasing the likelihood of selecting an appropriate target for consummation. It is also likely that more prepared sponsors require less time than unprepared sponsors to identify suitable acquisition targets. Furthermore, Vulanovic (2017) found that earlier announcements were positively correlated with the likelihood of post-merger survival, as early announcements gave sponsors more time to prepare for the business combination. Increased time preparing the target firm for the business combination can also have translated into better performance in the de-SPAC period, potentially explaining our results. Other explanations could be attributed to the quality of the sponsor. Lin et al. (2021) argues that higher quality sponsors on average uses less time to search for an acquisition target due to having superior network connections. It is not unlikely that having superior network connections leads to less time spent in the search for suitable acquisition targets as network connections might have helped the sponsors in quickly finding an appropriate target firm, which would also perform well following the business combination.

In the second regression model, we test whether the market reaction to the SPAC acquisition announcement is a determinant of long-term post-merger performance. Up until this point, our results from the short- and long-term event studies suggest that although acquisition announcements on average are positively received by the market, the average stock market performance following the business combination is considerably poor. As seen in *Table 7*, our variable *CAR_IPO* has a coefficient of -1.7977, indicating that the variable has a negative relationship with the dependent variable *BHAR_IPO*. This implies that a higher *CAR* surrounding the acquisition announcement has a negative impact on the long-term post-merger performance of the combined firm. The result is statistically significant at the 1 percent level, and the magnitude of the coefficient suggest that a 1 percent change in the independent variable *CAR_IPO* decreases the 12-month *BHAR_IPO* with 1.7977 percent, which is considered a moderate but not devastating effect.

The result from the second regression model rejects Hypothesis 2 where we expected to find a positive relationship between the short-term target announcement returns and the long-run

SPAC post-merger performance. As previous SPAC researchers have argued that the short-term returns surrounding the acquisition announcement reflects the stock market's view of the quality of the target, it was expected that deals in which the market approved the selected target firm would also perform better in the de-SPAC period than deals that were not approved by the market. As previously mentioned, Jenkinson and Sousa (2011) found large differences in the long-run post-merger performance of SPACs between their different subsamples of "Good SPACs" and "Bad SPACs", differentiating between whether investors approved the deal when the price at the decision date was higher alternatively lower than the trust value per share. Accordingly, the authors showed that the CAR surrounding the acquisition announcement functioned as a proxy for the quality of the target as investors that went against this market signal lost approximately 39 percent of their investments after six months and 79 percent after one year. However, this does not seem to be the case for SPACs in the new regime, where we rather find that investors should purchase shares in SPACs where the market sentiment was negative towards the selected firm, if any.

While our results deviate from previous findings in the SPAC literature, the general corporate finance literature provides some potential explanations for why firms with good short-term performance tend to perform poorly in the long run. One such explanation draws back to the root of asymmetric information, and the difficulties for investors in assessing the true value of a company in advance of it entering the public markets (Akerlof, 1978). As companies choosing the SPAC route are exempted from many of the hefty disclosure requirements of the traditional listing process, even greater information uncertainties exist with SPACs compared to regular firms, supporting this explanation. One related explanation is provided by Ritter (1998), who argues that companies performing good in the short-term but poor in the long-term do so because the initial divergence between optimistic and pessimistic investors' opinion is reduced as time progresses and more information is released to the market. This pushes the stock price of these firms that outperformed in the short-run down to equilibrium, and may explain why we see that SPACs yielding a positive CAR surrounding the acquisition announcements are followed by an inferior long-run performance following the business combination. Furthermore, as noted by Dimitrova (2017), a positive CAR surrounding the acquisition announcement should not be confused with the acquisition being a good one, but rather that it reflects the value that the market attributes to the deal relative its expectations. Drawing on this, another speculative but likely explanation is that targets that were approved by the market could not live up to the markets expectations when operating as a combined entity post-merger.

The third regression model tests whether operator-led SPACs have an impact on the long-term post-merger performance of the combined firm. Operator-led SPACs have been argued by previous researchers to differ from their non-operator-led counterparts, primarily because they take greater responsibility for the business combination's success as well as specialize more effectively in the search process for a potential target firm (Chauvire & Tan, 2020; Li, 2021). This "operators' edge" is expected to be reflected in a better performance following the business combination. However, the results from the third regression model does not support such claims. The binary variable *SPONS_QUAL* has a coefficient of -0.309, implying that having an operator-led SPAC is negatively correlated with the post-merger performance 12 months following the business combination. The result is however only statistically significant at the 10 percent level, indicating that there might exist a difference between operator-led SPACs and non-operator-led SPACs with regards to its following post-merger performance, although no definitive conclusions can be made. Further, as the result does not support a positive relationship as initially hypothesized, it is possible to conclude that SPACs being managed by sponsors with previous C-suite operating experience does not perform better following the business combination, leading to a rejection of Hypothesis 3.

Similar to Chauviere and Tan (2020), we only find weak evidence that operator-led SPACs differ from their non-operator-led counterparts. Our result points in a direction that if they would, their SPACs would on average be performing worse as a combined firm than non-operator-led SPACs, which is in contrast to Chauviere and Tan (2020) who found a considerable strong and positive insignificant relationship. The general SPAC literature depict the sponsor as the SPACs main asset, as their professional experience, competences and network are of great importance in profitably finding a suitable acquisition target, dividing high quality sponsors from low quality sponsors (Floros & Sapp, 2011; Cumming et al., 2014; Rodrigues & Stegemoller, 2014). However, this study shows that the operator's edge does not seem to be that dividing factor. Other researchers however have examined other characteristics of the sponsor team and suggest that sponsors having a predetermined industry and/or geographical focus increases the probability of succeeding with the business combination (e.g., Lewellen, 2009; Lakicevic et al., 2014). Others, e.g., Lin et al. (2021) show that the sponsor's connections and network, measured by its centrality, explain a large portion of the return variation among SPACs. Therefore, we do not deny the notion that the characteristics of a SPAC's sponsor team is an important aspect with respect to the following performance of the

combined company, however we conclude that the operator's edge is not one of those characteristics.

In the fourth regression model, we test the relationship between the governance and ownership characteristics of the SPACs and the subsequent long-term performance of the combined firm. We argue that these aspects potentially impact the post-merger performance as the SPAC management team's incentives to engage in value destroying acquisitions is affected by extent of governance exercised and ownership held, ultimately impacting the choice of acquisition target. However, we find that neither an independent board nor the fraction of stock held by the SPAC sponsors after the IPO has any influence on the post-merger performance of the combined firm. For both the variables *INDEP_BOARD* and *SPONS_OWN*, we find no significant difference, leading to a rejection of Hypothesis 4.

Our results from regression model 4 are to some extent expected as Howe and O'Brien (2012) found limited evidence on the relationship between governance and ownership characteristics and long-run SPAC performance. Starting with board independence, the authors only found that greater board independence was associated with better long-term performance in the three-year holding period, however not during a one-year holding period which is the time-horizon used in the regression. Furthermore, and similar to our results, neither did Howe and O'Brien (2012) find any significant difference between greater managerial ownership and long-term performance, suggesting that these aspects are not likely to be determinants of SPAC post-merger performance. As we, and the corporate governance literature, have argued that these monitoring mechanisms are among the most effective in aligning the incentives between managers and investors, as well as in hampering firm management from making decisions that are directly in their favor but at the expense of investors, we find no difference in the performance between those SPACs where these characteristics are strong compared to those where they are not. This suggest that either are SPAC sponsors doing their best in finding an appropriate target firm, making these governance mechanisms redundant as SPAC sponsors are not acting opportunistically against investors, or alternatively, they are not sufficiently effective.

Finally, none of the included control variables seem to influence post-merger performance of SPACs in the new regime, as they are all insignificant in the four regression models. This is surprising as the choice of controls are based on findings from the general M&A literature, or

taken directly from previous SPAC literature, where these control variables were suggested as determinants of stock market performance following a business combination. As argued by Moeller et al. (2004), large acquirers tend to perform poorly after an acquisition, leading the authors to suggest a negative relationship between large acquirers and returns generated to shareholders. However, we find that this relationship is non-existent among our SPACs, as those with greater market capitalizations at the acquisition announcement do not seem differ relative other SPACs. This is further similar to Dimitrova (2017) who also found no relationship between the size of a SPAC and its subsequent post-merger performance in the de-SPAC period for SPACs pre-2010. Furthermore, we find that the relative size between the acquirer (SPAC) and target do not matter for the performance of the combined firm either. As we had no expectations for this relationship due to the contrasting empirical evidence from previous M&A literature, documenting both a positive and negative relationship (see e.g., Asquith et al., 1983; Travlos, 1987), our insignificant results for the variable *REL_SIZE* is deemed reasonable.

Furthermore, the age of the target does not seem to be a determinant of the post-merger performance of the combined firm, even though Capron and Shen (2007) argued that more uncertainties are involved when evaluating younger private firms than more mature firms due to the extent and quality of information available. While this type of information asymmetry is likely to be problematic for SPACs sponsors as it increases the risk of sponsors selecting an inappropriate target for consummation, we find no evidence speaking in favor of this argument.

Additionally, the ownership and governance characteristics of the combined firm does not seem to be determinants of post-merger performance of the combined firm. While both the previous PE literature (e.g., Guo et al., 2011; Cornelli & Krakas, 2013) as well as SPAC literature (e.g., Dimitrova, 2017) strongly suggested that continuing to involve sponsors in the highest management and board positions is attributable to a superior performance following a business combination or leveraged buyout, we document no such relationship for SPACs in the new regime, despite the fact that there has been an increasing involvement of more sophisticated sponsors in recent years (Ilone Siporski, 2021). Lastly, the variable *CEO_TI* is dropped by the regression models due to the fact that all de-SPACs included with stock market data of 12-months following the business combination had a target insider as CEO of the combined firm.

Table 7. Regression results of post-merger SPAC performance

Table 7 presents the results from the four regression models. The dependent variable in all models is the 12-month BHAR using the FTSE Renaissance IPO Index as market benchmark. The main independent variables vary between the different models. The same control variables are applied in each of the models. Fixed year- and industry effects are used in all regression models except for Model 1 where the fixed year effect is excluded.

VARIABLES	(1) BHAR_IPO	(2) BHAR_IPO	(3) BHAR_IPO	(4) BHAR_IPO
log(ANNOUNCE_TIME)	-5.6062** (-2.469)			
log(ANNOUNCE_TIME2)	0.4493** (2.231)			
CAR_IPO		-1.7977*** (-3.014)		
SPONS_QUAL			-0.3090* (-1.794)	
INDEP_BOARD				-0.0900 (-0.458)
SPONS_OWN				0.5844 (0.091)
log(SPAC_MKTCAP)	0.0862 (0.742)	0.1447 (1.315)	0.1382 (1.258)	0.1742 (1.576)
REL_SIZE	0.0024 (0.088)	0.0086 (0.334)	0.0135 (0.498)	0.0113 (0.328)
log(TARGET_AGE)	0.1548 (1.349)	0.0701 (0.537)	0.1302 (0.919)	0.1130 (0.810)
BOARD_SIZE	0.0563 (0.941)	0.0324 (0.521)	0.0520 (0.932)	0.0441 (0.748)
CEO_SPONS	-0.1535 (-0.490)	-0.0253 (-0.081)	-0.0254 (-0.075)	-0.1474 (-0.482)
CEO_TI	-	-	-	-
CHAIR_SPONS	0.1261 (0.562)	0.0051 (0.022)	0.0430 (0.177)	0.0027 (0.011)
CHAIR_TI	0.2798 (1.205)	0.2100 (0.854)	0.3908 (1.619)	0.3795 (1.461)
Constant	15.4974** (2.296)	-1.7141* (-1.771)	-1.9311** (-2.077)	-2.2031 (-1.215)
Observations	76	76	76	76
R-squared	0.271	0.090	0.125	0.094
Year Fixed Effects	No	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.5 Robustness tests

We perform different forms of checks to test whether the results reported from the short-term event study, long-term event study, and following regressions are robust. By performing these checks, we test whether the estimated effects of interest are sensitive to changes in model specifications.

5.5.1 Short-term target announcement returns (CARs)

The initial robustness method conducted in this study is testing different event windows and market benchmarks when measuring the short-term CAR surrounding the acquisition announcement. As mentioned in *5.2 Short-term target announcement returns (CARs)*, our baseline event window for calculating CAR is the three-day event window [-1, 1]. In order to test the robustness of our baseline case, we expanded the event window length and calculated the CAR in three additional event windows, from five days surrounding the acquisition announcement [-2, 2] up to 11 days [-5, 5] (see *Appendix D-1*). As our baseline case uses one of the shortest event windows possible, expanding the event window could potentially include confounding events, thereby increasing the exposure to market noise (Lamdin, 2001). Positive significant returns are recorded in all expanded event windows and are of similar magnitude to those documented in the baseline case. Furthermore, the CAR was also calculated using two different market benchmarks, both the Russell 2000 Index and the FTSE Renaissance IPO Index. Positive similar and significant CARs were obtained when controlling for both market benchmarks and different event windows, suggesting that the result that SPACs on average exhibit positive market reactions surrounding the acquisition announcements is robust. These results are also significant at the 1 percent significance level.

5.5.2 Long-term post-merger performance of SPACs (BHARs)

The tests used for the assessing the robustness of the post-merger performance of the combined firm, measured by BHAR, is similar to the method for the short-term announcement returns (CAR). BHAR was measured at different holding periods, from three months following the business combination up until 36 months, and was benchmarked against both the Russell 2000 Index as well as the FTSE Renaissance IPO Index for all holding periods (see *Table 5*). Negative and significant post-merger returns were recorded in in all length intervals when benchmarked against both market indices, except for the Russell-adjusted 18-month BHAR where no significant results were obtained. The post-merger performance is also deteriorating

as time progresses when using both market benchmarks, suggesting that the poor and deteriorating performance of SPACs following the business combination is robust.

5.5.3 Regression analysis using Russell-adjusted returns

The four regression models presented in 5.4.2 *Multivariate analysis* have been re-estimated using the 12-month BHAR benchmarked against the Russell 2000 Index to compare with our baseline regression results where the IPO-adjusted 12-month BHAR was used. In this regression model, the announcement CAR was also changed, wherein the CAR benchmarked against the Russell 2000 Index is used instead of FTSE Renaissance IPO Index. Visible in *Appendix D-2*, we get similar results for regression model 2, 3 and 4, where CAR is negative and significant at the 5 percent level with a similar magnitude to the one documented in our baseline regression. Furthermore, we find that neither operator-led SPACs nor the governance and ownership characteristics have any significant differences on the post-merger performance of SPACs in the new regime, supporting our findings in the baseline case, implying that the result from these three regression models are robust. However, for regression model 1 where we tested the relationship between the time to announcement and the subsequent performance of the combined firm, we only find a negative relationship at the 10 percent significant level, as measured by the linear term, in contrast to our baseline case where it was significant at 5 percent. Furthermore, also in contrast to our baseline case, we find no significance for the quadratic term. While our baseline case suggested that there exists a turning point in where the negative relationship between the time spent searching for an acquisition target and the stock market performance of the combined firm wears off, no such turning point was found when using the Russell 2000 Index as market benchmark. This means that the robustness test reveal that our findings from the first regression model is sensitive to the choice of market benchmark as it only supported a negative relationship between time to announcement and post-merger SPAC performance at the 10 percent level, while the remaining regression models yields similar results when using different benchmarks.

6. Conclusion and Final Discussions

This chapter concludes the main findings with regard to the study's aim and purpose. Our findings are tied back to the theoretical framework, most notably the empirical findings from previous research as well as to the hypotheses. Secondly, the contribution of this study to the SPAC- and corporate finance literature is presented and discussed alongside its practical implications. Thirdly, our suggestions for future research are presented, which are based on the contrasting findings recorded in this study compared to the prior literature. Finally, the chapter ends with a discussion of the study's limitations and their implications for our results.

6.1 Conclusion

This study documents the post-merger performance of U.S SPACs that went public and closed a business combination between 2015 and 2021. While previous SPAC researchers have documented a severe and deteriorating stock market underperformance of the combined firm, this study aimed to progress research and shed light on the performance of SPACs in the most recent regime, in which the asset class has undergone major changes since those of earlier generations. Previous researchers have mainly blamed the sponsor's misaligned incentives to find and acquire a private target firm at any cost for the major stock market underperformance. Drawing on this, we conducted an updated study considering these aspects in times where the SPAC route to the public market has experienced significant growth in popularity as well as has been entered by more legitimate businesses, high-profile sponsors, underwriters and financial advisors.

The result from this study allows us to conclude that SPACs in the new regime does not perform better than those of previous generations. We find that the underperformance relative market benchmarks is apparent already after three months of trading and further deteriorates as time progresses, having similar or even worse market-adjusted returns after two to three years than what has been recorded in previous studies. With a foundation in the agency conflict between SPAC sponsors and their investors, we formulated four hypotheses to determine whether the severe stock market underperformance still is agency related, as suggested by the SPAC literature, even though efforts has been made by regulators to mitigate these conflicts. We do not find evidence for the notion of moral hazard by SPAC sponsors, as we find that spending more time searching for an acquisition target is initially negative but becomes positive once a certain amount of time has passed, consequently not supporting that SPAC sponsors engage in

emergency deals when approaching the liquidation date. Furthermore, we estimated the short-term returns surrounding the acquisition announcement to test whether the market sentiment towards the selected target had any effect on the performance of the combined firm. In line with previous researchers, we document significant positive CARs surrounding this event but surprisingly found that SPACs which experienced positive market reactions tend to perform worse in the de-SPAC period. We also tested whether SPACs managed by sponsors with previous C-suite operating experience, in contrast to only financial or investing experience, perform better as a combined firm. We find no evidence supporting this claim, despite the arguments from previous researchers that operator-led SPACs should outperform their non-operator-led counterparts. Finally, we tested whether the governance and management characteristics of SPACs also have an impact on the performance following the business combination, however, found no evidence on the case. In summary, our results lead to a rejection of all four hypotheses formulated in this report.

6.2 Contribution

To the best of our knowledge, this is the first paper exclusively examining SPACs in the most recent regime, including the record-breaking years of 2020-2021, during which the most SPAC IPOs and business combinations have been executed since the origin of the SPAC in 2003. As previously highlighted, the time period in question is of particular academic interest as there has been an apparent shift in the public and professional perception of SPACs, dividing the most recent regime from those of previous studies. By only examining these SPACs, in contrast to combining these with those of previous generations (e.g., Gahng et al., 2021), we document only the characteristics and performance of SPACs that experienced the inherently different market conditions and dynamics. Thereby, we contribute to the SPAC literature by providing novel and more nuanced evidence in this yet relatively little researched area. Furthermore, some of the most recent SPAC academics, e.g., Lin et al. (2021), still argue that limited evidence exists on the performance and performance-drivers of SPACs. By performing both short- and long-term event studies over different time horizons and holding periods as well as using different market benchmarks, we present extensive evidence on the stock market performance of SPACs, contributing to minimizing the highlighted research gap.

This study also contributes to the literature by presenting both confirmatory and contradictory evidence to the findings of previous SPAC studies. For the long-term post-merger performance of the combined firm, we confirm the findings of previous researchers by continuing to

document a severe stock market underperformance following the business combination. The study does however bring new perspectives to the considerable wealth destruction among SPACs, as brought to attention by previous researchers. While these have argued that shareholders have lost billions of dollars by participating as investors in SPACs, the wealth destruction for the most recent regime is not as substantial as previously documented due to the raw returns being far higher than those recorded in previous studies.

Furthermore, the result from this study also contradicts many of the established determinants of the post-merger performance following a SPAC-related business combination. We contradict previous researchers in mainly two ways. First, that more time spent by sponsors in the search process for an acquisition target should not necessarily be seen as the sponsor engaging in emergency deals and select whichever target firm in order to avoid liquidation. Second, the short-term returns surrounding the acquisition announcement should not be used by investors as a proxy for its post-merger performance and subsequently determine which SPACs to invest in. While we do not deny that this may have been the case in previous SPAC regimes, we provide evidence that the time to announcement and short-term returns do not have the same implications on the contemporary SPAC.

6.3 Suggestions for future research

It is evident from our results that more attention should be directed to SPAC research. As previous established determinants of post-merger performance have partially been rejected by this study, it is appropriate for future researchers to investigate and address the specific determinant of post-merger performance on the granular level, rather than the post-merger performance per se. As the research community, including this paper, are conclusive as to the significant underperformance of SPACs following a business combination, to advance the existing SPAC research, we suggest that future researchers should focus more specifically on the determinants of post-merger SPAC performance. The post-merger performance recorded in this study raises questions on whether it still is low-quality firms that use the SPAC route as a back door to the public market, even though arguments have been made that increasingly more legitimate business have been targets for consummation in recent years. As the existing SPAC research has predominantly investigated the determinants of the post-merger performance from the SPAC's perspective, we encourage future researchers to conduct the analysis from the private firms' view, as it is these firms that are operating as public companies following the business combination. Therefore, focusing more on the details of the private operating firms is

suggested to be the scope of future SPAC-related research to examine their characteristics to possibly highlight aspects that help explain the severe performance of SPACs following a business combination.

6.4 Limitations

We acknowledge that our study has several limitations with respect to the data collection process and methodology. Firstly, our hypotheses required that a significant portion of the data needed to be collected manually from two explicit filings available through the EDGAR database maintained by the SEC, namely the S-1 form and DEFM-14A filings. While this data gathering process is in line with how previous SPAC-researchers have collected their data, it signifies a potential limitation as it introduces subjectivity in the process while leading to an increased risk of human error. In an attempt to minimize these risks, both authors collected the data together, minimizing the risk for human error, and discussions were held when subjective judgement was required. Furthermore, due to our specific line of inquiry, our data was retrieved from a variety of sources and was required to be supplemented at times, increasing the risk of collecting potentially conflicting information. Mitigation efforts included the authors cross-checking the data against other, stand-alone information libraries.

Furthermore, the final data sample came out relatively small due to the nascentness of our sampled SPACs, which prohibited us from collecting long-term performance data for a not-insignificant number of companies in the sample. As the study's purpose was to shed light on SPACs in the new regime, increasing the sample size by extending the research period was not desirable as it would have led to an inclusion of previous generational SPACs as well. With regards to the potential issues of having a relatively small sample size, in an attempt to ensure the reliability of our result, we performed several robustness tests, where the first regression model turned out to be sensitive to the choice of market benchmark and therefore not robust.

In addition, our results are potentially limited by biases. Per our intention to shed light on the post-merger performance of SPACs, we only included those having succeeded with a business combination, hence excluding those that were liquidated, leading to a survivorship bias. However, with regard to the purpose of this study in examining the post-merger performance, no viable solution was found by the authors to address this bias. Furthermore, as we include SPACs that have made their IPO up until 2021-12-31, we are confronted with another bias problem, namely that SPACs qualifying for sample inclusion are those that were quick in

finding and announcing a target firm. This carries implications on Hypothesis 1 and our overall results, as SPACs not qualifying for inclusion might have different characteristics than their included counterparts, ultimately representing another limitation.

Lastly, we have limitations related to the assumptions of OLS. As seen in *Appendix A-4*, the Shapiro-Wilk test indicates that our residuals are not normally distributed. While this assumption is not required for the OLS estimator to be the Best Linear Unbiased Estimator (BLUE), the p-values of individual t-tests for the coefficients could be unreliable, leading to us potentially drawing false conclusions. Furthermore, it is likely that our models also suffer from endogeneity issues. However, in the setting which we are researching, endogeneity is significantly difficult to address as it would require the introduction of instrumental variables, which we lack, representing the final limitation of our study.

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Appendix A. Diagnostic tests

Appendix A shows the results from the diagnostic tests performed before running the regression models to examine whether the statistical assumptions of OLS hold in our models.

Appendix A-1. Test for linearity

Ramsey RESET test		
Model		
Model 1	F(3, 63) = 1.07	Prob > F = 0.3668
Model 2	F(3, 60) = 0.54	Prob > F = 0.6556
Model 3	F(3, 64) = 2.46	Prob > F = 0.0639
Model 4	F(3, 63) = 1.79	Prob > F = 0.1586

H0: Model has no omitted variables

Appendix A-2. Variance Inflation Factor (VIF)

Variance Inflation Factor (VIF)				
Variable	Model 1	Model 2	Model 3	Model 4
log(ANNOUNCE_TIME)	313.50	-	-	-
log(ANNOUNCE_TIME2)	312.63	-	-	-
CAR_IPO	-	1.13	-	-
SPONS_QUAL	-	-	1.10	-
INDEP_BOARD	-	-	-	1.25
SPONS_OWN	-	-	-	1.36
log(SPAC_MKTCAP)	1.15	1.18	1.14	1.40
REL_SIZE	1.23	1.21	1.22	1.49
log(TARGET_AGE)	1.09	1.09	1.09	1.12
BOARD_SIZE	1.27	1.24	1.27	1.28
CEO_SPONS	1.20	1.21	1.21	1.20
CEO_TI	-	-	-	-
CHAIR_SPONS	1.61	1.54	1.58	1.58
CHAIR_TI	1.48	1.42	1.43	1.45
Mean VIF	70.57	1.25	1.25	1.35

Appendix A-3. Test for heteroscedasticity

Breusch-Pagan test

Model	Chi-squared	Prob > Chi-squared
Model 1	7.16	0.0075
Model 2	14.78	0.0001
Model 3	6.04	0.0140
Model 4	4.71	0.0300

H0: Constant variance

Appendix A-4. Test for normality

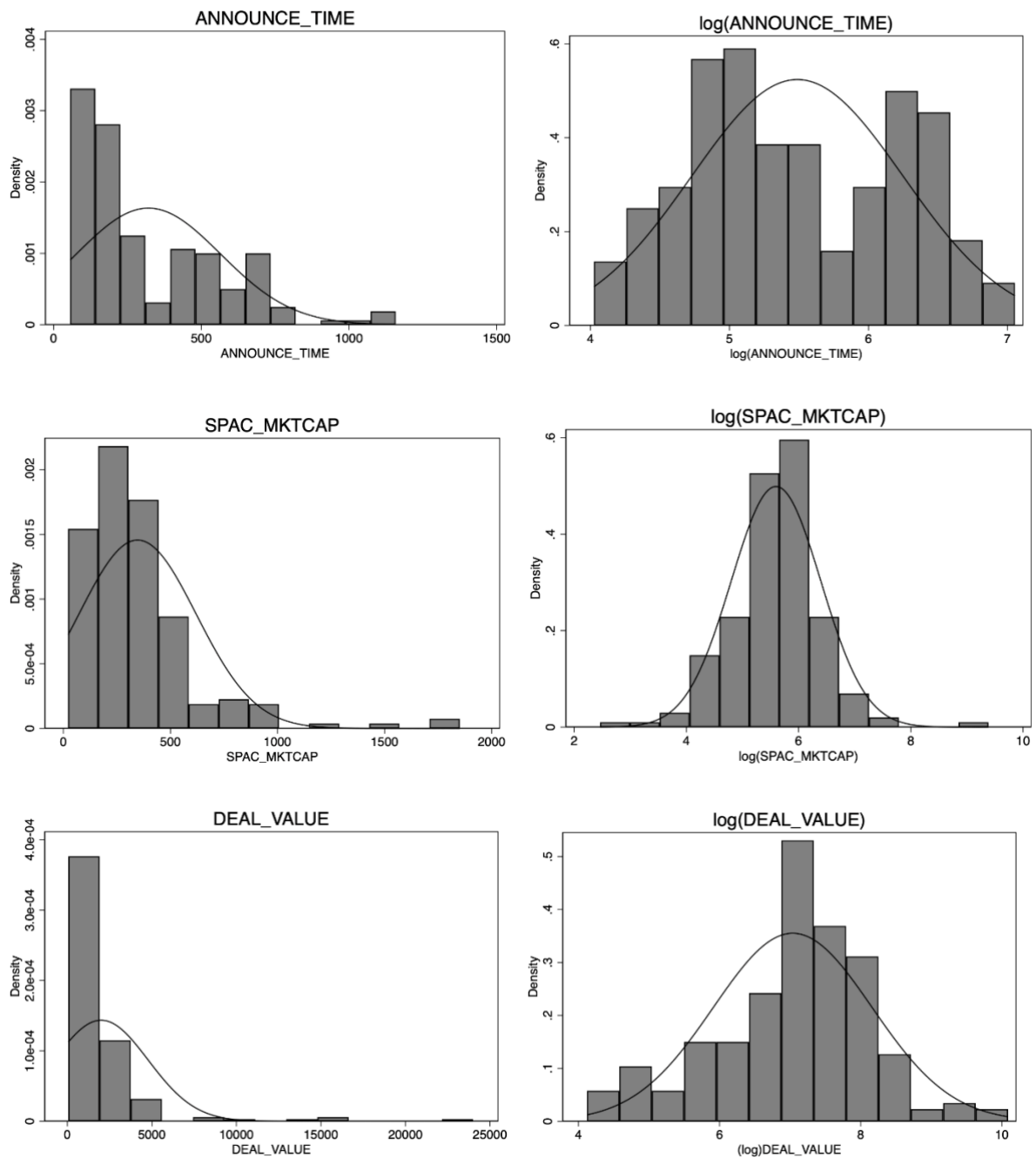
Shapiro-Wilk test

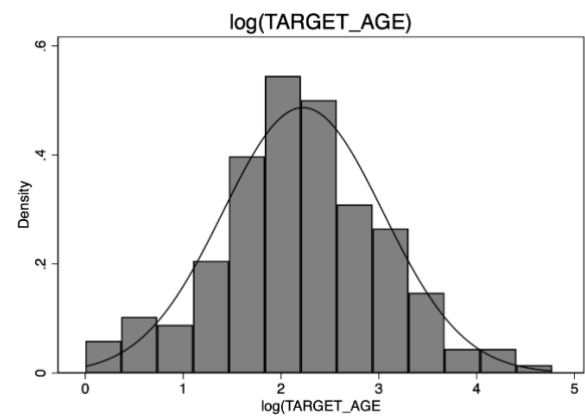
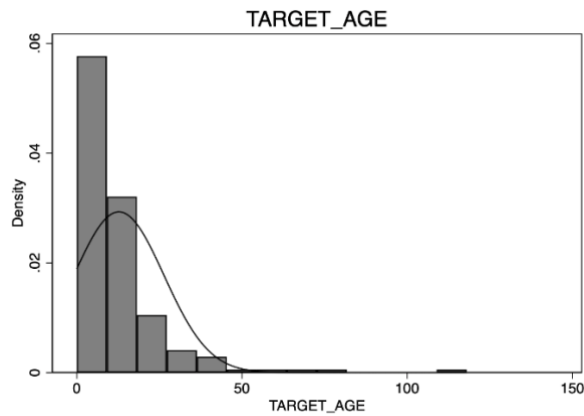
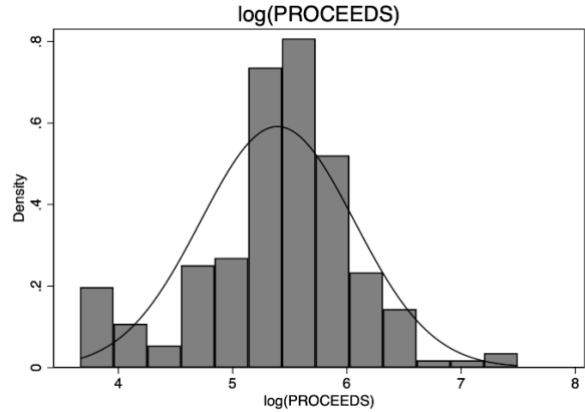
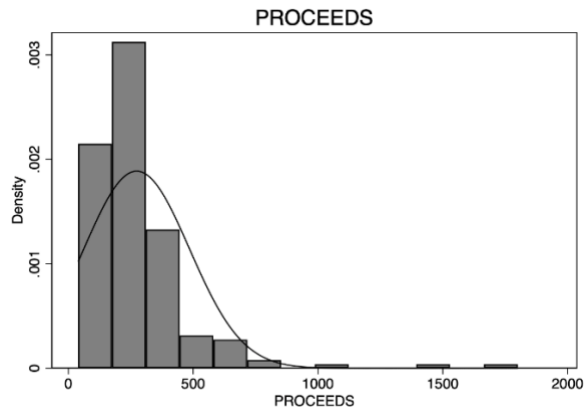
Variable	Obs	W	V	z	Prob > z
Residual Model 1	76	0.85503	9.130	4.817	0.00000
Residual Model 2	76	0.86374	8.581	4.682	0.00000
Residual Model 3	76	0.89583	6.856	4.206	0.00001
Residual Model 4	76	0.88439	7.609	4.434	0.00000

H0: Data is normally distributed

Appendix B. Log-transformation of continuous variables

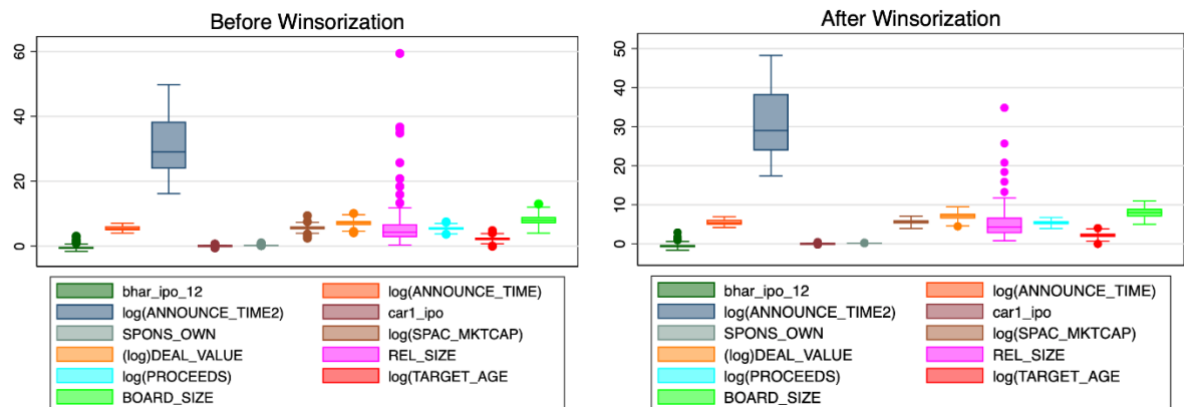
Appendix B shows the continuous variables in its original form and transformed form using the natural logarithm. By using the natural logarithm, the continuous variables appear to be increasingly more normally distributed compared to their original form.





Appendix C. Winsorization of continuous variables

Appendix C illustrates our continuous variables before and after winsorization at the 1st and 99th percentile in order to remove the most extreme outliers in our sample.



Appendix D. Robustness tests

Appendix D shows the tests conducted to check the robustness of our results.

Appendix D-1. CAR at different event-windows

Cumulative abnormal return (CAR)	Mean	Median	t-statistic
Panel A: Russell 2000 Index			
Event window [-2, 2]	0.0545	0.0107	9.875***
Event window [-3, 3]	0.0485	0.0118	7.348***
Event window [-5, 5]	0.0627	0.0112	7.242***
Panel B: FTSE Renaissance IPO Index			
Event window [-2, 2]	0.0573	0.0121	10.417***
Event window [-3, 3]	0.0478	0.0114	7.256***
Event window [-5, 5]	0.0640	0.0111	7.427***

***, ** and * denotes the significance levels of 1%, 5%, and 10%, respectively.

Appendix D-2. Regression using Russell 2000 Index

VARIABLES	(1) BHAR_RU	(2) BHAR_RU	(3) BHAR_RU	(4) BHAR_RU
log(ANNOUNCE_TIME)	-4.1049*			
	(-1.741)			
log(ANNOUNCE_TIME2)	0.3155			
	(1.518)			
CAR_RU		-1.4370**		
		(-2.067)		
SPONS_QUAL			-0.2463	
			(-1.355)	
INDEP_BOARD				-0.0918
				(-0.447)
SPONS_OWN				-1.3558
				(-0.208)
log(SPAC_MKTCAP)	-0.3249	0.1448	0.1580	0.1745
	(-0.927)	(1.153)	(1.283)	(1.387)
REL_SIZE	-0.0787	0.0099	0.0161	0.0105
	(-0.994)	(0.326)	(0.522)	(0.279)
log(TARGET_AGE)	0.1645	0.0581	0.1058	0.0971
	(1.330)	(0.451)	(0.749)	(0.706)
BOARD_SIZE	0.0347	-0.0088	0.0076	0.0037
	(0.587)	(-0.139)	(0.132)	(0.063)
CEO_SPONS	-0.1181	-0.0981	-0.0971	-0.1813
	(-0.380)	(-0.334)	(-0.279)	(-0.573)
CEO_TI	-	-	-	-

CHAIR_SPONS	0.2589 (1.026)	0.1433 (0.582)	0.1745 (0.675)	0.1348 (0.518)
CHAIR_TI	0.2329 (1.006)	0.1471 (0.605)	0.3114 (1.305)	0.3040 (1.196)
Constant	11.7053* (1.702)	-1.2345 (-1.253)	-1.5285 (-1.619)	-1.3038 (-0.705)
Observations	76	76	76	76
R-squared	0.236	0.052	0.077	0.060
Year Fixed Effects	No	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
