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## **Master Thesis**

SPAC Post-Merger Performance

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### **Authors:**

Rasmus Hjorter Blomberg  
ra1222hj-s@student.lu.se

Tim Söderman  
ti7472so-s@student.lu.se

### **Supervisor:**

Jens Forssbaeck  
jens.forssbaeck@nek.lu.se



## **Abstract**

Special purpose acquisition companies (SPACs) are shell companies with no operational assets with the sole purpose of using the raised capital from the initial public offering (IPO) to acquire a private target firm within a predetermined time frame. This financial vehicle has in recent years surged in interest and media coverage. Nevertheless, the long-term performance of the SPACs post-merger is vastly understudied. Existing literature tends to be focused on the short-term, focusing on the performance on the day of the announcement and a few days to half a year after the merger. In this paper, we aim to shed some light on the long-term performance in connection to the incentive structure of SPACs, the time limit on the acquisition, and the quality of the management. We find that the buy-and-hold return (BHAR) of SPACs significantly underperforms the market 3, 6, 12, 24, and 36 months after the acquisition date, worsening as time progresses. Additionally, we find that the longer an acquisition takes, the worse the return of the target firm becomes. We also find significant results of the CEO expertise coefficient in most models in the regression analysis, meaning that high-quality management can influence abnormal returns positively. Finally, we endeavor to show the magnitude of influence of the variables tested in a mean and median comparison. Ultimately, we have found that SPACs perform poorly in the long run due to an unhealthy incentive structure that encourages management to acquire poor firms over no firms for short-term personal gain.

**Keywords:** *Special Purpose Acquisition Company (SPAC), Incentive Structure, Moral Hazard, Long-Term Performance, Management Expertise*

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## **1. Introduction**

Generally, when a private company chooses to go public, it can either issue new shares through a primary offering, sell existing shares via a secondary offering, or a combination of both. This medium is known as the traditional IPO-route (Espinasse, 2011, pp 1). In recent years, the interest to take companies public via non-traditional routes has increased rapidly, where reverse mergers have been the most common. A reverse merger can usually be accomplished in two different ways. Either by a transaction between a private company and a natural shell company that is publicly listed but has financial problems or through an acquisition by a cash-shell company, usually referred to as a Special Purpose Acquisition Company (SPAC) (Kolb & Tykova, 2016). A SPAC firm is a listed blank-shell company without any operating assets with the sole purpose of acquiring a private company. After the merger, the private company overtakes the SPAC firm's place on the stock exchange (Klausner, Ohlrogge & Ruan, 2020). Private companies can get listed through this financial vehicle without going through an often costly and time-consuming traditional IPO process. Thus, through a reverse merger, they can avoid concomitant fees, restrictive valuations, and costs related to IPO underpricing (Cumming, Hab & Schweizer, 2014).

From the viewpoint of the SPAC founders, listing a SPAC firm is a simple way to get access to liquidity for an acquisition purpose. The business concept of SPACs enables private equity funds to sell their expertise and experience in the public market (Cumming, Hab and Schweizer, 2014). Furthermore, it gives the public investors a possibility to be invested in the private equity business, which otherwise is quite cumbersome (Jenkinson & Sousa, 2011). In the last two years, 573 SPACs have gone public in the U.S compared to 398 SPAC IPOs for the whole period between 2003 to 2019. Thus, this backdoor to the stock market has gone from a few transactions at the beginning of 2000 to the fact that SPACs accounted for more than 43% of the total IPOs in 2020 (Spacinsiders, 2021). Hence, SPACs have experienced a vast development at a fast pace and most probably will continue to do so for the foreseeable future (Blomkvist & Vulcanovic, 2020). Although SPACs have been facing an explosive boom, researchers and professionals have pointed out major risk factors with investing in these types of firms. Recently, the U.S Securities and Exchange Commission (SEC) published a statement where Acting Director John Coates urged that SPAC founders have strong incentives to inflate valuations to maximize their profit at the expense of ordinary shareholders. Through fees, founders' compensation, and excessive hauling from the managers, public investors risk taking heavy losses (SEC, 2021).

A well-used argument to support going public through the SPAC vehicle is that reverse mergers do not have the same legal responsibility as traditional IPOs (SEC, 2021). As a SPAC firm acquires an unlisted company, neither the target firm nor the SPAC firm needs to take equal accountability of security laws that usually would have had to be complied with for a traditional IPO.<sup>1</sup> The relaxation of regulations leaves greater room for speculations within the prospectus' forward-looking statements, which can be exploited by SPAC founders (Bryant, 2021; SEC, 2021). Due to these facts, questions arise whether legal shareholder protection can be maintained. In one of the first studies in this IPO subfield, Jog and Sun (2007) showed that SPAC founders earned annualized returns of 1900% while SPAC investors faced a negative annual return of 3% between 2003 to 2006. Consequently, the result indicates that there are moral hazard problems driven by misaligned incentives, potentially built into the SPAC structure where sponsors use complex financial structures to their advantage.

A large portion of previous research has focused on traditional IPOs; however, few studies have focused on reverse mergers in general and SPAC in particular (Cumming, Hab & Schweizer, 2014). Consequently, previous studies in this subfield can be argued as inadequate due to the relatively low SPAC activity in the market until recently. The rapid course of events and recent deregulations indicates that SPAC transactions are here to stay, and hence, more private firms are choosing this route to the public market.

The increased numbers of SPAC IPOs enable a more robust database that did not previously exist, which is a prerequisite for driving research forward. Another reason to examine the prevailing conditions in the SPAC market is that the exploding interest may have led to potential changes in the market compared to before. The studies done in the field have mostly either focused on studying SPAC acquisition around the announcement date or shorter post-merger performance, while there has been a lack of studies focusing on long-term performance (Cumming, Hab & Schweizer, 2014; Jenkinson and Sousa, 2011; Lakicevic and Vulcanovic, 2013; Rodrigues and Stegemoller, 2014).

To fill this research gap, the main objective of this study is to examine how SPAC firms perform in the long term as a result of reverse mergers. Additionally, SEC officials have recently pointed out that moral hazard could be built into the SPAC structure. Therefore, we aim to investigate if managers' incentives are a factor that influences the quality of the acquisitions and consequently the long-term post-merger performance.

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<sup>1</sup> In particular, the Private Securities Litigation Reform Act (PSLRA) which regulates forward-looking statements in IPO prospectus, does not need to be taken into account (Bryant, 2021; SEC, 2021).

**Research questions:**

- 1. How do SPACs perform in the long term?*
- 2. How do managers' incentives affect SPAC post-merger performance?*

## **2. SPAC overview**

*This chapter will present the company structure of SPACs and its clientele based on previous literature. We will then transition to a brief comparison between SPACs and traditional IPOs with an advantages and disadvantages approach. Lastly, the historical regulatory development will be covered.*

### *2.1 What is SPAC*

A special purpose acquisition company (SPAC) is a blank-shell company, usually created by an investment company, a private equity fund or a group of investors with experience within mergers and acquisitions (Klausner, Ohlrogge & Ruan, 2020). The SPAC firm becomes listed through a traditional IPO (hereafter SPAC IPO) with the purpose to use the liquidity to acquire a private company and bring it public through a reverse merger (Jenkinson & Sousa, 2011). Due to the structure of SPACs, the acquisition process comes with a predetermined time limit on when at the latest, the deal has to be finalized, generally within 24 months (Dimitrova, 2017).

Before the SPAC IPO, the SPAC founders provide information in the prospectus which sector and region they intend to search for a target (Kolb & Tykvová, 2016). Typically, no more information is given, meaning that the public investors have to rely on the founders' expertise, reputation, and previous experience (Cumming, Hab & Schweizer, 2014). Directly after the SPAC IPO, at least 90% of the liquidity is put into a trust account, generating the risk-free rate until the management finds a target. The residual amount is used in the operations, primarily for costs related to the searching process (Nilsson, 2018). When the SPAC firm has found an acquisition candidate, a vote takes place where the shareholders answer whether the target company is desirable or not. If the shareholders approve the proposed deal, they have two options: keep their shares in the new firm or redeem them in exchange for the corresponding value deposited in the trust account (Jenkinson & Sousa, 2011). If the SPAC firm fails to find a target within 24 months, the SPAC firm liquidates and the whole amount placed in the trust account will be repaid to the shareholders (Cumming, Hab & Schweizer, 2014; Dimitrova, 2017; Jenkinson & Sousa, 2011).

Accordingly, an initial investment in a SPAC IPO can be considered as a low-risk investment with an opportunity to gain high returns. If a particular public investor does not see an upside of the proposed deal, they have the opportunity to vote against proposals and get their initial investment back. This structure with regard to low risk, high control, and a



significant potential return can explain why SPAC has become so popular among institutional investors (Cumming, Hab & Schweizer, 2014).

### *2.2 Sponsorship compensation*

The structure is quite different from regular private equity funds when it comes to the SPAC managers<sup>2</sup> compensation. The managers are not guaranteed any formal salary or other compensation during the period from which the SPAC firm goes public until a deal has been approved (Cumming, Hab & Schweizer, 2014; Dimitrova, 2017). Instead, the sponsors obtain 20% of the equity in the SPAC IPO, and the remaining 80% is acquired by public investors (Nilsson, 2018). The equity received by the SPAC consists of non-tradable shares and a fraction of warrants and rights referred to as “founder shares” (Klausner, Ohlrogge & Ruan, 2020). These claims form the basis for the return that the sponsor will earn if and only if the SPAC firm completes an acquisition within 24 months after the SPAC IPO (Jenkinson & Sousa, 2011). If the SPAC firm does not succeed in getting a deal approved, they will lose their entire investment since their shares and warrants turn worthless (Cumming, Hab & Schweizer, 2014). Hence, to gain from the investment, a proposed deal has to be approved by the shareholders. For this reason, SPAC founders are strongly incentivized to close a deal; otherwise, they will become unpaid for their effort (Schumacher, 2020). In addition to founders' shares, the sponsor can participate in the IPO by buying additional shares, referred to as private placements. Unlike founders' shares, private placements have the same voting rights as common shares. Private placements and founders' shares constitute the sponsor's capital at-risk (Klausner, Ohlrogge & Ruan, 2020).

### *2.3 What type of investors invest in SPACs*

SPACs have for an extended period been looked upon as a way for retail investors to invest in SPACs as bets on management skills in finding a suitable target firm and creating value for the shareholders (Jenkinson & Sousa, 2011). Some literature points to the opposite, with the largest shareholders in SPACs being large institutional investors. According to Bryant (2020), ten hedge funds constitute more than a quarter of all SPACs, and the top 75 investment managers hold around three quarters. In the last few years, SPAC ownership has become more diversified, but as can be seen above, it is still heavily led by large institutional investors.

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<sup>2</sup> Hereafter synonymously used as SPAC sponsor and SPAC founders

What has been highlighted in recent literature is that most institutional investors are divesting at the time of the merger through either redeeming their shares or selling them on the market. Klausner, Ohlrogge and Ruan (2020) found that the mean divestment rate for the sponsors are as large as 90% meaning that post-merger, it is the new retail investors that have taken over the risk. It is important to remember that the sponsors and managers still have their warrants and rights, only leaving a potential upside.

Additionally, Nilsson (2018) finds that the generosity of rights results in initial investors exiting their original equity position in direct connection to the merger announcement, while they keep their warrants that potentially will result in more stocks, essentially for free. The other option these investors have is to hold their shares until after the merger, bearing the costs of management compensations, underwriter fees, and the likeliness of dilution.

#### *2.4 Advantages and disadvantages of SPAC mergers*

There is a considerable amount of existing literature on SPAC's advantages and disadvantages. Some of which will be presented here. Looking historically at traditional IPOs, it has been volatile in the number of firms going public with more intensive cycles and periods with fewer IPOs depending on the general market cycles. SPACs are not as dependent on these cycles as shell companies have cash on hand available for use which permits them to participate in business mergers even in cold market cycles (Nguyen, 2020). An advantage that is well spoken of is the timeframe of 6 months from announcement to completion of SPACs compared to traditional IPOs of one to two years (Kolb & Tykova, 2016). SPACs are also in a superior position compared to traditional IPOs from the perspective of regulations, especially as SPACs can elude the PSLRA Act which regulates the forward-looking statements of traditional IPOs (Bryant, 2021; SEC, 2021). Moving forward to fees and legal costs, it is clear that SPACs have an advantage. Firstly, reverse takeovers like SPACs are not under the same amount of SEC reviews as IPOs and therefore experience less legal costs (Cumming, Hab & Schweizer, 2014; Rodrigues and Stegemoller, 2014). Secondly, reverse merger fees are considerably lower than IPO fees (Adjei, Cyree, and Walker, 2008). The last advantage highlighted here is underpricing which is an intensely studied phenomenon in the IPO industry. Reverse takeovers have historically been experiencing less underpricing, which results in a greater value capture, or if chosen to look at it from a cost perspective, less costs have been incurred compared to traditional IPOs (Gleason, Rosenthal and Wiggins, 2005).

Disadvantages of SPACs have been known since the early development of the company structure. However, in recent years more have surfaced due to the exponential increase of SPAC IPOs and widespread media attention. First of all, it might be harder to find a target that is willing to enter the negotiation phase even though the transaction fees are relatively low as a result of the uncertainty of deal fulfillment (Renaissance Capital, 2021). Between 2015 and 2020, there have been 420 SPAC IPOs, but only 143 have merged and taken a firm public (Spacinsiders, 2021). In recent years, the dilution aspect of SPAC reverse mergers has been brought out of its shadow through numerous studies. Levine (2020) presents a result that is the opposite of the previously stated advantage of SPACs having lower transaction costs and fees than traditional IPOs. The study reports that SPAC fees are on average a fourth of money raised, three to four times larger than a traditional IPO. This cost relationship is a consequence of management and sponsors receiving 20% of the stocks essentially for free, which is a cost passed to the target company through dilution (Levine, 2020).

### *2.5 Regulatory development*

SPACs are registered with The Security and Exchange Commission (SEC) under the Securities act of 1933 as shell companies as they only consist of cash and cash equivalents (Bokosha, Boxwala, Swartz, Layne & Lenahan, 2021). This definition of a SPAC is a modern form of a blank check company with many integrated safety features as the original blank check companies were frequently used as means to defraud unsophisticated investors during the 1980s (Heyman, 2007). Because blank check companies are of speculative nature, these companies, according to the SEC, are a part of penny stocks (Shachmurove & Vulcanovic, 2018). All modern form SPACs raise capital of more than \$5 million and are therefore not considered penny stocks under the SEC Rule 3a-51-1 (Castelli, 2009).

During the 1980s, management of blank check companies often took part in pump and dump schemes which is a strategy based on boosting a stock's price based on false, misleading, or exaggerated financial information (Shachmurove & Vulcanovic, 2018). More specifically, the management would exercise their warrants after the acquisition announcement and then sell or dump their shares after the price had increased, resulting in investors losing an estimate of \$2 billion per year. As a response, Congress and SEC passed laws and regulations resulting in a more transparent disclosure of the blank check companies, reducing the criminal activity (Castelli, 2009). One of these past laws was The Penny Stock Reform Act of 1990 which posed severe restrictions on IPOs (Beatty and Kadiyala, 2003). As

a consequence of this regulatory backlash, the blank check companies largely disappeared from the market during the 1990s. In 1992, the first version of the modern SPAC we have today was created. It was developed by a team of lawyers and underwriters with sufficient investor protection that gained the approval of the SEC (Heyman, 2007).

Before 2012, investing in private placements for unsophisticated investors with average wealth was practically unattainable as one had to have accreditations (Rodrigues, 2012). The Jumpstart Our Business Startups Act (JOBS) was approved during the first half of 2012. The JOBS act presented a fundamental change to the business-financing environment making it easier for smaller firms to go public and raise capital. The act also made it possible to use crowdfunding when selling securities (Cunningham, 2016). The act was driven by pressure from the public to be able to invest in private securities together with private firms' need for capital. Rodrigues (2012) states that while the goal was to fulfill these two drivers, unwillingly, it also made it possible for average investors to take part in SPACs. As a natural result, within a couple of months, there were now more than ten companies registered as SPACs as a result of the relaxation of the regulations (Rodrigues, 2012). There are critics of the JOBS act as they argue that this act removed the protection for investors that the Sarbanes-Oxley Act<sup>3</sup> and the Dodd-Frank Act<sup>4</sup> implemented following the financial crisis (Wasik, 2012).

In 2015, SPACs began to offer its investors a 100% money-back guarantee with interest. They were also able to retain their warrants and other special rights regardless if they voted against the merger in question or not. This no-lose situation, combined with the Fed's low rates and relaxed monetary policies have influenced the recent popularity surge. Ultimately, SPACs and regulations have been evolving together and are expected to continue to do so (Gara, Haverstock & Klebnikov, 2020).

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<sup>3</sup> Sarbanes-Oxley Act is a U.S. federal law that protects investors by making corporate disclosures more reliable and accurate. It was signed into law by President George W. Bush 2002.

<sup>4</sup> Dodd-Frank Act was created as a response to the financial crisis of 2008. The act provides financial stability by promoting accountability and transparency in financial reporting.

### **3. Literature review**

*In the following chapter, the post-merger performance of SPACs is firstly introduced based on historical research findings. Subsequently, previous literature is presented on incentive structures of SPACs and consequently its moral hazard impact on SPACs performance. Finally, previous studies on the relationship between managements' quality and SPAC performance are discussed.*

#### *3.1 SPAC post-merger performance*

Historical SPAC performance has been a discussed topic over the last decade, but with few certain conclusions due to insufficient data. To start with, Boyer and Baigent (2008) did an empirical analysis of the performance early on between 2003-2006 with a sample set of 87 SPAC IPOs. The study showed that the SPAC firms performed an annual rate of return of 17% compared to an overall return of 7% on NASDAQ over the whole study period. The highest SPAC returns observed showed an annual rate of return of 33,80% in 2005. Even though these are the results presented by the authors, they are reserved against their findings by concluding that the sample size contains only five SPAC observations, making their findings uncertain.

A more recent study, with hence a larger sample, has come to a different conclusion. Kolb and Tykova (2016) investigate SPAC performance between 2004 to 2014 by using a buy-and-hold abnormal return approach over different time periods. This study focuses on the long-term abnormal returns and found that SPAC firms dramatically underperform the benchmark portfolios by -59%, -96%, and -85% for time periods of 6-months, 12-months, and 24-months respectively. Additionally, the study demonstrates that firms that choose the SPAC-route to the public market tend to be of lower quality than firms choosing the traditional IPO-route. On average, the SPAC-route firms in the sample were highly levered combined with lower profitability and growth opportunities, which partially explains the poor SPAC post-merger returns.

Dimitrova (2017) focuses on post-merger SPAC performance in the U.S market between 2004 and 2009. The study finds that the SPACs underperformed the market by abnormal returns of -64%, -56%, and -66% over a two-year period, correspondingly adjusted for size, industry, and IPOs. In addition, the study demonstrates that not only does SPAC adjusted returns perform worse but also concerning operating performance. The poor operating performance of SPACs is explained by the fact that the firms entering the public

market through SPACs are already of lower quality as they are less mature and less profitable, similar to the Kolb and Tykvová (2017) findings.

### *3.2 Incentive structure and SPACs' poor performance*

There has been a strain on the relationship between owners and management for quite some time in the business world (Jensen and Meckling, 1976; Myers and Maluf, 1984). Within economic theories, there is often an underlying assumption that people are rational and therefore will act in the interest of personal gain (Kahle, 2002). It is common that management takes highly inefficient actions from a value-creating standpoint which may benefit the managers but hurt the investors as they end up bearing the cost (Shleifer and Vishny, 1997). Additionally, agency problems in general and moral hazard problems, in particular, are recurring subjects within the SPAC research area.

Klausner, Ohlrogge and Ruan (2020) find that pre-merger shareholders, including the SPAC founders, earn on average a return of 11,6% while post-merger shareholders lose, on average, -14,5% on their investment. The authors argue that the founders' shares create misaligned incentives between the SPAC founders and the public investors. The potential upside is the same for both parties, while the post-merger downside risk is much more significant for public investors. Since the founders' non-tradable shares are sold in the market at the time of the merger, they have nothing to lose if they succeed in finding a target company. Suppose they succeed in finalizing a deal, and hypothetically, the share value decreases post-merger. In that case, the public investors will have to take losses, while the SPAC founders only miss out on exercising their warrants and rights from their initial investment. According to this structure, the SPAC management has incentives to enter a deal, independently of the target's quality, if the alternative is to terminate the SPAC firm (Dimitrova, 2017; Klausner, Ohlrogge & Ruan, 2020).

It is common for the founders to buy ordinary shares in the public market. Jenkinson and Sousa (2011) states that the reason for this is the founders' incentives to increase their voting power which increases the probability of getting bad deals approved. The study shows that founders of unsuccessful SPACs tend to buy large blocks of shares in close connection with the voting of the proposed deal. By increasing their voting power, the probability of getting a proposed deal approved is higher. The fact that the founders only get compensated if a deal being approved creates strong incentives to find a target company. However, this may lead to moral hazard since compensation is independent of post-merger performance, which is the true measure of their achievements.

Furthermore, Dimitrova (2017) finds that SPAC firms that struggle to reach the deadline perform worse than those SPACs that announced a merger well ahead of the fixed time frame. The result is explained by the fact that the management has strong incentives to pursue a last-minute acquisition, although the target is of poor quality, as the alternative is to liquidate the firm and end up without compensation.

Similarly, Schumacher (2020) argues that the management is under severe pressure to consummate an acquisition when approaching the deadline date which puts them into a do-or-die situation. Since the management has strong incentives to materialize a deal, they likely either overpay the target or use all tools available to convince the shareholders to approve an acquisition even when the target firm is of poor quality.

By the structure of SPACs, to succeed in finalizing a merger, the SPAC shareholders have to approve it in a voting process. Cumming, Hab and Schweizer (2014) investigate the factors that affect the approval probability of the deals proposed by the SPAC managers. Unexpectedly, the authors find that SPACs with experienced management does not increase the probability of succeeding in a deal. In fact, the result indicates the opposite where the findings show a negative relationship between managers' age and approval probabilities. This relationship is explained by a wealth motive where older managers have already accumulated wealth and therefore do not have the same financial incentives as younger managers to get a deal approved.

To summarize, existing literature points toward the direction that the SPAC financial structure may create a moral hazard problem as the management is highly incentivized to succeed in a merger before the deadline to not become without compensation, at the expense of public investors.

### *3.3 Management quality & its SPAC-performance*

When measuring the performance of SPACs, sponsors' quality has in some literature been used as an explanatory variable to explain the underlying drivers of post-merger performance. Klausner, Ohlrogge and Ruan (2020) suggest that SPACs with high-quality sponsors perform better than SPACs with low-quality sponsors. Their findings show that firms with high-quality management perform, on average, a 12-months return of -6% compared to a return of -57% for non-high-quality firms. This result is partly explained by the fact that more experienced management can remain engaged in the post-merger entity and their ability to drive harder bargains when negotiating with the target company.

In addition, Schumacher (2020) argues that when management has a high level of

expertise and knowledge, the investors feel more secure with the decisions of the SPAC management. The increased experience, in turn, results in a higher number of completed acquisitions as the probability of investors supporting the management's decision is higher in such instances. The author also highlights that given the increased confidence in the management, fewer investors will exit the SPAC and ask for their investment plus interest before the acquisition is complete, which might have positive impacts.

Finally, Rodrigues and Stegemoller (2014) state that target firms have historically been afraid of reputational damage. They believe the regulations regarding SPACs are not sufficient and therefore cannot guarantee that their reputation will hold intact in case of SPAC managers not acting in line with target company policies. Accordingly, if SPAC managers plan to stay within the SPAC business, they are incentivized to uphold a strong reputation in the market.



#### **4. Hypothesis development**

*In this chapter, we will develop hypotheses by summarizing the essential points from the literature review. These hypotheses will be the foundation of our continued study.*

The management compensation solely relies on their ability to get a proposed deal approved by the less informed public shareholders (Jenkinson & Sousa, 2011; Nilsson, 2018). Klausner, Ohlrogge and Ruan (2020) demonstrate that the founders' shares create misaligned incentives between the SPAC founders and the public investors. Similarly, Schumacher (2020) states that the management is under severe pressure to consummate an acquisition when approaching the 24 months deadline date which puts them into a do-or-die situation. Further, the misaligned incentives seem to be triggered by the fact that the SPAC management has strong incentives to rather pursue a last-minute acquisition than liquidate the SPAC, and hence, become without compensation (Dimitrova, 2017). Therefore, we expect that the pressure on management increases when time progresses toward the deadline date. If this is the case, it will imply a presence of agency problems, and we expect the true value of the target company will be exposed in the long-term, resulting in worse post-merger performance. These arguments lead up to our first hypothesis:

***H1:** High pressure on SPAC management leads to worse long-term buy and hold returns*

Cumming, Hab and Schweizer's (2014) findings indicate a negative relationship between older managers and approval probabilities. This is explained by a wealth motive where older managers have already accumulated wealth, and therefore, do not have the same financial incentives as younger managers to get a deal approved. If this argument is valid, younger managers would also have incentives to propose deals independently of the target's quality according to their wealth motive since they become unpaid if the SPAC liquidates. Therefore, we expect that young management SPACs more often pursue poor deals than more experienced management. Correspondingly resulting in, on average, worse post-merger performance. These arguments lead up to our second hypothesis:

***H2:** Younger management leads to worse long-term buy and hold returns*

One of the drivers to why public investors chose to invest in SPACs is the expertise of the SPAC management (Jenkinson & Sousa, 2011). Klausner, Ohlrogge and Ruan (2020) find

that firms with high-quality management perform better 12-months returns than non-high-quality firms between 2019 and 2020. The results are partially explained by more experienced management that can remain engaged in the post-merger entity, reducing the misaligned incentives. Additionally, Schumacher (2020) states that the more confidence in the management, the longer public investors hold their shares, resulting in less dilution, which might have positive long-term impacts. Finally, Rodrigues and Stegemoller (2014) state that target firms have historically been afraid of reputational damage. If SPAC managers plan to stay within the SPAC business, they are incentivized to uphold a strong reputation, obtained by delivering successful mergers. These arguments lead up to our third hypothesis:

*H3: A high-quality management increases long-term buy and hold returns*

## **5. Method**

*In the following chapter, the methodology of the study is presented. To begin with, an explanation of the data sample and the data gathering process is presented. Further, the model specification containing the chosen models is introduced. Moreover, the different approaches based on the models used to analyze the research question are presented. Finally, the reliability and validity of the study are discussed.*

### *5.2 Data sample*

#### *5.2.1 Study period and limitations*

The sample consists of data for U.S SPAC listings between 2010 to 2020. Previous research has examined similar SPAC studies using study periods ranging from 2004 to 2014, and as we aim to contribute to the existing literature, we match our study period where the former studies end (Dimitrova, 2017; Kolb & Tykvová, 2016). Most of the SPAC listings emerge in the U.S; hence, it is the most representative market to investigate for our purpose. Additionally, we chose to focus on one single market to increase the comparability among the firms. Aligned with our research purpose, we exclude liquidated SPACs, since post-merger data is not available. To minimize potential trading noise within the sample, we have chosen to focus on firms' post-merger performance. Thus, our first observation point starts when the two entities merge at the completion date. The alternative is to use the announcement date at the starting point, but this kind of approach would lower the comparability between the firms since the time required for the merger process varies. Furthermore, to capture the development over time, the post-merger returns are divided into different time periods. The periods to be investigated consist of 3 months, 6 months, 12 months, 24 months, and 36 months. Notably, we include data from 2020, meaning that the sample size for 3 months to 36 months will differ due to the simple reason that a longer time perspective is not available for the later SPAC IPOs.

#### *5.2.2 Data collection*

The SPAC data is primarily obtained from the SEC's Electronic Data Gathering and Retrieval database (EDGAR), consisting of firms' legally enforced filings. and is a primary data source. Firstly, to identify a sample solely consisting of shell companies, we sorted the firms by using SIC 6770 (shell companies), similar to the collection method of previous research (Cumming, Hab & Schweizer, 2014; Rodriguez and Stagemoller, 2014). Secondly, we

identify the SPAC companies by *form S-1 registration statement* where the disclosed registration purposes are. To ensure that we have collected the corresponding SPAC firms, we manually verified the firms within our sample with the SPAC dataset at the website Spacinsiders<sup>5</sup>. To avoid the possibility of missing companies that have gone bankrupt, we include all SPAC companies that have completed an acquisition within the study period. SEC saves all filings received in their database; hence, our sample does not suffer from explicit survivorship biases or selection biases for SPACs that successfully completed a merger. Although, liquidated SPACs are excluded which generally would be a subject for survivorship bias. However, these firms are beyond our research purpose, and therefore, this will not cause significant errors in this study. In total, the sample consists of 166 SPACs that completed a merger before the end of 2020. Table 1 shows the total number of SPAC IPOs and SPAC mergers that are included in the sample.

Price data and accounting data are mainly obtained from Bloomberg. For those where key figure data is missing, we have manually conducted complementary data from the company's SEC filings (10-K and 10-Q-reports) available at EDGAR. Human characteristic data regarding the CEO's former positions and education have been collected by analyzing the curriculum vitae provided in the prospectus (*form 424 in EDGAR*) prior to the SPAC IPO. To ensure that we have obtained the intended firms, we perform random sampling to check that the targeted companies' first trading day corresponds to the date expressed in the SEC filing. In some cases, companies have made name changes during the study period. We have used press releases and other external web sources to verify that the targeted companies are included correctly. Data for firm-specific variables and ownership structure has been obtained from published financial reports and SEC filings together with the website Spacinsiders.

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<sup>5</sup> The website Spacinsiders are considered reliable since SEC collecting data from the same source:  
<https://www.sec.gov/news/public-statement/spacs-ipos-liability-risk-under-securities-laws> ;  
<https://spacinsider.com/stats/>

**Table 1 - Summary statistics**

This table shows the yearly distribution of SPAC IPOs and SPAC Mergers in the U.S market between 2010-2020.

Year	SPAC IPOs	SPAC Mergers
2010	7	1
2011	15	2
2012	9	5
2013	11	11
2014	12	5
2015	20	10
2016	13	9
2017	34	13
2018	46	22
2019	59	28
2020	248	61
<b>Total</b>	<b>474</b>	<b>166</b>

### 5.3 Model specifications

#### 5.3.1 Event time analysis

To answer the first research question regarding how SPAC firms perform in the long run, we apply an event study approach focusing on the buy-and-hold abnormal return (BHAR). Consistent with existing research within the SPAC-field, we apply the following benchmarks in the model: U.S IPO index, Russell 2000, and MSCI Value Weighted Index (Dimitrova, 2017; Kolb & Tykvova, 2016). To clarify, the IPO Index consists of the Renaissance IPO ETF, which includes all newly listed companies in the U.S over a holding period of two years. Using IPO-benchmark is a relevant measure for adjusting SPAC companies' returns since SPAC mergers and traditional IPOs have similar functions and characteristics (Kolb & Tykvova, 2016). The individual SPAC firm return matches with the corresponding benchmark return by Kothari and Warners (2007) formula of buy-and-hold abnormal returns:

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

Where,  $BHAR_i(t_1, t_2)$  represents the buy and hold abnormal return for portfolio  $i$  throughout period  $t_1$  to  $t_2$ ,  $R_{i,t}$  is the weekly return of SPAC  $i$  and  $R_{b,t}$  represent the matching

weekly return of benchmark index  $b$ . A positive (negative)  $BHAR_i(t_1, t_2)$  demonstrates better (worse) performance than the benchmark index (Kothari & Warner, 2007). This approach is applied in section 6.1 where all SPAC firms with available return data are included in portfolio  $i$ .

Furthermore, to investigate post-merger performance differences between firms with various characteristics, we apply the same method as Dhamija and Arora (2017), but instead of using traditional IPO data, we use SPAC data to construct matching portfolios. Firstly, we construct different types of portfolios by the corresponding SPAC characteristics. If a SPAC meets the specific selection criteria, it will be sorted into the *matching portfolio*, and if the criteria are not met, it will be sorted into the *non-matching portfolio*. This approach is applied in section 6.3, where also the selection criteria for portfolio  $i$  is discussed.

### 5.3.2 Regression analysis

One of the main objectives of this study is to test our hypothesis connected to our second research question regarding how managers' incentives affect the post-merger performance. To achieve this, we apply a multivariate regression analysis to investigate in-depth how SPAC-specific variables affect the long-term performance following a merger. We apply the benchmark-adjusted BHAR of 24 months after the merger date as the dependent variable (defined in section 5.3.1). We expect that the length of 24 months is a valid measure for long-term performance. However, a longer time perspective has been considered but deprioritized due to lack of a significant number of observations. The sample in the regression analysis consists of 72 firms that have completed a merger over the study period and available price data of at least 24 months (see appendix A). In the regression model, we are primarily interested in the SPAC-specific variables used as proxies to evaluate our hypotheses. To estimate how these variables solely affect post-merger performance, we control for firm-specific variables which are not possible in an event study analysis alone. Therefore, we include variables that capture risk-related characteristics such as size, profitability, leverage, and liquidity. The regression model follows:

$$\begin{aligned}
 BHAR_{b, 24\ months} = & \alpha_i + \beta_1 Assets_i + \beta_2 ROA_i + \beta_3 Debt_i + \beta_4 Cash\_to\_assets_i \quad (2) \\
 & + \beta_5 Days_i + \beta_6 Private_i + \beta_7 Expertise_i + \beta_8 Young_i + \varepsilon_i
 \end{aligned}$$

Where,  $BHAR_b$  represent the dependent variable and consists of buy-and-hold abnormal return adjusted by benchmark  $b$ , over *24 months*.  $\alpha_i$  represent the intercept,  $\beta_k$  represent the coefficient of the individual explanatory variable and  $\varepsilon_i$  represent the error term. In the upcoming section, we will specify the explanatory variables in further detail.

### 5.3.2.1 Variables specification

Table 2, reports the variables included in the regression analysis with corresponding units and how these are defined.

**Table 2.** Variable definitions

This table summarizes and explains the firm- and market-specific variables included in the regression analysis.

Variable	Unit	Definition
<b>Firm-specific variables</b>		
Total assets	US\$	The natural logarithm of total assets.
ROA	%	Net income before extraordinary items divided by total assets.
Debt ratio	%	Long-term debt divided by total assets.
Cash to assets	%	Cash and equivalents divided by total assets.
<b>SPAC-specific variables</b>		
Days until announcement	days	The natural logarithm of days between SPAC IPO and announcement date.
Private placements	%	The fraction of sponsorship's private placements and IPO gross proceeds.
CEO expertise	Dummy	If the SPAC CEO has been a former CEO for a Fortune 500 company and graduated from an IVY League university, it will be set to 1; otherwise 0.
Young management	Dummy	If the CEO is under 40 years old, it will be set to 1 and 0 otherwise.

In the regression model, the firm-specific variables and market-specific variables constitute the control variables. We include *total assets* to control for size, *return on assets* to control for profitability, *debt ratio* to control for firm-specific risk, and *cash-to-asset* to control for short-term liquidity. Additionally, we include industry fixed effects as control variables by applying a binary approach using the sectors reported in appendix B. All accounting data are obtained in the next quarter after the merger date. Furthermore, the variables are winsorized at an 8% level to obtain more robust estimators (Jose & Winkler, 2008).

All the SPAC-specific variables are designed to evaluate our hypotheses. Although various theories are trying to explain SPACs' behaviour in the market, few studies have established any certain conclusions. Consequently, some of the SPAC-specific variables have not been tested before, meaning that we are in a position to perform an explanatory approach.

However, *days until announcement* are expected to capture the increasing pressure on

management to find a target as time progresses towards the deadline. We believe that the time between the SPAC IPO and the merger announcement date is the best way to measure the increasing pressure. The merger date will not be used here as we are not interested in how long time it takes to perform and complete the merger. Instead, we are interested in capturing the time it takes to find a target firm to which also the publicly expressed deadline is linked. If the merger is executed close to the deadline, we expect that management's incentives to find any firm, whether good or bad, will increase. According to our first hypothesis, there would be an increased probability of management executing poor acquisitions during this period. In such instances, this phenomenon should be observed in post-merger stock performance as the companies are of worse quality than what was justified at the time of acquisition. Regarding *Private placements*, we assume that as management's investments in the SPAC increase so does the incentive to boost the valuation prior to the merger. The impacts of the incentive structure should also be able to be observed in the post-merger stock performance from a long-term perspective.

Regarding the variable *young management*, we define a firms' management as young if the CEO age is under 40 years old. According to Cumming, Hab and Schweizer (2014), we expect that younger managers have incentives to propose deals regardless of the quality, consequently leading to on average lower post-merger returns. The coefficient is expected to be negative according to our second hypothesis.

As regards the variable *CEO expertise*, in parallel with Klausner, Ohlrogge and Ruan (2020), we suspect high-quality management to impact post-merger performance positively. To measure the quality of the management, we constructed two selection criteria where both have to be fulfilled for a management to be defined as high quality. The first criterion is if a SPAC CEO has previously been in the same role at a Fortune 500 company. The second criterion is if the CEO has graduated from a top-ranked university. The criteria have been selected to capture the experience and assumed knowledge of the SPAC CEO. To uncomplicate the gathering of this data, we chose to limit the definition of top universities only to include IVY league universities<sup>6</sup>. These universities are well-known and are associated with academic excellence. We are aware that this definition of high-quality management is imperfect, and we expect some level of systematic error. The rationale behind this is that there is a possibility that true high-quality firms are not being included in the sample and therefore are being defined as non-high-quality firms faulty. However, to increase

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<sup>6</sup> The Ivy League consists of Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, the University of Pennsylvania, Princeton University, and Yale University.



the reliability of the study, we chose to adapt clear guidelines and limits of the sample so the choice of high-quality firms will not be affected by our assessment. Despite the weaknesses of this definition, we expect to capture management's impact on post-merger returns. In addition, we believe it is of higher importance for management to maintain their reputation on the market. This variable, therefore, highlights the lower incentives to propose poor acquisitions, and thus we expect the coefficient to have a positive sign according to our third hypothesis.

**Table 3. Descriptive statistics**

This table shows the summary statistics for the variables included in the regression analysis.

Variable	Mean	Median	Max.	Min.	Std.	Kurtosis	Skewness
Total assets	5,86	5,68	10,80	1,97	1,65	3,58	0,34
Return on assets	-0,01	0,00	0,06	-0,17	0,05	4,46	-1,41
Debt ratio	0,64	0,65	1,45	0,02	0,33	2,58	0,17
Cash-to-Assets	0,11	0,06	0,00	0,56	0,12	6,12	1,81
Days until announcement	6,11	6,20	6,97	5,01	0,40	2,83	-0,64
Private placements	0,05	0,04	0,11	0,02	0,02	2,77	0,90

Table 4 shows the correlation between the independent variables included in the regression model. The table consists of 72 SPAC firms that have successfully merged with a target firm during the study period 2010 to 2020 and with available price data of at least 24 months. The regression model has some multicollinearity problems regarding *total assets*. Overall, we have decided to accept the risks associated with multicollinearity, but the interpretation of *private placement* will be performed with caution. Regression diagnostics are reported in appendix A.

**Table 4. Correlation matrix**

This table presents pairwise correlation coefficients between the explanatory variables included in the regression analysis. The significance levels of the coefficients are conducted by t-Tests.

Variable	Total assets	ROA	Debt ratio	Cash-to-Assets	Days unfil.	Young manag.	CEO expert.	Private place.
Total assets	1,00							
ROA	0,32*	1,00						
Debt ratio	-0,01	-0,11	1,00					
Cash-to-Assets	-0,28*	-0,23	-0,06	1,00				
Days until announcement	-0,03	-0,31*	0,06	0,18	1,00			
Young management	-0,09	0,01	0,02	0,08	0,01	1,00		
CEO expertise	0,08	-0,01	-0,10	-0,14	-0,01	0,03	1,00	
Private placements	-0,55***	-0,04	0,03	0,12	0,16	0,09	0,02	1,00

\*=5%, \*\*=1%, \*\*\*=0,1%

#### *5.4 Reliability and validity*

Reliability concerns the trustability of the study and essentially covers whether the study has been affected by randomness or not. When reliability is of high levels, the research conducted should be able to be repeated by others and the result should be the same. Variables that may affect the reliability are usually values and assumptions of the scholars that have administered the study (Bell & Bryman, 2017). To ensure this study's reliability, the data has primarily been gathered from secured and reliable sources such as Bloomberg and EDGAR. By using these sources, there is no room for subjectivity. When data has been missing in these databases, complementary data from the firms' annual reports in question have been used, which we deem to be dependable. All data gathered have been processed manually which leaves the risk that human errors could have taken place. These errors would in such an instance affect the reliability negatively. Furthermore, the authors have chosen to base the study on already proven models from previous studies (Dhamija & Arora, 2017; Dimitrova, 2017; Klausner, Ohlrogge & Ruan, 2020; Kolb & Tykova, 2016; Kothari & Warner, 2007). By replicating previous studies' courses of action, we reduce the risk for subjectivity and increase the study's objectivity (Bell & Bryman, 2017). However, it is worth adding that personal assumptions have been made in the execution of this study as previous studies have not declared all information regarding how their study was performed.

How well a study measures what is intended to be measured is referred to as validity. To consider the level of a study's internal validity as high, it is required that there is a causal relationship between the variables involved in the study. This relationship is often expressed as the independent variables' ability to explain the variation in the dependent variable. External validity signifies whether the result of a study can be generalized to a larger setting. The internal validity of this study is assessed to be of high levels as the variables used have been confirmed to have a causal relationship in previous studies (Dhamija & Arora, 2017; Dimitrova, 2017; Klausner, Ohlrogge & Ruan, 2020; Kolb & Tykova, 2016; Kothari & Warner, 2007). The study's external validity is determined to be more problematic. In the main analysis of the study (section 6.2 and section 6.3), the sample size is less than 100 firms for some parts of the result depending on what test and timeframe one looks at, which can be argued to be too few to be applicable in a generalized setting.

## **6. Results**

*The following chapter presents the result of the study and is founded on the collected data and the chosen methods to answer the study's research questions. Firstly, the long-term performance is presented in the form of BHAR to answer the first research question. Secondly, the regression results for each model are depicted and explained, constituting the basis for answering our second research question. Ultimately, the mean and median differences are presented to show the magnitude of the variables' impact on the long-term return.*

### *6.1 Post-merger performance*

This section examines the post-merger performance over different time periods to answer the first research question regarding how SPACs performs in the long run. To avoid the influence of extreme values, we focus primarily on median returns. The results are presented in Table 5.

In line with the results of Kolb and Tykvová (2016), we find that SPACs significantly underperform the market in all time periods for all market indices at the 0.1% level. By examining the shortest period first, we can tell that BHAR median ranges from -10% to -12% across all three benchmarks, and by time decrease further to between -0.78% to -0.94% in the 36-month time frame. The findings of this paper regarding the diminishing returns over time are consistent with previous research (Kolb & tykvová, 2016; Dimitrova, 2017). The skewness presented in Table 5 is mostly skewed to the right as we do not use logarithmic returns. In more detail, the return data do not have a positive ceiling but it has a negative ceiling, giving a slightly skewed result (Kothari & Warner, 2007). The number of observations diminishes when time increases as there are not enough data points for companies that recently came public. Given what has been stated above, with our results being consistent with well-regarded previous literature, we deem this not to be an issue of significant nature (Kolb & tykvová, 2016; Dimitrova, 2017).

**Table 5.** Buy-and hold abnormal return

This table depicts the post-merger performance of U.S SPACs between 2010 to 2020 by providing mean and median buy-and-hold abnormal return (defined in equation 1, in section 5.3.1). The merger completion date is used as the starting point for each firm. The different periods ranging from 3 to 36 months are adjusted for three individual benchmark indices. The table provides significance levels of all mean and median values by t-Test and Wilcoxon test correspondingly at 5%, 1% and, 0,1% statistical significance levels.

Panel A: IPO benchmark	Mean	Median	Std.	Skewness	N
3 months	-0,15***	-0,12**	0,37	0,18	166
6 months	-0,27***	-0,29***	0,47	-0,19	135
12 months	-0,44***	-0,50***	0,73	0,85	112
24 months	-0,87***	-0,88***	0,74	-0,24	79
36 months	-0,79***	-0,94***	0,83	1,82	56
Panel B: Russell 2000 benchmark	Mean	Median	Std.	Skewness	N
3 months	-0,14***	-0,11**	0,36	0,44	166
6 months	-0,18***	-0,21***	0,46	0,56	135
12 months	-0,20***	-0,34***	0,73	1,66	112
24 months	-0,53***	-0,61***	0,60	0,47	79
36 months	-0,51***	-0,78***	0,82	1,98	56
Panel C: MSCI-Value benchmark	Mean	Median	Std.	Skewness	N
3 months	-0,12***	-0,10**	0,36	0,63	166
6 months	-0,17***	-0,19***	0,45	0,69	135
12 months	-0,20***	-0,34***	0,74	1,88	112
24 months	-0,56***	-0,69***	0,55	0,54	79
36 months	-0,59***	-0,85***	0,84	0,54	56

\*=5%, \*\*=1%, \*\*\*=0,1%

By comparing the three different benchmark-adjusted return results, we observe that the market Russell-adjusted index and the MSCI-adjusted index tend to move fairly in line with one another while the IPO-adjusted index performs worse. The exact reason for this is in the current stage unknown, but there are relatively well-educated reasons that deserve some shed of light. The differentiation between the indices at all could be explained by Russell and MSCI both being directly or indirectly connected to the overall market. In contrast, the U.S IPO index is solely based on firms that have completed IPOs recently.

Dimitrova (2017) finds that firms choosing the SPAC-route significantly underperform firms choosing the traditional IPO-route. The cause of the notable magnitude difference of the IPO index, in our results, can thus be partially explained by SPACs poor operating performance. The underperformance is therefore explained as a consequence of firms entering the public market through SPACs are already of lower quality as they are less mature and less profitable. The time frame is an important factor here as the IPO index is

updated continuously with newer IPOs. This reasoning seems logical as Kolb and Tykova (2016) and Dimitrova (2017) point to a similar pattern with traditional IPOs to our findings of SPAC post-mergers in the sense of worsening performance as time progresses. One critical difference is that SPAC post-merger performs drastically worse than traditional IPOs even though the same trend can be observed.

Transitioning to a bigger picture of the buy-and-hold abnormal returns presented in Table 5, it is clear that SPAC firms are underperforming in the long term. Even though the results in Table 5 provide reliable results, we cannot draw specific conclusions of the underlying reasons for the underperformance of these firms. Regardless, we cannot disregard the possibility that firms that chose the SPAC-route already are of worse operating quality than the overall market, suggested in previous research (Dimitrova, 2017; Kolb & Tykvová 2016).

## 6.2 Regression analysis

Of all firms in the data sample, 72 firms met the selection criteria of having successfully completed a merger between 2010 to 2020 and having price data available of at least 24 months. The purpose of the regressions is to answer our primary research question about how sponsorship involvement affects post-merger long-term performance. The results are presented in Table 6.

**Table 6. Cross-sectional regression analysis**

This table shows the results of the OLS regression analysis. The sample consists of 72 SPAC firms that have successfully merged with a target firm during the study period 2010 to 2020 and with available price data of at least 24 months. In specifications 1 & 2, we use IPO-adjusted 24 months BHAR as the dependent variable. In specifications 3 & 5, we use Russell 2000-adjusted 24 months BHAR as the dependent variable. In specifications 5 & 6, we use MSCI-adjusted 24 months BHAR as the dependent variable. All firm-specific variables are winsorized at an 8% level. We include industry-fixed effects as control variables in specifications 2, 4, & 6. The industries used are provided in appendix B. To avoid statistical problems associated with multicollinearity, we exclude the private placements in specifications 1, 3 & 5. Corresponding t-values are presented in the parentheses.

Dependent variable	IPO-adj. BHAR		Russell-adj. BHAR		MSCI-adj. BHAR	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-1,61 (-1,48)	-1,50 (-0,73)	0,13 (0,91)	0,03 (0,02)	-0,15 (-0,12)	1,75 (0,45)
Total assets	0,14** (2,84)	0,17** (3,11)	0,09* (2,38)	0,09* (2,04)	0,14*** (4,24)	0,08* (2,07)
ROA	4,53** (3,10)	5,18** (2,92)	3,15** (2,79)	3,31** (2,33)	2,73** (2,42)	3,45** (3,03)
Debt ratio	0,52* (2,67)	0,52* (2,21)	0,39* (2,65)	0,40* (2,13)	0,38* (2,48)	0,42** (2,76)
Cash-to-Assets	1,93*** (3,47)	2,22*** (3,74)	0,81 (1,90)	0,89 (1,87)	0,78 (1,78)	0,74 (1,74)
Young management	0,13 (0,98)	0,15 (0,99)	0,07 (0,74)	0,11 (0,96)	0,07 (0,74)	0,12 (0,97)
CEO expertise	0,44* (2,50)	0,36 (1,71)	0,27* (2,02)	0,20 (1,18)	0,28* (2,01)	0,31* (2,29)
Days until announcement	-0,34* (-2,09)	-0,30* (-1,61)	-0,33* (-2,66)	-0,53 (-1,76)	-0,36** (-2,84)	-0,54 (-1,75)
Private placements		1,01 (0,27)		-5,61 (-1,85)		-6,14 (-1,92)
Industry fixed effect	No	Yes	No	Yes	No	Yes
N	72	72	72	72	72	72
Adj. R <sup>2</sup>	0,466	0,472	0,461	0,417	0,454	0,405

\*=5%, \*\*=1%, \*\*\*=0,1%

To begin with, Table 6 shows significant coefficients of almost all the control variables, except for *cash-to-asset*. As one can expect, both the *total assets* and *return on assets* exhibit

positive signs of the coefficients, meaning that a higher amount of total assets and higher profitability leads to higher adjusted returns (Dimitrova, 2017). A bit surprising, a higher *debt ratio* tends to increase stock prices of the SPAC firms, although it is in line with previous findings (Kolb & Tykvová, 2016). A potential explanation is that we include balance sheet data of the first quarter after the firm has gone public. Generally, firms' financial structure experience changes when the equity starts to trade publicly. A positive sign of the *debt ratio* coefficient indicates that the firms have not yet reached an optimum level of debt. In this case, a lower level implies that newly merged SPAC firms do not use their full potential of the tax shield. Furthermore, the results of *cash-to-asset* are more ambiguous. The coefficients in models (1) and (2) are significant at the 0,1% level whereas insignificant in all the other models; therefore, a direct interpretation is omitted. Regarding *private placements*, we find no evidence that the amount of capital at-risk affecting the post-merger performance. As mentioned earlier, the results of *private placement* are not reliable due to statistical problems associated with multicollinearity. We include industry-fixed effects in some models, but these control variables do not contribute to the regression. In fact, the industry fixed effect has a slightly reducing effect on the explanatory power, probably due to the relatively small sample of 72 observations. To summarize the strengths of the regressions, all models demonstrate an explanatory power between 40% and 47% which is considered reasonable due to similar studies (Dimitrova, 2017; Kolb & Tykvová, 2016).

### 6.2.1 Hypothesis 1

According to *Hypothesis 1*, the SPAC management has incentives to close a deal, independently of the target's quality, if the alternative is to liquidate. The objective is to test if higher pressure on the management to find a target before the deadline affects the post-merger returns negatively (motivation in section 4). We use *days until announcement* as a proxy to measure how increased pressure affects post-merger returns. Hypothesis 1 follows:

*H1: High pressure on SPAC management decreases long-term buy and hold returns*

Table 6 shows significant results of the coefficients in four of six models at a 5% significance level. All coefficients show negative signs as expected, ranging from -0,30 to -0,54. The results support our hypothesis that a long time leads to acquisitions of poor quality firms. The results exhibit that worse post-merger performance is triggered by severe pressure on the SPAC management to succeed in a deal before the deadline (Klausner, Ohlrogge & Ruan,

2020; Nilsson, 2018; Schumacher, 2020). The fact that sponsors are only compensated in case of a completed merger leads to management being incentivized to rather pursue a last-minute acquisition than liquidate the SPAC. The results point in the direction that public investors realize the poor quality of these firms too late, which consequently shows in the negative long-term returns. Dimitrova (2017) finds that deals that are announced late in the searching process have worse stock performance between 2004 to 2009. In line with previous research, we find that the past pattern remains, and we conclude upon the evidence that misaligned incentives are built into the fundamental structure of SPACs, consequently causing moral hazard problems (Klausner, Ohlrogge & Ruan, 2020; Nilsson, 2018; Schumacher, 2020; Myers & Maluf, 1984).

### *6.2.2 Hypothesis 2*

According to *Hypothesis 2*, younger managers have higher financial incentives to succeed in a deal, implying that they more often pursue poor deals compared to more experienced management (Cumming, Hab & Schweizer, 2014). Accordingly, we expect that younger management will affect the post-merger returns negatively. We use *age* as a proxy to measure how younger management affects the returns. Hypothesis 2 follows:

*H2: Younger management leads to worse long-term buy and hold returns*

Table 6 shows insignificant results of the *Age* coefficients in all models. The coefficients show positive signs and a magnitude between 0,07 to 0,15. These results do not support our suggested hypothesis, meaning that we find no evidence that younger management affects post-merger performance negatively. In fact, the result proposes the opposite, potentially explained by younger CEOs who are more motivated to demonstrate their skills at an earlier stage in their career. A reputation motive could also explain the positive signs of the coefficients. A strong reputation in the market driven by successful deals at the beginning of their career is valuable for the CEO's future within the SPAC business (Rodrigues and Stegemoller, 2014). Although, no conclusion is made due to a lack of statistical significance.

### *6.2.3 Hypothesis 3*

According to *Hypothesis 3*, the SPAC firm's management quality affects its ability to find successful target firms (Klausner, Ohlrogge & Ruan, 2020; Rodrigues & Stegemoller, 2014;



Schumacher, 2020). The objective is to test their statements by using *CEO expertise* as a proxy for management quality. Hypothesis 3 follows:

*H3: A high-quality management increases buy-and-hold abnormal return*

Table 6 shows significant results of the *CEO expertise* coefficients in four of six models. All coefficients show positive signs, in line with our third hypothesis with a magnitude between 0,25 and 0,44. The results support our hypothesis that high-quality management has the power to influence abnormal returns positively. One explanation is that greater experience and knowledge contribute to management being able to perform their duties more effectively and successfully, resulting in their increased ability to find attractive targets. Additionally, a high degree of expertise likely contributes to a credible reputation in the market. Consequently, the reputation motive increases managers' incentives to accomplish successful acquisitions to preserve a strong reputation (Rodrigues & Stegemoller, 2014). Our findings can also be explained by the fact that more experienced management can remain engaged in the post-merger entity, and as a consequence, reducing the misaligned incentives (Klausner, Ohlrogge & Ruan, 2020). Regardless of the underlying factors, our results suggest that management quality affects the post-merger returns positively. Thus, implying that high-quality management mitigates agency problems related to misaligned incentives (Klausner, Ohlrogge & Ruan, 2020; Myers & Maluf, 1984). The result found in this study supports previous findings which indicate that management expertise has a positive impact on SPAC post-merger performance (Klausner, Ohlrogge & Ruan, 2020; Rodrigues & Stegemoller, 2014; Schumacher, 2020).

### 6.3 Median and mean differences

So far, we have demonstrated that both the pressure on management and their level of expertise are affecting the long-term post-merger performance of the SPACs. In this section, we focus on the variables *days until announcement* and *CEO expertise* which support Hypothesis 1 and Hypothesis 3 respectively, in the regression analysis. This part of the paper aims to demonstrate the magnitudinal effect respective variables have on the buy-and-hold abnormal return within our sample. We sort the firms into portfolios based on the corresponding selection criteria, meaning that we construct one matching portfolio and one non-matching portfolio. We measure the buy-and-hold abnormal return for each portfolio and perform a comparison between them. The mean and median differences are evaluated by paired sample t-Tests and Wilcoxon-Mann-Whitney tests, respectively.

In the first comparison (Panel A), we focus on the time it takes for the SPAC firm to find a target, measured by the time between the merger announcement date and the deadline date. Firms that have announced a merger less than 60 days before the deadline date are defined as high-pressure firms and consequently included in the *high-pressure* portfolio. Firms that have announced a merger more than 60 days prior to the deadline date constitute the control group and are thus included in the *non-high-pressure* portfolio.

In the second comparison (Panel B), we focus on the CEO's expertise, measured by the previous experience and education (described in section 5.3.2.1). Firms with a CEO that has been a former CEO at a Fortune 500 company combined with an academic degree from a top university, are defined as firms with high-quality management, thus included in the *high-quality* portfolio. Firms that do not match these criteria constitute the control group and are therefore included in the *non-high-quality* portfolio. Buy-and-hold abnormal returns are adjusted by the same benchmarks as in section 5.1.

### 6.3.1 Results

**Table 7. Median and mean differences**

The table shows the results in the OLS regression analysis. The sample consists of 72 SPAC firms that have successfully merged with a target firm during the study period 2010 to 2020 and with available price data of at least 24 months. Panel A reports benchmark adjusted buy-and-hold return for the high-pressure portfolio and the non-high-pressure portfolio. Firms that have announced a merger less than 60 days before the deadline date are sorted into the high-pressure portfolio. Panel B reports benchmark adjusted buy-and-hold return for the high-quality portfolio and the non-high-quality portfolio. Firms that have a CEO that has been a former CEO at a Fortune 500 company combined with an academic degree from a top-ranked university are sorted into the high-quality portfolio. Additionally, nonparametric Wilcoxon-Mann-White test and t-Test of respectively median and mean differences between the portfolios are reported.

Panel: A	High pressure-portfolio			Non-high pressure-portfolio						
	Median	Mean	N	Median	Mean	N	Median diff.	Mean diff.	WMW test z-Value	t-Test t-Value
<i>IPO adj. BHAR</i>	-0,89	-0,89	22	-0,75	-0,78	50	-0,14	-0,11	-0,70	-0,63
<i>Russell adj. BHAR</i>	-0,81	-0,71	22	-0,42	-0,42	50	-0,39*	-0,29*	-1,97	-2,16
<i>MSCI adj. BHAR</i>	-0,84	-0,77	22	-0,46	-0,47	50	-0,38*	-0,30*	-2,02	-2,30

Panel: B	High quality-portfolio			Non-high quality-portfolio						
	Median	Mean	N	Median	Mean	N	Median diff.	Mean diff.	WMW test z-Value	t-Test t-Value
<i>IPO adj. BHAR</i>	-0,66	-0,61	11	-1,24	-1,05	61	0,58	0,44	1,33	1,05
<i>Russell adj. BHAR</i>	-0,50	-0,37	11	-0,98	-0,86	61	0,48	0,40	1,16	0,93
<i>MSCI adj. BHAR</i>	-0,48	-0,38	11	-1,08	-0,95	61	0,60	0,57	1,49	1,22

\*=5%, \*\*=1%, \*\*\*=0,1%

In Table 7, Panel A reports the median and mean buy-and-hold abnormal return of the high-pressure portfolio and the non-high-pressure portfolio, adjusted by corresponding benchmark indices. The results suggest that firms that announce an acquisition in connection to the impending deadline date, defined as high-pressure firms, perform worse than firms that announce a merger at an earlier stage. Both Russell 2000-adjusted and MSCI-adjusted buy-and-hold abnormal returns are significantly lower for the high-pressure portfolio with median returns of -39% and -38% lower than the non-high-pressure portfolio. The differences are smaller and insignificant for IPO-adjusted buy-and-hold abnormal returns, with a median return of -11%. As already has been concluded, the pressure on management increases their incentives to find a target firm to avoid liquidating and ending up without compensation for their effort. However, the magnitude of the return differences between the portfolios is quite remarkable, where the negative Russell 2000 adjusted buy-and-hold abnormal returns are reduced by approximately a third if the management does not undergo the possibility of missing the deadline.

In table 7, Panel B reports the median and mean buy-and-hold abnormal return of the

high-quality portfolio and the non-high-quality portfolio, adjusted by corresponding benchmark indices. The results suggest that high-quality management firms perform better than firms with non-high-quality management. On average, the negative median buy-and-hold abnormal returns are reduced by approximately half (50%) if the firm possesses high-quality management. Despite this, no significant results are obtained, most likely due to too few observations in the high-quality portfolio. To recap, from the regression analysis, we conclude that high-quality management has the power to affect the post-merger return positively as a result of their expertise to find attractive target firms, even though the magnitude of their effect on the return cannot be proved with certainty in this section.

## **7. Summary and Conclusion**

The increasingly popular financial innovation known as special purpose acquisition company (SPAC) offers public shareholders the opportunity to partake in private equity-like investments. This company structure comes with a unique financial contract between investors and management. This paper assesses this contract by conducting empirical work to test how the incentive structure, the time limit on the acquisition, and management characteristics affect the long-term performance of the SPAC post-merger. We achieve this by performing buy-and-hold abnormal return calculations for different periods ranging from 3-months to 36-months adjusted for three indices. The results of our study points towards diminishing abnormal returns over time with SPAC underperforming the market in every time period for all market indices at the 0.1% significance level.

To go into more depth, we also perform a regression analysis to explain what drives this poor performance in more detail. Here we used numerous explanatory variables such as return on assets and size to capture firm-specifics in combination with days until announcement and CEO expertise to capture SPAC-specific variables. After running the regression, we could see that the longer an acquisition takes, the worse the post-merger performance of the target firm becomes. We also found significant results of the CEO expertise coefficient in most models meaning that high-quality management has the power to influence abnormal returns positively. Regarding the young-management coefficient, we found no evidence that the age of the CEO affects the post-merger performance negatively, in fact, the results indicate the opposite, but no conclusion can be taken regarding if it affects performance positively due to lack of statistical significance.

Lastly, we conducted a mean and median comparison to show the magnitude of influence these variables have on returns in our sample. The results found in Panel A of Table 7 suggest that high-pressure firms perform worse than firms that announce a merger at an earlier stage. Continuing to Panel B, the results suggest that high-quality management firms perform better than firms with non-high-quality management.

To conclude the results above, we have successfully demonstrated that the pressure on management as a result of the incentive structure of this financial vehicle affects long-term post-merger performance negatively. In other words, the SPAC contract encourages SPAC sponsors and management to make poor acquisitions for short-term personal gain. We can also, with certainty, tell that the level of expertise of the CEO in combination with how long it takes to find a target company are the two most impactful variables affecting long-term buy-and-hold abnormal returns of the variables tested in this study. With all this said

regarding the poor long-term performance, it is surprising that SPAC IPOs and mergers have experienced exponential growth in popularity over the last few years.

## **8. Limitations & Future Research**

One limitation of this study is the relatively small sample size, especially in the regression analysis consisting of 72 firms. A sample smaller than 100 can be considered problematic for greater generalisations of the overall SPAC market. The main reason for this is that there are still relatively few firms that choose to go public via the SPAC-route compared to traditional IPOs. Consequently, individual firms can affect the result at a greater magnitude than in a larger sample; hence, the result cannot be completely reliable. Another limitation is that we cannot with certainty measure the relationship between managers' financial incentives and the post-merger performance; hence we suggest that future research should focus on defining their incentives more accurately. It would be interesting to study how the “true” pressure on management affects their choice of acquisition. One way is to combine the founders’ initial investment and the time it takes to succeed in a deal. Thus, we suggest that future research involves interacting variables of time and compensating-based holdings to obtain a more precise definition and magnitude of the management's financial incentives to close a deal within the fixed time frame. Although to measure the founders’ initial investments, one has to get access to confidential data on their holdings. Finally, we suggest that further research focuses on investigating when the initial investors do their exit and compare their gains with the gains of public investors. We believe that it would be a valuable understanding for the public investors, especially for the timing of their investment decision and for the understanding of the complex financial structure of the SPAC.

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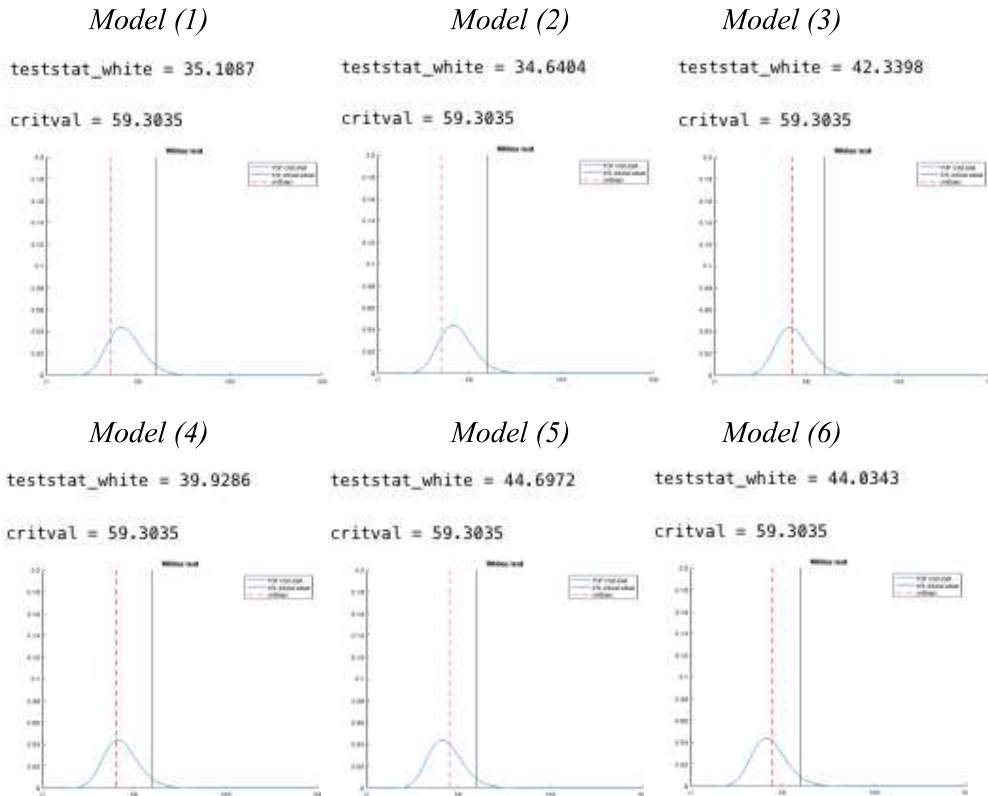
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## Appendix

### Appendix A: Regression diagnostics

#### A1. Test for heteroskedasticity - White's test



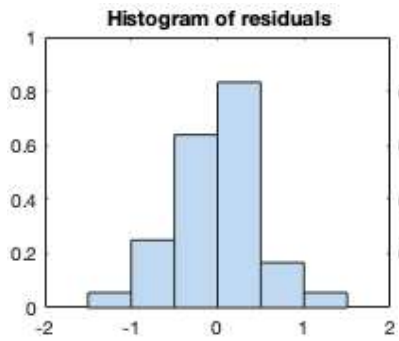
#### A2. Test for autocorrelation - Durbin-Watson test

The table shows the results from DW tests conducted on each individual regression model.

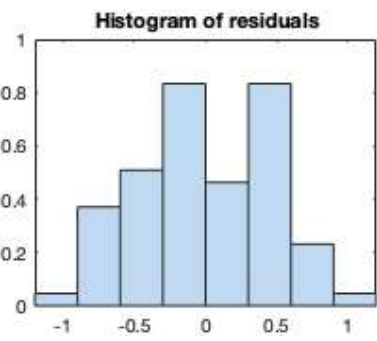
	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
<i>DW test statistic</i>	1,988	2,011	2,426	2,358	2,439	2,381
<i>P-value</i>	0,922	0,909	0,072	0,168	0,063	0,140

*A3: Normality check - Histogram of residuals*

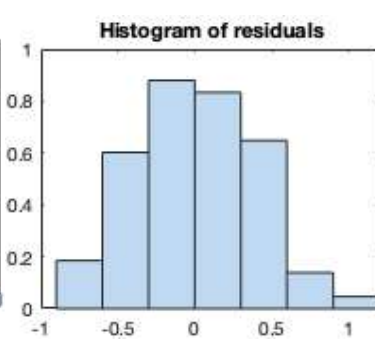
*Model (1)*



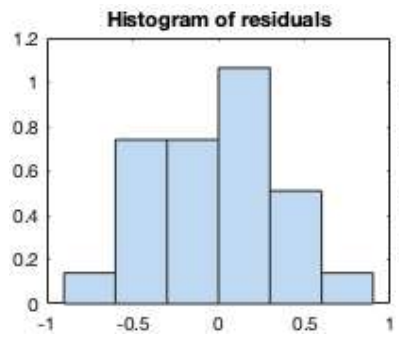
*Model (2)*



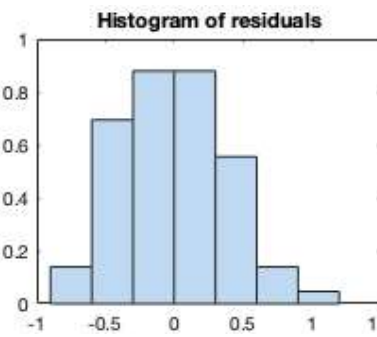
*Model (3)*



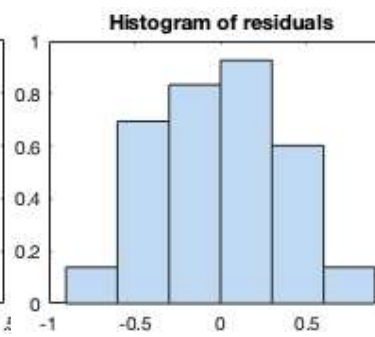
*Model (4)*



*Model (5)*



*Model (6)*



*Appendix B: SPAC mergers by industry*

**Table B1.** Sample descriptive

The table shows the U.S SPAC mergers between 2010 to 2020 included in the regression analysis.

Target's industries	No. of transactions	Percent
Technology	15	20,8
Consumer Dcretionary	13	18,1
Industrials	12	16,6
Communications	7	9,7
Energy	6	8,3
Financials	6	8,3
Consumer Staples	6	8,3
Materials	4	5,5
Real estate	1	1,0
Healthcare	1	1,0
Utilities	1	1,0
Total	72	100