How do SPACquisitions Perform?

Empirical Evidence on Post-Merger Performance in SPAC 3.0

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2021

Master's Programme in Accounting and Finance

Abstract

Special Purpose Acquisition Companies ("SPACs") provide targets with an alternative route to the public markets and have grown significantly in popularity in recent years. The existing literature on SPAC performance, which predominantly examines the previous generation of SPACs (pre-2010), reveals that the market tends to react positively to acquisition announcement, while post-merger performance tends to be poor on average. Since then, much has changed: the SPAC market has boomed, and new stakeholders have begun to take an interest in SPACs. This paper aims to find out how the latest generation of SPACs are performing and whether explanations and theories for performance patterns found in previous research still hold. To find out, we apply a quantitative method that involves an event study, multiple regression, and Lasso regression. For a sample of 92 SPACs that announced and completed a merger in the U.S. between 2010-01-01 to 2021-04-08, our study was able to find empirical evidence for both the existence of positive acquisition announcement returns and for poor post-merger performance. In addition, we find that the degree of underperformance tends to increase if underwriters defer a large fraction of their total compensation, and that late mergers perform better on average. Furthermore, we find that greater SPAC sponsor and target insider involvement in the de-SPAC firm is associated with better post-merger performance. Finally, our robustness tests reveal that our findings are sensitive to the choice of benchmark, which causes us to issue a warning to other researchers to be careful with the choice of such in future SPAC performance studies.

Keywords: Special Purpose Acquisition Company, SPAC, Post-merger performance, Moral hazard, Initial Public Offering, Double Selection Lasso

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Acronyms

AMEX	American Stock Exchange
BHAR	Buy-and-Hold Abnormal Returns
CAR	Cumulative Abnormal Returns
CM ranking	Carter and Manaster ranking
CV	Cross Validation
EDGAR	Electronic Data Gathering, Analysis and Retrieval system
EGC	Emerging Growth Company
IPO	Initial Public Offering
JOBS Act	Jumpstart Our Business Start-Up Act
LASSO	Least Absolute Shrinkage and Selection Operator
M&A	Merger & Acquisition
MSE	Mean Square Error
NASDAQ	National Association of Securities Dealers Automated Quotations
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
PE	Private Equity
SEC	Securities and Exchange Commission
SOX	Sarbanes-Oxley Act
SPAC	Special Purpose Acquisition Company
VC	Venture Capital

1   Introduction

In *Section 1.1*, we start by introducing the reader to the relatively new phenomenon of Special Purpose Acquisition Companies ("SPACs") which have seen a huge increase in popularity in recent years. In the same section, we also shortly describe the incredible journey that this corporate phenomenon has undergone in recent years. After that, in *Section 1.2*, we briefly describe the motivation for the study and formulate the research questions that we intend to answer. In *Section1.3*, we summarize our findings and our contribution to the SPAC literature. Finally, in *Section 1.4*, the outline for the remainder of the paper is described.

1.1   SPAC Background

A SPAC is a type of cash shell or blank check company and an acronym for Special Purpose Acquisition Company. The main characteristics of blank check companies are that they do not own any assets (except for cash contributed by the SPAC sponsors and IPO proceeds), have no underlying operating business and also no previous operating track record. This means that the only information that investors possess about SPAC at the time of IPO is information about the SPAC management team, such as their identity and their previous achievements (Jog & Sun, 2017). The main purpose of a SPAC is to raise public capital with the intention of later merging with a private target, thereby taking the company public. This means that private firms that choose to and successfully merge with a publicly listed SPAC can raise capital and achieve public listing status without having to go through the standard time consuming and costly IPO procedure. The transaction that enables this to happen is technically a reverse merger and is often referred to by practioners as de-SPACing (Gahng et al., 2020).

SPACs have also been described using PE industry analogies when described as one-shot private equity deals (Dimitrova, 2017) or single deal private equity funds (Jenkinson & Sousa, 2011). The utilization of SPAC vehicles for private firms seeking public listing status have become very popular in recent years and as a result, SPAC vehicles have reached record levels in raised capital.

The first IPO of a Special Purpose Acquisition Company ("SPAC") took place in the U.S. in August 2003. The SPAC company, Millstream Acquisition Corporation, also became the first SPAC ever to complete a merger when they successfully merged with NationsHealth Inc. in September the following year (Kolb & Tykvová, 2016). Since then, the market for SPACs has gradually grown larger, with more and more SPAC listings each year. At the peak of the wave in 2007, SPAC IPOs accounted for 14% of the total IPO market. In 2020, that figure was about 50% (Nasdaq, 2020). In 2020 alone, SPAC companies in the U.S. raised $75,3bn, which is

more than what have been raised by SPAC companies in total in all previous years combined (Gahng et al., 2021).

Figure 1 illustrates the number of SPACs that completed IPO between 2010 and 2020. This figure hit 248 in 2020, which is around four times more than that in the previous year.
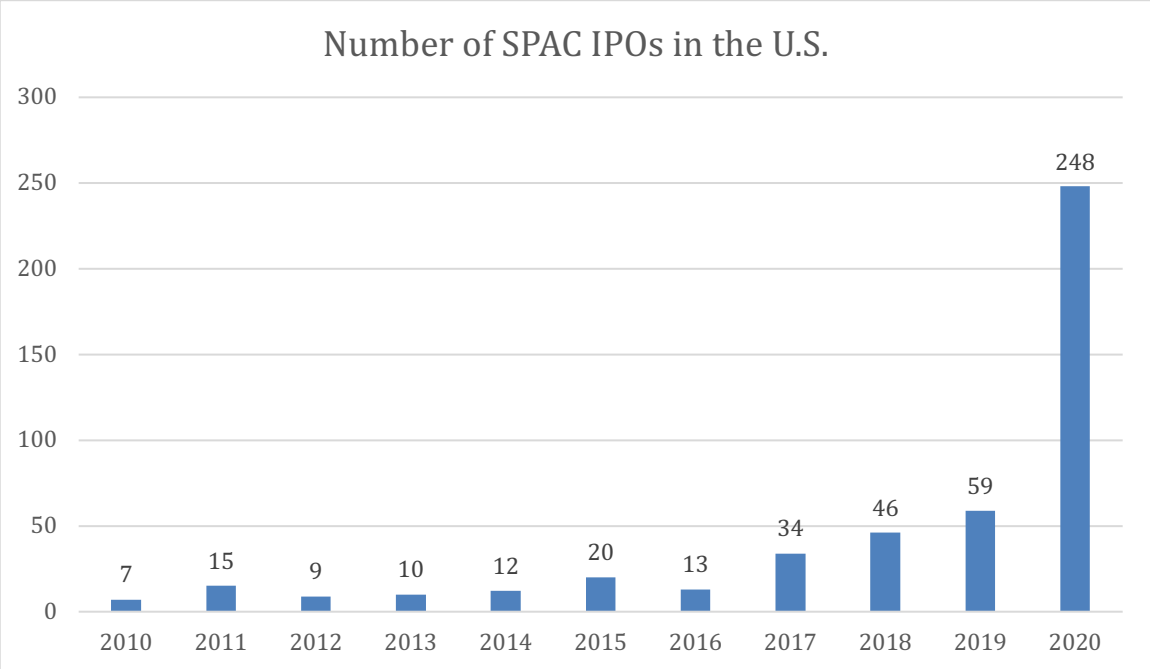
Figure 1. Number of SPAC IPOs in the U.S. 2010-2020

Figure 1 illustrates the number of SPAC IPOs in the U.S. between 2010 and 2020. The number of SPAC IPO has grown exponentially from 2010, hitting listing record in 2020. Source: www.spacresearch.com

Between 2003 and 2010, it was mainly smaller and highly indebted companies with poor future prospects that chose to go public with SPACs (Kolb & Tykvová, 2016). Furthermore, the investment banks involved in underwriting the offerings were generally lower tier investment banks (Riemer, 2007; Heyman, 2007).

Since 2010, several game changing events have taken place. Having prior to 2010 almost predominantly been traded over-the counter on the Over-the-Counter Bulletin Board ("OTC-BB"), SPACs are now exclusively traded on the major and well-known stock exchanges such as AMEX, NYSE and Nasdaq (Castelli, 2009). Over time, and as SPACs have gained increasing legitimacy, larger and more high-profile companies have also begun to take an interest in SPACs as an alternative to normal IPOs. The same applies to SPAC sponsors, who have a similar role as General Partners in private equity funds. A concrete proof of this is when Social Capital Hedosophia Corporation, a SPAC company run by the series entrepreneur and former Facebook senior executive Chamath Palihapitiya, merged with Virgin Galactic in 2018. Another consequence of larger companies starting to show interest in SPACs is that the most prestigious investment banks, such as Credit Suisse and Goldman Sachs, have also been attracted to underwrite SPAC deals. The market shares of prestigious underwriters have increased steadily, and continues to increase year by year (Lakicevic & Vulanovic, 2013; Scachmurove & Vulanovic, 2017.

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Finally, several regulatory changes have taken place both pre- and post-2010 that have affected the IPO market. In 2002, the SEC passed the Sarbanes-Oxley Act ("SOX"), which proved to have an inhibitory effect on the number of IPOs due to the high regulatory compliance burden put on companies. In an attempt to boost and restore IPO activity, the JOBS Act was passed in 2014, which aimed to ease some of the costly compliance requirements demanded by the SOX, especially for small fast-growing firms.

The reasons behind the increased popularity of going public through SPACs relative to the traditional IPO route may be manyfold. According to a 2021 report by the Security Exchange Commission (SEC), one of the major advantages that have been brought up by practioneers is that from the perspective of the private company, going public through a SPAC deal drastically reduces uncertainty as to pricing and control over deal terms (SEC, 2021a). This is because, unlike going public through the traditional IPO process, the incumbent private owners can reach an agreement regarding sales proceeds directly with the SPAC company outside of the public market and can thus avoid the uncertainty related to the public market's assessment of the company's value. Also, all necessary correspondence with the SEC as well as related filings have already been submitted by the SPAC company in advance, enabling target firms to achieve public status with less complications and within a significantly shorter time frame, usually within a couple of months as compared with traditional IPO that usually takes up to a year to complete (Sjostrom, 2007). Other benefits are the security that investing in SPAC companies brings to investors. Shareholders of SPACs have the right to vote against a proposed merger and redeem their shares. If a merger is not consumed within a prespecified time limit, contributed funds will also be redistributed back to the shareholders at the pro rata value (Jenkinson & Sousa, 2011). Among the disadvantages are the uncertainty associated with whether a proposed merger will eventually be completed or not and that the large proportion of warrants that are usually held by SPAC sponsors may eventually lead to a significant dilution of the common stock (Berger, 2008).

1.2   Motivation for the Study and Research Question

Since SPAC's inception, several researchers have been attracted to studying SPACs and to gain an increased understanding of the multifaceted SPAC concept from different points of view. The studies that have been conducted to date, however, have some common denominators: they examine SPAC performance on the first modern SPAC era between 2003 and 2010 (often referred to as SPAC 2.0) and are, in general, characterized by very small samples. In most cases, the small samples have in turn prevented researchers from conducting post-merger performance studies with longer time horizons than a couple of months following a merger (Jenkinson & Sousa, 2011; Jog & Sun, 2007). Considering this, while also taking into account what has been discussed above, makes it particularly interesting to conduct an updated study on SPAC performance that is focused on the latest SPAC wave. Consequently, we aim to study post-merger SPAC performance for all transaction that took place between January 2010 and April 2021 in the U.S.

The research questions that we intend to answer, and which form the basis of our study are the following:

1. How is the latest generation of SPACs performing?
2. Can the chosen explanatory variables explain post-merger performance in the latest generation of SPACs?

1.3   Findings and Contribution

Since the beginning of the modern SPAC era in 2003, SPAC related performance studies have been of great interest to the research community. Most studies that examine SPAC performance in the previous generation of SPACs conclude that announcement returns are positive on average (Howe & O'Brien, 2012; Lakicevic & Vulanovic, 2013; Rodrigues & Stegemoller, 2014; Dimitrova, 2017). The results from our study suggest that acquisition announcement returns tend to remain positive on average for the latest generation of SPACs when compared with normal IPOs and market benchmark. These findings are stable even when controlling for different event windows. Our interpretation of positive CAR is that ex-post market sentiment is positive on average which could imply that the market looks favourably upon the SPAC sponsors' choice of announced targets. We also find that post-merger BHAR tends to remain exceptionally poor on average, in line with what has previously been reported for the previous generation of SPACs, both 6 months after completed acquisition (Jog and Sun, 2007) and over longer time horizons (Kolb & Tykvová, 2016; Datar et al., 2012; Dimitrova, 2017).

Our regression results disclose a negative relationship between announcement returns and post-merger BHAR, which can potentially be attributed to the market's difficulties in making correct assessments of companies' fair market value in advance (Akerlof, 1976) and which can be further fuelled by diverging opinions between optimistic and pessimistic investors (Ritter, 1998). Furthermore, we find that the risk of investors being exposed to moral hazard increases when participating underwriters defer a large portion of their total compensation. Besides, we also find that acquisitions that take place close to the predetermined deadline tend to be beneficial, rather than detrimental, to investors. Dimitrova (2017) argues that SPAC sponsors have perverse incentives to complete any acquisition, even a bad one, if the time limit approaches because they have little to lose from applying such a strategy but much to gain. Our findings rather suggest that more time and effort spent by SPAC sponsors searching for targets increases the likelihood of finding a "good" target, ultimately resulting in better performance. Finally, the choice of chairman in the de-SPAC firm seems to be important for post-merger performance. More specifically, the appointment of a SPAC sponsors or a target insider as chairman seems to be associated with better subsequent performance. However, our findings are sensitive to the choice of benchmark used, so we issue a warning that one must be careful with the choice of such when conducting SPAC performance studies.

Our study involves several contributions to the SPAC litterature. First, we examine SPAC returns surrounding acquisition announcements and post-merger performance for the latest generation of SPACs in the U.S., namely between January 2010 up to April 2020, which to the

best of our knowledge have previously only been studied to a limited extent and thus needs more research. Second, we document and compile the whole journey from the scandal-ridden shell companies in the 1980s and describe how the regulatory development ultimately shaped the modern SPACs of today. Furthermore, we examine post-merger performance for several different time horizons; from 6 months up to 36 months after completed acquisitions which allows us to compare short and long-term performance. Finally, we examine the prevalence of moral hazard and agency related problems in the latest SPAC wave that shareholders may be exposed to, how the choice of governance structure tends to affect post-merger performance and how the same is affected by ex-post market sentiment following acquisition announcements. The latter, ex-post market sentiment, has to the best of our knowledge not previously been used as an explanatory variable in post-merger performance studies, which constitutes an additional contribution.

1.4 Outline

The reminder of the thesis is structured as following: Section 2 discusses some of the major theories that are particularly applicable to our study, such as Agency theory, incentive asymmetry and Moral hazard, and reviews and summarizes the existing SPAC literature and discoveries made from the most influential papers on SPACs to date. Section 3 describes the entire SPAC lifecycle and process, from the initial public offering of the SPAC shell to the final reverse-merger transaction whereby a private target achieves public listing status, as well as the entire development that shell companies have undergone from the 1980s, how these evolved to eventually become today's modern SPACs and the evolution of U.S. financial market regulations. Section 4 introduces all hypotheses that we intend to test for in this study. Section 5 presents the methodologies used by the authors, such as event study, multi-regression and double selection Lasso. Section 6 describes our data and the sources used to collect data, while in Section 7 we present our results and discuss our findings in relation to our expectations and previous research. Section 8 finally outlines the conclusion of the study where our research questions are also answered. We also report the limitations of the study and suggestions for future research.

2   Literature Review

Since inception, performance studies on modern SPACs have been of great interest to the research community. The first modern SPAC was established in 2003 which means that SPAC is a relatively new field of study that remains quite unexplored. Academics that have studied SPAC performance have mainly examined short-term performance as the availability of data has been limited. Consequently, the existing SPAC literature is far from as comprehensive as the traditional IPO literature. Since 2003, several changes in the legal framework surrounding SPACs have taken place (more on this in Section 3). In this section, we begin by discussing the major theories related to SPACs. After that, we summarize the findings from the most influential papers on SPAC performance to date.

2.1   Major Theories Related to SPACs

Agency problems in corporate settings have been widely discussed ever since the concept of separation of ownership and control was introduced (Berle & Means, 1932). Agency problems refer to the problems related to asymmetry of incentives that may prevail between different stakeholders and which may consequently lead to agents, appointed by the principals to act on their best behalf, acting in a way that maximizes their own wealth rather than that of the principals (Morck et al., 1990). These problems arise because there is information asymmetry between certain parties and because the behaviour of an individual party is not possible to observe (Holmstrom, 1979). In addition, contracts between principals and agents are never complete, making it difficult for principals to foresee all possible actions of the agents a priori (Jensen & Meckling, 1976). This in turn risks giving rise to various agency costs that shareholders will ultimately have to bear.

The findings from most M&A performance studies suggest that the value created through acquisitions, if any, tends to end up in the pockets of target owners rather than in those of the acquiring company shareholders (Morck et al., 1990; Hackbarth & Morellec, 2008; Mateev, 2017; Königs & Schiereck, 2008). This raises the question of why managers, who are appointed by shareholders to act in their best interests, choose to pursue acquisitions in the first place when they tend to not be value creating for acquiring shareholders on average. Roll (1986) argues that many business leaders suffer from hubris which causes them to overestimate their ability to run the business, which, in turn, causes them to overpay for targets. Another explanation is that of Morck et al (1990), who instead argues that managers' self-interests often drive acquisitions, and that managers are willing to overpay for targets if the personal benefits are large enough. Another explanation that has been discussed is that CEOs tend to prefer to manage a large company rather than a small one because running a large company is often

associated with higher pay and more prestige (Grinstein & Hribar, 2004). Acquisitions can thus be used by CEOs as a tool to achieve several personal benefits at the expense of shareholders (Chen & Sougiannis, 2012).

Monitoring is often mentioned in the literature as one effective measure to counteract this type of problem. However, monitoring also incurs costs, so the optimal degree of monitoring depends on the marginal cost of monitoring relative to the reduction in agency cost (Jensen & Meckling, 1976). Furthermore, the conflict of interest between shareholders and management tends to worsen if managers have little or no ownership at all in the company they run. Under such circumstances, management has an even stronger incentive to take actions that are favourable to themselves, even if they are not favourable to shareholders, as they do not have to bear responsibility for the consequences of their actions (Berk & DeMarzo, 2016). This is an example of a behaviour that is usually referred to as moral hazard. With unlimited upward potential and limited downside risk due to limited liability, shareholders have incentives to increase risk-taking in the company and to pay out large dividends if the negative consequences are borne by someone else, such as creditors (Jensen & Meckling, 1976). This example illustrates an interest asymmetry between shareholders and creditors which may give rise to a moral hazard problem.

Contractual design, not least related to managers' compensation packages, has been considered as important measures to get managers to act in the best interests of shareholders (Coffee, 1988). Incentive contracts have proved to be certainly important to align incentives between the general partners and investors in the VC industry (Litvak, 2009) as well as in in SPACs (Rodrigues & Stegemoller, 2013). To motivate general partners in VC firms to maximize investors returns, general partners' compensation is usually split into different components. In addition to an annual management fee that amounts to about 2% per year and is based on the entire capital they manage, they also receive their largest portion of compensation through a so-called "carried interest" which is paid as a percentage of the profits generated by the fund, usually 20% (Sahlman, 1990). It is also common to specify in the contracts a limit for how much capital may be invested in each company and how much time, as a minimum, that needs to be dedicated to management of the fund by the general partners (Sahlman, 1990). In addition to this, general partners also invest part of their private wealth in order to make them less likely to make unfavourable decisions, as they will then also suffer from the negative consequences.

In summary, contracts between investors and general partners in the VC industry are designed in such a way that general partners should be motivated to work in the best interests of investors, thereby reducing the risk of moral hazard.

2.2   SPAC Performance

Prior to 2007, several studies had been conducted that examine announcement effects surrounding reverse merger transactions (Gleason et al., 2006; Aydogdu et al., 2007). These studies, however, focus on shell companies, i.e., the forerunner of modern SPACs. Apart from the fact that both shell companies and blank checks are publicly traded entities, Aydogdu et Al.

(2007) argues that the similarities are few. In contrast to blank check companies that possess large cash holdings, traditional shell companies do not possess any assets, nor do they have any ambition to carry out an M&A transaction (Aydogdu et al., 2007). The first study on modern SPACs was the study conducted by Jog and Sun (2007). In their pioneering study, the authors examine SPAC returns between the IPO date and two months following the completion date from different stakeholder perspectives. The results found are striking to say the least. While SPAC sponsors earn an average of 1900%, abnormal returns for investors during the same time period are negative, on average minus 17%. This extremely skewed distribution of wealth is according to Jog and Sun (2007) attributed to the SPAC sponsors' ability to, prior to the SPAC IPO, buy additional securities at a substantially lower price than the listing price through so called "private placements", which constitute the "risk capital" of the SPAC sponsors. In the event that management fails to close a deal before the expiration date, these securities will expire worthless (Lewellen, 2009). On the other hand, these securities have the potential of becoming extremely valuable upon successful business combination, which according to Jog and Sun (2007) explains the skewed distribution of wealth between SPAC management and other shareholders in their study.

In another study by Jenkinson & Sousa (2011), similar findings are made when measuring post-merger performance from the time of the merger approval (decision date), namely that SPAC performance tends to be poor on average. According to Jenkinson & Sousa (2011), the SPAC structure creates extreme incentives to pursue an acquisition for the sponsors because their compensation is fully conditional on a successful merger. That is, if the firm is not consummating a business combination within the time limit, their options will expire worthless, and they will only receive the liquidation value. Up to the point of the acquisition announcement, the observable market price is trading close to the IPO price as not much information has yet been revealed. When the SPAC announces an acquisition, new information is revealed to the public, causing stock prices to move and reflect what the market believes to be the true value of the deal. After that, investors can "vote with their feet" by voting for or against the proposed deal and consequently remain invested or redeem their shares (Lewellen, 2009). Jenkinson & Sousa (2011) argue that ex ante market prices are informative to investors in regards of expected future performance, and investor therefore should listen to the market, making their decision whether to stay invested or not based on the liquidation value relative to the market value. They show this by dividing SPAC companies into "good SPACs" and "bad SPACs" based on their market price at the announcement date, where "good SPACs" are SPACS whose market value exceeds the trust liquidation value at the time of the announcement, while "bad SPACs" are SPACs with market values below the trust value. Interestingly enough, the authors found that "good SPACs" performed significantly better than "bad SPACs", and that the latter ones suffered -39% and -69% cumulative abnormal returns 6 months and 1 year following the announcement date, respectively. In sum, investors who made their decision based on this rule experienced positive returns, while investors that went against the market signal experienced significant losses.

These findings are also partially explained by the authors on the basis of the conflicts of interest between SPAC managers and investors. At the time of the IPO, investors hand over a large pile of money to the SPAC sponsors, who then conduct an IPO from which they retain about 20% of the capital value. SPAC sponsors do not enjoy any salaries or other compensation for their searching effort (it is virtually non-existent) but the ultimate compensation is instead realized

from the value of their ownership if and when a merger is eventually effectuated. Dimitrova (2017) discusses the implications that such a design of SPAC contracts creates. Not only do SPAC managers have very much to win from pursuing "any acquisition over no acquisition", also underwriters have similar incentives since a large portion of their underwriting compensation is usually deferred and only paid out upon a successful merger. In other words, since the pay-out for both SPAC sponsors and underwriters is not tied to performance but rather to completed transaction, investors risk being subject to the moral hazard problem from two directions: both by the SPAC management team and by the financial institution who undertakes to underwrite the deal (Dimitrova, 2017). As the author points out, it is conceivable that the that SPAC managers might become desperate to find any target when time starts running out as they otherwise will face liquidation. In her sample consisting of 72 SPACs that went public between 2003 and 2010, Dimitrova found evidence in support of these arguments, namely that merger announcements that took place close to the predetermined deadline performed worse on average. Furthermore, Dimitrova (2007) also finds a significant negative relationship between the degree of deferred underwriting fees and long-run performance, which she also attributes to underwriters being prone to pitch deals to the SPAC management team even if they are lemons. This is because their deferred compensation, just like the compensation of the SPAC's sponsors, is binary and thus paid out only upon a successful deal regardless of if the deal is good or bad.

Howe & O'Brien (2012) also examines SPAC performance for a sample of SPACs that went public and completed an acquisition between 2003 and 2008. While the authors find positive returns surrounding acquisition announcements, on average 1,4%, they also find that long-term performance is poor, on average -14% (after 6 months) and -53,8% (after 3 years) following completed acquisitions. In addition, Howe & O'Brien (2012) examine how ownership structures and corporate governance impact both short- and long-term performance. The main findings are that acquisition announcement returns are not affected by either SPAC sponsors or institutional ownership, and that the composition of the board (such as the fraction of board members that constitutes of independent directors) also does not tend to have an impact on short-term performance. These findings are explained by the fact that incentives are not aligned between sponsors and shareholders. In summary, the authors emphasize that the development of the SPAC concept and regulatory changes that have taken place post 2010 have the potential to reduce the observed conflict of interest, which in that case could potentially remedy the dysfunctional structure.

2.3   SPAC IPO vs. Traditional IPO

Several studies have been focusing on why private firms choose to go public through a SPAC merger instead of the traditional IPO. While normal IPOs can take a year to complete, going public through a SPAC transaction can be done in a matter of weeks (Sjostrom, 2008; Riemer, 2008). This time difference can be directly decisive for the survival of some companies, especially for companies that are running short of money, and can provide an explanation for why more vulnerable companies choose to go public through a reverse merger transaction with SPACs rather than through normal IPO (Kolb & Tykvová, 2016).

Another advantage of SPACs are the low underwriting fees, on average around 3,5% (Gahng et al., 2020), relative to the high average gross spread of 7% associated with traditional IPOs (Ritter, 2000; Torstila, 2001; Loughran & Ritter, 2002). As Lowry et al. (2017) documents, a large portion of the total gross spread in traditional IPO underwritings is to compensate the lead underwriter for its underwriting effort and to cover underwriting expenses, such as roadshows and underwriter counsel. Since the marketing of the deal is not necessary for SPAC IPOs and the level of effort that must be performed by underwriters is also lower, the result is a lower gross spread.

Conducting an IPO in the traditional way also requires the support of underwriters who are willing to underwrite the offering. As a general rule, underwriters are not willing to underwrite offerings if the company in question has revenues below $ 20 million, net income below $ 1 million and has the potential to maintain a high growth for the five years following the IPO (Sjostrom, 2008). These high demands on companies imply that many companies cannot satisfy the requirements and are thus excluded from the opportunity to go public through the normal IPO mechanism (Sjostrom, 2008). Thus, another major advantage of reverse mergers is that they allow firms to go public even though they may not meet these requirements. (Riemer, 2008). Furthermore, going public through a SPAC acquisition may be advantageous since the SPAC possess large cash holdings in the form of IPO proceeds and can thus provide the private target with a large cash injection. In addition, merging with a SPAC will ensure a high degree of share liquidity post acquisition. This is because a trading market for the SPAC's shares has already been established a priori (after the SPAC IPO) and the SPAC's underwriters have incentives to support trading after the merger. These mechanisms contribute to increased attractiveness of SPACs (Sjostrom, 2008).

Berger (2008) analyses the IPO market between the years 2003 and 2008 and notes that SPACs are associated with several advantages that private companies are not able to benefit from if they go public the traditional route. According to Berger (2008), the SPAC route is particularly advantageous when circumstances are complicated, for example as a result of temporary market distortions. Under such conditions, firms may be forced to postpone projects, which may hamper growth and thus the opportunity to carry out a normal IPO. Thus, the SPAC route may be of particular interest to companies operating in niche industries (Berger, 2008). In addition, niche industries are not diligently followed and covered by analysts and few analysts possess extensive industry knowledge. This lack of expertise along with few comparable firms to benchmark with might lead to lower valuations (Berger, 2008).

Gleason et al. (2015) compare costs and legal requirements for both the traditional and non-traditional going public options and finds that reverse merger fees are substantially lower, equalling 2,7% on average compared to normal IPOs with average gross spreads of 7,2% (Lee et Al. (1996). In addition, the authors find that reverse mergers are associated with significantly less underpricing than normal IPOs, and that they, unlike normal IPO's, are insensitive to hot and cold markets and can thus be executed regardless of market situation (Gleason et al., 2015). Kolb & Tykvová (2016) argues that cash-out motives are also of great importance to the target owners when determining how to go public. In the case of a normal IPO, restrictions follow that limit the existing owners' ability to sell shares, namely through lock-up provisions. Thus, owners are only allowed to make partial exit with normal IPO. SPACs, on the other hand, possess large cash reserves that are stored in the trust account. These cash reserves that mainly

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consists of the IPO proceeds can be used to redeem existing shareholders in exchange for a larger portion of cash in connection with merger transactions.

There are, however, also disadvantages associated with SPACs. SPAC sponsors, who often hold large portions of warrants, can upon completed merger exercise their options, which in turn can erode the value of target shareholders' shares and thereby discourage them to get involved with SPACs (Lakicevic et al., 2014). Furthermore, the low listing requirements enables firms to access the public markets that otherwise would not be able to go public (Gleason et Al., 2015). The low requirements have led to smaller and less profitable firms choosing to go public via reverse mergers (Kolb & Tykvová, 2016). According to Gleason et al., (2015), cherries will instead use the traditional route as a way to signal their quality and distinguish themselves from lemons. Thus, choosing the SPAC route can potentially lead to damaged reputation (Gleason et Al., 2015). Finally, shareholders in SPACs have the opportunity to vote down acquisition proposals through their veto rights. This mechanism contributes to uncertainty regarding deal approval which in turn can discourage private companies from negotiating with SPACs.

2.4   SPAC Incentives

SPACs are a unique form of organization with several stakeholders involved. As Howe & O'Brien (2013) point out, these various stakeholders have widely different interests which in turn has the potential to lead to conflicts of interest between a number of stakeholders involved.

First, shareholders are interested in maximizing their returns but have very limited information to support their decision making by the time they invest their money. Thus, shareholders are in a vulnerable position from the very beginning of the lifecycle (Jog and Sun, 2007). In addition, SPAC investors fear that sponsors may abuse their position of power in various ways. One such example is salaries to SPAC sponsors, as they erode capital intended to be used for acquisitions. To deal with this potential conflict of interest between shareholders and SPAC managers, the contracts are primarily designed so that the sponsors are not entitled to any ongoing compensation for their work. Instead, the SPAC management compensation consists of the value attributed to their shares in the event that they complete a deal. In theory, this contractual design would thus align the incentives of shareholder and SPAC managers. However, SPAC sponsors have limited time to find and acquire a private target, usually 18-24 months (Jenkinson & Sousa, 2011). If they fail to find a target within this prespecified time limit, the SPAC must be liquidated, after which the SPAC sponsors' compensation is not forthcoming. This may potentially expose shareholders to moral hazard related problems since SPAC sponsors are desperate to close any deal prior to the expiration of the time limit (Dimitrova, 2017). To deal with this potential conflict of interest, it has become increasingly common for SPAC sponsors to invest a larger part of their private wealth, thereby increasing their "skin in the game" (Rodrigues & Stegemoller, 2014). According to the authors, more private wealth invested in the SPAC by the SPAC sponsors is intended to motivate them to only pursue high quality deals, as they would suffer more from making bad acquisitions.

Furthermore, it is not uncommon that SPAC managers, prior to the shareholder vote on a proposed acquisition, substantially increase their ownership positions by buying shares on the open market (Jenkinson & Sousa, 2011). By doing so, SPAC sponsors can ensure themselves that they end up holding a sufficiently large stake in the SPAC they manage (at least 20%) that can turn into a fortune upon successful business combination. In addition, the authors claim that this strategy can be interpreted as management trying to buy shares of likely "no" voters, thereby increasing the probability of a successful vote. These acquired shares give SPAC sponsors the same rights as outside shareholders when it comes to voting rights for proposed acquisitions and trust value claims upon liquidations. Thus, SPAC sponsors can use these shares to ensure a successful vote, and, once the deal is completed, sell the shares on the open market (Jenkinson & Sousa, 2011).

Also, in order to attract investors and protect them from the exploitation of managers, it has become increasingly common for the entire capital raised in the IPO to be placed in escrow accounts during the searching period, which generates a guaranteed return. Because of this, SPAC shares should never trade below the discounted trust value per share before a business combination is completed (Lewellen, 2009).

As is well known, investors in SPACs receive both shares and warrants. The offering from investors point of view can be seen as a risk-free zero-coupon bond with an option on a future acquisition (Cumming et al., 2014; Lewellen, 2009). This gives rise to another kind of conflict of interest, namely that investors can pursue a risk-free arbitrage by voting down proposed acquisitions because if they do so, they are entitled to receive the full pro rata per share trust value. Large block holders, such as hedge funds, can also engage in an activity referred to as "SPAC mailing". This strategy involves threatening to vote against a proposed acquisition if the SPAC sponsors are not willing to buy the large block holder's shares at a significant premium to market price (Lewellen, 2009; Howe & O'Brien, 2012). This example illustrates a prevailing agency conflict that exists between influential shareholders and minority shareholders and has proven to be particularly attractive to pursue for SPAC sponsors under certain conditions (Howe & O'Brien, 2009). If the trust value per share is less than the market value per share, the greater is the risk that the proposal will be voted down by the incumbent shareholders. Under such conditions, SPAC sponsors are particularly willing to overpay for the shares, because when the shares change hand the SPAC sponsors can increases their influence over the voting. Consequently, if the voting goes through, management can reap large profits even if that is not the case for shareholders (Jenkinson & Sousa, 2011).

In addition, the investment banks involved in the underwriting process constitute a gatekeeper role and also act as SPAC stakeholders (Sjostrom, 2008). Not only do underwriters help structure the deals to make them appealing for potential investors, they also often act as advisors to the SPAC management team (Lakicevic & Vulanovic, 2013). In addition, it is not uncommon for underwriters to purchase SPAC shares for their own account (Shachmurove & Vulanovic, 2017). In the early years, SPAC underwriters received their full compensation up front, which later proved not to harmonize enough with investor preferences (Lewellen, 2009). Nowadays, it has become increasingly common for underwriters to defer a portion of their compensation to make it conditional on a successful acquisition (Heyman, 2007). Shachmurove & Vulanovic (2017) report that the average deferred fees were 0% in 2003, 32% in 2006 and as high as 60.7% in 2016. The logic is that delaying parts of the compensation should weld interests between

SPAC managers, underwriters, and investors so that deal approval probability increases. In addition, deferring a portion of the underwriting fees implies a higher proportion of funds to be stored in the trust account, as they would otherwise be subtracted from the trust account. As a result, deferred underwriting fees contribute to increased investor security and increased attractiveness of the SPAC offering (Lewellen, 2009). However, as a larger part of the fees has begun to be postponed, underwriters have become even more inclined to pitch deals, even if they are not financially optimal, in order to be able to collect their full compensation (Dimitrova, 2017).

3 The SPAC Process and Regulatory Framework in the U.S.

3.1 How SPACs Work

The lifecycle of SPACs starts with SPAC sponsors, usually business veterans with extensive industry experience, conducting an initial public offering (IPO) of the SPAC company whereby capital is raised with the intention of later merging with a private target company (Gahng et al., 2021). Prior to the IPO, the SPAC sponsors purchase so called "founder shares" which are Class B shares that are non-redeemable and without voting rights but that will convert into Class A shares if a successful business combination is consummated (Gahng et al., 2021). These founder shares are acquired for a substantially reduced nominal price, often around one tenth of a cent, and are designed in such a way that the sponsors will maintain an ownership share corresponding to at least 20% of the SPAC following the IPO (Gahng et al. 2021; Vulanovic, 2017). This structure provides the SPAC sponsors with great incentives as these founder shares can become very valuable if the SPAC successfully merges with a target at a later date. The public offering, on the other hand, consists of a combination of shares, warrant and rights. The shares are almost predominantly offered at a price of $10 and accompanied by one or more warrants that gives the holder the right to convert each warrant to equity in the combined firm if a business combination is successfully consummated (Gahng et al., 2021). The same goes for rights which also resembles a publicly traded call option on the combined firm but with the difference that they are not subject to broker commissions when exercised. It is not unusual that SPAC sponsors, in addition to their founder shares, also acquire warrants for a value of at least $5m at the time of the public offering, something that is referred to as a Private Placement (Gahng et al., 2021). Once the IPO is completed, the IPO proceeds are placed on a trust account. The portion of the underwriting fees that is conditional on successful merger completion (deferred underwriter fee) is also stored in the trust account. The trust account amount to at least 90% of the SPACs total assets and are placed in government securities, yielding the risk-free rate (Jenkinson & Sousa, 2011).

This high proportion of assets stored in Escrow accounts may partially provide explanation to the increasing interest of investing in SPACs, as the invested funds are secured until investors approve the acquisition of a target (Jog and Sun, 2007). A higher proportion of cash stored in escrow accounts can also provide a signal to the market of operating efficiency as it implies less money needed to cover operating expenses (Cumming et. Al., 2014). Despite this it is important to notice that given a 90% trust amount (i.e., ten percent of total cash holdings can be used by SPAC sponsors to cover searching expenses and other expenses) and underwriting

fees of 4%, that implicitly means that investors are willing to waive 14% of their investment during the searching period which in turn sheds light on the strong faith investors place in the SPAC sponsors ability to find a good target. It is, however, not uncommon for trust account values to exceed 100%. This is because the proceeds from the warrants purchased by the SPAC sponsors are also stored in the trust account and are available to cover the direct underwriting fees and other operational expenses (Rodrigues & Stegemoller, 2013).

Once the IPO is successfully conducted, the securities commence trading. This usually happens around 50 days following the IPO. At this point, the firm enters the second stage of the lifecycle and commence searching for a potential target. In many cases, the SPAC have explicitly and beforehand expressed in the S-1 filing in which industry and/or geographical area they are primarily seeking a target. A time limit within which the company must complete a merger in order to avoid liquidation is also specified in the S-1 statement and is usually set to 18 months from the SPAC IPO date with the possibility of extension to 24 months if the company has announced a merger but not yet completed the transaction and/or if a "letter of intent" has been signed by both parties (Rodrigues & Stegemoller, 2013). Once a potential target has been identified by the sponsors, shareholders may participate in a proxy vote to make their voice heard. At this point, shareholders have the opportunity to vote for or against a proposed merger and also have the opportunity to redeem their shares. For a proposed merger to be approved, the simple majority rule applies, meaning that at least 50% of shareholders must vote for the proposal. Another prerequisite for an acquisition proposal to go through is that the proportion of shareholders who choose to redeem their shares does not exceed a certain predefined threshold, i.e., the so-called "redemption threshold". This threshold also varies and is specified in the SEC filings, but just like the proportion of deferred underwriter, the redemption fee has also showed tendencies of increasing over time. Shareholders who ultimately choose to redeem their shares then receive the pro-rata value. In summary, an acquisition can be carried out if less than 50% of shareholders do not vote against a proposed merger and if fewer shares are redeemed than what is stipulated as redemption threshold in the S-1 filing. When and if these conditions are met, target shareholders are allotted shares in the combined firm (in practice the same shares as the original SPAC owners were allocated) and the reverse merger transaction can finally take place. This last step is referred to as the de-SPAC stage and marks the end of the SPAC lifecycle and the beginning of a new operating business (Gahng et al., 2021). For a visual representation of the entire SPAC life cycle, see *Appendix A: The SPAC Lifecycle.*

3.2   The Development of SPACs (1980-2019)

Although SPAC in its current form is a relatively new concept, similar structures have been around for a long time. As early as in the late 1980s, the predecessor of SPACs, namely blank check companies, dominated the U.S. penny stock market (Castelli, 2009). At that time, the market for penny stocks was unregulated which created conditions for stockbrokers to utilize blank checks as means of engaging in fraudulent and unethical trading practices. The fact that penny stocks were not traded over a national security exchange opened up the possibility for broker-dealers to exploit and deceive unsophisticated investors through "pump and dump" schemes. Brokers, often operating in "boiler room environments", cold-called presumptive

investors and sold overvalued shares in order to collect profits made up of the difference between the current price and the mark-up (Heyman, 2007). In the late 1980's, it is estimated that frauds related to penny stock trading accounted for losses of $ 2 billion per year (Castelli, 2009).

In response to this systematic exploitation of unsophisticated investors, the Securities Enforcement Remedies and Penny Stock Reform Act 1990 ("PSRA") was introduced in order to increase investor safety protection.

In 1992, the SEC also introduced Rule 419 in order to remedy the issues related to blank check trading during the late 1980s. This rule was designated to target blank check IPOs and was introduced as an extended arm to the PSRA due to the SECs demanding a higher degree of investor protection related to blank check IPOs. The regulatory requirements set out in rule 419 were extensive (Castelli, 2009). First, Rule 419 required IPO proceeds to be kept in a trust account and not be released until either a complete merger with an operating business or liquidation. Second, a maximum time limit of eighteen months from the IPO date to carry out a merger was introduced before the company must liquidate. Third, securities are not to be traded on the secondary market until the blank check has merged with a target. Fourth, a super majority shareholder vote (i.e., more than 80% of shareholders must vote for a proposed merger) before a merger can be effectively consummated while shareholders voting against a proposed acquisition are entitled to withdraw their investment and claim back the full amount. Fifth, the target market value must exceed 80% of the SPACs asset value (Castelli, 2009).

In general, private companies aspiring to go public through a shell company had to disclose the same amount of information that is required by normal IPO (Castelli, 2009). According to Heyman (2007), the implications of the introduction of the new rules were twofold; on the one hand they were effective in curbing fraudulent practices related to blank checks. On the other hand, such extensive requirements to live up to also led to reduced interest of private companies choosing to go public with blank checks. In fact, 3,000 blank check offerings were carried out in the last three years leading up to the 1990s, but only 15 were carried out in the early 1990s (Heyman, 2007). However, the Rule 419 regulation had exceptions if certain criteria were fulfilled. These exceptions were determined under Rule 3a51-1 and applied to companies with less than 3 years of operating activity and with a net asset value less of more than $ 5 million. In general, this meant that SPACs were excluded from Rule 419 as the net asset value following a SPAC IPO exceeds the 5 million minimum criteria. As a result, SPAC firms could avoid the regulatory burden demanded by Rule 419 (Castelli, 2009).

However, this did not prevent SPACs from taking voluntarily measures in order to restore confidence in the SPAC market (Castelli, 2009). Such self-regulation consisted, among other things, of applying the general requirements set for companies listed on Nasdaq. In addition, 80% of cash raised in the IPO must be kept in an escrow account or only paid out in the event of a merger or if the company is liquidated. In the latter, the pro rata trust value per share shall be redistributed back to shareholders. The remaining 20% will be used to cover current expenses, but not to finance salaries for SPAC managers. Time limits were also introduced with some freedom of choice, usually 12 or 18 months with the option to extend to 24 months if an acquisition was announced but not completed before the time limit expired. Also, the fair market value of an acquisition carried out by a SPAC must be at least 80% of the asset value of

the SPAC. A simple majority rule applied to voting procedures as a way to increase investor confidence. This was accompanied by standardizing a redemption threshold of 20%, meaning that an acquisition could not be completed if more than 20% of SPAC shareholders voted against the proposal (Castelli, 2009). Another feature that was introduced to increase attractiveness from an investor's point of view was the possibility of trading SPAC shares already in connection to IPO completion. This made it particularly attractive for institutional investors to invest in SPACs as it enabled a higher level of liquidity (Hale, 2007).

In summary, SPACs chose to self-regulate and voluntarily adapt various regulatory requirements stated by Rule 419 to increase investor confidence, make investments in SPACs more attractive to the general public and to stay on good terms with regulators (Riemer, 2007). Despite these self-regulatory initiatives to avoid falling out with the SEC, some mandatory rules that all SPAC companies must comply with were eventually introduced. Perhaps the biggest relative benefit for private firms of choosing the SPAC route instead of listing the traditional route, namely not having to disclose comprehensive information, disappeared when the SEC in the autumn of 2005 increased the disclosure requirements under Section 5.06 in Form 8-K. In practice, private companies needed to provide the same amount of information as before a normal IPO (Castelli, 2009). The biggest changes affecting trading in SPACs occurred after 2005 (Castelli, 2009). As interest in SPACs has increased and they have gained a more legitimate position in the market, the platforms in which they have been traded have also developed and adapted.

Having only been allowed to trade on the Over-the-Counter Bulletin Board (OTC-BB) prior to 2005, SPACs are now allowed to trade on recognized exchanges. In 2005, the American Stock Exchange ("AMEX") became the first to allow listing of SPACs, and since then, other exchanges have followed. In February 2008, Nasdaq announced that it had submitted a similar request to the Securities and Exchange Commission (SEC) for a change in the rules applicable to SPACs. Shortly afterwards, the New York Stock Exchange ("NYSE") also followed suit (Castelli, 2009). Since then, the SPAC structure has been gradually improved in order to remedy various types of recognized inefficiencies. One such example is the original 20 percent shareholder provision, which effectively gave shareholders a veto over the acquisition. Although such a provision was appealing to the original SPAC investors, it also resulted in few acquisitions. It also created a hold-up problem that institutional investor arbitrageurs learnt to exploit. As a result, this provision was completely removed in 2010, enabling SPACs to carry out an acquisition while shareholders have the right to redeem their shares if they dislike the proposed acquisition (Rodrigues & Stegemoller, 2013).

3.3   The Evolution of US Financial Market Regulation

The early 2000s were marked by several accounting related scandals, with high-profile companies involved such as WorldCom and Enron. In an attempt to prevent similar corporate frauds form happening in the future, the U.S. Congress passed the Sarbanes-Oxley Act (SOX) in July 2002 (Ritter, 2012). In the aftermath of these major scandals, legislators realized that the then prevalent regulatory standards were insufficient to avoid the occurrence of fraudulent

financial reporting. In addition, the existing securities regulations needed to be updated so that responsible persons could be held liable for damages and punished if they did not live up to the requirements for financial reporting (Coates & Srinivasan, 2014). In summary, the regulatory framework needed to be updated in order to restore confidence in the financial markets (Ritter, 2012). Most importantly, Section 404(b) in SOX requires management to establish internal controls over financial reporting with external auditors as well as the establishment of reporting processes to ensure the adequacy of the controls (SEC, 2021a). The costs associated with living up to the regulatory requirements turned out to be significant and include everything from hiring auditors to performing audits and reviews to attorneys to dealing with the SEC (and other associated costs related to filings). This in turn made it more difficult for firms to go public, which ultimately reduced IPO activity (Riemer, 2007).

To address these negative consequences and facilitate for companies to go public and raise capital, especially smaller growth companies, the Jumpstart Our Business Start-Up Act (JOBS Act) was adopted in the spring of 2012 (SEC, 2015). In practice, the JOBS Act enables smaller companies to enjoy a reduced regulatory burden if certain conditions are met. These reduced compliance requirements are based on SOX Section 404 and can be enjoyed by companies with so-called Emerging Growth Company (EGC) status (SEC, 2015). Companies may enjoy EGC status if they have less than $ 1 billion annual revenue the preceding fiscal year or meet the definition of a large accelerate filer, i.e., has a market capitalization exceeding $ 700 million. Firms that satisfy the $1 billion revenues test may maintain their EGC status for a maximum period of five years following the IPO completion date provided that their annual revenues do not exceed $1 billion any given year during the five-year period. In addition, companies are not allowed to issue more than $1 billion in non-convertible debt over a continuous 3-year period (SEC, 2015). Qualifying for EGC status does not, however, mean that companies can completely free themselves from all compliance requirements stipulated by SOX. Firms under EGC status are still required to submit audited financial statements prior to the IPO, but only for the two most recent years. In addition, they are exempt from the SOX Section 404(b) requirement of establishing internal controls over financial reporting with external auditors and thus only have to disclose the mechanisms in place for internal controls (SEC, 2015). Another advantage associated with EGC status is the opportunity provided by the so-called "test-the-water" provision. The purpose of this provision is to enable companies, before embarking on a time-consuming and costly IPO process, to take the temperature of the market and thus gain a better idea of the interest in a possible offering (SEC, 2015).

In September 2019, the SEC announced the adoption of Rule 163B under the Securities Act of 1933, thus expanding the "test-the-water provision" to include all companies regardless of status and size in an attempt to increase the likelihood of successful public offerings (SEC, 2019).

4 Hypothesis Development

4.1 Announcement Cumulative Abnormal Return

From the time the SPAC company conducts the IPO until the time when a merger is announced, the value of SPAC shares tends to reflect the per share discounted value of the trust account. Later, when the SPAC sponsors propose an acquisition target to shareholders, it is the first time the market receives the acquisition information, and the share price begins to move to reflect the value the market attributes to the deal. Admittedly, the market has formed an expectation of the incoming merger proposal, and the stock price fluctuation around the event only shows the shareholder value of an acquisition, as assessed by the market, relative to the prior expectation (Dimitrova, 2017). However, intuitively, CAR around the announcement can be a potential proxy of the target quality in the shareholders' view, which will be revealed in the de-SPAC performance. If CAR (Cumulative Abnormal return) surrounding the announcement date is positive, it can be interpreted as the shareholders are evaluating the decision made by the SPAC sponsors as a good choice of target. If CAR, on the other hand, is negative, the choice of target is judged to be poor. Thus, we use announcement CAR as a proxy for ex-post market sentiment and to see if the SPAC sponsors' judgment can reflect post-merger performance. To the best of our knowledge, CAR's influence on de-SPAC BHAR has not been empirically tested historically.

Hypothesis 1

Ho: CAR does not have an impact on post-merger performance

H1: CAR have an impact on post-merger performance

4.2 Deferred Fees and Underwriter Quality

In SPAC transactions that took place during the first decade of the 2000s, second- and third-tier underwriters were primarily involved in the underwriting process (Castelli, 2009). Moreover, Kolb & Tykvová (2016) documents that the typical companies that chose the SPAC route as a listing alternative during the first modern SPAC wave, namely between 2003 and 2010, tended to be smaller companies of poor quality. This goes hand in hand with the argument that top tier investment banks tend to match with high quality firms and vice versa (Carter, Dark & Singh, 1988). Back then, it was also customary for underwriters to receive full up-front

compensation in connection with the SPAC IPO. Since 2003, however, the degree of deferred underwriting fees has increased substantially year by year (Lewellen, 2009). This tendency to postpone a larger fraction of the underwriting fees has been found to be detrimental to investors due to the increased risk of being exposed to moral hazard by underwriters who are prone to pitch even suboptimal deals to the SPAC managers, just to be able to collect the full underwriting fees (Dimitrova, 2017). This would imply a negative relationship between deferred fees and performance. That is, larger the deferred fees as a fraction of the total underwriter fees to be associated with worse de-SPAC performance.

Lately, more sophisticated Tier 1 investment banks such as J.P Morgan, Citigroup and Goldman Sachs have begun to engage in SPAC underwritings (Lakicevic & Vulanovic, 2013; Riemer, 2007; Heyman, 2007; Scachmurove & Vulanovic, 2017). According to Heyman (2007), more reputable investment banks are less likely to be engaged in value destroying deals, since that could potentially cause severe damage to their heir reputational capital, which is of major importance to investment banks. We thus predict that underwritings carried out by more prestigious underwriters should reduce the risk of shareholders being exposed to moral hazard on behalf of the underwriters. As discussed in Section 2, it is common that underwriters act as advisors to the SPAC management team SPACs in the searching process. It is therefore not unreasonable to assume that prestigious underwriters are more competent in the market and can thus provider the SPAC management team with more qualified target candidates.

In the regressions, we will thus use deferred fee as a proxy for moral hazard that investors may be exposed to by underwriters, where a negative relationship between deferred fee and post-merger performance would indicate the presence of moral hazard.

In sum, despite the higher levels of deferred fees in recent years, it is also possible that post-merger performance has the potential of being positively influenced by underwriter quality.

Hypothesis 2

Ho: Deferred fees do not have an impact on post-merger performance

Hi: Deferred fees have an impact on post-merger performance

4.3   Time to Announcement

We also intend to investigate if time spent by the SPAC sponsors to find a target, more specifically measured as the number of days between the IPO date and announcement date, has an impact on post-merger performance. In a sample of 72 firms that completed acquisitions between 2003 and 2010, Dimitrova (2017) reports that late mergers perform worse on average than early announced mergers, which the author believes constitutes evidence of a persistent moral hazard problem between SPAC sponsors and shareholders. The author bases her argument on the negative relationship found between Time to announcement squared and post-merger BHAR, which she believes provides evidence for the notion that SPAC sponsors

become desperate to close any deal when time starts running out, even if it is not optimal for shareholders, as they otherwise will miss out on their compensation. However, a reverse relationship is not inconceivable either, namely that more time spent searching could increase the probability of finding a satisfactory target. We therefore intend to investigate whether any of these relationships tend to exist in our sample. We test for this relationship by having time to announcement and time to announcement squared as the main explanatory variables in one of our regression models, where the latter is a proxy for moral hazard that shareholders might be exposed to by SPAC sponsors.

Hypothesis 3

Ho: Time to announcement does not have an impact on post-merger performance

H1: Time to announcement have an impact on post-merger performance

4.4   Governance Quality

Researchers have over the years tried to gain a better understanding of various determinants of post SPAC performance. Among other things, governance characteristics have been the subject of investigation. Howe & O'Brien (2012) examine the governance characteristics of SPACs and found that the composition of governance does not tend to have any significant influence on long-term performance. However, other studies, such as the one conducted by Kolb & Tykvová (2016), have found that companies that appoint SPAC sponsors as chairman and CEO tend to perform better in the long run. These studies only cover completed SPACs belonging to the second generation of SPACs, hence pre-2010. Since then, SPACs have become increasingly popular, attracting both more competent SPAC sponsors to manage SPAC vehicles and more high-profile targets than ever before (Castelli, 2009). To test whether the choice of governance in de-SPAC companies is important for post-merger performance in the latest generation of SPACs, we use several dummy variables that captures governance characteristics. The dummy variables we intend to use capture if a target insider or SPAC sponsor is appointed CEO, chairman or both and in the combined company. These governance dummy variables, which are used as a proxy for governance quality, appear as main explanatory variables in the last regression model.

Hypothesis 4

Ho: Governance characteristics does not have an impact on post-merger performance

H1: Governance characteristics have an impact on post-merger performance

5   Methodology

The study is conducted in three steps. In the first step, an event study is conducted to get the CAR (Cumulative Abnormal Returns), i.e., to capture the stock market reaction surrounding the acquisition announcement. Similarly, an event study is conducted to shed light on post-merger performance of the de-SPAC firms. After that, four multiple regression models are used to explain the relation between BHAR (Buy and Hold Abnormal Return) and main regressors with other control variables, of which CAR from the first stage constitutes one of the main independent variables. In the third step, a Lasso-based method for inference is conducted on the regression models to provide another side of model interpretation. Lasso can reduce the high variance problem generated when a large number of explanatory variables are used to explain relatively small samples by applying the regular OLS (Ordinary Least Squares) method.

5.1   Event Study

5.1.1   Event Study Design

According to Campbell et al (1997), the event study divides the time horizon of an event into three windows: estimation window, event window and post-event window.

An estimation window that goes from T_0 to T_1 provides information to specify the 'normal return', and an event window that captures 'abnormal return' contains event date and goes from T_1 to T_2. The abnormal returns will depend on both, the actual returns during the event window and the forecasted 'normal returns'. This study mainly operated the data of estimation window and event window of events to research the impact magnitude.
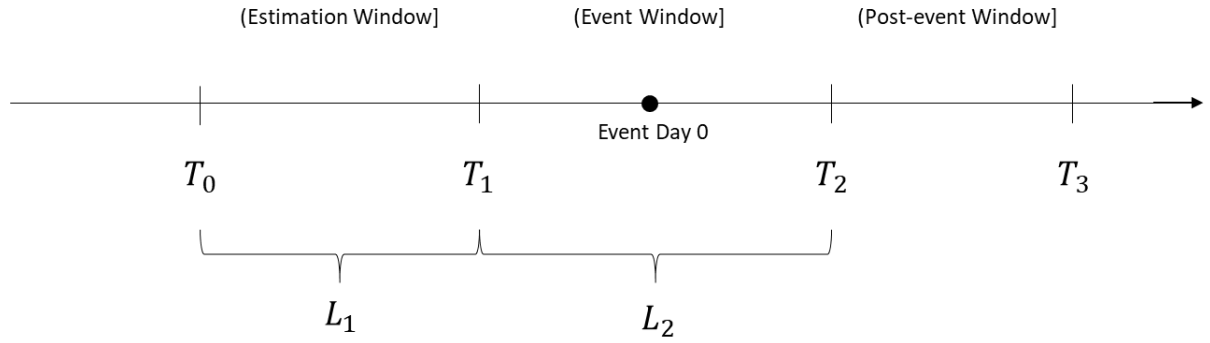
Figure 2. Event Study Timeline

Figure 2 illustrates the time horizon in a typical event study. The estimation window is before the event day and estimates the relationship between market index and the stock price. The event window captures the abnormal returns surrounding the event day, and the post-event window always follows the event window. L_1 and L_2 are the number days included in the estimation window and event window, respectively.

The market model is applied in the study for it is simpler and has less restrictions than economic models and can control for the correlation between the market and the company's return (MacKinley, 1997). Also, the market model is widely accepted as the standard model for an event study. For event window length, a three-day event window (-1,1) around the acquisition announcement date is adopted, following the same event window used by Dimitrova (2017). For the estimation window length, there are many different choices. E. Boehmer et al. (1991) used an estimation window of 239 days (-249, -11) in their study. A.R.Cowen et al. (1996) used 255 days of estimation window (-255, -1). MacKinlay (1997) advocated two different ideas, one is 250 days (-270, -21) and the other is 120 days. Considering that the time limitation for many SPAC companies to find a merger target is only 12 months, a 120-day estimation window is applied in this paper. For certain companies, the time interval between IPO date and announcement date is less than 120 days. In that case, we use available days with valid stock prices before the acquisition announcement as the length of the estimation window.

The first step of event study is conducted by using the Market Model to estimate the normal returns:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, E[\varepsilon_{it}] = 0, Var[\varepsilon_{it}] = \sigma_{\varepsilon_i}^2 \tag{1}$$

Where R_{it} is the return of the SPAC i on date t, R_{mt} is the return of the reference market benchmark, index Russel 2000 index or FTSE RENAISSANCE IPO Index on date t; α_i, β_i are the estimated parameters in the linear regression model. α_i is the intercept and β_i is a measure of the sensitivity of R_{it} on the reference market. And ε_{it} means the error term (a random variable) with expectation zero and finite variance.

During the event window, the expected normal return can be estimated in the case where we assume there was no impact of the event by using the two parameters α_i, β_i above:

$$E[R_{it}^* \mid \Omega_{it}] = \alpha_i + \beta_i R_{mt} \tag{2}$$

Where $E[R_{it}^* \mid \Omega_{it}]$ is the expected return of the SPAC i if there was no event happened on date t.

5.1.2 Cumulative and Buy and Hold Abnormal Returns

The abnormal return during the event window can be calculated as:

$$AR_{it} = R_{it} - E[R_{it}^* \mid \Omega_{it}] \tag{3}$$

Where AR_{it} means the abnormal return of the SPAC i on date t, and R_{it} is the actual return of the SPAC i on date t during the event window.

The next step is getting cumulative abnormal returns to measure the total impact of the event. $CAR_i(t_1, t_2)$ can be defined as the cumulative abnormal return from t_1 to t_2, where $T_1 < t_1 \leq t_2 \leq T_2$. Thus, the CAR from t_1 to t_2 is the sum of the abnormal returns in the mentioned period (MacKinlay, 1997).

$$CAR_i(t1, t2) = \sum_{t=T_1+1}^{T_2} AR_{i,t} \tag{4}$$

To test the significance of CAR for single stock, t-test was performed according to Brown and Warner (1985) test method. The hypotheses for the test are:

$$H_0: CAR_i = 0$$

$$H_1: CAR_i \neq 0$$

The t statistic under null hypothesis is:

$$t = \frac{CAR_i}{S_{CAR}} \tag{5}$$

and the test statistics obey t-distribution. S_{CAR} stands for the standard deviation of CAR, and can be derived from the following equation:

$$S_{CAR}^2 = L_2 * \frac{1}{M_i - 2} * \sum_{t=T_0}^{T_1} (AR_{i,t})^2 \tag{6}$$

where Mi stands for the number of observations during the estimation window for SPAC i, and L_2 stands for the number of dates in the event window.

To capture the post-acquisition performance of SPACs, we calculate Buy-and-Hold Abnormal Returns (BHAR). We use both Russel 2000 index and FTSE RENAISSANCE IPO Index to estimate the post-acquisition performance of SPACs. While Russel 2000 index can provide stable market information, IPO index is valuable for a comparison with normal IPOs, especially

for the 6-month post acquisition period. This is because de-SPAC firms are closely related to normal IPOs in many respects. For any day t within the event window, the AR is calculated by:

$$AR_{it} = R_{it} - E[R_{it}^* \mid \Omega_{it}] \tag{7}$$

And BHAR is a geometric sum of the return:

$$BHAR_i = \prod_{t=T_1+1}^{T_2}(1 + AR_{it}) \tag{8}$$

The t-test for BHAR is:

$$t_{BHAR} = \frac{\overline{BHAR_{it}}}{S_{BHAR}/\sqrt{L_2}} \tag{9}$$

Where S_{BHAR} is the standard deviation of sample BHAR.

5.2   Regression Models and Diagnostic Tests

5.2.1   Regression Models

Four regression models will be estimated to test the four hypotheses. The dependent variable employed is the same in all four models, namely 6-month BHAR calculated using the IPO benchmark. We use 6-month BHAR as the dependent variable because it allows us to include the largest-possible sample. Furthermore, we use IPO adjusted BHAR because SPAC acquisition are in many respects similar to traditional IPO; thus, the IPO benchmark can be a better index to benchmark against for the purpose of our study.

For each model, the core element(s) that are assumed to influence the post-acquisition performance are set as the main variable(s), and other variables that capture market, size or unique characteristics of each company other than the main variables are treated as control variables. The control variable group consist of: board size, relative size, deal value, cyclicality, industry or region focus, target age, market capitalization and proceeds. To avoid inter-influence among different models, the main variables only appear in the according model, but not show as control variables in other models. The four main regressor groups and according models the paper will estimate are:

Model 1. Main regressor: Announcement CAR.

$BHAR = \alpha + \boldsymbol{\beta\,CAR} + \gamma\,control\;variables' + \varepsilon$

Model 2. Main regressor: Deferred Fees and Underwriter Quality.

$BHAR = \alpha + \boldsymbol{\beta_1 Deferred\;Fees} + \boldsymbol{\beta_2 Underwriter\;Quality} + \gamma\,control\;variables' + \varepsilon$

Model 3. Main regressors: Time to Announcement.

$$BHAR = \alpha + \beta_1 Time\ To\ Announcement + \beta_2 (Time\ To\ Announcement)^2 + \gamma\ control\ variables' + \varepsilon$$

Model 4. Main regressor: Governance

$$BHAR = \alpha + \beta\ Governance' + \gamma\ control\ variables' + \varepsilon$$

The $Governance'$ and control variables$'$ are the variable vectors, α, β, γ are estimation coefficients of factors, and ε is the error term. The expansion version of regression models is reported in *Appendix B: Expansion Regression Models*.

Table 1. Main Explanatory Variables in Models.

Table 1 shows what the main explanatory variables in each regression model are a proxy for. More detailed information regarding the variables and what they stand for can be found in *Appendix C: Variable Description*.

Main Explanatory Variable	Proxy for
Model 1	
CAR	Ex-post market sentiment
Model 2	
Log(Time to Announcement)	Moral hazard from SPAC sponsors
Log(Time to Announcement)^2	
Model 3	
Deferred fees (%)	Moral hazard from underwriters
Underwriter Quality	
Model 4	
Governance Dummy variables	Governance quality

5.2.2   Diagnostic Tests and Remedies

To conduct OLS to estimate the four models, the sample needs to meet several assumptions. The dataset used in this study is cross-sectional data, thus, there are four possible violations of OLS assumptions that need to be tested: heteroscedasticity, non-normality, multicollinearity and non-linearity. If these violations exist in the dataset, the corresponding remedies will be taken in order to perform the regression in the later stage Also, we introduce winsorizing to relieve the biases magnitude generated by outliers in the sample.

Heteroscedasticity

The homoscedasticity assumption holds that the variance of the errors is constant. If heteroscedasticity exists, and even if the coefficient estimates are still unbiased, the standard errors will be wrong. To test for this assumption, a White's test is performed to check different functional forms of heteroscedasticity. If heteroscedasticity is detected, i.e., the p-value is more than 5%, transforming variables and/or the usage of robust standard errors in the regression models can be possible remedies.

Non-normality

The non-normality assumption is that the error term of the regression is normally distributed. There are two ways to detect non-normality: use a histogram to plot the residuals or perform the Jarque-Bera test. If the test statistic exceeds the critical value in the Jarque-Bera test, the normality assumption is violated. The possible remedies for non-normality are to transform the variables, increase the sample size or to winsorize the sample to remove the influence of extreme outliers.

Winsorizing is a statistic method to deal with the possible situation where extreme outliers heavily influence the mean, thereby distorting the results. By applying winsorizing, the values at the tails of the sample distribution are recoded to less extreme values. Two commonly used winsorizing levels are 1% or 2.5%. If the dataset is winsorized at 2.5% percent, the 1.25% percent of the top and lowest values will be recoded to the 1.25th percentile and the highest value would be recoded to the 98.75th percentile.

Multicollinearity

Multicollinearity occurs when the explanatory variables are highly correlated with each other. Perfect multicollinearity occurs if variables are perfectly correlated, and near multicollinearity is the correlation value between two variables are equal or larger than 0.8. If two highly correlated variables are estimated in the same model, the coefficient estimates will be sensitive to small changes in the specification and can even result in strange coefficient estimates. The way to deal with the violation is to set up a correlation matrix, and then drop one of the collinear variables.

Non-linearity

Non-linearity will not generate bias to regression results like other violations. However, it can result in the true relationship between the explanatory variable and the dependent variable not to be revealed. To detect non-linearity, the Ramset RESET test is conducted. If the null hypothesis that the model has no omitted variables is rejected, i.e., the p-value of F-test in Ramsey test is more than 5%, some non-linear item can be introduced to the model to improve the model performance.

5.3   Lasso Regression for Inference

Lasso is invented by Tisbshirani (1996) and is originally an acronym for Least Absolute Shrinkage and Selection Operator. It is a machine learning method for prediction and model selection by selecting and fitting covariates in a model with a large set of potential predictors. The basic concept is that under the sparsity assumption, Lasso minimizes the sum of squared residuals under the constraint that the sum of the absolute values of the regression coefficients is less than a constant. In the mechanism, some regressors are set to 0, hence reducing the dimensions and fulfilling the variable selection. Lasso regression is rather effective in the situation where the number of regressors is large compared to the observations (few degrees of freedom), such as in this study. The traditional lasso expression is:

$$\min_{\beta,\beta_0}(\frac{1}{2N}\sum_{i=1}^{N}(y_i - \beta_0 - x_i^T\beta)^2 + \lambda\sum_{j=1}^{p}|\beta_j|) = \min_{\beta,\beta_0}(RSS + \lambda\sum_{j=1}^{p}|\beta_j|) \qquad (10)$$

The purpose of the equation is to obtain vector β,β_0 that minimizes the output of the expression. The first part $\sum_{i=1}^{N}(y_i - \beta_0 - x_i^T\beta)^2$ is the RSS (residual sum of square) from linear regression, representing the deviation between the estimated equation and the measured value. The second part $\lambda\sum_{j=1}^{p}|\beta_j|$ is a penalty function that aims to achieve factor shrinkage, where λ controls the complexity of the selected model. When λ increases, the estimated equation parameters will be closer to 0. Typically, the K-Fold Cross Validation method, i.e., dividing the original sample into a training sample and an evaluation sample, is used to pick the λ that minimizes the forecast error out of the validation sample to avoid overfitting.

K-fold cross validation (K-fold CV) is a method to split the sample into a training sample and an evaluation sample. It is often used together with machine learning to avoid overfitting. The general idea of cross validation is randomly partitioning the original sample into K groups of (about) equal size, leaving one group out and train the model on K-1 partitions, and then using the left group as the validation set. In Lasso regression, it is conducted to pick up the λ. The model is fitted to the training sample for many different values of λ and for each λ the square errors are computed for the evaluation sample, the value of λ that minimizes the square errors is then used in the final step of the estimation which is conducted on the entire sample. This whole procedure is then repeated K times so that each partition is used exactly once for evaluation, and then the average λ is picked from the K λ's that minimized the square errors. The function of the process can be described as:

$$K - \text{Fold CV}_{(k)} = \frac{1}{k}\sum_{i=1}^{k}MSE_i \qquad (11)$$

Where k is the kth time calculation, and MSE is the mean square errors. The advantage of K-fold CV is that it has low re-sampling variance, thus, it can prevent overfitting issue while generating robust results.

Nevertheless, the traditional Lasso method is not applied to coefficient interpretation like OLS. This is due to several reasons. First, the variable-selection method will introduce a new source of variability and cannot account for the sample-to-sample variability in the variable selection.

Second, Lasso will omit covariates with small coefficients, even if they have economically meaningful, thus, causing bias to other coefficients. Finally, even if the number of observations is increased, the model selected by Lasso does not converge to the true model.

In 2014, Belloni, Chernozhukov, and Hansen (2014a) shed light on the Lasso for inference method by introducing resampling to obtain explainable coefficients. In this study, we conduct the double selection Lasso which was originally developed by Belloni, Chernozhukov, and Hansen (2014b) with the application of 10-Fold Cross Validation to select an optimal value of the lasso penalty parameter λ. We do this in order to produce robust outcomes for each model as a supplement reference to the traditional multi-regression results. The regression model used in this study for double selection lasso is:

$$E[y|d, x] = d\alpha' + x\beta' + \epsilon \tag{12}$$

Where y is the dependent variable, the vector d is the main variables from the estimation models that can be interpreted, and the vector x is potential control variables from which the Lasso's select. The logic for the Lasso algorithm process is as follows:

First, run a Lasso of d on x. This is the extra selection compared to traditional Lasso and makes the final results robust from the selection mistakes of single selection Lasso. After that, the second Lasso is applied to y on x. Finally, regress y on the union of the selected covariates from the first two steps, and the coefficients, standard errors, confidence intervals and p-values can be interpreted in the same way as traditional linear model results.

The regression models used for double selection Lasso estimation is slightly changed based on the multi-regression model. 6-month BHAR (IPO benchmark) is still the dependent variable and the four main independent variable groups stay unchanged. But time limitation, proceeds, time process ratio and year control are additionally introduced into all models as control variables in factor selection process to capture possible covariance.

6   Sample Selection and Sample Characteristics

6.1   Data Collection

The data sample consists of U.S. SPACs that announced and completed a merger between 2010-01-01 to 2021-04-08. The sample is limited to the U.S. market in order to ensure proper comparability between the companies.

Our SPAC list was obtained primarily from Capital IQ, from which we also retrieved information on important dates, such as when an acquisition was announced and completed and when the SPAC IPO was conducted. After that, we also cross checked our sample with other databases such as Bloomberg and Zephyr to reduce the risk of not including certain completed SPAC transactions. Transactions, that after closer examination did not turn out to be SPAC transactions, were excluded from the sample. For more recently completed SPAC acquisitions, we also cross checked our sample with websites such as spactrack.net, spacinsider.com and spacresearch.com.[1]

During 2010 to 2020, 473 SPACs completed an IPO, which is a large number compared to our sample that consists of 92 observations. The large discrepancy is due to the fact that many SPACs have completed an IPO during the time period, but most of them are still in the process of finding a target. In addition, a large fraction of publicly traded SPACs fails to finish the de-SPAC process and are thus forced to liquidate.

Data related to our independent variables was retrieved from the U.S. Securities and Exchange Commission's EDGAR database. Relevant data was retrieved exclusively from two different

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[1] www.SPACtrack.net, www.SPACinsider.com and www.spacresearch.com are three popular and widely used websites for SPAC-related information.

filings, namely form the S-1 filings (for data related to the SPAC IPO) and from the DEFM14A filings (for data related to SPAC acquisitions). Companies with missing S-1 and DEFM14A filings were also screened out from the sample.

Information regarding deal value was also predominantly collected from the DEFM14A files in the EDGAR database. In the few cases where such information could not be obtained from DEFM14A, the information was complemented with information from Zephyr.

The variables that we intend to use in our regression models are divided into four categories: (1) SPAC Characteristics, (2) Deal Characteristics, (3) De-SPAC Governance, (4) Stock Prices and Benchmark. For more detailed information, see *Appendix C: Variable Description*.

SPAC Characteristics

In this category, the data indicate the characteristics of the SPACs on the IPO date, where proceeds, deferred fee percentage, industry or region focus, underwriter name(s), and time limit were gathered from S-1 filings. The variable cyclicality refers to the number of successful completion transactions that took place each year. The underwriter quality data is obtained from Jay Ritter's website, which was originally developed by Carter and Manaster (1990) and extended by Carter, Dark, and Singh (1998) and Loughran and Ritter (2004). The ranking is based on underwriter's relative position in IPO tombstone announcements. The CM (Carter and Manaster) ranking ranges from 0 to 9, where zero reflects the lowest underwriter reputation and nine the highest reputation. If a SPAC transaction was underwritten by a syndicate, we use the mean ranking of the lead underwriter(s).

Deal Characteristics

Deal value and market capitalization were gathered from DEFM14A filings, while relative size is obtained by calculating deal value as a fraction of the market capitalization of the acquiror. Time to announcement measures the time (in days) between the IPO date and the acquisition announcement date. Target Age is calculated as the difference between the year the merger transaction took place and the founding year of the target.

De-SPAC Governance

This category of data is gathered from DEFM14A filings and includes seven governance related variables. One of them is board size, which indicates the number of directors on the board of directors in the combined company post-merger. The other six variables, which are dummy variables, capture whether a target insider or a SPAC sponsor has been appointed CEO, chairman or both in the combined firm. If the condition is met, a value of 1 is assigned to the dummy variable, otherwise 0. The six dummy variables used in this study are: Chairman is a Target Insider, Chairman is Sponsor, CEO is a Target Insider, CEO is a Sponsor, CEO duality of Target Insider and CEO duality of Sponsor.

Stock Prices and Benchmark

Daily stock prices, which enabled us to calculate performance for both SPACs and de-SPACs were obtained from DataStream. Two companies that had no available stock data were excluded from the model estimation but were still included in summary statistics. For abnormal return calculations, we use Russel 2000 index as market benchmark which is the same market benchmark that has been used by several other researchers, such as Dimitrova (2017) and Kolb and Tykvová (2016). In addition to Russel 2000 index, we also used a traditional IPO benchmark in order to be able to compare SPAC and de-SPAC performance with normal IPOs: FTSE RENAISSANCE IPO Index. The FTSE Renaissance Global IPO Index Series is designed to track the activity and performance of the global IPO market, and to add structure and transparency to these equities, providing market participants-controlled access to the attributes of IPOs (FTSE, 2021). Since de-SPAC process can be compared to an IPO for the target company, the FTSE Renaissance Global IPO Index can be used as a proxy of normal IPO performance. Index daily prices were also obtained from DataStream.

6.2 Diagnostic Test Results

Before the diagnostic tests, we transformed some data to improve the model performance. First of all, proceeds, deal value and market capitalization are taken logarithm value rather than the original form. This is because they are much larger than the dependent variable BHAR and are skewed, which will incur small coefficients and will generate bias to the model. As illustrated in *Appendix D-1*, the logarithm version of these variables is closer to normal distribution. Following Dimitrova (2017), the time to announcement variable(s) are also taking logarithm form. The test results are reported in *Appendix D: Pre-estimation Diagnostic Tests*.

Heteroskedasticity: White's Test

The White's test results are displayed in *Appendix D-2*. Judging from the result table, none of the p-values are significant. Thus, we cannot reject the null hypothesis of homoscedasticity, and we do not change any of the variables.

Non-normality: Jarque-Bera Test

The Jarque-Bera test results are shown in *Appendix D-3*. For model 1 and model 2, the test statistics exceed the critical values, whereas the critical values are larger than test statistics for model 3 and model 4. The null hypothesis of normality is rejected for model 1 and model 2. Since the observations of the completed SPAC sample is limited, we will winsorize the dependent variable at 2.5% level. *Appendix D-4* presents BHAR summary statistics before- and after-winsorizing. Comparing with the original sample, the mean of winsorized BHAR decreased 10%.

Multicollinearity: Correlation Matrix

The correlation matrix of all non-dummy variables is found in *Appendix D-5*. According to the matrix table, market capitalization and proceeds have high correlations of around 0.96. Hence, we exclude proceeds and only include market capitalization in the regression models.

Non-linearity: Ramsey RESET Test

Ramsey RESET Test results are shown in *Appendix D-6*. According to the test results, no p-value is larger than 5% significant level. Thus, there is no omitted variable for the model, implying that the linear models can effectively be used to explain the dependent variable.

6.3   Sample Characteristics

In this section, we report summary statistics for our data set. Furthermore, the summary statistics is based on all 89 observations, while only the 61 companies with valid stock data for more than 6-month post-merger will be included in regression.

The summary statistics, in which we report information for the whole sample set, reveal great variation in the number of completed de-SPAC transactions during the study period, ranging from only 2 in the year when the least number of de-SPAC transactions were completed and up to 28 in the year when most transactions were completed. On closer inspection of our data set, it appears that the least number of completed transactions coincides with the beginning of our survey period and with more and more towards the end, in line with our expectations considering that SPACs have gradually increased in popularity over the past decade. When it comes to deferred underwriter fees, we expected that that underwriters in the latest generation of SPACs defer a significant portion of their total compensation. On average, the deferred underwriting fee in our sample constitutes 53% of the total underwriter fee with a median of 64%, a significant increase from 2003 and 2007 when it was reported to be 0% and 32% on average, respectively (Shachmurove & Vulanovic, 2017). Capital raised in SPAC IPOs also seems to have increased sharply in later years. Jog and Sun (2007) reports that the average SPAC raised $ 65mn from IPO between 2003 and 2007, while Vulanovic (2017) reports that the average gross proceeds raised by SPACs in their sample of SPACs between 2003 and 2013 was $119m on average. For our sample, we find that the average SPAC raised $ 212 million, a significantly higher figure in comparison.

Time limit, which should not be confused with time to announcement, refers to the pre-defined time frame under which a SPAC has to carry out an acquisition in order to avoid liquidation. This time frame does not appear to have been either extended or shortened on average compared to the previous era of SPACS and amounts to 24 months on average, in line with what has been reported by Rodrigues & Stegemoller (2013) for the earlier generation. On average, it took 403 days to announce a target for our sample firms. This is very similar to the figure that Dimitrova (2017) reports for her sample between 2003 and 2010, which is 389 days.

According to Loughran & Ritter's (2004) interpretation of the underwriter ranking, underwriters with a ranking in excess of 8.5 are considered to be prestigious while rankings

between 0-5 are considered lower tier underwriters. Heyman (2007) argues that in recent years, more and more prestigious underwriters have started to show interest in SPAC underwritings, which is a big difference from previous generations of SPACs that mainly attracted lower tier investment banks. Judging by summary statistics, we can confirm that the average underwriter ranking in our sample exceeds 6, which implies that the average underwriter in the latest generation belongs to the middle tier segment rather than lower tier segment. As can also be seen from the maximum value of 9, we have evidence that some of the most prestigious investment banks have also been involved in SPAC underwritings in recent years.

Finally, 4 out of 5 SPACs in our sample, on average, expressed an ambition to acquire a target in a specific industry or region, which is exactly the same fraction as reported by Vulanovic (2017) for the earlier generation.

From what can be observed in Panel B, deal value tends to vary greatly in our sample, ranging from a minimum of $ 45m to a maximum of $ 5678m with an average and a median of $ 991m and $ 512m, respectively. Great variations also apply to SPAC size measured as market capitalization, which ranges from $ 31 million up to $ 1416 million with an average of $ 248 million. A comparison with Dimitrova's (2017) study, which finds that the average deal value and SPAC size measured in market cap is $ 275 million and $ 153 million respectively, indicates that both the size of deals and SPACs have seen a dramatic increase over the past decade. In addition, targets that choose to go public with the help of SPACs seem to be 20 years old on average and with a median age of 13 years.

Finally, our summary statistics show that the average board size in the de-SPAC firms consists of 7 directors and that more than 4 out of 5 CEOs who are entrusted to lead the combined company come from the target company. A target insider also tends to be appointed chairman of the combined company in the majority of cases, i.e., in 52 percent of the cases.

Table 2. Summary Statistics

This table summarizes data for all variables included in this study. Panel A presents data attributable to SPAC characteristics, while the data in Panel B and Panel C are related to deal characteristics and de-SPAC governance, respectively. Presented summary statistics is based on our whole sample, hence 89 observations.

	Mean	Median	Std. D	Min	Max	N
Panel A: SPAC Characteristics						
Cyclicality	15.51	13.00	9.08	2	28	89
Deferred fee %	0.53	0.64	0.20	0	0.81	89
Proceeds (in $millions)	212.71	200.00	157.18	40	750	89
Time Limitation (in months)	21.10	24.00	4.16	12	24	89
Underwriter Quality	6.56	6.00	2.07	2	9	89
Industry or Region Focus	0.79	-	-	0	1	89
Panel B: Deal Characteristics						
Deal value (in $millions)	991.86	512.00	1282.95	45.15	5678	89
Time to Announcement (in days)	402.99	418	204.48	21	997	89

Market Cap (in $millions)	248.32	196.00	238.41	31.50	1416.6	89
Time Process Ratio	0.75	0.73	0.39	0.05	2.14	89
Relative Size	4.49	2.75	4.49	0.56	21.70	89
Target Age	20.89	13.00	23.19	1	154	89

Panel C: De-SPAC Governance

Board Size	7.42	7.00	1.87	3	14	89
Chairman is a Sponsor	0.42	-	-	0	1	89
Chairman is a Target Insider	0.52	-	-	0	1	89
CEO is a Sponsor	0.17	-	-	0	1	89
CEO is a Target Insider	0.83	-	-	0	1	89
CEO duality from Sponsor	0.04	-	-	0	1	89
CEO duality from Target Insider	0.26	-	-	0	1	89

7   Results and Analysis

7.1   Announcement CAR

Table 2 shows the test results of short-term stock performance of SPACs, where CAR captures market reactions surrounding SPAC acquisition announcements. The event window employed is (-1,1), hence 3 days, and the estimation window used is (-121, -2)[2]. The results indicate that the announcement has a significant influence on SPAC daily returns during the event window.

As Table 2 discloses, CAR surrounding the acquisition announcement dates is positive, 3.05% on average compared with Russel 2000 index. Relative to our IPO benchmark, over-performance is even greater, 4,24% on average. Our findings might possibly indicate that the ex-post market sentiment is on average positive, which can be interpreted as the market looking favourably upon the SPAC sponsors' choice of announced targets. The results are in both cases significant at the 1% level. As Dimitrova (2017) points out, a positive CAR is not necessarily synonymous with the acquisition being a good one, but rather reflects the value that the market attributes to the deal relative to previous expectations. Hence, and according to the author, CAR can also be positive for value destroying deals if they are less value destroying than what the market anticipated ex-ante. Based on this information, it is thus not possible to say whether the acquisitions were value-creating or not. Dimitrova (2017) examines announcement return for companies that announced a merger between 2003 and 2010 and found positive CAR relative to Russel 2000 and at a similar magnitude. Thus, the market still seems to view the acquisition announcements of the SPAC management positively and market reactions appear to be similar across both generations.

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[2] In alternative estimation we use event window (-2,2) and our results remain stable. See *Appendix E: CAR with Alternative Event Window*.

Table 3. Cumulative Abnormal Returns Results

Table 3 shows CARs and corresponding t-test results. CAR is calculated by using different benchmarks, FTSE RENAISSANCE IPO and Russell 2000 index with a three-day event window of (-1,1). The cumulative abnormal returns are different in magnitude, but both results are significant at 1% level.

	Mean	Median	t statistic	p-value
CAR [-1,1]				
benchmark				
FTSE RENAISSANCE IPO	4.24%	0.86%	3.2165	0.0018
Russell 2000	3.05%	0.52%	3.1787	0.0020

7.2   De-SPAC Performance

Several studies that have been conducted in the past have shown that post-merger performance tends to be poor on average (Dimitrova, 2017; Jog and Sun, 2007; Jenkison and Sousa, 2011; Kolb and Tykvová, 2016). Consistent with these findings, we find poor post-merger performance to also be the case for the latest generation of SPACs.

Table 3 disclose that investors who bought shares in a newly combined firm at the beginning of the second day of trading and pursued a buy-and-hold strategy for six months experienced substantial negative BHAR, ranging between -16,02% and -53,91% depending on which benchmark is used as comparison. When the time horizon is extended, the results are even worse. In fact, our findings show that the median BHAR is -115,37%, significantly underperforming our normal IPO benchmark three years following the completion date. These results are both alarming and surprising at the same time, especially in light of the increased popularity of SPACs in recent years which has been argued to have attracted more high-profile companies to go public with SPACs (Castelli, 2009).

On the other hand, Dimitrova (2017) found that six-month post-merger returns compared to the same market benchmark used in our study, Russel 2000 index, were slightly worse than what our study suggests (-21.01% compared to our findings, -16.02%). After two years, the magnitude of under-performance seems to be very similar across both studies; -55.74% (our study) compared to -57.7% (Dimitrova, 2017). The poor performance in general and the even greater difference between our SPAC sample and the IPO benchmark suggest that lower quality companies continue to choose to go public with SPACs (Kolb & Tykvová, 2016) and that higher quality companies prefer going public with normal IPO.

Another possible explanation for these poor performance patterns may also be attributed to the implementation of various regulations in recent years. As discussed in Section 2, the Sarbanes Oxley Act was introduced in 2002 to counteract the occurrence of accounting related abuses from happening in the future. However, the implementation of SOX also proved to have disadvantages. Not only did the regulatory burden put on companies become much heavier, it

also required large financial resources in order to be able to live up to the compliance requirements. These high costs made it impossible for many companies to go public, which ultimately led to a sharp reduction in IPO activity. In an attempt to restore IPO activity, the JOBS Act was passed in 2012. The JOBS act eased several of these regulatory compliance requirements, especially for smaller firms, which meant that several companies that previously could not afford to go public now saw an opportunity. Judging by the increased SPAC activity in recent years, it is not inconceivable that the easing of these compliance requirements that followed from the JOBS Act may have contributed to this development. If it has become easier for companies in general to go public, it is also not inconceivable to imagine that the lowered thresholds for what is required by firms in order to achieve a public status might have led to more lemons seeing an opportunity to go public. However, no such conclusion can be drawn based on this information.

Table 4. Post-acquisition Performance in Different Time Horizons

Table 4 demonstrates the BHAR of de-SPACs across different time horizons. Panel A uses FTSE RENAISSANCE IPO as benchmark, while Panel B uses Russell 2000 index as benchmark. The results of t-tests of differences are reported in the difference-mean column.

| | SPAC | | Benchmark | | Difference | | |
Period	Mean	Median	Mean	Median	Mean	Median	N
Panel A: FTSE RENAISSANCE IPO							
6 months	5.03%	-30.53%	58.95%	33.37%	-53.91%***	-61.41%	61
12 months	-6.41%	-19.68%	43.71%	24.88%	-50.12%***	-53.98%	50
24 months	-42.22%	-62.69%	51.50%	33.27%	-93.73%***	-96.91%	32
36 months	-29.34%	-67.50%	56.34%	47.87%	-85.67%***	-115.37%	21
Panel B: Russell 2000							
6 months	5.03%	-30.53%	21.06%	8.53%	-16.02%	-34.61%	61
12 months	-6.41%	-19.68%	13.44%	10.14%	-19.84%*	-33.41%	50
24 months	-42.22%	-62.69%	13.51%	11.75%	-55.74%***	-67.76%	32
36 months	-29.34%	-67.50%	22.22%	21.95%	-51.55%***	-88.15%	21

* Significance at the 10% level, respectively.

**Significance at the 5% level, respectively.

 ***Significance at the 1% level, respectively.

7.3   Multi-regression Analysis

In this section, four models are estimated using the OLS method in order to test our four hypotheses. Since our sample is limited in size, we use 6-month BHAR as the dependent variable in all models. A correlation table is found in *Appendix D-5 Multicollinearity:*

Correlation Matrix. Due to the presence of two extreme outliers, the sample has been winsorized at the 2.5% level to avoid these two observations from contaminating the results of the study. By doing this, we can ensure that a more accurate picture of our sample and study is reflected in the results. All models, except for model 3, control for year fixed effects. The regression results are displayed in Table 4 below[3].

In model 1, we test how ex-post market sentiment affects long-term performance. We do this by using CAR as a proxy for SPAC sponsors' judgment regarding the chosen target. Judging by the negative coefficient for CAR in Model 1, it seems that a higher announcement CAR has a negative impact on the subsequent post-merger performance. This finding is in line with Akerlof's (1978) information asymmetry explanation as to why newly listed companies that have shown good short-term performance tend to perform worse in the long run, namely that it is difficult for the market to make a correct assessment of the true firm value in advance. The fact that the information disclosure requirements are not as extensive for firms choosing to go public with SPACs as they are with normal IPO speaks even more in the direction of this hypothesis. Our findings are also consistent with the similar explanation provided by Ritter (1998), namely that good short-term performance tends to be followed by poor long-term performance. Ritter (1998) argues that the initial divergence of opinion between optimistic and pessimistic investors is reduced over time as more information becomes available to the public, which in turn pushes down the stock valuation until an equilibrium is reached. The results from Model 1 disclose that CAR is not significant when benchmarked against normal IPOs, while the opposite is true when benchmarked against Russel 2000 index. The relationship between CAR and BHAR is, however, preserved when benchmarked against Russel 2000 index. A potential explanation for this finding could be that SPACs have more in common with normal IPOs than with established companies when it comes to characteristics and transparency, which might also explain the less negative magnitude when comparing with normal IPOs. However, this example shows that one must be careful with the choice of benchmark used in SPAC performance studies. These results should thus be interpreted with great caution.

In Models 2, we test for the presence of moral hazard that investors may be exposed to from underwriters. We find a negative relationship between BHAR and deferred fee in Model 2, which is consistent with Dimitrova's (2017) findings and supports her explanation that underwriters, due to their strong compensation incentives, are more prone to suggest suboptimal deals to the SPAC management team if the deferred portion of their total compensation is large. Furthermore, and based on the positive relationship between underwriter quality and BHAR, it

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[3] We also perform an alternative regression using Russel 2000 adjusted BHAR as the dependent variable. The regression results can be found in *Appendix F: Regression Results with Russell 2000 Benchmark*.

seems like the risk for shareholders of being exposed to moral hazard by underwriters diminishes if more reputable investment banks underwrite the offering, in line with our expectations. This positive relationship lends support to the notion that more prestigious underwriters are more likely to safeguard their reputation and thus less willing to expose investors to moral hazard by pitching bad deals. The coefficient for deferred fee is, however, significant at the 10% level while underwriter quality is not. Hence, the results should be interpreted with great cautiousness, and no definitive conclusions related to underwriter quality can be drawn.

In Model 3, we test if time to acquisitions, measured as the time between the SPAC IPO date and the acquisition announcement date, have an impact on post-merger performance. It has often been argued that SPAC managers have strong incentives to carry out any acquisition before the expiration of the time limit, even if they are bad. This is because SPAC sponsors compensation, which comes in the form of 20% of the shares in the SPAC, is only received if they successfully conduct an acquisition. If they fail, they get nothing. (Rodrigues & Stegemoller, 2014). Due to this compensation structure, Dimitrova (2017) argues that as the time limit begins to approach, sponsors tend to become less picky with their choice of target and instead begin to focus on just finding anything to acquire. The author believes that the conflict of interest is exacerbated by the fact that SPAC sponsor compensation is not linked to performance metrics but only to the closing of the transaction itself. Poor performance of late mergers might thus reflect desperation on the part of SPAC sponsors.

To test whether the risk of investors being exposed to moral hazard by SPAC managers increases as the time limit approaches, we also include time to announcement squared in model 3. If the Time to Announcement squared variable shows a negative relationship with BHAR, it would indicate that late mergers perform worse on average than early ones, which in turn would provide support for the notion that SPAC sponsors act in self-interest at the expense of investors. This in turn would provide support for the notion that SPAC sponsors, due to their perverse incentives, become increasingly inclined to throw investors under the bus when time starts running out.

Our results reveal that time to announcement is negatively correlated with BHAR, indicating that more time spent searching for a target seems to be associated with worse post-merger performance. Time to announcement squared, on the other hand, is positively related to BHAR, suggesting that after a certain point in time, more time spent searching for a target before an acquisition announcement is made seems to improve post-merger performance. Thus, these findings provide support to the counter argument that more time spent on the margin increases the probability of finding a good target, ultimately resulting in better performance. The explanations for these found patterns may be manifold. First of all, it is intuitive to imagine that more time spent searching for a target should in general increase the chance of finding a good one. Why this connection tends to be present in the later generation of SPACs, but not in the pre-2010 generation of SPACs, may be because there are more potential targets to scout for the SPAC sponsors now compared to before. Since due diligence is a time-consuming process for SPAC management, it may be that more time needs to be devoted to this purpose, which could potentially explain the time dimension. Consequently, if there are several interesting candidates in the pipe to choose from in the end, the probability increases that the choice that is ultimately made is of higher quality.

Furthermore, Castelli (2009) mentions that while SPACs has grown in popularity, so has the competition for both private operating companies and investors capital. For SPAC sponsors who intend to become serial SPAC sponsors, such as Chamath Paliphitaya who is currently running his 6th SPAC[4], good reputational capital is probably of great importance in order to be able to secure future funding. Failure to act in the best interests of SPAC investors would damage investor confidence and reduce the likelihood of SPAC sponsors being able to attract future capital. Another possible explanation for our found results may thus be that SPAC sponsors have become more inclined to act in the best interests of investors in recent times as it may be beneficial for their future careers, in other words a behavioural change that ultimately translates into less risk for investors being exposed to moral hazard.

While both time to announcement variables in Model 3 are statistically significant at the 5% level when using normal IPO adjusted BHAR as dependent variable, the results are not significant when Russel 2000 adjusted BHAR is used as the dependent variable. The relationship between time to announcement and BHAR is, however, preserved in both cases. This once again shows the importance of being careful with the choice of benchmark used in SPAC performance studies, as it can have an impact on the results.

In summary, we do not find evidence in support of the notion that the risk of investors being exposed to moral hazard increases as the deadline approaches. Rather, it seems that more time spent searching for targets is beneficial to investors.

In the last model, Model 4, we examine how the choice of de-SPAC governance influence long-term performance by introducing dummy variables that capture whether a target insider or SPAC sponsor is the CEO, the Chairman or both in the new combined company. If Castelli (2009) is right that the increasing popularity of SPACs in recent years has also attracted more experienced and competent industry veterans to become SPAC sponsors, then it is not inconceivable that they are better suited to run the combined firm than those in previous generations of SPACs. If that is true, a positive relationship should be found for these variables. In recent times, more and more high-profile firms have also begun to show interest in going public with SPACs. High-profile firms are usually run by competent management teams, which would suggest a positive relationship with BHAR. In addition, Guo et al., (2011) found that performance for LBO tends to be higher in buy out deals where the CEO is replaced upon closing of the transaction. Others have found that a greater involvement of PE sponsors in target

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[4] Chamath Palihapitiya took his first SPAC, Social Capital Hedosophia ("SCH"), public on September 14th 2017. About 2 years later, SCH successfully merged with Virgin Galactic in a transaction valued at $ 1.4bn (Quartz, 2021).

firms is associated with better performance in general (Cornelli & Karakas, 2013). Schwert (1985), on the other hand, shows that a greater involvement of target insiders is associated with better performance under the conditions that they are provided with the right incentives. If this is the case, greater involvement of target insiders is preferable, as they possess a great deal of knowledge about both the company they run and the industry in which they operate, in which shareholders can benefit. In addition, it is not uncommon for target insiders to also be the founders of the company they run, which is particularly common in smaller companies. In such companies, target insiders are the most important asset for the company, and are crucial to the company's success (Schwert, 1985). All in all, there are arguments that both greater influence from SPAC sponsors and target insiders can lead to better performance.

The results from Model 4 show that all coefficients associated with governance quality are all positive, but to varying degrees. However, only those related to the Chairman are statistically significant. The chairman variables are consistent in terms of relationship and significance regardless of if we use IPO adjusted BHAR or Russel 2000 adjusted BHAR as the dependent variable. While CEO is a target insider is weakly significant at the 10% level when using IPO adjusted BHAR, it is not when we use BHAR that is adjusted with the other benchmark.

Judging by our data, some SPACs in our sample appointed a chairman in the newly combined firm that is neither a target insider nor a SPAC sponsor. In such cases, performance tends to be significantly worse than the average performance of our sample set. The fact that both the coefficient for Chairman is a sponsor and Chairman is a target insider are positive, appears to have a similar magnitude and are both statistically significant makes us believe that the market does not pay much attention to who is elected chairman as long as it is a SPAC sponsor or a target insider. In sum, it seems like the choice of de-SPAC governance is important for post-merger performance.

Regarding the control variables, we find that deal value tends to matter for post-merger performance. In fact, deal value is significant across all models and is not sensitive to the choice of benchmark used. Furthermore, the positive relationship is in line with our expectations, as researchers have found that large M&A deals tend to be associated with higher returns for acquirers than smaller ones following acquisitions (Moeller et al., 2015).

Firm size also seems to be important for post-merger performance, as control variables related to firm size are significant in Models 3 and 4 while also being insensitive to the choice of benchmark used. The negative relationship is also consistent across all models, a relationship that is consistent with our expectations as several studies have found a negative relationship between performance and firm size both in the SPAC literature (Jog and Sun, 2007) and in the traditional M&A literature (Moeller et al., 2015).

As for the remaining control variables, all are insignificant, with the exception of cyclicality which is weakly significant at the 10% level in one of the models. However, the negative relationship between cyclicality and BHAR is not surprising, as several studies have found that private companies that choose to go public during periods characterized by high IPO activity experienced poor long run performance following the IPO (Loughran et al., 1994; Ritter, 1984).

Table 5. Regression Results of Post-Merger Stock Performance of SPACs

Table 5 reports the regression results of the four regression models. 6-month IPO adjusted BHAR is the dependent variable for all models, but the main variable groups are different for each model. The main variables are reported at the front part of each column, and control variables are listed behind variables. For model 3, since the main variables are time-related factors, the year control is not applied.

Independent Variables	(1)	(2)	(3)	(4)
Announcemment CAR (IPO benchmark)	-0.576			
	(1.120)			
Deferred Fees (%)		-1.103*		
		(0.550)		
Underwriter Quality		0.0996		
		(0.0710)		
log(TimeToAnn)			-18.85**	
			(8.163)	
log(TimeToAnn)^2			3.833**	
			(1.663)	
Chairman is a SP				1.231***
				(0.363)
Chairman is a TI				1.394***
				(0.411)
CEO is a SP				0.614
				(0.530)
CEO is a TI				0.862*
				(0.492)
CEO duality from SP				0.760
				(0.828)
CEO duality from TI				0.611
				(0.506)
Boardsize	0.0222	0.0232	-0.00257	0.0975
	(0.0847)	(0.0706)	(0.0815)	(0.0638)
Relative Size	-0.125	-0.114	-0.191**	-0.147**
	(0.0831)	(0.0783)	(0.0830)	(0.0710)
Log(Deal Value)	0.942**	0.855**	0.995**	1.091***
	(0.384)	(0.358)	(0.387)	(0.334)
Cyclicality	-0.0213	-0.0164	-0.0311*	-0.0113
	(0.0248)	(0.0234)	(0.0163)	(0.0261)
Industry/Region Focus	-0.167	-0.0473	0.0857	-0.383
	(0.326)	(0.303)	(0.270)	(0.364)
Target Age	-0.00497	-0.00322	-0.00491	0.000669

	(0.00416)	(0.00457)	(0.00455)	(0.00495)
Log(MarketCap)	-0.604	-0.401	-0.702*	-0.744*
	(0.613)	(0.573)	(0.575)	(0.533)
Constant	-7.544**	-9.742***	17.09*	-11.38***
	(3.073)	(3.286)	(10.15)	(3.541)
Observations	61	61	61	61
R-squared	0.350	0.424	0.224	0.502
Year Control	Yes	Yes	No	Yes

Robust standard errors in parentheses

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

	(0.00416)	(0.00457)	(0.00455)	(0.00495)
Log(MarketCap)	-0.604	-0.401	-0.702*	-0.744*
	(0.613)	(0.573)	(0.575)	(0.533)
Constant	-7.544**	-9.742***	17.09*	-11.38***
	(3.073)	(3.286)	(10.15)	(3.541)

7.4   Double Selection Lasso Results

In this section, four models are estimated by double selection Lasso to get the robust coefficient results of main variables. The results of CV function are reported in Figure 2, and the selected λ with minimum MSE of each model is highlighted by the red line. The selected control variables are displayed in *Appendix G: Lasso Selected Control Variables*.
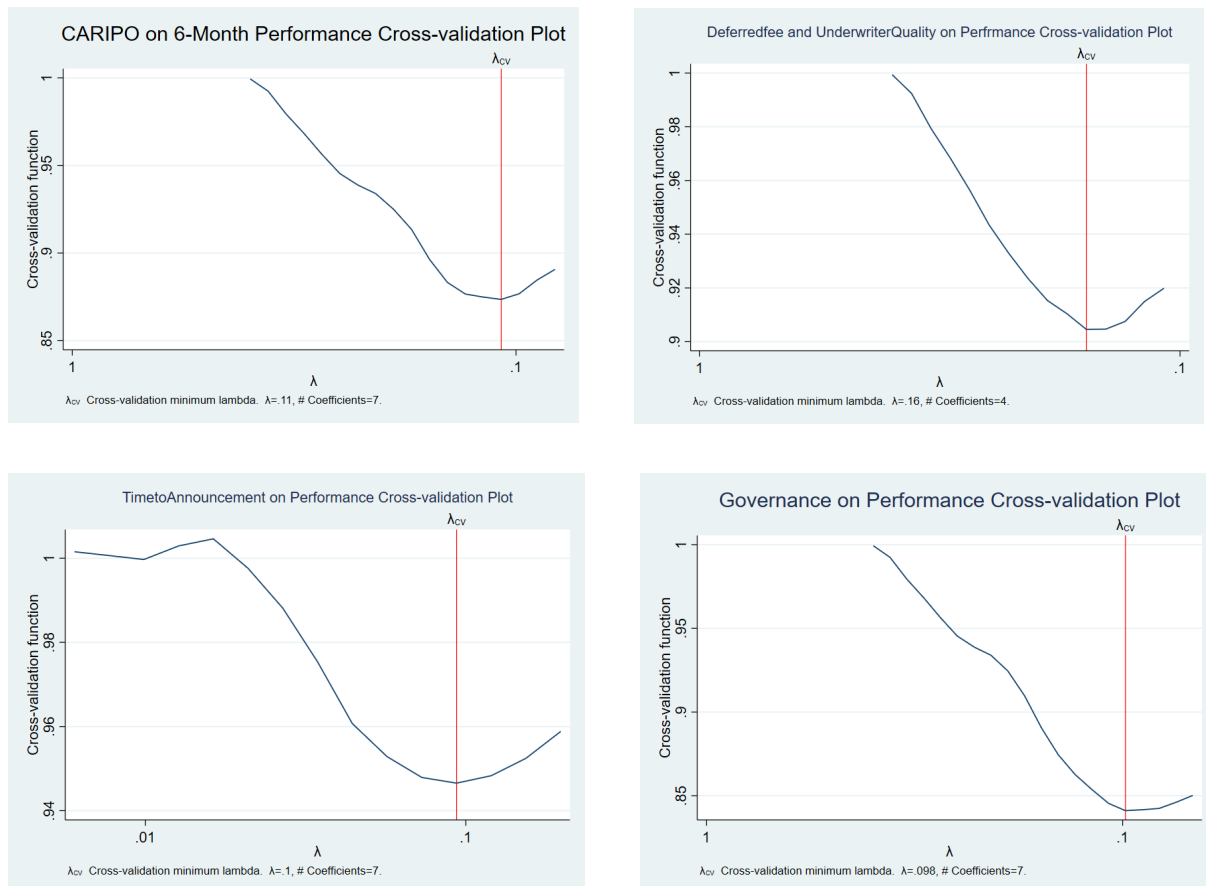
Figure 3. 10-fold Cross Validation Function Result

Figure 3 demonstrates the cross validation function over the 10-fold searching grid for the penalty parameter λ. The CV function is the MSE (mean square error) of the factors in the CV sample. The λ with the minimum mean square error is selected for the final results calculation for each model.

Table 5 demonstrates the results of the double selection Lasso regression. Compared to the OLS results, the signs of all main variable coefficients are preserved. Model 1, 3 and 4 report the similar significance levels for the coefficients with different numbers. Specifically, in model 1, CARIPO shows more negative effect, while it moves closer to 10% significant level; in model 4, both significant variables, Chairman is a Sponsor and Chairman is a Target Insider generate less positive effect on BHAR. In model 3, the coefficients changed, but the turning point of negative is still around 138 days after IPO. Interestingly, Model 2 demonstrates different significant results of the two main variables. In multi-regression model, deferred fee is

significant at 10% and underwriter quality seems to not be significant, whereas in double selection Lasso the opposite is true for underwriter quality. However, both insignificant variables are close to the 10% significant edge.

Table 6. Double Selection Lasso Results

Table 6 reports double selection Lasso results of the four regression models. 6-month IPO-adjusted BHAR is the dependent variable for all models. Since only coefficients of main variables can be explained, the control variables are omitted here.

Main Variable	Coef.	Robust Std. Err.	z	P>z	95% Conf. Interval	
Model 1						
CAR (IPO benchmark)	-1.07774	0.742278	-1.45	0.147	-2.53258	0.377097
Model 2						
Deferred Fees	-0.82948	0.597699	-1.39	0.165	-2.00095	0.341985
Underwriter Quality	0.118606	0.070093	1.69	0.091	-0.01877	0.255985
Model 3						
log(Time to Ann)	-20.6491	9.224921	-2.24	0.025	-38.7296	-2.56857
log(Time to Ann)^2	4.721158	2.054719	2.3	0.022	0.693982	8.748333
Model 4						
ChairmanisaSP	0.787316	0.315731	2.49	0.013	0.168495	1.406137
ChairmanisaTI	1.029	0.393153	2.62	0.009	0.258435	1.799566
CEOisaSP	-0.0998	0.406446	-0.25	0.806	-0.89642	0.696822
CEOisaTI	0.138587	0.401924	0.34	0.73	-0.64917	0.926344
CEOdualityfromSP	0.342698	0.719204	0.48	0.634	-1.06692	1.752312
CEOdualityfromTI	0.230506	0.380838	0.61	0.545	-0.51592	0.976935

After having cross-checked the results from the multiple regressions with the results derived from double selection Lasso, it is safe to say that the relationships between the four main factor groups and the 6-month BHAR of de-SPAC companies are robust. Similar to the results from OLS multiple regression, the results from double selection Lasso show that both significance and relationship is preserved for the time to announcement related variables. This also applies to the variables Chairman is a Sponsor and Chairman is a Target Insider, from which the Lasso regression's results reveal a preserved relationship. In addition, the results from double selection Lasso disclose that CAR, deferred fee and underwriter quality also have preserved relationships. In sum, and based on the results from double selection Lasso, we conclude that our results from the multiple regressions are robust.

8 Conclusion and Discussion

8.1 Conclusion

This paper examined pre- and post-merger performance for the third generation of SPACs.

In Section 1, two research questions were formulated. These two were:

1. How is the latest generation of SPACs performing?
2. Can the chosen explanatory variables explain post-merger performance in the latest generation of SPACs?

The result from our study reveals that announcement of mergers tends to earn significantly positive market response. However, for the post-merger performance, this study, like several other studies done for previous generations of SPACs, shows that average long-term performance tends to be poor. The answer to this question is thus twofold: Pre-merger performance is good, while post-merger performance is poor.

In order to answer the second question, the paper evaluated four models in two ways: multi-regression and double selection Lasso, where the latter was used to control for the robustness of the results derived from the multiple regressions. The results from double selection Lasso revealed that our findings from the multiple regressions are robust.

In this study, we find that CAR is negatively associated with post-merger BHAR. While the results are significant when using our alternative benchmark, we do not find such evidence when using IPO adjusted BHAR as the dependent variable. However, we believe that the negative relationship can be partly attributed to the market's difficulties in making accurate assessments of newly listed companies' fair value in advance. Another possible explanation for the negative relationship can possibly be attributed to Ritter's (1998) divergence of opinion theory, namely that good short-term performance tends to be followed by poor long-term performance because of differences in opinions between optimistic and pessimistic investors. Eventually, when more information becomes available to the public, the difference of opinion decreases, which in turn pushes down the stock price until an equilibrium is reached. However, and as mentioned earlier, our findings related to CAR seem to be sensitive to the choice of benchmark and should therefore be interpreted with some caution.

Our study was also able to find that late mergers tend to perform better on average, suggesting that more time spent searching for a target pays off for investors. These findings give support to the argument that more time spent by SPAC sponsors searching for a target increases the

likelihood of finding a good target, which investors ultimately will benefit from. We thus find no evidence for the notion that late acquisitions would increase the risk of investors being exposed to moral hazard by SPAC sponsors (Dimitrova, 2017).

We believe that our discoveries might be explained by the fact that the SPAC market has become more competitive in recent years, which has contributed to SPAC sponsors becoming more concerned about maintaining their good reputation so as not to sabotage their future opportunities to start new SPACs. Another reason we think may hold explanatory power is that the increasing popularity of SPACs has made it easier for SPAC sponsors to find good targets, which means they can avoid entering into acquisition agreements that are detrimental to investors to a greater extent and only pitch acquisitions that they judge are the best available. However, this study cannot draw any such conclusions, but rather constitutes speculation on the part of the authors.

In line with what other researchers have found, our results also suggest that the risk of investors being exposed to moral hazard by underwriters increases when underwriters defer a large part of their total compensation. In addition, we hypothesized that the risk of moral hazard would decrease if more prestigious underwriters were involved in the underwriting process. Our study could not find support for this argument.

Furthermore, we find that more influence from target insiders and SPAC sponsors in the combined company, more specifically as Chairman, is positively related to post-merger performance. In other words, it seems that the choice of governance is important for long-term performance.

In sum, for the four hypotheses in the study, we accept three and reject one. The answer to the second question is thus: Yes, to a great extent.

8.2   Limitations

In this paper, we study the performance of the latest generation of SPACs. We are, however, aware of the fact that the study has some limitations. To alleviate some of these issues, we have applied several measures.

First, since there is no single database that could provide us with complete information on SPACs, our data was retrieved from different sources. Not being able to retrieve all data from one single and credible database means that data must be gathered and supplemented from several different sources, which in turn increases the risk of failing to include certain observations that should have been included. To reduce this risk, we cross-checked our data across the various sources. Although our belief is that this risk is low, we cannot completely rule it out.

Second, most of the data was collected manually from the Securities and Exchange Commission's ("SEC") EDGAR database. As mentioned in Section 6, most of the data was gathered from S-1 and DEFM14A filings. Since these are corporate filings, there was no other

way to extract information from these files other than to do it manually. As is natural when data is retrieved manually, the risk of human errors increases. To reduce such risk and in order to avoid subjective interpretations on behalf of the authors, both authors participated in the retrieval of this data.

Third, the sample size is relatively small in this study, which may influence the credibility of the results. We have 89 observations for summary statistics of which only 61 are included in the regressions. Nevertheless, since the number of SPACs that have successfully completed a business combination is still small in relation to the number of SPACs that have completed an IPO, it was impossible for us to increase the sample size. Instead, to ensure the reliability of our results, we performed several robustness tests. For calculating CAR, we used two different event window lengths: (-1,1) and (-2,2). For BHAR calculations, we employed two different benchmarks (IPO benchmark and Russell 2000 index) and tested BHAR over several time horizons; and for multi-regression analysis, we conducted regressions using both IPO adjusted BHAR and Russel 2000 adjusted BHAR as the dependent variable.

Finally, several post-estimations tests and double selection Lasso were conducted to verify the results from the OLS regressions. All the robustness checks demonstrated that our conclusions are robust.

8.3   Discussion and Suggestions for Future Research

The number of SPAC IPOs has increased dramatically in the last decade. Having only accounted for 14% of the total IPO market in 2007, SPACs now constitute more than 50% of the IPO market in the United States.

In addition, last year a new record was set in terms of capital raised from SPACs, when more than $ 70 billion was raised by SPACs. The fact that SPACs as a phenomenon continue to gain ground to this enormous extent is fascinating given that SPACs on average tend to perform poorly in the long-run, significantly worse than the general market and their traditional IPO counterparts. Naturally, this raises the question of why interest in SPACs, despite these trends, still continues to increase in both numbers and capital raised year after year.

Despite these poor de-SPAC performance patterns, there are, nonetheless, also positive things to say about SPACs. We believe that SPACs play an important role in the market, not least for young companies that cannot live up to the high requirements associated with raising capital through a normal IPO process. This is because SPACs open the possibility for companies to raise public capital even though they do not meet the conditions for going public the traditional way (Riemer, 2008). Gaining access to growth capital is also a prerequisite for companies in order to be able to grow and ultimately hire employees, something that is associated with great societal benefits. To make SPACs more attractive to long-term investors, we also believe that SPACs should seek more inspiration from their VC industry cousins. In the VC industry, the agreements between general partners and limited partners are carefully designed in order to minimize the presence of conflicts of interest between the two stakeholders. Among other things, GP compensation in the VC industry is not binary in the sense that it is linked to a

completed acquisition but is rather largely performance based (Sahlman, 1990). The implementation of a similar incentive-based compensation structure for SPAC sponsors and underwriters would lead to better alignment of incentives with shareholders, thereby reducing the risk of moral hazard related problems. Consequently, it is reasonable to assume that this would lead to better acquisitions being proposed, which investors ultimately would benefit from.

The poor post-merger performance patterns observed in our study do, however, raise the question of whether it is only lemons that, after all, choose to turn to SPACs. We find it difficult to believe that the answer is so simple, and therefore recommend that more research be done on SPACs in the future in order to gain a better understanding of what type of companies are best suited for SPAC mergers relative to the traditional IPO route, as well as what other circumstances contributes to making SPACs a more attractive alternative to normal IPOs for all stakeholders involved.

A concrete example of an interesting future research topic would be to examine post-merger performance between firms in different industries, i.e., to see if firms in certain industries tend to perform better on average than others. It would also be interesting to gain an increased understanding of how crucial SPAC management's knowledge and experience are for long-term success. In an attempt to answer that question, SPAC management's experience in executive roles and education (in years) could be included as explanatory variables. Perhaps it is the case that under certain conditions, SPACs can nevertheless be (or become) an attractive long-term investment alternative for investors.

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Appendix A: The SPAC Lifecycle

Appendix A: Illustration of the SPAC lifecycle. This is a visualization of the SPAC lifecycle described in *Section 3.1 How SPACs Work*.
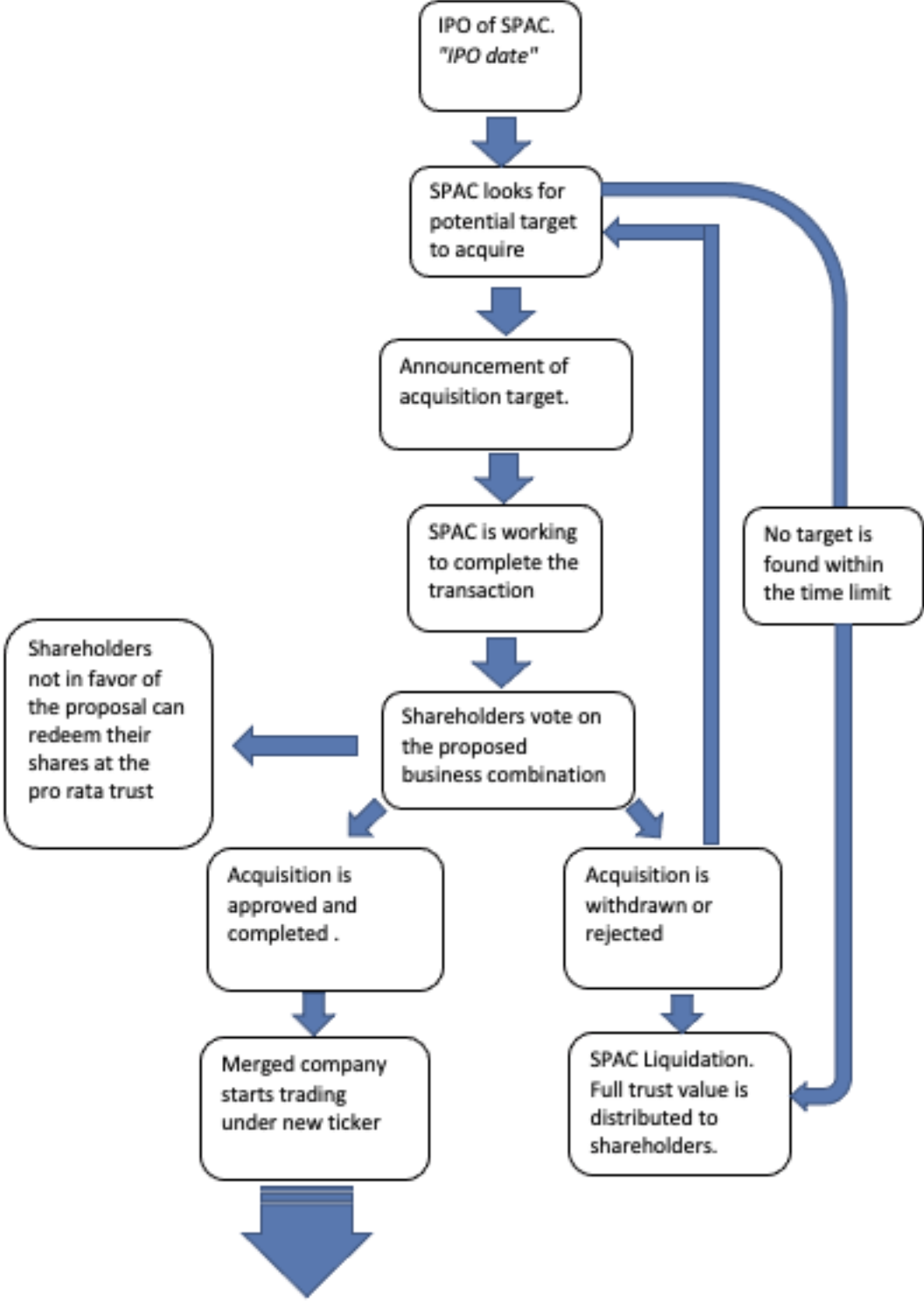
Appendix B: Expansion Regression Models

Model 1. Main regressor: Announcement CAR

$$\text{BHAR} = \alpha + \boldsymbol{\beta\,CAR} + \gamma_1 \text{ Board Size} + \gamma_2 \text{ Relative Siz} + \gamma_3 \text{ Deal Value} + \gamma_4 \text{ Cyclicality}$$
$$+ \gamma_5 \text{ Industry or Region Focus} + \gamma_6 \text{Target Age} + \gamma_7 \text{ Market Capitalization}$$
$$+ \gamma \text{ Year COntrol}' + \varepsilon$$

Model 2. Main regressor: Deferred Fees and Underwriter Quality

$$\text{BHAR} = \alpha + \boldsymbol{\beta_1 Deferred\ Fees} + \boldsymbol{\beta_2 Underwriter\ Quality} + \gamma_1 \text{ Board Size}$$
$$+ \gamma_2 \text{ Relative Siz} + \gamma_3 \text{ Deal Value} + \gamma_4 \text{ Cyclicality} + \gamma_5 \text{ Industry or Region Focus}$$
$$+ \gamma_6 \text{Target Age} + \gamma_7 \text{ Market Capitalization} + \gamma \text{ Year COntrol}' + \varepsilon$$

Model 3. Main regressors: Time to Announcement

$$BHAR = \alpha + \boldsymbol{\beta_1 Time\ To\ Announcement} + \boldsymbol{\beta_2\ (Time\ To\ Announcement)^2}$$
$$+ \gamma_1 \text{ Board Size} + \gamma_2 \text{ Relative Siz} + \gamma_3 \text{ Deal Value} + \gamma_4 \text{ Cyclicality}$$
$$+ \gamma_5 \text{ Industry or Region Focus} + \gamma_6 \text{Target Age} + \gamma_7 \text{ Market Capitalization} + \varepsilon$$

Model 4. Main regressor: Governance

$$\text{BHAR} = \alpha + \boldsymbol{\beta_1} \textbf{ Chairman is a Sponsor} + \boldsymbol{\beta_2} \textbf{ Chairman is a Target Insider}$$
$$+ \boldsymbol{\beta_3} \textbf{CEO is a Sponsor} + \boldsymbol{\beta_4} \textbf{CEO is a Target Insider}$$
$$+ \boldsymbol{\beta_5} \textbf{CEO duality from Sponsor}$$
$$+ \boldsymbol{\beta_6} \textbf{ CEO duality from Target Insider} + \gamma_1 \text{ Board Size}$$
$$+ \gamma_2 \text{ Relative Siz} + \gamma_3 \text{ Deal Value} + \gamma_4 \text{ Cyclicality} + \gamma_5 \text{ Industry or Region Focus}$$
$$+ \gamma_6 \text{Target Age} + \gamma_7 \text{ Market Capitalization} + \gamma \text{ Year COntrol}' + \varepsilon$$

Appendix C: Variable Description

Appendix C elaborates all variables used in the study. The variables are divided into three categories: SPAC characteristics, Deal characteristics and Governance.

Variable Name	Description
SPAC Characteristics	
Cyclicality	Number of SPACs that completed an acquisition in a specific year
Deferred fee	Fraction (%) of the total underwriting compensation that is being deferred
Proceeds	Capital raised in the Initial Public Offering of the SPAC excluding green-shoe provisions, in $ millions
Time Limitation	The time a company has at its disposal to complete a merger transaction before it is forced into liquidation, in months.
Underwriter Quality	Taking values from 1-9, with 9 indicating the highest underwriter reputation. Based on R.J Ritter's underwriter quality ranking that was originally developed by Carter and Manaster (1990).
Industry or Region Focus	Dummy variable. 1 if the SPAC has an industry or region focus when searching targets in S-1 file
Deal Characteristics	
Deal Value	Acquisition transaction value, in $ millions
Time to Announcement	Time between the IPO date and the reverse merger announcement date (in days)
Market Capitalizations	Market capitalization of the SPAC at the time of the merger announcement, in $ millions
Time Process Ratio	Time to announcement as a fraction of time limitation
Relative Size	Target value as a fraction of the SPACs market capitalization
Target Age	Target age in years at the time of the merger announcement

Governance

Boardsize	Number of directors in the combined firm
Chairman is a Target Insider	Dummy: 1 if the Chairman of the combined firm is a target insider, 0 otherwise
Chairman is a Sponsor	Dummy: 1 if the Chairman of the combined firm is a SPAC sponsor, 0 otherwise
CEO is a Sponsor	Dummy: 1 if the CEO of the combined firm is a SPAC Sponsor, 0 otherwise
CEO is a Target Insider	Dummy: 1 if the CEO of the combined firm is a target insider, 0 otherwise
Target Duality	Dummy: 1 if the CEO and Chairman of the combined firm is the same person and is a target insider, 0 otherwise
Sponsor Duality	Dummy: 1 if the CEO and Chairman of the combined firm is the same person and a SPAC Sponsor, 0 otherwise

Appendix D: Pre-estimation Diagnostic Tests

Appendix D-1. Before- and After-logarithm Transformation of Proceeds, Deal Value and

Market Capitalization

Appendix D-1 shows the before- and after-logarithm process of the three variables. Before the transformation, the three variables do not appear to be normally distributed. After the transformation, the distributions are more close to normal distribution.
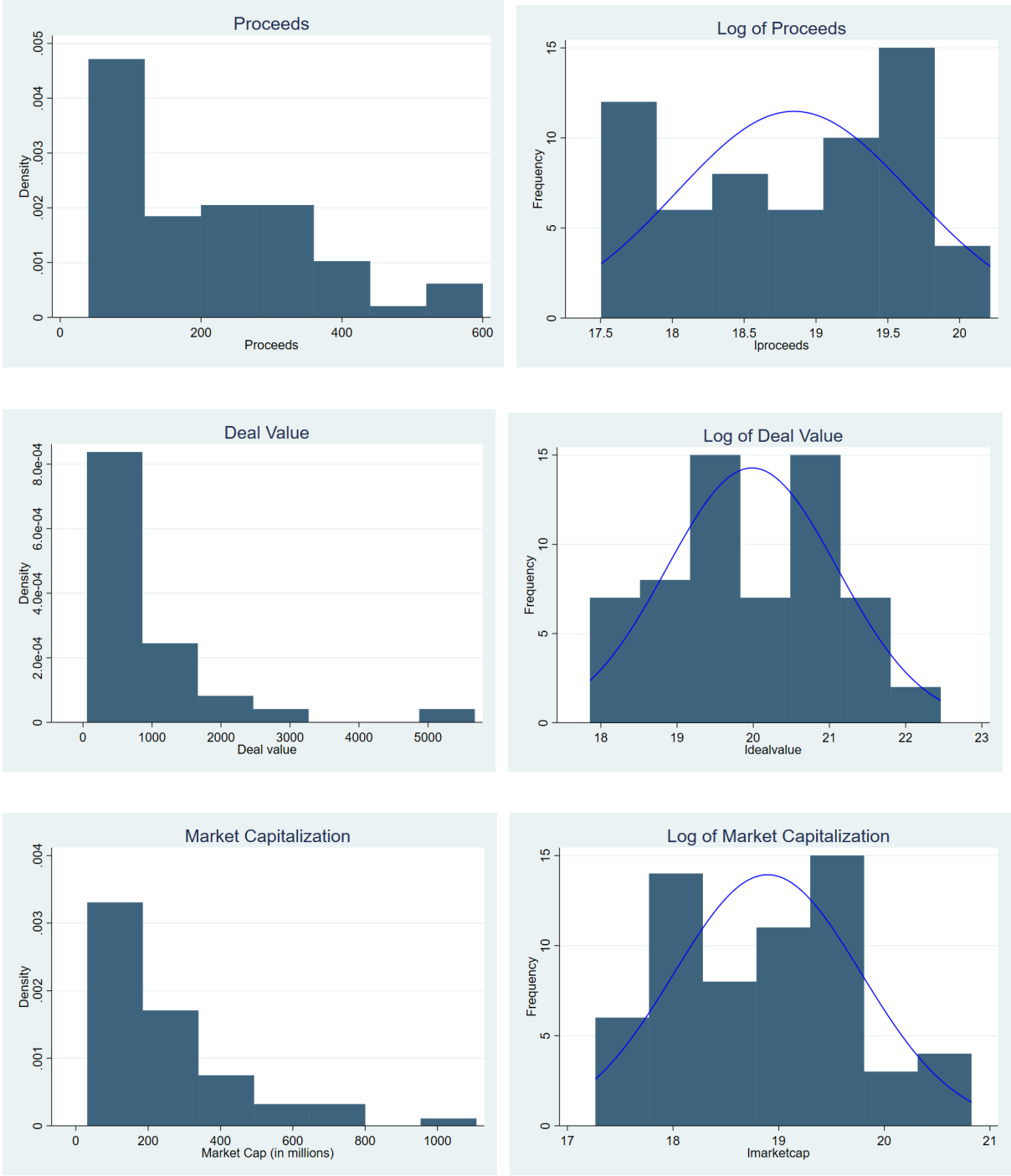
Appendix D-2. Heteroskedasticity: the White's Test

Appendix D-2 displays the test results of the White's test. The test statistics and p-values are shown for each model.

H_0: *The variance of the errors is constant* (*homoskedasticity*).

	Test Statistic	P-value
Model 1	61	0.4397
Model 2	61	0.4397
Model 3	46.62108	0.6098
Model 4	61	0.4397

Appendix D-3. Non-normality: Jarque-Bera Test

Appendix D-3 displays the test results of Jarque-Bera Test. The test statistics and critical values are shown for each model.

H_0: *The skewness and the excess kurtosis are zero*.

	Test Statistic	Chi(2)
Model 1	1.372	0.5036
Model 2	1.232	0.5402
Model 3	0.1761	0.9157
Model 4	0.1857	0.9113

Appendix D-4. Winsorizing

Appendix D-4 displays BHAR summary statistics before- and after-logarithm transformation.

Variable	Obs	Mean	Std. Dev.	Min	Max
BHAR	61	-0.44225	1.310067	-3.77858	5.959507
BHAR_winsorized	61	-0.49361	0.991672	-2.51334	1.561103

Appendix D-5. Multicollinearity: Correlation Matrix

Appendix D-4 displays a correlation matrix that includes all variables.

	CAR	Deferred Fee	Underwriter Quality	log (TimeToAnn)	log (TimeToAnn)^2	Board Size	Relative Size	log (Deal Value)	Cyclicality	log (MarketCap)	log (Proceeds)	Target Age
CAR (IPO benchmark)	1											
Deferred Fees	0.0953	1										
Underwriter Quality	0.1496	-0.1275	1									
log(TimeToAnn)	0.023	0.0762	-0.05	1								
log(TimeToAnn)^2	0.0233	0.0774	-0.0607	0.9982	1							
Board Size	0.0187	0.0534	-0.1015	-0.3638	-0.3573	1						
Relative Size	0.3212	0.088	0.1189	0.2305	0.2423	-0.092	1					
log (Deal Value)	0.2661	0.3738	0.0785	0.0784	0.0929	0.2284	0.5539	1				
Cyclicality	0.1597	0.2918	0.1094	-0.1093	-0.1101	0.0759	0.1573	0.3644	1			
log (MarketCap)	0.0922	0.3692	-0.0663	-0.0075	0.0062	0.334	-0.0887	0.7328	0.277	1		
log (Proceeds)	0.1563	0.4074	-0.0332	0.0741	0.0862	0.2829	0.0143	0.7629	0.2436	0.9586	1	
Target Age	-0.0144	0.1734	0.0099	0.1581	0.16	-0.1014	0.2656	0.3289	-0.1242	0.1901	0.2334	1

Appendix D-6. Non-linearity: Ramsey RESET Test

Appendix D-6 displays the test results of the Ramsey RESET Test. The F-test of the estimated Ramsey regression of the residual term are shown in the table.

H_0: *Model has no omitted variables.*

Model 1	F(3, 42) =	0.26	Prob > F =	0.8516
Model 2	F(3, 41) =	0.57	Prob > F =	0.6351
Model 3	F(3, 48) =	2.70	Prob > F =	0.0561
Model 4	F(3, 37) =	0.46	Prob > F =	0.7103

Appendix E: CAR with alternative Event Window

Appendix E shows CAR and corresponsding t-test results using a (-2,2) event window, hence 5 days. CAR is calculated using two different benchmarks: FTSE RENAISSANCE IPO and Russell 2000 index, respectively. Both results are significant at 1% level.

	Mean	**Median**	**t statistic**	**p-value**
CAR [-2,2]				
benchmark				
FTSE RENAISSANCE IPO	4.30%	0.67%	3.4001	0.0012
Russell 2000	4.24%	0.64%	3.3465	0.0010

Appendix F: Regression Results with Russell 2000 Benchmark

Appendix F shows the regression results for Model 1-4 when the dependent variable is Russel 2000 index benchmarked Buy-and-Hold Abnormal Return (BHAR) over a six-month period following the SPAC acquisition completion date. In Model 1, the independent variable CAR is also benchmarked against Russell 2000 index.

Independent Variables	(1)	(2)	(3)	(4)
Announcement CAR (benchmark Russell 2000)	-3.142*** (1.030)			
Deferred fee (%)		-0.992 (0.725)		
Underwriter Quality		0.0792 (0.0766)		
log(TimeToAnn)			-12.63 (10.30)	
log(TimeToAnn)^2			2.564 (2.081)	
Chairman is a SP				1.833*** (0.543)
Chairman is a TI				1.876** (0.703)
CEO is a SP				0.386 (0.680)
CEO is a TI				0.714 (0.668)
CEO duality from SP				0.806 (0.808)
CEO duality from TI				0.853 (0.651)
Boardsize	0.0181 (0.111)	0.0242 (0.100)	0.00329 (0.107)	0.105 (0.0976)
Relative Size	-0.140 (0.0875)	-0.159 (0.0957)	-0.205** (0.0973)	-0.201** (0.0870)
Log(dealvalue)	1.014** (0.444)	0.961** (0.472)	1.009** (0.462)	1.251*** (0.423)
Cyclicality	-0.00862 (0.0333)	0.00312 (0.0343)	-0.000240 (0.0195)	0.00968 (0.0338)
IndustryRegionFocus	-0.249 (0.390)	-0.200 (0.362)	-0.0859 (0.358)	-0.542 (0.456)
Target Age	-0.00580 (0.00437)	-0.00334 (0.00492)	-0.00557 (0.00537)	0.00293 (0.00618)
Log(MarketCap)	-0.780* (0.441)	-0.672 (0.505)	-0.821* (0.485)	-1.038** (0.511)

Constant	-5.683	-6.764	11.58	-9.728**
	(3.897)	(4.560)	(12.86)	(4.414)
Observations	61	61	61	61
R-squared	0.302	0.277	0.135	0.440
Year Control	Yes	Yes	No	Yes

Robust standard errors in parentheses

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

Appendix G: Lasso Selected Control Variables

Appendix G shows selected control variables for each model. The BHAR column shows the selected control variables from the second Lasso selection, and the rest of columns shows the selected control variable from the first Lasso selection, where the cell marked with x indicates the selected variable. In the end, the control variables in the normal regression models are a union of the selected covariates from the two selections.

Model 1

	BHAR	CAR (IPO benchmark)
Deferred Fees	x	
TimeLimitation	x	
Underwriter Quality	x	
log (dealvalue)	x	
Year Contol	x	
constant	x	x

Model 2

	BHAR	Deferred Fees	Underwriter Quality
Time Limitation	x		x
log (proceeds)		x	
log (dealvalue)		x	
CAR (IPO benchmark)			x
CEOisaTI			x
CEOdualityfromTI			x
Year Contol	x		x
constant	x	x	x

Model 3

	Performance	Time to Ann	(Time to Ann)^2
Deferred Fees	x		
Underwriter Quality	x		
log (dealvalue)	x		
log (marketcap)	x		
Time Process Ratio		x	x
Cyclicality		x	x
Boardsize		x	x
TargetAge		x	x
log (proceeds)		x	x
ChairmanisaSP		x	x
Year Contol	x	x	x
constant	x	x	x

Model 4

	Performance	ChairmanisaSP	ChairmanisaTI	CEOisaSP	CEOisaTI	CEOdualityfromSP	CEOdualityfromTI
Deferred Fees	x						
Time Limitation	x						
Underwriter Quality	x				x		
log (dealvalue)	x						
CAR (IPO benchmark)			x				
log (proceeds)			x				
Year Contol	x		x				x
constant	x	x	x	x	x	x	x