FACULTEIT ECONOMIE EN BEDRIJFSKUNDE

UNVEILING THE SPAC EFFECT: A COMPARATIVE ANALYSIS OF FIRM PERFORMANCE PRE- AND POST-MERGER

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Preface

This master's dissertation is the capstone of our studies in Business Engineering, master in Finance at Ghent University. We had the privilege of delving into SPACs, a topic that is both timely and significant in the context of corporate finance. The writing of this thesis was a rewarding and instructive experience that allowed us to develop a profound understanding of this complex financing vehicle. Under the expert guidance of our promotor, Professor Rudy Aernoudt, we were able to navigate the complexities and nuances of SPACs, striving to contribute meaningful insights to the academic literature. Throughout this process, we have been fortunate to receive valuable insights and support from Professor Aernoudt, whose expertise and feedback have been instrumental in shaping the direction and quality of our work.

We would also like to thank our parents for providing us with the opportunity to pursue an academic degree at Ghent University, and our friends for making this chapter of our life all the more joyful.

Lastly, we would like to thank every reader of this dissertation. We hope they will find our work informative and that it will serve as a valuable resource for those interested in the evolving landscape of SPACs.

Sincerely,

Matisse Maelfait, Timo Nuyttens

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Glossary

Abbreviation	Meaning
COGS	Cost Of Goods Sold
DPO	Days Payable Outstanding
DSO	Days Sales Outstanding
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortisation
EDGAR	Electronic Data Gathering, Analysis, and Retrieval
EV	Electric Vehicle
FY	Fiscal Year
IPO	Initial Public Offering
IQR	InterQuartile Range
M&A	Mergers & Acquisitions
OTC	Over The Counter
PIPE	Private Investment in Public Equity
PSLRA	Private Securities Litigation Reform Act of 1995
ROA	Return On Assets
SEC	Securities and Exchange Commission
SPAC	Special Purpose Acquisition Company
US	United States

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1. Introduction

Special Purpose Acquisition Companies (SPACs) are a rather new and exciting phenomenon in the financial markets. The relevance and popularity of SPACs has soared, particularly during the period of 2020 and 2021, driven by a surge in investor interest and favourable market conditions. The appeal lies in their promise of lucrative returns, the prestige of high-profile individuals behind the SPAC, and the allure of a simplified path to becoming a public company. However, this rapid rise was soon followed by a notable decline as can be seen from Figure 1. While they offer potential benefits, SPACs have also been criticized for their post-merger performance, which has frequently fallen short of projections, leading to increased scrutiny from regulators and investors.

Our dissertation aims to delve deeper into the financial performance of firms that have merged with SPACs. The existing literature around SPACs is rather scarce and predominantly focuses on the structural aspects, characteristics of target firms, risks, regulations, and stock market performance. However, a critical gap remains in understanding the fundamental financial performance of the target operating firms. This dissertation seeks to fill this void by examining the accounting performance of SPAC target companies both before and after the merger.

The first part of this dissertation is devoted to explaining the SPAC concept by going over the lifecycle, its structure and the parties involved. Subsequently, the advantages and disadvantages of this vehicle are discussed as well as the criticism related to SPACs and the regulator's response.

The second part of this thesis focusses on answering our central research question: "How does the post-merger financial performance of the firm compare to the pre-merger performance?". By providing a detailed comparative analysis of pre- and post-merger performance, we aim to uncover significant differences and patterns that can offer insights into the impact of SPAC mergers on firm performance. Our study focuses on companies that merged with US-listed SPACs in 2020.

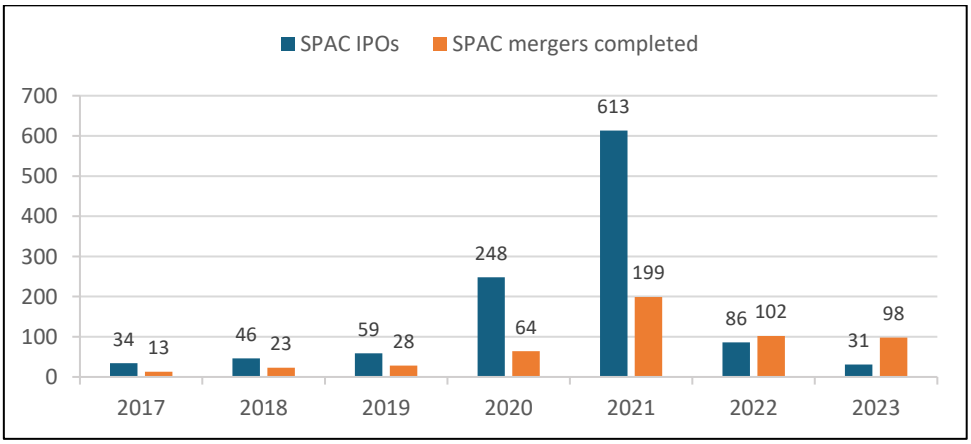

Figure 1: SPAC activity (Source: SPAC Research, 2024)

2. Literature review

2.1 Introduction to SPACs

Special Purpose Acquisition Companies (SPACs) have been around since the 1990's when around a dozen of these entities were formed. However, it wasn't until 2003, after some regulatory reforms, that SPACs really emerged as a prominent vehicle for firms to enter public markets. This emergence happened against the backdrop of a struggling IPO-market that was inaccessible to smaller companies seeking to go public in the aftermath of the Dot-com bubble (Feldman & Dresner, 2006). In a traditional Initial Public Offering (IPO) a private company offers its shares to the public for the first time and becomes listed on the stock exchange, while a SPAC is created to raise funds through an IPO to acquire another company and take it public. The appeal of merging with SPACs lies in the fact that it offers a quicker, cheaper, and less stressful way to raise capital and become listed compared to an IPO (Datar, Emm, & Ince, 2012).

In essence, a SPAC is a newly formed public shell company that has no operating business and minimal assets (Hale, 2007). As the name implies, SPACs are single-purpose entities which sole purpose is to raise large sums of money from investors in its IPO with the intention of giving this money to the private operating company, with which they later merge. Once the merger is completed, the SPAC "de-spacs," effectively transforming the private target into a publicly traded company. The target firm can then use the cash delivered to them to boost growth or to pay down debt (Riva & Provasi, 2019). SPACs hence serve as an alternative way for private firms to get listed, particularly in years with weak IPO activity and volatile markets (Kolb & Tykvova, 2016). When the SPAC is formed, it does not have a specific acquisition target under consideration and has not entered into conversations with anyone about a potential transaction. It is only after the IPO that the SPAC can begin to pursue acquisition targets. Given the limited lifetime of a SPAC, the acquisition must be completed within a specified time period, usually 2 years (Berger, 2008). In the next section we will discuss in more detail the different stages a SPAC goes through during its lifetime. According to Riva & Provasi (2019) the lifecycle of SPACs can be segmented in four phases:

1. Constitution of the instrument
2. Company IPO and listing
3. Exploration of the market to find an operating target company
4. Completion of the transaction or corporate liquidation

2.2 SPAC lifecycle

2.2.1 Constitution

The lifecycle of a SPAC begins with its constitution or foundation. This happens through an initial capital injection or private placement for a fee of $25,000 by the founders of the SPAC, called sponsor or promotor (Kolb & Tykvova, 2016). In return, the sponsor will receive a block of sponsor shares that amounts, on average, to 20% of the target company's equity (Cumming, Hass, & Schweizer, 2014). This block of shares is referred to as the sponsor's promote and serves as the sponsor's compensation for setting up the SPAC and managing the process of taking the target company public. However, the sponsor's promote is conditional upon the closing of a business combination (Klausner, Ohlrogge, & Ruan, 2022). During the incorporation phase, all the ordinary shares of the SPAC vehicle are held by the sponsor and the sponsor does not receive any further compensation, except for reimbursement for the activities carried out (Riva & Provasi, 2019). The sponsor is typically a separate corporate entity that controls the SPAC through the appointment of the SPAC's officers and directors. These individuals themselves typically control the sponsor or are affiliated with it. The parties behind the sponsor range from private equity or hedge funds, to former Fortune 500 executives, to individuals with no particularly relevant background (Klausner et al., 2022).

2.2.2 IPO

The first phase is followed by the IPO of the SPAC, during which the majority of the funds are raised that are necessary to carry out the future business combination. To become listed on the stock exchange the SPAC managers must register the SPAC with the Securities and Exchange Commission (SEC) and engage an underwriter to compile a prospectus. The prospectus documents information about management's acquisition focus, evaluation criteria for potential targets, business experience of management, etc. (Cumming et al., 2014). Hale (2007) stresses the importance of the quality and depth of the management in attracting underwriters and having a successful offering. In addition, Kim (2009) finds that the under-pricing experienced on the first day of trading can be a proxy for the quality of the management of a SPAC since it has no assets or history besides management. Hence, the information about management can be of great importance to investors to judge the prospects of a SPAC.

In its IPO, the SPAC issues units consisting of one share of common stock, one or more warrants, and in some cases, a right to acquire a fraction of a share at no cost when the merger closes. The proceeds of the issuance are placed in a trust account, which is invested in short term government securities (Klausner et al., 2022). At least 85% of the funds raised in the IPO must be placed in the trust (Kolb & Tykvova, 2016).

In recent times, the latter is no obstacle as typically 100% of the gross proceeds are put in the trust thanks to the sponsor buying warrants in a private placement at $1.50 each for a total amount of usually $5 million or more at the time of the IPO (Gahng, Ritter, & Zhang, 2021). As opposed to the sponsor promote, this stake is not acquired for a notional amount and is therefore referred to as the sponsor's "at risk" investment. It results in the sponsor having more skin in the game and aligns the interests of the sponsor with those of investors. The proceeds of this "at risk" investment usually amount to 3% of the IPO proceeds (Berger, 2008). Therefore, these funds are sufficient to cover the up-front underwriting fee, which amounts to 2% of the gross IPO proceeds, and thereby "top up" the trust such that public investors can start with 100% of the gross proceeds in the trust rather than 98% (or the net proceeds) (Gahng et al., 2021).

The cash held in the trust can be released only to "(a) acquire a company, (b) contribute to the capital of the company formed by the SPAC's merger, (c) distribute to shareholders in liquidation if the SPAC fails to consummate a merger, or (d) redeem shares" (Klausner et al., 2022, p. 11). The money cannot be used by the sponsor for personal compensation, such as salaries or finder's fees. However, they are permitted to utilize a predetermined fraction of the interest earned on the principal in the trust to cover administrative expenses related to office space and due diligence costs (Lewellen, 2009).

2.2.3 Identification of the target company

Following the IPO the SPAC begins its search for a private target company to merge with. The merger must be completed within a predefined timeframe of usually between 18 and 24 months, with the possibility of an extension up to 36 months which is conditional upon shareholder approval. (Riva & Provasi, 2019).

Riva and Provasi (2019) distinguish 2 type of SPACs: SPACs that set out acquisition criteria regarding the sector and the geographical area in advance and SPACs that do not limit themselves to these criteria. The former usually focuses on a specific region or industry in which the sponsors have a high degree of expertise (Lewellen, 2009).

As soon as a potential target firm is identified, the SPAC managers make an announcement to the SPAC shareholders via a letter of intent. An important requirement here is that the fair market value of the target must be at least 80% of the SPAC's net asset value (Cumming et al., 2014). After the acquisition announcement the SPAC managers perform due diligence and negotiate the structuring of the deal (Kolb & Tykvova, 2016).

2.2.4 Business combination or liquidation

After entering into a definitive agreement with the target the shareholders of the SPAC will either receive a proxy, information or tender offer statement. In many cases, the SPAC seeks shareholder approval for the initial business combination. The SPAC therefore provides a proxy statement to its shareholders prior to the shareholder vote. In the proxy statement the SPAC outlines details about the proposed transaction, including information about the target company, its financials, the terms of the merger and the interests of the transaction parties. If the transaction is completed, all shareholders will get the opportunity, including those that responded in favour of the transaction, to redeem their shares of common stock in return for their pro rata share of the aggregate amount in the trust account. However, it is possible that select shareholders, such as the sponsor and its affiliates, will have enough votes to approve the transaction, allowing the SPAC to avoid seeking public shareholder approval. In this case, an information statement will be presented to the shareholders. If a SPAC is not obliged to foresee their shareholders with a proxy or information statement, for instance when shareholder approval of the transaction is not required, a tender offer statement will be provided instead. The latter includes information about the target business and the redemption rights (SEC, 2021).

In case the business combination goes through, the SPAC facilitates the transition of the target company to a publicly listed entity by incorporating its exchange listing and trust value. This de-SPAC process essentially entails the conversion of the SPAC into an operational company, with its trust value serving as fresh equity for the target company, effectively facilitating a reverse merger. The outcome in terms of ownership structure varies based on the financing arrangement and the extent of the stake acquired by the SPAC. Initial owners of the target company may retain significant ownership, transition to minority stakeholders, or opt to exit their positions altogether (Cumming et al., 2014).

On the other hand, if the proposal is rejected, the SPAC can explore other potential acquisition targets. Nevertheless, if the SPAC sponsors are unable to successfully acquire a firm within the specified timeframe, the SPAC undergoes liquidation. Consequently, the proceeds and accumulated interest from the trust account are distributed among the shareholders (Kolb & Tykvova, 2016).

2.3 Securities structure and terms

Central to the understanding of SPACs and the incentives of the different parties involved (see further) is an exploration of the SPAC securities structure and the accompanying terms. The structure and terms have evolved significantly over the years, reflecting shifts in market dynamics and regulatory frameworks. In this section, we focus on the typical terms of recent SPACs, shedding light on key components such as the units sold in the IPO, sponsor shares, and private placement warrants. By exploring these details, we aim to offer a clear understanding of SPAC transaction structures and their significance for all stakeholders.

The units sold to investors in the IPO typically comprise a combination of a common share, a warrant and sometimes a right to acquire a fraction of a share at no additional cost upon the merger's completion. Units are priced at $10.00 and the exercise price of the warrants is set at $11.50 per share (Klausner et al., 2022). In recent SPACs the number of warrants per unit varies, ranging from zero or a fraction of a warrant, to one full warrant, with each whole warrant allowing the purchase of one share of common stock. The warrants generally are exercisable within 5 years after the business combination (Gritstone Asset Management, 2023). Shortly after the IPO the units become unbundled, and the common shares and warrants start to trade separately on the stock exchange on which the SPAC is trading. The common shares, also referred to as class A shares, can vote on a merger and are redeemable. Shareholders that redeem, receive $10.00 per share plus a pro rata share of the accumulated interest and can do so even if they voted in favour of the business combination. The warrants are not subjected to redemption, meaning that investors can keep the warrants for free if they chose to redeem their shares (Gahng et al., 2021).

Both the private placement warrants bought by the sponsor and the warrants that were part of the units are not exercisable until a business combination is completed and therefore resemble a call option that becomes worthless if no merger is realised (Cumming et al., 2014).

The sponsor shares, as mentioned earlier, amount to 20% of the outstanding shares after the IPO. These class B shares have no voting and redemption rights and thereby do not participate in any liquidation distribution from the trust in case the SPAC fails to consummate a merger. However, if a merger is completed these shares will convert into common shares. Sponsor shares are typically subject to lockup periods, a window of time in which investors are not allowed to sell their shares, ranging from 6 months to a full year and often include vesting provisions (Gahng et al., 2021).

2.4 SPAC parties

We will discuss the five main prominent parties involved during the SPAC process: the sponsor, IPO investors, Private Investment Public Equity (PIPE) investors, the private operating firm and the underwriters. A SPAC is a financing tool that is appealing to all involved parties. With regard to the sponsor, it allows the sponsor to capitalize on its industry knowledge and experience. Next to that, a new publicly available pool of potential buyers has been provided to the private target company. For investors the SPAC vehicle offers investors an investment that has downside protection and upside potential (Hale, 2008). Finally, the underwriters benefit from fee income and SPACs can create a revenue stream in times of subdued activity in the IPO market (Boyer & Baigent, 2008).

2.4.1 Sponsor

At the time the SPAC reaches an agreement with a private target firm, sponsors serve the role as a non-bank intermediary to bring small and risky firms public. Investment banks refrain from taking these type of companies public because of high expected litigation costs and high due diligence efforts relative to the size of the underwriting fees. SPAC sponsors are less constrained by expected litigation costs as they fall under merger laws, which offers safe harbour provisions. SPAC sponsors hence can fill the gap that investment banks leave as underwriters, however a SPAC is in no way an underwriter itself and the IPO of the SPAC is led by investment banks as underwriters (Bai, Ma, & Zheng, 2023).

According to Berger (2008), SPAC sponsors generally can be classified into one of the four following categories: Accomplished operating executives, unfunded financial sponsors, alternative asset managers and corporates. On the next page in Table 1, we provide an overview table of these four types of sponsors with the third column indicating the motivation for the sponsor to form the SPACs. The fourth column, gives a more recent example than those provided by Berger (2008), in order to show that this type of sponsor still exists. However, we were not able to find a more recent example of a corporates sponsor, indicating that this type of sponsor is rather unique compared to the other three sponsor types.

Type of sponsor	Characteristics	Incentives	Example
Accomplished operating executives	Industry expert	Independence & potential higher financial rewards compared to being an operating partner at a private equity fund	Reinvent Technology Partner Y is the third blank check company formed by Reid Hofmann and Mark Pincus, co-founder of LinkedIn and founder of Zynga respectively. The SPAC merged in 2021 with Aurora Innovation.
Unfunded financial sponsors	Individual or capital group who does not have the equity financing needed for the transaction in advance	SPAC provides dedicated capital & removes the burden of finding co-investors as they can rely on public investors	Chamath Palihapitiya, a prominent venture capitalist and founder of Social Capital, has been involved in multiple SPACs. One example is Social Capital Hedosophia Holdings Corp. V, which merged with Virgin Galactic Holdings in 2019, taking it public.
Alternative asset managers	Mostly private equity fund managers	Extend alternative asset manager's franchise & capture opportunities that do not fit the fund's core mandate	Apollo Global Management, an alternative asset manager, has formed several SPACs. For example, Spartan Acquisition Corp. III which merged with Allego, a Dutch operator of EV charging stations, in March 2022.
Corporates	Public firm	Capitalize on deals outside core focus but of strategic relevance	Navios Maritime Holdings, a dry bulk shipper, which raised a SPAC to pursue acquisitions of other types of ships, such as tankers or containerships.

Table 1: Sponsor types

The sponsors' compensation consist of the private placement warrants and the sponsor promote, both of which become worthless if no acquisition occurs. SPAC management can thus receive a very high compensation (20% of the SPAC's post-IPO equity plus warrants) or lose the entire at risk investment. The payoff structure is therefore highly dependent on shareholder approval and the eventual completion of a business combination. This structure (in theory) creates an incentive for sponsors to

complete a business combination with the best possible target, thereby increasing approval probability and maximising shareholder value. On the other hand, it may incentivise sponsors to complete a merger at all costs and cause them to push less favourable deals especially towards the end of the SPAC's lifetime (Cumming et al., 2014).

The private placement warrants or the at risk investment result in the sponsor having some skin in the game and thereby better align the interests of sponsors and investors. As opposed to the sponsor promote it is not a free lunch in the case of a successful business combination (Hale, 2007). To further align the interests of investors and sponsors some SPACs have started to introduce state-contingent sponsor compensation structures.

One such structure resembles an earnout by means of vesting provisions for sponsor shares, tied to future stock prices of the merged company (Gahng et al., 2021). Typically a portion of the sponsor's shares will vest when a business combination is completed and the remaining shares will only vest when the share price hits a specified threshold. Gahng et al. (2021) investigated a sample of 153 business combinations completed as of March 2021 by SPACs that went public since January 2015, and reported that 27% of their total sample had vesting provisions for the sponsor shares. However, within this 27% the portion of sponsor shares that are subject to vesting provisions are rather low, given only 11% of sponsor shares have vesting provisions. Often there exists multiple thresholds, typically two or three, where each threshold is associated with a portion of the sponsor's shares. The most common thresholds are $12.50 and $15.00 and must be reached within a period of 5 years (Klausner et al., 2022). In order to reach these thresholds, the sponsor will be encouraged to find a better target as it increases the chance of a higher stock price post-merger, benefitting not only the sponsor but all remaining shareholders.

Gahng et al. (2021) provide the merger between Double Eagle Acquisition Corporation (SPAC) and Williams Scotsman, which was completed on November 29, 2017 as an example where vesting provisions were included in the merger agreement for the sponsor shares. Taking a closer look at this specific merger, we see that this is a rather exceptional example as the full 100% of founder shares were subject to vesting provisions. To be concrete, 50% of the founder shares, equal to 6,212,500 shares, vested if the closing price of the shares of the new merged company's common stock exceeds $12.50 per share for twenty of any thirty consecutive trading days within three years following the closing of this business combination. The remaining 50% of the founder shares were subject to the same restrictions, but with a threshold of $15 per share instead of $12.50. Next to that, not all of the vested shares would have gone towards the founders as a certain proportion, depending on the redemption rate at the time of the merger , would go towards a PIPE investor, namely Sapphire Holding

We will elaborate more on PIPE investors in section 2.4.3 but this example already shows that sponsors occasionally shift a fraction of their sponsor shares (or warrants) to PIPE investors in order to attract them.

The previous example was rather extraordinary in the sense that all sponsor shares were subject to vesting provisions, therefore we looked for an example that is more in line with the general findings of Gahng et al. (2021). For Alpha Capital Acquisition Company, which closed its merger with Semantix on August 3, 2022, only 15% of the founder shares (862,500 out of the 5,750,000 sponsor shares) were subject to vesting provisions. However, it does show similarities to the previous example in the sense that once again the vesting shares are split equally between the $12.50 and $15 threshold. On the contrary, whereas the previous example gives the sponsor a period of 3 years to reach these share price levels, the current example is more generous towards the sponsor as a period of 5 years upon the closing of the business combination was set.

Another structure that is used to increase alignment with shareholders is the cancellation of a portion of the sponsor's shares if a certain redemption threshold is reached. For example, the prospectus will state that a specified number of sponsor's shares will be forfeited if the redemption percentage exceeds the predetermined threshold. Similar to the earnout structure there can be multiple thresholds with a fraction of sponsor's shares associated with each threshold (Gahng et al., 2021). This structure incentivises sponsors to propose a good merger with a qualitative target such that redemption is kept to a minimum and consequently the sponsor can receive its full compensation.

To give a concrete example of the above, Gahng et al. (2021) mentiones the merger agreement between Acies Acquisition Corporation and PlayStudios in 2021. Next to the fact that this merger agreement incorporated vesting provisions for the promote shares, the sponsor also agreed to forfeit a proportion of its promote shares as soon as the redemption rate of the public shares is higher than 25%. If the redemption rate reached 25%, the company forfeited 403,594 Class B promote shares. When the redemption rate exceeded 50%, this forfeiture doubled to a total of 807,188 Class B promote shares. For redemption rates between 25% and 50%, the company forfeited the initial 403,594 Class B promote shares for surpassing the 25% threshold, plus a proportional amount of the additional 403,594 Class B promote shares. Although we already referred to two other SPAC merger agreements involving vesting provisions, it is still worthwhile to mention it here as it has a special feature to it. The shares subject to vesting were again equally split between the thresholds of $12.50 and $15 per share, each accounting for 450,000 founder shares. However, if the vesting provision were met, this would also result in providing the sellers (i.e. the target company shareholders) with an additional 7,500,000 shares. The latter would also hold for both the threshold of $12.50 and $15 per share, such that the

sellers could obtain an extra 15,000,000 shares in total if the post-merger operating company would perform good. At the time of this agreement, there would have been a total of 141 million shares outstanding post-merger, assuming there would not have been any redemption. On a fully diluted basis, there could be 164.7 million shares consisting of the 141 million shares already outstanding, 8.7 million shares if all warrants would be exercised and then 15 million shares from the earnout (Ghang et al., 2021). This shows that although vesting provisions lead to more shareholder alignment, it can also lead to dilution for shareholders post-merger in case the stock price reaches the thresholds.

2.4.2 IPO investors

According to Klausner et al. (2022), investors in SPAC IPOs are most of the time large institutional investment managers affiliated with hedge funds who are required to file SEC Form 13F, which is a quarterly report that any institutional investment manager with over $100 million in assets under managements must report. This file provides insight into all their equity holdings.

By examining the divestment rate, Klausner et al. (2022) conclude that most of the IPO investors do not show any commitment to remain invested in the SPAC post-merger. The divestment rate was calculated by looking at the amount of SPAC shares a 13F investor holds immediately before a merger announcement and compare it with the amount of SPAC shares immediately after the merger closes. Divestment can occur either as a result of redemption or through the sale of their shares on the market. The end results were divestment rates with a mean of 92% and a median of 98%. These divestment rates show that very few pre-merger shareholders maintain their shares post-merger, even in cases where redemption rates are modest. Consequently, the main role of IPO investors is to create a public vehicle that seeks to merge with a private company in which new shareholders will then invest (Klausner et al., 2022).

Those institutional investors view the SPAC unit as a “riskless” zero-coupon bond with an option on a future acquisition. The redemption option limits the downside risk for IPO investors as they will receive their pro rata share of the trust value, plus any accrued interest (Cumming et al., 2014). Over time, it became common that the sponsor bought private placement warrants at the time of the IPO for $1.50 per warrant to cover up-front underwriting fees and future expenses. As a result, the public investors start with $10 per share in the trust account, rather than the $9.80 in net proceeds from the IPO (Gahng et al., 2021). This evolution has even further decreased the downside risk for IPO investors, so it is very unlikely that investors will receive less than their initial investment ($10) if they choose to redeem. Hence, IPO investors make a riskless investment. With regard to the investors that do not have any long-term interest, it is mainly the inclusion of a warrant in the SPAC unit that makes SPACs attractive,

since they are able to keep or sell the warrants in spite of redeeming the shares. Given the redemption option for the shares, that is approximately equal to $10, one can say that the warrants are a free lunch for IPO investors (Gahng et al., 2021).

To better understand the free lunch that warrants offer to investors in SPAC units, we will elaborate on SPAC warrants and their pay-off structure. In essence, a warrant is a long-term call option that allows the holder to purchase a share of the company's stock (i.e. the underlying asset) at a predetermined price (i.e. the strike price) in the future (Dalisky, 2022). Table 2 gives an overview of all the important concepts related to such warrants.

Concept	**Description**	**Value (typical for SPACs)**
Spot price (S_0)	Present market value of the underlying asset.	>0
Strike price or exercise price (K)	The predetermined price at which the underlying asset can be bought if the warrant is exercised.	$11.50
Intrinsic value	The value of the warrant if it would be exercised instantaneously.	Max (S_0 – K ; 0)
Extrinsic value or time value	The value of the warrant attributable to factors other than the underlying asset's price.	Either positive or negative, depends on maturity date and implied volatility of underlying asset
Premium or price	The market value of the warrant.	Intrinsic value + extrinsic value.
Expiry date or maturity date	The date at which the warrant expires.	5 years after de-SPAC

Table 2: Warrant concepts

Figure 2, shows that the intrinsic value can never be negative, it is either zero or positive. If the strike price is higher than the spot price, the intrinsic value will be zero and the warrant is out-of-the-money. As soon as the spot price is higher than the strike price, the intrinsic value becomes positive and the warrant is in-the-money. Contrary to the intrinsic value, the extrinsic value can either be positive or negative. In general, it holds that the further away the maturity date and the higher the implied volatility of the underlying asset, the higher the extrinsic value will be as there is a higher chance that the underlying asset will be worth more than the strike price at a certain point in time before the maturity date of the warrant.

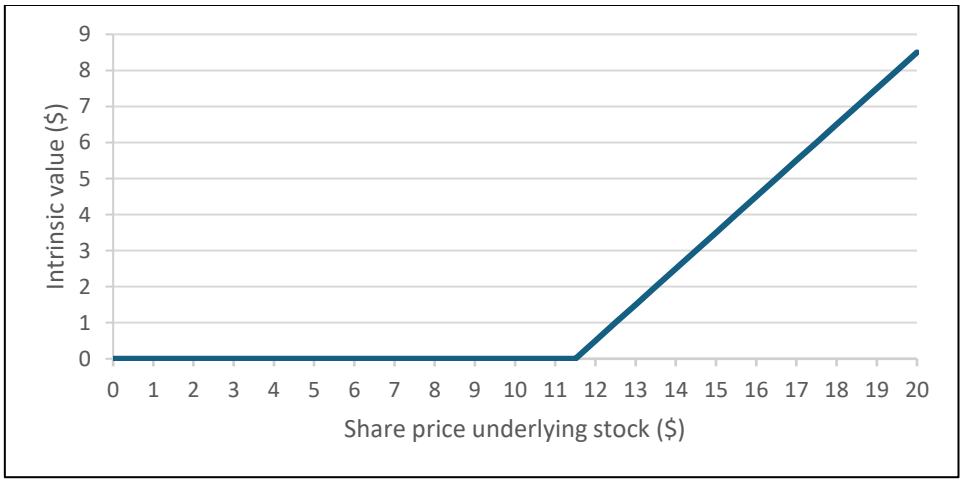

Figure 2: Intrinsic value warrant

We will further illustrate by means of an example. Figure 3 shows the share price of Vincerx Pharma (VINC), which merged with LifeSci Acquisition Corp. (LSAC). Before the deal announcement the share price of VINC is close to the $10 at which the SPAC units were bought in the SPAC's IPO. Consequently, as the strike price of the warrants is set at $11.50, the warrants are out-of-the-money. However, from Figure 4 we can see that the price of the warrant "pre-deal" is larger than zero even though the warrant is not in the money. This value stems from the time value of the warrant and results in the warrant providing value for IPO investors even before a deal is announced. In this instance, IPO investors could redeem their shares or sell them on the market, get their initial investment of $10 per unit back, and sell the warrant in the market for a quick profit. As a result, IPO investors can make positive returns in a riskless way.

Figure 3: Stock price of Vincerx Pharma, Inc. (Source: SPAC Research, 2024)

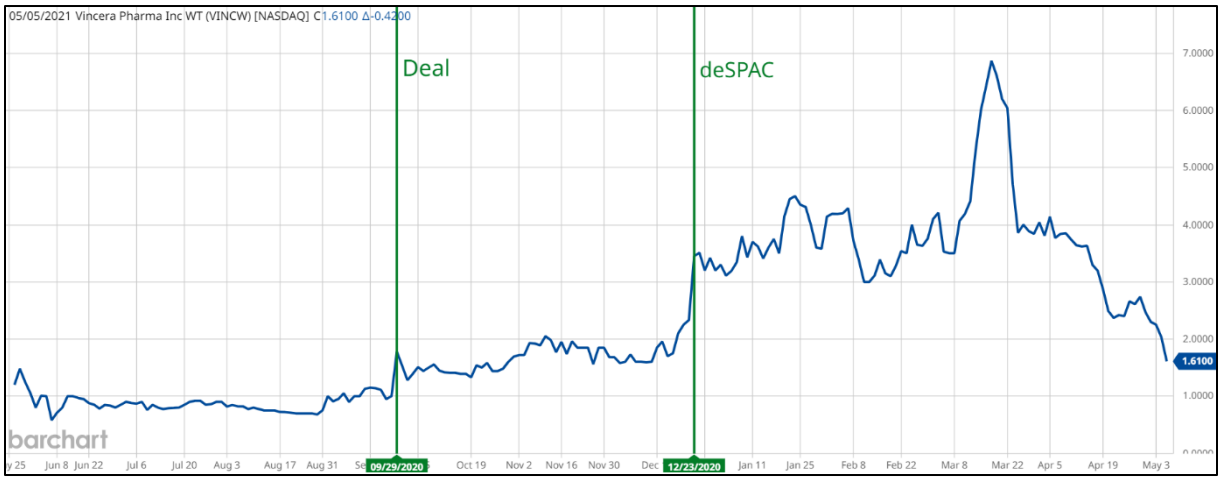

Figure 4: Warrant price of Vincerx Pharma, Inc. (Source: Barchart 2024)

To continue, Gahng et al. (2021) split the lifecycle of SPACs into two periods, namely the SPAC period and de-SPAC period, in order to examine the investor returns per period. The SPAC period starts at the SPAC's IPO and ends with the completion of a business combination or liquidation whereas the de-SPAC period starts on the first trading day of the merged company. In order to calculate the investor return during the SPAC period, they chose to calculate the returns assuming that the investor follows an optimal redemption strategy. The strategy entails that the investor will sell each component of the SPAC unit, 5 trading days before the close of a business combination or liquidation, if the market prices are higher than redemption values, or redeems if the market prices are lower than redemption values. They reported an annualized return of 15.9% on average during the SPAC period. With regard to the de-SPAC period, there is a huge difference in return between the merged company shares and the warrants. The equally weighted average one-year buy-and-hold return of the merged companies' common shares was -8.1% whereas the equally weighted average one-year buy-and-hold return of the merged companies' warrants was 68.0%. Given the annualized return of 15.9% in the SPAC period and the fact that the one-year buy-and-hold return of the merged companies' warrants was 68.0%, we can conclude that IPO investors, who most often redeem or sell their shares at the time of a business combination, have yielded on average very good returns, whether they chose to sell their warrant at the time of the merger or chose to hold it.

Nowadays the fraction of a warrant per SPAC unit is less compared to the sample period of Gahng et al. (2021), which was from January 2010 – December 2019. The incentive misalignment that allows SPAC investors to redeem their shares but still approve value destroying mergers because they can keep their warrants, should therefore be minimized by offering these less dilutive warrants. Next to that, some SPACs came up with contingent warrants. These SPACs want to discourage redemption and

reward the shareholders who don't redeem their shares by giving them an additional fraction of a warrant per share if they opt to hold their shares. A specific example is Global Partner Acquisition Corporation II, who rewards shareholders, who don't redeem, with an additional 1/6 of a warrant on top of the already 1/6 of a warrant that was included in the SPAC units where one full warrant entitles the holder to buy a share at $11.50. This feature provides a path towards a more sustainable equilibrium as the SPAC period investors, who mostly redeem or sell their shares as they do not have any long-term interest, collect less economic value and consequently allows de-SPAC period investors to capture more as there will be less dilution (Gahng et al., 2021).

2.4.3 PIPE investors

In most cases, the SPAC seeks to find Private Investments in Public Equity (PIPE) investors around the same time they reach a merger agreement with a target firm. As already known by now, the current shareholders will then have to vote whether to approve the business combination along with indicating whether they redeem their shares or not. Given that shareholders can still redeem their shares, it is unclear how much cash the SPAC will be able to provide to the target firm in the end. The target firm tackles this issue by incorporating a minimum amount of cash that the SPAC needs to deliver to them (Klausner et al., 2022).

Klausner et al. (2022) investigated SPACs, who merged between January 2019 and June 2020, and reported mean and median redemption rates of 58% and 73%, respectively. Taking into account these redemption rates, sponsors know that not all of the IPO proceeds will go towards the target firm. In order to fill the gap and comply with the minimum amount of cash agreed upon in the merger agreement, they will pursue PIPE agreements.

Next to the function of providing enough capital to meet the minimum cash requirement, PIPE investments serve another crucial function. A PIPE investment, performed by an outside entity, gives confidence to current shareholders that the deal is attractive and consequently discourages redemptions. We explicitly mention that the latter function only applies when it is an outside entity, such as a mutual fund or private equity firm, since the sponsor sometimes too makes PIPE investments. However, a sponsor typically purchase common shares, as a PIPE investor, at a price per share equal to the IPO price of $10 (Gahng et al., 2021).

On the contrary, external PIPE investors typically negotiate for a discount or the sponsor decides to shift a fraction of its shares/warrants towards these PIPE investors. We mentioned earlier the merger between Double Eagle Acquisition Corporation and Williams Scotsman, which is now called WillScot

Mobile Mini Holdings Corporation, where the sponsor gave part of its sponsor shares to a PIPE investor. The same example can be used to show that PIPE investors typically pay a discounted price per share. The PIPE investor (Sapphire Holding S.à.r.l.) purchased a total of 43,568,901 shares of class A common stock at a price of $9.60 per share. These benefits can be justified for several reasons. First of all, these PIPE investors engage in extended and detailed due diligence. The small investor does not have enough at risk to put a lot of time, effort and resources into evaluating the project and management skills at stake in the new company. They could therefore opt to free-ride on the work of an investor, with much more at stake given their investment amount, investigating the potential of the target company (Fagan & Levmore, 2023). On top of that, these PIPE investors typically have private conversations with the target's management, which is of course invaluable information that is not disclosed to the market (Klausner et al., 2022). Next to that, a PIPE investor typically has the opportunity to invest in multiple firms along with different sponsors. Common shareholders can therefore gain confidence that the target company has great potential. These PIPE investors get then compensated for the resources they have allocated by buying shares at a certain discount relative to the market price that common shareholders need to pay in order to obtain shares. Do note that these shares are typically locked up for six months (Bazerman & Patel, 2021).

The extent to which PIPE investors obtain friendlier terms will also depend on the state of the SPAC market as well as under which type of pressure the sponsor is. With regard to the SPAC market, the greater the variation as well as the more available SPACs , the harder it will be for PIPE investors to distinguish winners from losers. They want of course to be compensated for their increased efforts related to their evaluation of potential investments. Finally, the more the sponsor fears high redemption rates and the less time it has to look for a potential new target, the more leverage PIPE investors have to negotiate attractive terms (Fagan & Levmore, 2023).

2.4.4 Private operating firm

For private operating firms, merging with a SPAC serves as an alternative way to access public markets and get listed. It creates an opportunity to access the external capital raised by the SPAC and use this readily available cash to facilitate expansion or capital structure solutions. The choice to merge with a SPAC can also be driven by exit motives of existing shareholders of the private company that want to cash out on their investment, especially when there is little interest from strategic or financial buyers (Berger, 2008).

Kolb & Tykvova (2016) show that firms that go public through a SPAC instead of a regular IPO are smaller, more levered, have lower growth opportunities and would have difficulties in completing a

successful IPO. In addition, they confirm the belief of Brown, Ferguson & Lam (2013) that these firms are more risky and use the SPAC vehicle as a backdoor to public markets. In more recent research, Bai et al. (2023) provide evidence that SPAC firms are indeed smaller and riskier, but also younger than IPO firms. On the contrary to what Kolb and Tykvova claim, Bai et al. (2023) show that SPAC firms grow at similar or even higher rates than firms that follow an IPO. Their findings even present evidence contrary to the notion that the SPAC market exclusively harbours lower quality firms, and propose an alternative perspective: SPAC entities could, on average, boast comparable quality to IPO firms.

2.4.5 Underwriters

When the SPAC is formed by the sponsor, an underwriter is typically engaged in order to issue shares in the IPO. Underwriters receive underwriting commission at two different points in time, namely at the time of the SPAC's IPO and at the time of a business combination. Their commission is usually in total 5.5% of the SPAC's IPO proceeds where they agree upon receiving 2% at the time of the IPO and defer the remaining 3.5% up until a possible future business combination. Nevertheless, SPAC underwriters may decide to forego some of their deferred income to ensure the completion of a merger. Just as with the sponsor promote, underwriters give up a higher proportion of their deferred underwriter commissions if they are dealing with higher redemption deals (Gahng et al., 2021). The latter, however, is related to situations where the SPAC finds itself already at the time of the merger agreement.

In few cases, the underwriter agrees upfront to waive a proportion of its deferred commission fee if redemptions would be high. This consensus ensures that underwriters will seek more long-term investors at the time of the SPAC's IPO (Klausner et al., 2022). This can be seen as positive as it may reduce the probability of redemption and therefore the uncertainty of total cash received by target firms.

Comparing to a traditional IPO, underwriters mostly demand a fee of 5-7% of IPO proceeds. Next to that, the application of Section 11 of the Securities Act applies a more strict standard of liability to underwriters in connection with a traditional IPO. As there is no longer underwriting of shares at the moment of the merger, SPAC underwriters are not exposed to litigation risk under Section 11 as opposed to underwriters in a traditional IPO. Shareholders therefore cannot file a claim against a SPAC underwriter, even though they may have a valid Section 11 claim against the SPAC and its management (Klausner et al., 2022).

2.5 Advantages and disadvantages to SPACs

2.5.1 Advantages

The reason for the existence of SPACs lies in the benefits they provide to the target company, investors and other parties involved. As mentioned earlier, the SPAC effectuates the business combination through a reverse merger. This has several advantages for the private operating firm. Floros & Travis (2011) identify five primary advantages of a reverse merger over an IPO:

1. The target firm avoids the lengthy and costly SEC review process and thereby can save 2 to 12 months. The SPAC vehicle has already gone through this process and borne the costs.
2. Less legal preparation is required, resulting in lower direct expenses and lower indirect IPO costs, such as underpricing.
3. Less dependence on market conditions, thereby avoiding the risk of investors losing interest because of falling markets.
4. The private firm's management can focus on operations instead of having to spend lots of time on doing roadshows.
5. The owners of the target generally maintain a large majority of the resulting public company, meaning that selling out to a SPAC can be an alternative for private companies that want to retain control.

The first advantage is somewhat contested in other literature. Kolb & Tykvova (2016) find evidence that SPAC acquisitions can take longer to be executed than IPOs, while Gahng et al. (2021) note that it is nearly impossible to measure and compare the actual time it takes to go public via a SPAC and an IPO. However, they assert the conventional wisdom that 'merging with a SPAC is faster' and that firms use this benefit to swiftly take advantage of the favourable market sentiment in a specific sector or industry.

The third advantage is accepted in many other academic research (Berger, 2008; Boyer & Baigent, 2008; Kolb & Tykvova, 2016). However, Cumming et al. (2014) find evidence that SPACs are also prone to so called "IPO windows", in the sense that deal approval probability is higher in upward-trending markets. The SPAC vehicle's reduced dependence on market conditions stems from the absence of a book-building process, unlike IPOs. In the book building process the price of the IPO is determined by supply and demand whereas with a SPAC the price is established through negotiations between the SPAC and the target company, which provides more certainty (Reddy, 2021).

Another advantage for the private firm is that its management can capitalise on the industry expertise and experience of the SPAC management as the sponsor can provide advice, certification and mentorship (Gahng et al., 2021; Hale, 2007). Moreover, the SPAC structure offers a solution for private

companies active in sectors that lack research coverage and have few or no comparable companies to benchmark the target's valuation (Berger, 2008).

One last advantage of the SPAC structure for the private firm is that it allows to make forward-looking projections that fall under the safe harbour provisions of U.S. merger law. A traditional IPO falls under security issuance law and does not provide these safe harbour provisions. Making forward-looking statements on revenue and profits can help to maximise the pre-money valuation and to make the deal look more attractive (Gahng et al., 2021).

One of the major advantages for investors in SPACs, over investing in a private equity fund for example, is that they can exit at any time by selling their shares or redeem their shares (Boyer & Baigent, 2008). Since the investment in a SPAC resembles a "riskless" zero-coupon bond (money-back guarantee) with an option on a future acquisition, it offers a very attractive pay-off profile to SPAC IPO investors.

The benefits for the other parties are clear. Underwriters benefit from fees and SPACS offer a means for investment banks to generate revenue in times of subdued activity in the IPO market (Boyer & Baigent, 2008). The sponsor benefits from the generous compensation package of 20% of the post-merger equity. In addition, for a sponsor it is easier and faster to raise money through a SPAC than to raise money for a private equity fund (Boyer & Baigent, 2008).

2.5.2 Disadvantages

The SPAC structure however also carries some disadvantages for both private target firms and investors.

The fact that the merger must first be approved by the SPAC shareholders introduces some uncertainty for the private firm that hopes to go public via the SPAC (Kolb & Tykvova, 2016). There is also some uncertainty regarding the cash delivered to the operating company. Because SPAC shareholders can redeem their shares, the cash provided to the target is not known until shortly before the merger closes. To mitigate this, operating companies negotiate a minimum amount of cash that needs to be delivered to them in order to close the merger (Klausner et al., 2022).

The main disadvantage to investing in the IPO of a SPAC over a traditional IPO lies in the fact that little to nothing is known about the target firm that is going to be acquired (Boyer & Baigent, 2008). Moreover, the preferential prices against which the sponsor and the PIPE can invest, suggests that there is no guarantee that the investors initial investment at $10 per share is a good deal (Fagan & Levmore, 2023).

Cumming et al. (2014) note that post-merger investors face a high level of asymmetric information, risk and uncertainty with regard to the newly formed public company. Furthermore, since the original shareholders of the target firm most of the time retain a large majority of the shares in the newly formed entity, it results in thin trading volume and an illiquid stock which hurts both investors and the firm itself (Boyer & Baigent, 2008; Cumming et al. 2014). Lastly, post-merger shareholders suffer from dilution as the sponsor shares convert to common shares and if warrants are exercised. We will further elaborate on this in section 2.6.

To a lesser extent there is also a disadvantage for the sponsors because they risk to lose their entire "at risk" investment if no merger is completed.

2.6 Criticism and the regulator's response

In recent years, SPACs have come under increasing scrutiny and scepticism, particularly following the boom and bust observed between 2020 and 2022. This period prompted widespread concern among investors, academics and regulators. The SEC, recognizing the challenges posed by SPACs, has undertaken efforts to address these issues through the formulation of new regulatory measures. This chapter explores the criticisms surrounding SPACs and examines suggestions of academics and the response of regulatory authorities to mitigate associated risks and safeguard investor interests.

In "A sober look at SPACs", which first appeared in 2020, Klausner et al. (2022) criticise heavily the structural weaknesses of SPACs. First they highlight that although a SPAC raises $10.0 per share from investors at the time of the SPAC's IPO, the net cash per share a SPAC can ultimately provide to its target company at the time of the merger is far less. More specifically, the mean and median net cash per share were $4.10 and $5.70, respectively during their primary sample period of January 2019 – June 2020. They repeated these calculations for a more recent period (June 2020 – November 2021) and reported a slightly higher net cash per share, but still far below $10. The low amount of net cash per share is due to several dilutive factors. First, there is the dilutive effect of the sponsor's promote and the warrants included in the IPO units, which decrease the cash on a per share basis. The sponsor's warrants, however, are not seen as dilutive since they serve to cover the initial underwriting fees. Second, the (deferred) underwriter fees and other type of fees further reduce the net cash per share. Lastly, redemption further amplifies the dilution and the decrease in the cash on a per share basis. This is due to the fact that the sponsor promote does not scale down in proportion to redemptions, meaning that redemption reduces cash by an amount disproportionately greater than the reduction in shares. Redemptions also increases the per share underwriting costs.

Furthermore, they examine whether the post-merger SPAC shareholders or the target bear these costs. To answer this question, they focused on the relationship between pre-merger net cash and post-merger share price. If the target companies are able to negotiate deals where the post-merger share price is almost identical as the net cash per share it receives from the SPAC, they have successfully protected themselves from these costs and shifted these costs towards the post-merger SPAC shareholders. Their findings indicate that mainly non-redeeming SPAC shareholders borne the costs associated with SPACs.

They also criticise the uneven regulatory playing field between SPACs and IPOs. SPACs frequently use forward-looking statements at the time of the merger agreement whereas traditional IPOs rarely incorporate forward-looking statements. This huge difference in the use of forward-looking statement between SPACs and IPOs is due to the fact that the Private Securities Litigation Reform Act's (PSLRA) safe harbour applies to SPACs whereas IPOs do not fall under this safe harbour. Additionally, SPAC underwriters are not exposed to litigations risk. Hence, this could lead to over optimistic projections by the SPAC in order to attract shareholders and reduce the redemption level. Blankespoor, Hendricks, Miller & Stockbridge Jr. (2022) examined the accuracy of these projections. Many SPACs do indeed make future-looking projections where revenue and EBITDA projections are most popular. Their results are rather concerning as only 35% of the SPACs were able to meet or beat their projections. Even more concerning, this proportion declines with forecasts of longer horizon and there is trend towards projection horizons above the average projection horizon of 4 years in recent years.

There is a clear lack of alignment between post-merger shareholders and the other parties. IPO investors can enjoy positive returns in an almost entirely riskless way. Underwriters are guaranteed of their income as long as there is a business combination but the quality of the deal does not impact their revenue in most cases. The sponsor usually only needs to avoid liquidation of the SPAC in order to achieve very generous returns.

To tackle this lack of alignment between sponsors and post-merger shareholders, Klausner et al. (2022) suggest a number of changes that would make the SPAC more friendly towards post-merger SPAC shareholders, who face negative returns in most cases. To start with, they advise a SPAC to issue no warrants or rights in its IPO. Next to that, they would opt for lower sponsor compensation and structure it to better align with shareholders' interest. The latter can be achieved, for instance, by making the sponsor compensation dependent on redemption levels. They suggest to not only make the sponsor's compensation dependent on redemption levels but also the deferred underwriter commissions. Lastly, they mention that SPACs should focus on bringing in large PIPE that would not only validate the SPAC's merger but also lead to less dilution. The reduced dilution of PIPE may seem odd as PIPE investors

usually obtain shares at a discount price. Nevertheless, these discounted prices would still be higher than the above mentioned mean and median net cash per share, such that they ultimately lead to higher net cash per share, which benefits post-merger SPAC shareholders.

With regard to the costs embedded in SPACs and sponsor's interest, Klausner et al. (2022) are of the opinion that these should be better disclosed.

Being aware of the criticism, the commissioners of the SEC announced proposed new rules and regulations directed at SPACs on March 30, 2022. Layne & Haigwood (2022) extensively discuss these proposed SPAC rules with the following 5 topics being the most worthwhile to mention:

1. Enhanced disclosures and investor protection
2. Enlarging gatekeeper obligations
3. Revising the registration requirements for De-SPAC transactions
4. Bringing forward-looking statements for De-SPAC transactions into compliance with IPO regulations
5. Status of SPACs under the Investment Company Act of 1940

Regarding the enhanced disclosures, there would both be new requirements as well as codification of already existing disclosure practices. The new requirements are linked to projections and the fairness of the de-SPAC transaction. With regard to the projections, it includes mentioning who and for what purpose the projections were made and whether or not they were based on past operations. Concerning the fairness, the SPAC board has to express their reasonable belief as to whether the de-SPAC transaction is fair or unfair to the SPAC's unaffiliated securities holders. The SEC hereby hopes that SPAC boards will be more inclined to request fairness opinions or third-party appraisals. Next to these new requirements, additional disclosure will be needed for different sources of dilution and their impact, conflicts of interest and disclosure with respect to the SPAC's sponsor (Layne & Haigwood, 2022).

To continue, the second topic has a big impact on the underwriters of SPACs. The SEC wants to extend underwriter liability by mandating an investment bank to act as a statutory underwriter in the de-SPAC transaction. Consequently, any material misstatements or omissions in disclosures during the de-SPAC transaction will not only hold the SPAC liable but investment banks too (Layne & Haigwood, 2022).

The third topic impacts the target company, as the SEC intends to make the target company a co-registrant, next to the SPAC, at the time a SPAC offers its securities in a de-SPAC transaction. The SEC thereby not only wants to expand the underwriter liability under Section 11, but the target company

too. Although this rule would expand the target's liability, Layne & Haigwood (2022) do mention that the SEC has already been able to hold target companies accountable under the existing liability regime.

With regard to the forward-looking statements, the SEC will reevaluate whether SPACs should fall under the PSLRA safe harbour as traditional IPOs do not.

Lastly, the SEC is proposing a new Rule 3a-10 under the Investment Company Act of 1940 in response to recent claims that SPACs are unregistered investment companies under the Act. If certain requirements are met, the rule would provide SPACs with safe harbour from the Investment Company Act status (Layne & Haigwood, 2022).

These proposed SPAC rules were then subject to a comment period, in which they received a total of 83 comment letters (Layne & Haigwood, 2022). Shortly after the proposal Senator Elizabeth Warren published a report titled "The SPAC Hack: How SPACs Tilt the Playing Field and Enrich Wall Street Insiders". Her investigation finds that "the structure of SPACs routinely rewards serial SPAC creators and Wall Street backers while leaving retail investors at risk from SPACs' convoluted structure and incentives for dilution, fraud, and abuse" (Warren, 2022, p. 6). She suggested the SEC and Congress to further crack down on SPACs. On January 24, 2024 the SEC finally finalized the SPAC rules, which will become effective on July 1st, 2024 (SEC, 2024).

With regard to the enhanced disclosures, the SEC decided to hold on to their proposed rules. On the contrary, the SEC refrained from adopting its original proposal, which would have made underwriters involved in the IPO potentially liable under Section 11 of the Securities Act in relation to the de-SPAC transaction if the underwriter assisted in the de-SPAC transaction or took part in it, either directly or indirectly. Regarding the co-registrant status for the private target company, the target firm will now be an issuer required to sign the Securities Act registration statement filed by a SPAC. Accordingly, for any substantial misstatements or omissions in the registration statement, the SPAC regulations extend Section 11 liability to the target company as well (Goriola & Lane, 2024). Next, the safe harbour under the PSLRA will no longer be available to make forward-looking statements, thereby aligning the regulatory treatment of projections by traditional IPOs and SPACs (Dunaevsky, 2024). Lastly, just as with the proposed rule regarding the liability of underwriters participating in the SPAC's IPO, the SEC opted to issue guidance instead of adopting its proposed rule with regard to determining if a SPAC represent an investment company under the Investment Company Act (Goriola & Lane, 2024).

3. Research

3.1 Aim of the research

The existing literature on SPACs is mainly focused on the structure itself, the characteristics of the target firm, risks, regulation and stock market performance. In this last field, research often revolves around finding variables that can explain the poor stock market performance of SPACs post-merger. However, most of these studies focus on variables related to the SPAC itself, the sponsor and the deal structure (warrants per unit, redemption rates, sponsor promote, etc.) and to our surprise almost completely ignore the underlying performance of the target operating firm. Blankespoor et al. (2022) were one of the first to focus on the performance of the target firm. They have shown that only 35% of companies were able to meet or exceed the projections made at the time of the merger. Therefore we believe the financial performance of operating firms is often unjustly overlooked in the literature as it undoubtedly plays an important role in explaining the weak stock market performance of SPACs post-merger.

The literature, in general, on the financial performance of the operating firm is extremely scarce. This dissertation tries to fill this gap as we examine the pre- and post-merger accounting performance of SPAC target companies. We aim to assess if there are any significant differences in the financial performance pre- and post-merger and aim to answer the following research question:

"How does the post-merger financial performance of the firm compare to the pre-merger performance?"

Our research contributes to the existing literature as there is only one other study, to the best of our knowledge, that examined the performance of SPAC targets pre- and post-merger. This study of Ribeiro (2022) focussed on companies that merged with US listed SPACs between 2004 and 2019, while we focus on firms that merged with US listed SPACs in 2020. In addition, Ribeiro's research in this regard is limited to return on assets and return on sales, while we will look at a larger set of financial metrics that relate to growth, profitability, solvency and liquidity. In addition, for most metrics we will compare the effect of the merger both in the short term, and in the more long term (i.e. two years after the merger).

Our expectations regarding the research question are that the liquidity, specifically the current ratio, and the solvency of the SPAC's target companies will improve in the short term since they receive a sum of cash from the SPAC when the business combination closes. However, based on the research of Klausner et al. (2022) we know that a SPAC delivers significantly less cash per share to the target firm than the initial $10 per share that was raised from investors. Therefore the impact on the liquidity and solvency position of the firm might be smaller than initially thought. Over the longer term we would

expect that the positive impact of the cash injection is less pronounced because SPAC target companies are mostly unprofitable (Gahng et al., 2021; Hjort & Hoel, 2022; Vinayagamoorthy & Wentzel, 2021) and therefore we can expect them to burn through their cash rather quickly which results in a worse liquidity and solvency position.

With regard to growth, we are somewhat undecided. If the firm can use the cash it received from the SPAC to pursue and invest in growth opportunities it might lead to higher growth rates post-merger. On the other hand we know from the research of Blankespoor et al. (2022) that most companies do not meet the growth targets set forth at the time of the merger and Datar et al. (2012) as well as Kolb & Tykvova (2016) documented that SPAC targets have lower growth opportunities than firms that go public via an IPO.

When it comes to profitability, we would expect it to decrease based on Ribeiro's findings (2022) that the return on assets and return on sales of target firms decreases after the merger. However, for firms where the sponsor is an accomplished operating executive that remains involved with the target firm after the merger we can expect profitability to increase. Our reasoning is based on findings from Chauviere, Green, & Tan (2020) that suggest that "operator led" SPACs, meaning SPACs whose leadership has former C-suite operating experience, outperform other SPACs as well as their sector.

3.2 Sample

Our sample consist of companies that completed a merger with US-listed SPACs during 2020. Initially, we wanted to focus on companies that merged with a SPAC in 2021 because SPAC activity in terms of completed mergers boomed that year. The reason for focussing on 2020 instead, is that if the merger year is 2021 we would for example be comparing the post-merger revenue growth in 2022 with the pre-merger revenue growth in 2020. This would lead to a distortion in our results as the year 2020 was heavily impacted by covid for a lot of firms. By using 2020 as the year in which the merger has taken place, the impact of covid on the results will be less pronounced.

The sample was constructed by using the "Deals Screener" in Refinitiv and applying the following filters:

1) Asset class: 'M&A'
2) Deal Status: 'Completed'
3) Blank Check Company (SPAC) Flag: 'True'
4) Date Effective: '01 Jan 2020 and 31 Dec 2020'
5) Acquiror Primary Stock Exchange: 'Nasdaq' and 'New York Stock Exchange'

This resulted in a list of 66 companies. After manually verifying all the names in the list we found 1 company that that did not merge with a SPAC and 3 companies that are affiliates of other companies in the list that merged with the same SPAC. These 4 companies were omitted from our sample, leaving us with 62 companies. In addition, we cross-checked our results with the de-SPAC list of Spactrack.io (2023) and SPAC Research (2024) which both count 64 completed SPAC deals for 2020. The two companies that were missing from our results, namely Fusion Fuel Green and Clever Leaves, were added to our list. Furthermore, two companies were dropped from our sample. The first, Vincerx Pharma, was only incorporated on December 19th 2018. It had no sales in any of the years from 2018 till 2022 nor assets in 2018 and 2019, and was therefore omitted from our sample. The second company, Pacific Architects and Engineers (PAE), was not considered because the company was acquired on February 15th 2022 and as a consequence the annual report with the financials for 2021 was not available. After the corrections our final sample ultimately consisted of 62 companies.

The accounting data for each of the companies in our sample was collected as follows: for the merger year itself and the post-merger years (i.e. 2020, 2021 and 2022) the data was retrieved from Refinitiv and for the pre-merger years (i.e. 2018 and 2019) the financials were collected from the annual reports, prospectuses or proxy statements of these companies consulted via SEC filings on the Electronic Data Gathering and Retrieval (EDGAR) database since these were often unavailable through Refinitiv. We calculated the financial metrics in the same way that Refinitiv calculates them.

Next to that, we also put an effort into collecting information with regard to the amount of cash received by the target company thanks to the merger. We therefore looked up the date the merger became effective and then analysed the SEC 8-K filings (6-K filings for non-US target companies) on the EDGAR database following the effective merger date. We explicitly searched for 8-K filings as these extensively disclose major developments throughout the SPAC lifecycle, particularly during the merger process with a target company. To be precise, we searched in these 8-K filings for pro forma condensed combined financial statements of the company and then focused on the pro forma adjustments relating to cash and cash equivalents.

Table 3 provides information on the sample composition of companies that merged with a SPAC in 2020 by region, initial stock exchange, current stock exchange and industry. By far the largest part of our sample (77,42%) is located in North America. This is in line with the findings of Hansen (2024) who reported that 82% of companies that merged with a US listed SPAC in 2020 and 2021 were companies incorporated in the US. We make a distinction between initial stock exchange and current stock exchange because 18 companies were delisted from their initial stock exchange. Eight companies started trading on the Over-The-Counter (OTC) markets because their share prices and market

capitalisations no longer met the minimum requirements to trade on a major exchange like the NASDAQ or New York Stock Exchange. The other ten companies were delisted because they were either acquired or filed for bankruptcy. More specifically, 4 companies were acquired and 6 went bankrupt. Most firms in our sample are classified as “High Technology” companies (23%) and “Industrials” (16%). Adami, Mathew, & Sivaprasad (2022) find similar results in their study of 509 SPACs over the period 2010 and 2019. 18% of companies in their sample are classified as Industrials and 17% as Technology. The “Other” category in our classification comprises companies in the “Telecom”, “Real Estate” and “Materials” industry.

Category	Subcategory	Frequency	Percent
Region	North America	48	77.42%
	Asia	7	11.29%
	Europe	4	6.45%
	Middle East	2	3.23%
	South America	1	1.61%
	Total	62	
Initial stock exchange	Nasdaq	43	69.35%
	New York Stock Exchange	19	30.65%
	Total	62	
Current stock exchange	Nasdaq	31	50.00%
	New York Stock Exchange	13	20.97%
	Delisted	10	16.13%
	OTC market	8	12.90%
	Total	62	
Industry	High Technology	14	22.58%
	Industrials	10	16.13%
	Healthcare	7	11.29%
	Consumer	7	11.29%
	Financials	7	11.29%
	Energy and Power	7	11.29%
	Media and Entertainment	5	8.06%
	Other	5	8.06%
	Total	62	

Table 3: Sample overview target companies

3.3 Methodology

To study the impact of the SPAC merger on the financial performance of the firm and to answer the research question we need to compare the performance of the firms before the merger with their performance after the merger. In doing so we will evaluate the performance from 4 different perspectives, using indicators for growth, profitability, solvency and liquidity.

First, we will present summary descriptives for our sample in terms of net cash collected, total assets, sales, equity, Net Financial Debt (NFD) and operating income (EBIT). The net cash collected, which is the cash the target company receives from the SPAC net of transaction costs and redemptions, will be expressed on an absolute basis as well as relative to the total assets in 2020. The total assets and sales will be expressed in absolute terms whereas dummy variables will be used for equity, NFD and EBIT to indicate if the variable takes a positive or negative value. We will run McNemar's tests on these dummy variables to see for example if there is any significant difference between the number of companies that have positive equity pre-merger and post-merger.

In a second part, we will make use of dependent samples t-tests to see whether there are significant differences between the financial performance of the pre-merger subsample and the post-merger subsample and thus to see if the merger significantly affects the financial performance of the firm. These tests will be done repeatedly for the different indicators of financial performance.

For most companies in our sample, the fiscal years ends on December 31 such that the fiscal year ended on December 31, 2020 represents the fiscal year in which the merger has been completed and will be represented by FY0. FY-2, FY-1, FY1 and FY2 then corresponds with 2018, 2019, 2021 and 2022 respectively. For a few companies, however, the fiscal year did not end on December 31. Consequently, we had to look up for these companies when the merger was effective in order to decide which year corresponds with FY0 (the merger year). To give a concrete example, Eqonex Limited's fiscal years end on March 31. As of October 1, 2020 the merger became effective such that the fiscal year ended on March 31, 2021 will be seen as FY0 as this is the fiscal year in which the business combination closed. FY-2, FY-1, FY1 and FY2 then corresponds with 2019, 2020, 2022 and 2023 respectively. As this only holds for very few companies in our sample and for simplicity, referring to 2018, 2019, 2020, 2021 and 2022 will correspond with FY-2, FY-1, FY0, FY1 and FY2 respectively for the rest of this paper.

Table 4 on the next page gives an overview of the financial metrics or indicators that we will consider for our dependent samples t-test analysis. The choice for the selected metrics is based on the courses and book of Ooghe, Vander Bauwhede, & Van Wymeersch (2017).

Financial metric	Calculation	Unit
Growth		
Revenue growth (in year t)	$\left(\frac{Revenue_t}{Revenue_{t-1}} - 1\right) * 100$	%
Profitability		
Gross profit margin	$\frac{Revenues - COGS}{Revenues} * 100$	%
EBIT margin	$\frac{Operating\ income}{Revenues} * 100$	%
ROA	$\frac{Net\ income}{Total\ assets} * 100$	%
Solvency		
Debt ratio	$\frac{Debt}{Total\ assets} * 100$	%
Leverage ratio	$\frac{Net\ financial\ debt^a}{Gross\ profit}$	-
Liquidity		
Current ratio	$\frac{Current\ assets}{Current\ liabilities}$	-
DSO (in year t)	$366 * \frac{(Accounts\ receivable_{t-1} + Accounts\ receivable_t)/2}{Revenues_t}$	Days
DPO (in year t)	$366 * \frac{(Accounts\ payable_{t-1} + Accounts\ payable_t)/2}{COGS_t}$	Days

Table 4:Financial metrics

3.3.1 Growth

In terms of growth of the firms we consider only 1 metric being revenue growth. We will compare the revenue growth in the first year before the merger (FY-1) with the growth in the first year after the merger (FY1). Note that we do not compare with growth in 2020 (FY0) since a lot of companies had lower revenue due to the effects of the covid crisis. Additionally, it is likely still too early to observe the effects of the merger on growth for FY0, such that we compare FY-1 with FY1 to look at the short term impact.

In addition, we will compare the growth in 2019 with 2022 to see how the revenue growth two years after the merger compares to the growth in the year before the merger. In this way a more long term view is established and the impact of the weak covid year (2020) and the subsequent rebound (2021) is reduced to a minimum.

[a] Net financial debt is the sum of all interest bearing debt, both long term and short term including leases and subtracted with cash and cash equivalents and short term investments

3.3.2 Profitability

To evaluate profitability we use 3 different metrics namely gross profit margin, EBIT or operating income margin and Return On Assets (ROA). The reason why we do not consider the Return On Equity is because 38 out of the 62 companies in our sample have a negative equity value which makes this ratio useless since you cannot tell if it the ratio is negative due to negative equity in the denominator or a net loss in the numerator. For all three profitability metrics we decided to compare the average profitability over the period 2018-2019 with the average over the period 2021-2022. The reason for looking at the average in the 2 years before and after the merger is to smoothen out potential extreme years and to have a view on the longer term impact. For example, we could expect an exceptionally high profitability in the year leading up to the merger as the company could be optimising its financials in an opportunistic way to increase the valuation. Additionally, comparing only with 2021 may overlook the impact of strategic actions taken by SPAC management, who joined the target company post-merger, to improve profitability, which might become evident only over a longer period. We do not compare with the year 2020 for the same reasons as for the growth. We chose to use the EBIT margin instead of the net income margin. This decision is based on Barber and Lyon (1996), who argue that operating income is a cleaner measure of the productivity of operating assets, as it is less affected by special items, tax considerations, and minority interests. Additionally, corporate events impacting capital structure have a greater effect on interest expense and net income, making EBIT a more reliable indicator.

3.3.3 Solvency

With respect to solvency we will use two metrics for the t-test analysis. The first one is the debt ratio for which we will compare 2019 with 2020 as well as 2019 with 2022. The first will show the impact of the merger in the short term, while the latter for a longer term view. Contrary to growth and profitability, we compare the debt ratio of 2019 with the merger year itself (2020) instead of the year following the merger (2021). Reason being is that the effect of the SPAC merger is expected to be immediately visible with regard to solvency.

The second metric is the leverage ratio, which is calculated here by dividing the net financial debt with the gross profit. The reason for using gross profit rather than EBITDA, which is more common and industry practice, is because most of the companies in our sample did not have positive EBITDA. Still, 8 of the 62 companies have negative gross profit in 2019 and can therefore not be used for evaluating this ratio. For 2 companies (excluding the pre-revenue companies, see 3.3.5) the gross profit was negative in 2022 so these were only used to compare this ratio for 2019 and 2020. If the gross profit is

positive, then this ratio can be interpreted as follows: the smaller the ratio, the higher the debt repayment capacity, the better the solvency of the firm. A negative ratio in this case points to a net cash position instead of a net debt position. We will compare the pre-merger and post-merger years in the same way as will be done for the debt ratio.

We will not consider the equity ratio because it is simply the reciprocal of the debt ratio. In our descriptive statistics, however, we will look how many companies have positive or negative equity and how this has evolved over the years.

3.3.4 Liquidity

Finally to assess liquidity we look at three different metrics, namely current ratio, Days Sales Outstanding (DSO) and Days Payable Outstanding (DPO). For the first one we will analyse how the ratio compares both in the short term (2019 with 2020) and in the long term (2019 with 2022). Just as with solvency, we expect an immediate impact of the merger on the current ratio of the target company and therefore we compare 2019 with 2020 for assessing the short term impact. For DSO and DPO we will only compare the long term impact (2019 with 2022). The reason for not comparing with FY0 is that there hasn't been sufficient time since the merger to observe its impact on payment terms in our opinion. In addition, the formula for DSO (DPO) makes use of average accounts receivables (payable), which is the average of the previous and the current year and this would lead to using the pre-merger accounts receivables (payables) in calculating the post-merger DSO (DPO) in FY0 (2020).

3.3.5 Special cases

We will now discuss some special cases for which we could not use all the metrics and how these will be treated.

Firstly, 4 companies in our sample were acquired by another firm in 2022. As a result, the last year for which the annual report and financial data is available is 2021. For these firms only the performance in the short term (i.e. FY-1 compared with FY0 or FY1) is considered. Additionally, for Triterras and Eqonex, which were not acquired, the annual report for 2022 was also unavailable.

Secondly, 13 companies in our sample can be considered as pre-revenue companies since they have no to minimal sales in all or most of the years. As a consequence a lot of ratios could not be calculated or led to extreme values with little meaning. For these types of companies we only consider the current ratio and debt ratio for our t-test analysis. The same will be done for American Virtual Cloud

Technologies, which underwent a significant transformation in its business model in 2020. Transitioning from hardware and perpetual software licenses to a subscription model led to a significant revenue decline in subsequent years, entirely due to this shift, not the SPAC merger or firm performance.

Triterras, Hycroft Mining and Clever Leaves had no revenue in 2018 but have significant revenue in the subsequent years and therefore do not fall into the pre-revenue category. We will not consider growth, DSO and DPO as it would lead to extreme values with little meaning because of the zero revenue base. We do look at profitability for these companies as opposed to the pre-revenue companies.

Moreover, there are 5 companies (GCM Grosvenor, Immatics NV, Global Blue Group, International General Insurance, and Hall Of Fame Resort & Entertainment) in our sample that do not report their Cost Of Goods Sold (COGS) and that do not fall into the previous category of pre-revenue companies, therefore we were unable to calculate the gross profit margin, leverage ratio and DPO. The reason why these do not report COGS is related to the nature of their business (asset management, insurance, biotech, etc.)

For Skillz, GCM Grosvenor, and International General Insurance we were unable to calculate DSO, since they do not report accounts receivable. Hence, they will be excluded from the DSO analysis.

Additionally, 4 companies (GCM Grosvenor, International General Insurance, Lion Group Holding and Hall Of Fame Resort & Entertainment) in our sample do not report current assets. Evidently, these companies will be dropped from the analysis for current ratio.

For Lion Group Holding, the revenue was negative in 2022 due to a loss from trading revenues therefore we only look at ROA and D/TA in fiscal year 2022. For the other years we were able to calculate all metrics, except the current ratio as mentioned hereabove.

Lastly, for High Peak Energy and Cheer Holding the income statement and balance sheet for 2018 is unavailable, therefore we cannot use these to analyse growth, DSO and DPO.

3.3.6 Outliers

To mitigate and limit the impact of outliers in our t-test results, we identify and filter outliers using the InterQuartile Range (IQR) method for all metrics except DSO and DPO. We opted the IQR over Z-score method as our data has high variance and high skewness. More specifically, the IQR method is more robust to skewed data as it is based on the median and quartiles whereas the Z-score relies on the mean and standard deviation to detect outliers. For DSO and DPO the outliers have been identified manually.

3.4 Results

3.4.1 Descriptive results

Net cash collected

The net cash collected by the target companies from the SPAC merger is shown in Table 5. The average company in our sample received a net cash consideration of $276.25 million, which corresponds to 47.21% of total assets at the end of the year in which the merger has taken place. The median or 50 percentile shows that 50% of companies received $166.31 million or 40.87% of total assets in net cash. The fact that the absolute median is substantially lower than the absolute mean points to the fact that we have some companies who collected relatively high cash amounts, while most companies received a substantial lower amount of cash. This is also confirmed by the skewness statistic of 1.52. Companies that fall into the 25 percentile did not receive a lot of cash. This is mainly due to the fact that most cash, stemming from the PIPE investments and SPAC's trust account, is used to pay existing shareholders of the target company that decided to sell out. Large redemption numbers, transaction costs and deferred underwriter fees also led to lower net cash delivered to the target.

In conclusion, the results in Table 5 show that most companies in our sample received a significant and substantial amount of hard cash they can use for different purposes such as paying down debt or investing in growth opportunities.

	N	Mean	Std. Deviation	25 percentile	50 percentile	75 percentile
Net cash collected						
Absolute ($M)	58	276.25	315.92	30.94	166.31	447
Relative	58	47.21%	41.37%	13.93%	40.87%	78.78%

Table 5: Net cash collected on an absolute basis and relative to total assets in FY0

Total assets and sales

Table 6 gives an overview regarding the total assets and the sales amount of our companies for the years 2019, 2020 and 2021 (FY-1, FY0 and FY1 respectively). The mean of total assets in the year before the merger is $584.39 million and increases substantially in the following years. The largest increase in mean assets takes place from FY-1 to FY0. This is probably mostly due to the substantial inflow of cash, thanks to the SPAC merger in FY0, which is of course immediately visible on the balance sheet. More specifically, this huge inflow of cash increases the cash amount on the assets side and leads to an increase in equity on the liability side of the balance sheet. Melander, Sandström, & von Schedvin (2016) found that cash flow has a positive impact on investment. The subsequent year (FY1) can therefore show continued balance sheet growth as the huge inflow of cash could be an incentive to

invest more heavily. Remarkably, 75% of companies in our sample have total assets below $357.87 million in FY-1, which is substantially below the mean value. This points to the fact that there are some exceptionally high values pulling the average up, while most companies have substantially lower total assets. This is true for the other years as well but to a lesser extent. There are a lot of small companies in our sample reflected by 25% and 50% of companies having total assets below $37.53 million and $95.16 million respectively for FY-1. In other words, the sample is heavily skewed to the right with a skewness statistic of 3.97 for total assets in FY-1.

Focusing on the sales amount, we find a mean of $416.63 million in FY-1. In FY0 or 2020 we see that the mean drops 6%, which is very likely due to the effects of the lockdowns. However, all percentiles increase in FY0, especially the 50% and 75% percentile, this points to the fact that the companies with the biggest sales amount have not experienced sales growth in FY0. More specifically, from the 5 companies in our sample who had more than a billion dollars sales in FY-1 only one achieved sales growth in FY0. This tendency could be explained by the fact that big companies with a lot of sales generally have relatively lower growth rates (Moncada-Paternò-Castello, Haegeman, & Marques Santos, 2021) and the effects of the covid crisis caused these rates to fall below zero. In addition, Moncada-Paternò-Castello et al. (2021) found evidence that the probability of innovative firms, which are generally smaller firms, to show sales growth in 2020 is four times larger than for their counterparts. The remarkably low amount for the 25 percentile in all three years, compared to the mean, is due to the appearance of 13 very early-stage or pre-revenue companies in our sample.

For both total assets and sales, the standard deviation is very high. Consequently, there is substantial variation in the total assets and sales of the companies in our sample. More specifically, it means that we have companies that have total assets and/or sales that are either far below or far above the mean.

All numbers below in Table 6 are expressed in millions of dollars. There were some companies who reported in a different currency (euros, renminbi or Mexican peso) but we converted their total assets and sales amount to US dollars based on the exchange rates that held when their fiscal years ended.

	N	Mean	Std. Deviation	25 percentile	50 percentile	75 percentile
Total assets ($M)						
FY-1	62	584.39	1445.25	37.53	95.16	357.87
FY0	62	882.35	1475.40	168.09	351.53	756.91
FY1	62	1145.56	1920.57	212.81	400.98	997.65
Sales ($M)						
FY-1	62	416.63	1050.10	7.85	69.81	246.75
FY0	62	391.23	889.34	8.51	81.71	283.20
FY1	62	627.13	1536.48	15.54	137.27	458.53

Table 6: Total assets and sales for 2019, 2020 & 2021

Equity

Table 7 gives insight into whether the equity of the firms is positive or negative. Before the merger, the majority (55%) of the companies had negative equity, which is mainly due to their accumulated losses. However, following the merger, the vast majority of our sample had positive equity, both in FY0 (85%) and FY2 (86%[b]). This is not unsurprising as the business combination leads to additional paid-in capital and therefore an increase in equity for the target companies. The valid percent in Table 7 shows the percentages if we leave out the missing values for FY2.

Based on the McNemar's test we find that the number of firms with positive equity in FY0 (53) is significantly higher than in FY-1 (28) ($N = 62$, $p < .001$[c]). The number of companies with positive equity in FY2 (48) is significantly higher than in FY-1 (26) as well ($N = 56$, $p < .001$[c]). The first test represents the short term impact of the merger whereas the latter gives insights whether the impact still holds for the longer term or not, which it does in this case.

Note that the amount of companies with positive equity in FY-1 differs in the two McNemar's tests due to the difference in sample size. For the second test, the sample size is reduced by six due having no information about FY2 for 6 companies. Regarding the second test, the amount of companies with positive equity in FY-1 (26) cannot be derived from Table 7 as this incorporates all 62 companies of our entire sample. Nevertheless, it can be easily derived from the cross-tabulation of Table 9 as this only takes into account the 56 companies eligible for the second test. The difference in sample size will also hold for the net financial debt and the EBIT for the exact same reason.

The cross-tabulations of our tests give additional insights in the dynamics of the companies with regard to their equity and is extra useful for interpreting the second test. The additional insights stem from the fact that you can now clearly see how many companies remained either negative or positive post-merger and how many went from negative equity to positive equity or vice versa.

	FY-1		**FY0**		**FY2**		
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Valid percent
Equity							
Negative	34	55%	9	15%	8	13%	14%
Positive	28	45%	53	85%	48	77%	86%
Missing	0	0%	0	0%	6	10%	
Total	62	100%	62	100%	62	90%	

Table 7: Equity for 2019, 2020 & 2022

[b] Valid percent

[c] Binomial distribution used

	FY0	
FY-1	Negative equity	Positive equity
Negative equity	7	27
Positive equity	2	26

Table 8: Cross-tabulation equity 2019 & 2020

	FY2	
FY-1	Negative equity	Positive equity
Negative equity	7	23
Positive equity	1	25

Table 9: Cross-tabulation equity 2019 & 2022

Net financial debt

Regarding the net financial debt, 58% of the companies in our sample had a net debt position before the merger (FY-1). The receipt of cash, thanks to the merger with a SPAC, reduces the net debt position. Table 10 confirms this as the companies with a net debt position reduces to 35% of our total sample in FY0. However, comparing FY0 with FY2, we see that the number of companies in our sample with a net debt position increases again from 22 to 31. This comparison, however, is a bit flawed as there are 6 companies in our sample for which we do not have information for FY2. Of these six, one had a net debt position in FY0. Nevertheless, if we adjust for these 6 companies, the number of firms with a net debt position in FY0 increases from 21 to 31 in FY2. On top of that, 12 out of the 25 companies who still hold a net cash position in FY2 still saw a decrease in their net cash position. This indicates that our target companies certainly made use of the received cash from the merger and some of them burnt through it rather quickly.

The McNemar's test indicates that the amount of companies with a net debt position in FY0 (22) is significantly lower than the amount of companies with a net debt position in FY-1 (36) (N=62, p = .003[c]). On the contrary, we do not find a significant difference between the amount of companies with a net debt position in FY2 (31) and in FY-1 (33) (N=56, p=.815[c]).

	FY-1		**FY0**		**FY2**		
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Valid percent
NFD							
Net cash	26	42%	40	65%	25	40%	45%
Net debt	36	58%	22	35%	31	50%	55%
Missing	0	0%	0	0%	6	10%	
Total	62	100%	62	100%	62	100%	

Table 10: Net financial debt for 2019, 2020 & 2022

	FY0	
FY-1	Net cash	Net debt
Net cash	23	3
Net debt	17	19

Table 11: Cross-tabulation Net Financial Debt 2019 & 2020

	FY2	
FY-1	Net cash	Net debt
Net cash	15	8
Net debt	10	23

Table 12: Cross-tabulation Net Financial Debt 2019 & 2022

EBIT

We immediately see in Table 13 that the majority of our companies have negative EBIT, both in the pre-merger year and post-merger years. With regard to the short term impact, the amount of companies with negative EBIT in FY1 (41) are not significantly different from the amount of companies with negative EBIT in FY-1 (39) (N=62, p=.727[c]). Similarly for the longer term impact, there is no significant difference between the amount of companies with negative EBIT in FY2 (37) and FY-1 (35) (N=56, p=.774[c]). The same conclusion can been drawn from analysing the cross-tabulations. In both cases, the majority of our sample held the same sign of EBIT pre-merger and post-merger. On top of that, those who did change sign are relatively well equally distributed among the two possibilities of either becoming positive in the post-merger year if EBIT was negative in the pre-merger year or vice versa.

	FY-1		**FY1**		**FY2**		
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Valid Percent
EBIT							
Positive	23	37%	21	34%	19	31%	34%
Negative	39	63%	41	66%	37	60%	66%
Missing	0	0%	0	0%	6	10%	
Total	62	100%	62	100%	62	100%	

Table 13: EBIT for 2019, 2021 & 2022

	FY1	
FY-1	Negative EBIT	Positive EBIT
Negative EBIT	36	3
Positive EBIT	5	18

Table 14: Cross-tabulation EBIT 2019 & 2021

	FY2	
FY-1	Negative EBIT	Positive EBIT
Negative EBIT	30	5
Positive EBIT	7	14

Table 15: Cross-tabulation EBIT 2019 & 2022

3.4.2 T-test results

As mentioned before, our total data set contains a total of 62 companies. However, the sample size of our tests will always be lower due to two reasons. First, the "special cases" mentioned in section 3.3.5 caused a reduction in sample size. Secondly, we applied the IQR method to leave out outliers. However, before applying the IQR method, we sometimes had to adjust the data set due to the special cases. This, because we only applied the IQR method on the companies that were eligible for the test. Since the special cases led sometimes to unavailable information for only one of the years we considered in a certain test, we first had to discard the corresponding value for the other year to make sure that we performed the IQR method solely on those companies that were eligible for the test.

With regard to reporting our results, we will each time mention how many companies were ineligible for the test due to either being a special case or an outlier. Although not specifically mentioned, the final sample size for each test can easily be derived as we always mention the degrees of freedom in parentheses with our t-value. The sample size for the corresponding test can then be calculated by adding one to the mentioned degrees of freedom. On top of that, all our paired samples t-tests were two-sided and performed on the 95% confidence level.

Growth

Regarding the comparison of the sales growth of FY-1 with FY1, we have 19 "special cases" and then an additional 4 outliers were identified using the IQR method. The revenue growth in FY1 (M = 59.82%; SD = 56.90%) is significantly higher than in in FY-1 (M = 37.27%; SD = 55.63%) based on the paired samples t-test ($t(38) = 2.295$; $p = .027$). The effect size, however, is rather small ($d = .367$).

If we analyse the revenue growth over the longer term by comparing the sales growth in FY2 with the growth in FY-1, 24 companies were excluded because they fall under the "special cases" and 6 outliers were removed resulting from the IQR filter. The revenue growth in FY2 (M = 16.69%; SD = 28.90%) is lower than the growth in FY-1 (M = 33.71%; SD = 47.18%). However, the difference is not significant ($t(31) = 1.671$; $p = .105$).

Following these two tests, we observe a post-merger sales growth rate in the short term (i.e. the first year after the merger) which is statistically significantly higher than the sales growth rate in the pre-merger year, while the revenue growth in the second year after the merger is lower than in the pre-merger year, although not significantly different. However, the median sales growth of 16.69% in FY2 is still substantial. Our results thus contradict the findings of Datar et al. (2012) as well as Kolb & Tykvova (2016) who state that SPAC targets have a lack of growth opportunities.

The higher sales growth in the first post-merger year compared to the second post-merger year, could be due to several factors. First of all, the huge cash infusion from the merger could have been used for many different purposes, such as debt repayment, but the high revenue growth rates in the first post-merger year might indicate that the companies in our sample used the merger proceeds especially to invest in growth initiatives. Growth opportunities typically require a huge amount of cash to be invested in order to pay off. Consequently, the received cash is probably already gone for a large part entering the second post-merger year, so that it is hard to sustain and fund this high growth rate. Next, it is very likely that covid-19 also played a role in these results. Covid-19 had negative impact on most companies' sales in 2020. As a result, the growth in FY1 could have been exceptionally high as sales rebounded from the lower revenue base in 2020.

Profitability

Our sample for comparing the average gross profit margin in the pre-merger period (i.e. FY-2 to FY-1) with the average over the post-merger period (i.e. FY1 to FY2) excludes 29 "special cases" and 2 outliers based on IQR. The average gross profit margin post-merger (M = 38.33%; SD = 26.84%) is not significantly different from the average pre-merger margin (M = 36.52%; SD =29.96%) ($t(30) = 0.444$; $p = .660$).

To compare the average EBIT profit margin over the pre-merger period (i.e. FY-2 to FY-1) with the average over the post-merger period (i.e. FY1 to FY2) we exclude 24 "special cases" and 7 outliers based on IQR. Running a paired-sample t-test revealed that the average EBIT margin in the post-merger period (M = -14.48%; SD = 46.00%) is not significantly different from the average EBIT margin in the pre-merger period (M = -6.11%; SD = 35.33%) ($t(30) = 1.288$; $p = .208$).

In comparing the average ROA in the pre-merger years with the average ROA in the post-merger years, we exclude 22 "specials cases" and 6 outliers according to IQR. The average ROA post-merger (M = -15.08%; SD = 23.74%) is statistically significantly lower than the average ROA pre-merger (M = -6.52%; SD = 23.44%) ($t(33) = 2.326$; $p = .026$). The effect size is not high given the Cohen's d value (d = .399).

In summary with regard to profitability, we find that ROA is significantly lower post-merger. The EBIT margin is lower as well post-merger, however the difference is not significant. On the contrary, the gross margin is higher post-merger, although not significant. The lower ROA is in line with the findings of Ribeiro (2022). He finds that the ROA in the three-year period after the merger is significantly lower than the subsequent three-year period at the 1% level. Jain and Kini (1994) give 3 potential factors that may contribute to a decline in ROA of companies that transitioned from private to public

ownership. Although their study focuses on companies that transitioned to public ownership by means of an IPO, these factors may also be at play for companies who go public via a SPAC merger. The first factor is agency costs such as a suboptimal use of the proceeds for nonvalue maximising projects because of conflicts between initial shareholders or management and the new shareholders or management (i.e. the sponsor). The second factor is that management may attempt to window-dress their accounting numbers prior to going public. In the case of SPACs this could be done to drive the valuation up and it would result in pre-merger performance being overstated. The last factor is that management might be opportunistic and choose to go public at a time when the performance is unusually good. The fact that ROA and EBIT margin declines post-merger might also indicate that for most firms in our sample there were no "operator-led" SPACs where the SPAC management remained involved with the target after the merger.

Solvency

Before running the paired-sample t-test for the debt ratio in the short term, there were 7 outliers that were removed and no "special cases" that needed to be excluded. The debt ratio in FY0 (M = 54.68%; SD = 38.26%) is significantly lower than the debt ratio in FY-1 (M = 79.87%; SD =54.26%) (t(54) = 3.447; p = .001). The effect size was mediocre (d = .465).

For the t-test that analyses the debt ratio over the longer term, 6 "special cases" were excluded and 7 outliers. The debt ratio in FY2 (M = 58.45%; SD = 32.99%) is significantly lower than the debt ratio in FY-1 (M = 76.82%; SD = 52.67%) (t(48) = 2.348; p = .023). The effect size is small (d = .335).

The lower debt ratio in post-merger years can also be linked to the cash injection of the merger with the SPAC. More specifically, the merger resulted in extra equity in the form of additional paid-in capital. As equity increases, debt in relation to total assets will decrease. Although the debt ratio in FY2 is still significantly lower than pre-merger, we do however see that the mean debt ratio of FY2 is a bit higher than the debt ratio of FY0. This could be the result of taking on more debt over the years, but we did notice in the profitability section that the average ROA post-merger had a mean of -15.08%. The latter indicates that the companies suffer net losses that will result in reduced equity due to retained losses. Consequently, as the equity decreases, debt in relation to total assets increases.

Our sample for comparing the leverage ratio in FY-1 with FY0 excludes 26 "special cases" and 4 outliers based on IQR. Given a p-value of .005, we can state that the leverage ratio in FY-1 (M = 1.03; SD = 1.99) is significantly higher than the leverage ratio in FY0 (M = -0.38; SD = 3.05) (t(31) = 2.997). Regarding the effect size, the Cohen's d value of .530 indicates that the effect size is mediocre.

With regard to the long term impact on the leverage ratio, we had a total of 26 values available for this paired samples t-test as there were 33 "special cases" and then an additional 3 outliers detected by the IQR method. Contrary to the short term impact, the leverage ratio in FY-1 (M = 1.04; SD = 2.11) is not significantly different from the leverage ratio in FY2 (M = 0.74; SD = 1.76) (t(25) = 1.225; p = .232).

The results for the leverage ratio are completely in line with those of the McNemar's test for the number of firms with a net debt position, as we have a significant difference in the short term for both metrics but not over the longer term. The significantly lower leverage ratio in FY0 can be explained by the significant amount of companies in our sample that switched from a net debt position to a net cash position in FY0. The mean leverage ratio in FY0 is negative as well, pointing to a net cash position on average. To a lesser extent the improvement might also be attributed to the denominator of the leverage ratio (i.e. gross profit). The gross profit margin increased post-merger although not significantly.

Liquidity

In comparing the current ratio in FY0 with FY-1, we leave 4 "special cases" and 9 outliers out. Running the paired-sample t-test shows us that the current ratio in FY0 (M = 4.54; SD = 4.79) is significantly higher than the current ratio in FY-1 (M = 1.57; SD = 1.53) (t(48) = 4.490; p < .001). The average current ratio in FY-1 is higher than 1 which points to a healthy short term liquidity position before the merger, therefore we do not view short term liquidity problems as the main reason for companies to merge with a SPAC.

For the longer term impact our sample is adjusted for 10 "special cases" and 9 outliers. For FY2 we find that the current ratio (M = 2.26; SD = 1.61) is significantly higher than in FY-1 (M = 1.46; SD = 1.32) (t(42) = 2.987; p = .005).

We can conclude that the merger has a significant positive impact on the current ratio and thus on the liquidity, both in the short term and over the longer term. This can be explained by the substantial cash injection at the time of the merger. In the descriptive statistics we saw that the mean cash collected by SPAC targets in our sample was $276.25 million. However the effect is less pronounced over the long term reflected by the effect size which was rather high (d = .64) for the first test whereas we see a medium effect size for the second test (d = .46). The lower effect over the long term could be attributed to a continued cash burn which leads to a lower current ratio.

Based on the paired-sample t-test we find that the DSO in FY2 (M = 56.50; SD = 50.72) is not significantly different from the DSO in FY-1 (M = 56.12; SD = 51.19) (t(31) = 0.092; p = .927). 27 "special cases"

companies were excluded from this test as well as 3 outliers which were identified based on the fact that their DSO changed by a factor more than 3 after the merger. The choice for identifying the outliers for DSO in this specific way is because the IQR method is not appropriate for DSO as the amount of days sales outstanding is sector specific. As we have several sectors included in our data set, it is not correct to leave out the days sales outstanding if these are substantially higher or lower than the middle 50% of our data. The same reasoning has been applied for the days payable outstanding.

The same test was again run for DPO and we come to the same conclusions as for DSO. The DPO in FY2 ($M = 53.45$; $SD = 52.70$) is not significantly different from the DPO in FY-1 ($M = 46.93$; $SD = 32.70$) ($t(29) = 0.973$; $p = .338$). Here, 29 “special cases” and 3 outliers were removed from the sample.

4. Conclusion, limitations and future research

4.1 Conclusion

This dissertation aims to assess how the financial performance of a company is affected by going through a SPAC merger. More specifically, it seeks to uncover any significant differences in the pre- and post-merger financial performance.

As already stated, and to the best of our knowledge, there is no previous research on the impact of the merger on the financial performance of the target firm, except for that of Ribeiro (2022). Therefore, our dissertation tries to fill this gap in the existing literature. While Ribeiro focused on return on assets and return on sales for firms merging with US-listed SPACs between 2004 and 2019, our study focuses on firms that merged with US-listed SPACs in 2020 and includes a more comprehensive array of financial indicators that relate to growth, profitability, solvency, and liquidity.

The first step of our analysis shows that that the vast majority of the companies in our sample had a net financial debt position and negative EBIT margins in the year before the merger. This shows that the SPAC targets are financially constrained as they are already in debt and unable to generate profits. In a further part of our analysis, we find that the mean current ratio before the merger is substantially higher than 1, which show a healthy liquidity position in the short term. These two findings might indicate that the most important reason for companies to merge with a SPAC, is to collect funds to be able to operate and grow in the future and that it is not driven by a need to solve short-term liquidity problems. We also give insight into how much cash the companies really received from the merger and this appears to be a significant and substantial amount of cash. The mean net cash collected by companies in our sample is $276.25 million which corresponds to 47.21% of total assets at the end of the merger year.

The second part of our analysis provides a detailed comparative analysis of pre- and post-merger performance. In terms of revenue growth, we find evidence that the growth rate accelerates in the first year after the merger. In the second year after the merger, the growth rate is still positive but appears to be lower than the year before the merger, although the difference is not significant.

With regard to profitability, our findings corroborate those of Ribeiro (2022) as the ROA margin significantly deteriorates post-merger. The EBIT margin declines as well compared to the pre-merger period but the difference is not significant. On the other hand, although not significant, we find evidence that the gross margin improves post-merger.

When examining solvency, we find that the debt ratio is significantly lower both at the end of the merger year and at the end of the second year after the merger. The leverage ratio on the other hand

is only significantly lower at the end of the merger year compared to the pre-merger year. The improvement in solvency after the merger can be explained by the cash injection linked to the merger.

Lastly, our findings show that the liquidity improves. The current ratio at the end of the merger year is significantly larger than in the pre-merger year and the same holds for the current ratio at the end of the second year after the merger. Again, this improvement can be attributed to the cash collected by the firm in the merger. With respect to DSO and DPO, our findings suggest that the merger has no noticeable impact since the differences are small and not statistically significant.

In conclusion, our analysis reveals that the SPAC merger has a positive impact on growth in the short term, a negative impact on profitability, and a positive impact on solvency and liquidity both in the short term and over the longer period of 2 years after the merger. These findings suggest that a SPAC can serve as an effective financing vehicle for private operating firms.

4.2 Limitations

We would like to mention 3 limitations with regard to our comparative analysis of the firm performance pre- and post-merger. The first limitation arises partly from the strong quality of our data. More specifically, we decided for each company in our sample which metrics were suitable and which were not. The outcome of this analysis has been mentioned in section 3.3.5. As we had to leave out a substantial amount of companies for most of our metrics, either due to being unsuitable for the specific metric or being an outlier, the sample size of our paired samples t-tests was frequently around only half of our full sample size, which consisted out of 62 companies. Consequently, the statistical power of our paired samples t-tests was not always of the highest order. Nevertheless, we view it is more important to assure the quality of the data that is being used in these paired samples t-tests.

The second, and probably most important limitation is related to the normality assumption of the paired samples t-test. The paired samples t-test assumes that the differences between the pairs are normally distributed. For each of our paired samples t-tests, we calculated the difference for each pair and then performed the Shapiro-Wilk test to see whether or not the differences between the pairs follow a normal distribution. Unfortunately, the Shapiro-Wilk test frequently produced a p-value lower than 0.05. As a result, the null hypothesis, which states that the differences between the pairs follow a normal distribution, was rejected in most cases. More concretely, the difference between pairs only followed a normal distribution when we compared the sales growth in the short term, the current ratio in the long term and the leverage ratio in the long term. The other results should therefore be interpreted with caution as an important assumption of the paired samples t-test was violated.

However, we do want to note that all tests for which the normality assumption was violated, had a sample size larger than 30. For these tests, we rely on the Central Limit Theorem. Applying the Central Limit Theorem on the paired samples t-test, it allows us to relax the normality assumption as the Central Limit Theorem states that the difference between pairs will be approximately normal if the sample size is large enough (threshold of 30 as sample size is typically used for this).

Finally, the third limitation is that we will not be able to extrapolate our results to the entire population, being all mergers with a US-listed SPAC. The first reason for this is the rather small sample size of our tests compared to the entire population. On top of that, we have the temporal specificity of only looking at mergers with US-listed SPACs in 2020.

4.3 Further research

For future research we introduce 2 suggestions that could be worthwhile to investigate. Both recommendations focus on the financial performance of the firms, as was the case in our dissertation.

As our research only tackled the financial performance of the firms, it would be interesting to extend this by linking the financial performance of the firms with their stock performance. More specific, we would recommend to evaluate the firm's post-merger stock performance in light of its post-merger financial performance. It would not be feasible to do this pre-merger as the target company is then still private. In doing so, it might reveal whether a good financial performance is also reflected by a good stock market performance, or the other way around, if the stock market performance can be explained by the underlying financial performance of the firm . In addition, it could be interesting to incorporate the forward-looking projections that were made at the time of the merger agreement. Blankespoor et al. (2022) found that only 35% of SPACs were able to meet or beat their projections. Consequently, the inclusion of these forward-looking projections could be of extreme value in explaining why good financial performance of a firm is not resulting in good stock market performance. For example, a specific company can have substantial revenue or EBITDA growth, but if this growth still falls short of the previously made projections, it can result in bad stock market performance.

A second suggestion is linked to the renewed regulation of SPACs. As mentioned in the literature review of our thesis, the SEC made some adjustments to existing SPAC rules in 2024. On top of the adjustments, new rules were introduced. These will all become effective on July 1st, 2024. In our opinion, the co-registrant status for the private target company and the elimination of the safe harbour under the PSLRA which allowed to make forward-looking projections will have the most impact on the

current working of SPACs. It would be interesting to investigate to what extent these forward-looking statements will still be used, if they are more conservative or not and to what extent they are met.

The elimination of the safe harbour under the PSLRA aligns the regulatory treatment of projections between traditional IPOs and SPACs. This levels the playing field in terms of forward-looking statements between these two paths of going public. Add to that, the fact that target companies are being held more liable and one can clearly see SPACs losing some of the traits that made this vehicle attractive in the first place. It will be interesting to see how the new regulation will play out. Will it make an end to the bad reputation of SPACs and make the vehicle more respectable, transparent and credible? Or will it kill its popularity?

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