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SPACs: Kinder Surprise Eggs with a Bad After-taste

An Empirical Analysis of the Determinants of SPAC Mergers and DeSPAC Returns in the U.S.

Aleksander Ragnvaldsen & Kristian Ragnvaldsen

Supervisor: Francisco Santos

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Aleksander Ragnvaldsen

Kristian Ragnvaldsen

Abstract

Special purpose acquisition companies (SPACs) have received strong attention and taken a significant market share compared to traditional IPOs in the last couple of years. This thesis analyses the determinants of why companies go public through a SPAC, instead of a regular IPO, alongside determinants of post-merger performance. We provide evidence that SPAC mergers are relatively more in demand during times of higher volatility and weaker sentiment in equity capital transactions. Moreover, higher stock market valuation, higher sector leader return, and a lower cost of debt increase the likelihood of a SPAC acquisition.

Furthermore, we find that common shares from SPAC mergers perform worse than the overall market over a time horizon of several years. However, we find that SPAC warrant investors have persistently outperformed the market in our sample period. Lastly, we find that a high redemption ratio and longer time for a sponsor to identify a business combination predict lower post-merger returns.

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1. INTRODUCTION

During the past three years, the popularity of Special Purpose Acquisition Companies (SPACs) has risen significantly. At the time of writing, such entities have taken a majority market share among listings in the US. In 2020, a total of 248 SPAC IPOs raised $83.3 billion, which was more capital raised than in all previous years combined. The SPAC craze has continued into 2021, with 591 SPAC IPOs in 2021 and $157.6 billion in IPO proceeds as shown in Table 1. This amounts to a market share of 63% of the total number of IPOs and 49% based on deal size as showcased in the third and fifth column in Table 1. However, due to recency of the phenomenon, SPACs have received little scholarly attention. Moreover, there has been even less research documenting the determinants of why companies choose a SPAC merger to access public markets.

Table 1. SPAC activity

Year	SPAC IPOs	SPAC %	SPAC prodeeds $M	SPAC %
2021	591	63%	157,631	49%
2020	248	55%	83,386	46%
2019	59	28%	13,600	19%
2018	46	20%	10,750	17%
2017	34	18%	10,048	20%
2016	13	12%	3,499	14%
2015	20	12%	3,902	10%
2014	12	5%	1,750	2%
2013	10	5%	1,447	2%
2012	9	6%	490	1%
2011	16	11%	1,110	3%
2010	7	4%	503	1%

This table reports the past eleven years of SPAC activity[1]. Raising a SPAC has become relatively popular for a certain group of investors in the last couple of years. In this short period, several respected and well-known investors have raised SPACs, such as Chamath Palihapitiya, Mark Cuban and Bill Ackman.

A SPAC is essentially a blank check company created by a sponsor with the intention of finding a fitting private company to merge with. The company uses the IPO proceeds to complete the merger, then taking the company public in the process. For almost all SPACs created from 2010 until now, units have been priced at $10 each. The unit typically consists of a share and a fraction of a warrant entitling the holder to buy a share at an exercise price of $11.5 with a maturity date that usually is five years after the completion of the merger. Just as important,

[1] Data retrieved from SPAC Analytics December 11th.

the IPO proceeds are placed in a trust account where it earns interest. The units become unbundled, giving shares and warrants the opportunity to trade separately.

Simply put, merging with a SPAC is an alternative way for companies to go public that differs from a traditional initial public offering (IPO) in its process, speed and regulatory requirements. The structure has caught the public eye through the increasing market share and has been further popularised through high returns earned on a few high-profiled companies going public through a SPAC. To mention a few, Virgin Galactic, Nicola Motors, DraftKings and Opendoor have all been listed through a SPAC in the last two years. What these companies have in common is that they are leading companies in emerging niches, and that most of the expected discounted cash flow is far in the future. In addition, several new companies from new industries have been listed through the structure. As an example, the electric vehicle (EV) industry has contributed with more than 30 SPACs. Several market commentators have made comments that companies that go public through a SPAC are riskier and more growth-oriented than their peers that take the regular listing path (Naumovska, 2021).

So far, 1,228 of the US SPAC IPOs have materialised in 453 completed mergers.[2] However, the enthusiasm for SPACs might be confusing when looking at all the distrust and scepticism provided by academics, regulators, and journalists. A predominant attitude of commentators is that SPACs is a segment in the IPO market that enables "lemon" firms to bypass demanding SEC supervision and underwriting litigation risk that traditional IPOs face (Naumovska, 2021). Advocates of SPACs argue that, by giving an additional option for capital raise and listing of companies, SPACs benefit both the issuers and the investors (Bazerman et al., 2021).

The objective of this paper is to investigate the determinants of companies that goes public through a SPAC merger compared to the traditional IPO route. Further, we evaluate performance of SPAC mergers and analyze what characteristics determine the post-merger returns. We use a sample of 306 special purpose acquisition vehicles with mergers between January 1st, 2010 until November 1st, 2021 and 1830 traditional IPOs going public between June 30th, 2009[3] to November 1st, 2021 for our empirical study. A central limitation of our

[2] Retrieved from SPAC analytics December 11th

[3] The start of the lifecycle for the SPAC IPOs in our sample is comparable with the time period of traditional IPOs, with first mergers in our sample from 2010.

analysis is that most of our observations of SPAC mergers are issued over the past couple of years, which may affect the robustness of whether our results are consistent over time.

Our empirical analysis is presented in three main parts. In the first part (I) of our empirical analysis, we investigate the likelihood of going public through a SPAC through a logistic regression on market, firm, deal and sector-specific variables. We identify that a SPAC merger is more likely compared to traditional IPOs in times of higher volatility and weaker sentiment of equity capital transactions. We believe these findings might reflect that SPACs already have obtained a large part of conditional funding through their IPO proceeds, can utilise more funding sources, and have deadlines that makes them less vulnerable to timing of market sentiment. Deal and valuation certainty might thus be important traits for companies choosing to go public through a SPAC merger.

Moreover, our analysis showcase that the valuation of the S&P 500 and the sector leader return over the past six months positively impact the probability of going public through a SPAC. This gives credibility to the argument that SPACs might be a faster way to access the public markets. Or even more importantly, negotiate the deal terms. Even though there is a proxy vote that might take some months to complete, the most important conditions will already be agreed upon through the merger agreement. Further we find less PE and VC involvement in SPAC transactions compared to regular IPO processes, and that lower revenue tend to increase the likelihood of a SPAC merger. The latter might relate to the ability to give forward-looking statements and guidance on future financials, compared to traditional IPOs.

Our second part (II) of the empirical analysis evaluates the post-merger returns of warrants and common shares. We create monthly portfolios for different time periods for our samples of SPACs common shares, SPAC warrants and IPO common shares. We then use Fama French five factor model with momentum (Fama et al., 1993) to evaluate performance. We showcase that SPACs tend to underperform the overall market from March 2013 until today. However, warrants tend to outperform the overall market significantly. Lastly (III), we examine the company characteristics which determine the post-merger return of the SPAC. We identify that a high redemption ratio and long time to find a target predict lower post-merger returns.

We contribute to the literature by providing a focused report on determinants of which companies choose the SPAC listing venue compared to traditional IPOs. While recent papers helps to better understand the SPAC structure, we address the drivers behind the SPAC

acquisitions. Moreover, we introduce market- and sector-specific variables to evaluate the likelihood of method of going public. We add to the literature of deSPAC returns by evaluating performance of both SPACs and warrants through a Fama French five-factor model with momentum. Further, we contribute to the literature by providing an analysis of determinants of SPAC returns based on market-, deal-, firm- and sector-specific variables. Lastly, we believe we might have the largest number of deSPAC observations presented in an empiric analysis in recent literature with over 300 SPAC business combinations in our data set.

In addition to our analysis, we present a detailed overview of the SPAC structure. This is to further enable discussion of the differences compared to traditional listing processes. In addition, we provide a discussion based on our findings and how our findings relate to the SPAC structure and contribute to the overall literature. Lastly, we provide a short discussion of the viability of the vehicle going forward based on our analysis.

The proceeding sections of the thesis are structured in the following way: section 2 briefly summarizes existing literature on SPACs and how our findings compare to these results. Section 3 describes the structure of a SPAC and provides an overview of stakeholders, cost elements and advantages. Section 4 describes our data sample of SPACs and IPOs. Section 5 presents the empirical results to gain a better understanding of the determinants of SPAC mergers, performance and the determinant of post-merger returns. This section also provides an analytical discussion of our findings compared the SPAC structure throughout the part. Finally, section 7 summarizes and conclude the thesis.

2. LITERATURE REVIEW

In this section, we provide a brief overview of literature related to SPACs. There is limited empirical research on the topic. The reason is probably due to data issues and the historic poor reputation of the listing method. The SPAC structure and regulations have evolved over time, making the SPAC structures created before 2010 materially different from today's third-generation SPACs.[4] Hence, most research relates to older versions of the SPAC structure and have a tilt towards qualitative discussions related to advantages and disadvantages of the structure. However, there are a few recent papers as the listing method has gained traction. We like to highlight three papers in particular: Ritter et al., (2021), Bai et al., (2020) and Klausner et al. (2021). We structure this section in the same way as the empirical structure of the thesis.

2.1 SPAC mergers and the market for traditional IPOs

The basis for most emerging literature on the differences between SPAC mergers and traditional IPOs is related to the structural differences of the two listing processes and its underlying mechanism. Klausner et al. (2021) and Ritter et al. (2021) provides a detailed analysis of the differences in cost elements and the economics of the different stakeholders. Klausner et al. (2021) identify that a large part of the cost is not born by the merging company going public, but instead by SPAC shareholders who hold shares at the time of the completion of the business combination. Thus, the cost difference between SPACs and traditional IPOs is not included in our analysis of determinants for why companies choose to go public through a SPAC merger.

Bai, Ma and Zheng (2020) evaluate the existence, time-series variation and the recent boom of Blank Check IPOs. For their time-variation analysis, they use 69 business combinations from 2003 Q2 until 2020 Q3. They provide a theoretical framework of a segmented market of listing venues that can rationalise why SPAC and IPOs should co-exist. Their model demonstrates that the SPAC and IPO market structures provide differences in the incentives for companies to go public. Their main hypothesis assumes that investment banks prefer to take larger and

[4] Previous generations of SPACs were structured differently from today's SPACs. Derek Heyman (2007) provides research on previous generation of the vehicle

safer operating firms public, creating a sub-market of companies with limited ability to raise capital through public offerings.

Their results suggests that SPAC firms are usually smaller in terms of size and have greater cash-flow volatility than the companies listed through a traditional IPO. This is consistent with our result suggesting that companies with lower revenue is more likely to go public through a SPAC merger.

Further, Bai et al. (2021) show that SPAC proceeds and IPO market share correlate with market sentiment in their time-series analysis. In comparison, our paper focuses on how market-specific variables affects SPAC merger activity. We identify that SPAC merger activity is more likely relative to traditional IPOs in times of higher volatility and rougher market for equity capital transactions. Thus, we complement existing literature by showcasing how market-related variables affects a separate part of the SPAC life cycle. While an increased number of SPAC IPOs and proceeds might be partly explained by favourable market conditions, our findings suggest that a SPAC merger show higher robustness in terms of bringing a company public. Our results also contribute to the literature by indicating that a lower cost of debt, higher market valuation, and a stronger sector leader return leading up to the announcement date increases the likelihood for a SPAC. Furthermore, we show that VC and PE companies prefer traditional listings compared to SPAC mergers.

To the best of our knowledge, limited research has been published to investigate the determinants of why operating firms choose to merge with SPACs over traditional IPOs. Similarly, to Bai et al. (2020), we use firm-specific variables related to size to access the likelihood of a SPAC merger, although with a more recent and larger data sample. Furthermore, we contribute to the literature by introducing market-, sector- and deal-specific and more firm-specific variables to our regression of the likelihood of a SPAC merger.

2.2 Performance of SPACs

The common way to evaluate performance in SPAC literature is to view the return between the SPAC IPO and merger announcement (SPAC period) and the post-merger (deSPAC period) return. In our paper, we focus on the deSPAC period to evaluate returns for our sample of SPAC business combinations.

Ritter, Gahng and Zhang (2021) analyse investor returns for both the SPAC and deSPAC period. For the deSPAC period, they look at 114 business combinations between January 2012 and September 2020. In their sample, they show that the equally weighted one-year common share return has been negative 7.3% in the period, while the common share warrants perform 64.4% on average. The calculations are based on deSPAC period buy-and-hold returns.

In addition, they use the Fama and French (1993) three-factor model to evaluate returns based on 94 monthly portfolios. They use equal-weighted and value-weighted portfolios for common stocks over one and three years. They find that their three-year value-weighted portfolio underperforms the market. In comparison, we use a Fama French five-factor model with momentum to evaluate returns for 271 SPAC mergers distributed on 104 monthly portfolios. Similarly, to their result, our value-weighted portfolio, including all dates, shows that SPAC mergers underperforms the market over time. Additionally, we contribute to the literature by evaluating performance for warrant portfolios in the Fama French five-factor model with momentum. We find that warrants outperform the market over all of our time horizons for both our equal- and value-weighted portfolios.

In summary, we contribute to the literature by providing a larger, more recent sample over a longer time horizon. In addition, we contribute to the literature by evaluating warrant performance using a Fama French five-factor model with momentum.

2.3 Determinants of post-merger returns

Dimitrova (2017) examines post-merger returns for SPAC mergers completed between 2004 and 2010. Her findings indicate weaker performance for deals announced close to the two-year sponsor deadline. Although the structure differs for SPACs created before 2010, we identify the same findings as Dimitrova. Our regression on common shares indicates a negative relationship between the time it takes for a sponsor to identify a target compared to post-merger returns.

Jenkinson and Sousa (2011) analyze deSPAC common share returns for SPACs that went public before 2010. They document that a higher redemption ratio leads to worse returns for the post-merger SPACs. Jenkinson and Sousa thus argue that the redemption ratio is a strong indication for the quality of the proposed business combination. Similarly, we identify that the redemption ratio shows a negative relationship for post-merger returns. Klausner et al. (2021)

argues that the redemption ratio is the most important factor for the overall cost structure related to dilution, which may explain the observed relationship.

Further, we contribute to the literature by including market-, firm-, and sector-specific variables for our regression. We identify that strong market fundamentals at the time of business combination effect the return positively short-term but loses explanatory power longer term. In addition, we contribute to the literature by evaluate determinants for post-merger returns of warrants. For warrants, we likewise identify that a higher redemption ratio and longer time to complete an acquisition leads to lower returns.

In summary, we contribute to the literature in all three parts of our empirical analysis by introducing new elements to the different analysis. Our contribution includes the finding that market- and sector-related factors impact the likelihood of going public through a SPAC merger. Furthermore, we find that SPAC warrants persistently outperforms the market, while common shares underperform longer term. Due to the strong increase of SPAC IPOs over the last couple of years, the field is quickly evolving. At the time of writing, we are probably possessing one of the largest data samples on the number of SPAC observations by public research. Thus, our analysis of post-merger returns related to asset-pricing models also contributes to the literature by providing a longer and more recent time period with more observations. We use some elements of the above-mentioned papers as inspiration for our analysis, while our results may differ based on the differences in sample and number of observations.

Having presented existing recent research on SPACs, we describe the vehicle and its structure in more detail in the next section. This is to give an understanding of the variables that are important for companies merging with SPACs as a listing venue, before we start to describe our data sample and perform the empirical analysis.

3. SPACS AND THE IPO MARKET

3.1 SPACs at a Glance

In the United States, the Security and Exchange Commission classifies a SPAC as a blank check company. As an investment vehicle, SPACs can be traced back to the 1800s. In this period, blank checks were first mentioned as blind pools during the infamous South Sea Bubble. The investors invested in ships travelling overseas, without knowing what the ship would bring back. Whatever the ship brought back would then be sold at the domestic market, with the proceeds going to the investors. The modern SPAC follows the same basic principles as the ships that travelled from the Great Britain. The SPAC has no underlying operating exposure when it raises initial proceeds, but bets on the creator's ability to identify a good investment opportunity. A modern SPAC is broadly defined as a public investment vehicle which is created with the purpose of merging with a privately held company and bringing it public (Klausner et al., 2021). However, the description misses some of the underlying complexity and embedded costs of the structure, which will be investigated further in this section.

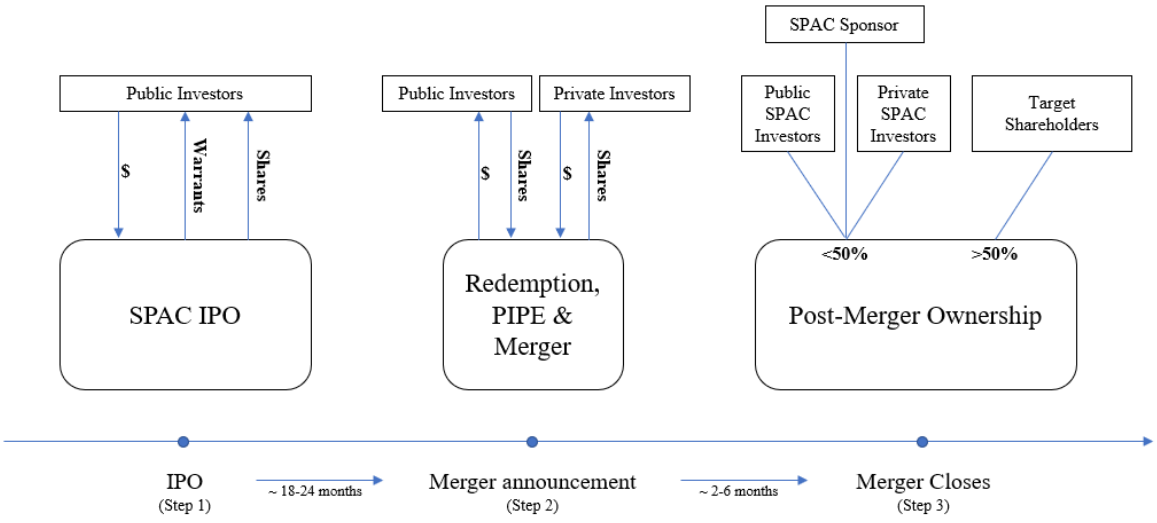
A SPAC's creation starts with a sponsor which forms a corporation and works with an underwriter to bring the SPAC public through an IPO. A sponsor could typically be an industry expert, former S&P 500 CEO, or a large private equity firm, but there are also sponsors with no particularly relevant background. The sponsors do not receive management fees for their work but are compensated by a part of the firm´s equity dependent on a successfully closed acquisition. This generally amounts to a quarter of the IPO proceeds, which equivalently means 20% of the post-IPO equity. This share of the equity is often referred to as the sponsor´s promote. If the sponsor fails to complete a merger, their compensation shares become worthless.

For modern initial public offerings of SPACs, units are sold to investors. A unit usually consists of a common share and a fraction of a warrant. Almost all modern SPACs are uniformly setting their unit prices at $10. The number of warrants offered per unit usually ranges from one quarter to a whole share, with an average of 0.5 warrants per unit (Klausner et al., 2021). These warrants often have a uniformly set exercise price at $11.50 per share. A short time after the IPO, the units become unbundled and allows the shares and warrants to trade separately.

Additionally, at the same time as the IPO, SPAC warrants, shares or both are purchased by the sponsor for a price, which by estimation shall represent fair market values. The research for a target company, in addition to the deferred part of the underwriting fee, is covered by the proceeds from the sponsor's investment.

Figure 1 summarizes the steps of a SPAC´s lifecycle. After raising cash through the IPO, the SPAC usually sets 18 to 24 months as a deadline to identify a target. The potential target is not allowed to be pre-identified before the IPO process. However, SPACs often have a sectoral or geographic initial focus, which generally reflects the sponsor´s area of expertise. Usually, the SPAC acquire a minority stake in the proposed target company. If the SPAC is not able to identify a business combination within the proposed timeline, it must be liquidated and must return the IPO proceeds to the investors in addition to the accrued interest of the period. If the SPAC reaches a merger agreement with a target, the shareholders of the SPAC set a vote as to whether they should approve the proposed business combination or not. In a separate process, the shareholders decide on whether to redeem their shares instead of participating in the merger. The redemption option secures that the shareholders could get their investment back with money market interest included. In addition, unit holders can keep or sell their warrants even if they redeem their shares. SPAC IPO investors thus have a default-free option structure embedded in their investment, in addition to a convertible option to equity. Bearing in mind that the IPO proceeds are invested in money-market interest through a trust, the SPAC structure can be considered a default-free convertible bond with investment-grade interest-return characteristics up until the merger.

Figure 1. SPAC lifecycle stages



We summarize the lifecycle of a SPAC through 3 steps. Step 1: Investors buy units, consisting of shares and a fraction of a warrant in a SPAC´s IPO, and the sponsor buys shares and/or warrants. Further, the sponsor receives 20% of the SPAC´s post-IPO equity (the promote). Step 2: Within two years, the SPAC proposes a merger combination. SPAC shareholders have the right to redeem their shares, and the sponsors and/or third parties purchase shares in a private placement. Step 3: At the closing of the merger the ownership usually includes a combination of public shareholders, the SPAC sponsor, and third-party private investors, while the shareholders of the target company maintain a majority share of the equity.

There have been several regulatory changes over time that have given the SPAC holders of today more investor protection. Among the structural changes is the redemption right as an effective disciplinary tool for the sponsor. Around 2010, the initial trust value per share became more valuable since the sponsors started to buy more warrants or units, in an initial private placement, at the time of IPO. Thus, a larger part of the IPO proceeds could be put into the trust and be redeemable for investors. The sponsor investment will cover up-front underwriting fees and the search for a potential acquisition. This gives the investors in the SPAC IPO the ability to cover their entire investment, in addition to accrued interest. In other words, the cost structure allows the public investors to start with $10 in the trust account, which will be paid back in full if the SPAC is liquidated or the shareholder decides to redeem its shares. The initial purchase effectively gives the sponsor a slightly higher incentive to find a suitable acquisition.

3.2 The economic roles of SPAC stakeholders

According to Dimitrova (2017), SPAC sponsors can essentially be compared to specialized private equity (PE) funds while the SPAC sponsors can be compared with general partners. Stulz (2020) points out that the growing importance of intangible assets for younger companies, which may make it relatively more attractive to have specialised investors which can provide mentoring and capital. A SPAC could undertake the role as a specialized investor. Many SPAC sponsors consist of industry experts and former executives in the industry. Several entrepreneurs who decide to go public through a SPAC merger refer to the benefit of sponsor´s industry expertise. Additionally, practitioners often mention that specialised sponsors can evaluate merging companies more efficiently and potentially reach agreements faster (Bazerman, 2021).

SPACs and Private Equity funds are similar in several ways. Both have deadlines for investing the money provided by investors. The deadlines are designed for not keeping the funds idle for too long. The compensation structure also involves similarities. Metrick and Yasuda (2010) show that the sum of management fees for the typical life cycle of a PE fund has an approximate net present value of 20% of capital committed. Thus, the fee structure is comparable to the 20%

sponsor promote share. The private placement warrants that sponsor purchase at the time of the IPO are similar to the carried interest received by general partners in a typical private equity contract because both provide payoffs only when other investors earn positive returns. Thus, the incentive structure also involves certain similarities. Both PE general partners and sponsors usually obtain board seats at the acquired company. However, the two structures differ in the way that private equity funds usually monitor their own investments more closely for several years while the sponsors' most important task is to search for a suitable acquisition for two years. Also, the reputation and track-record are probably more important traits for a private equity institution than a SPAC where the investors have the option to redeem their shares if not satisfied with the proposed acquisition.

The redemption right is a critical component of the SPAC structure and gives the SPAC IPO investors an important role of the SPAC economics. When the deadline approaches, the sponsor has an incentive to propose a bad merger rather than having no options available. This is because the sponsor will not be compensated unless there has been a successfully completed merger. However, the redemption right acts as a disciplinary covenant. It discourages the sponsor from proposing a deal where most shareholders would redeem their shares, and thus give the SPAC too little cash to complete the merger requirements. The sponsor could, however, invest its own money, include a private placement (PIPE), or take a haircut on the promoter share to complete a deal. Ritter et al. (2021) document that sponsors give up a sizable part of their pre-determined compensation, especially in weak deals, to other investors as inducements not to redeem their shares or to invest new capital.

Critics argue that misaligned incentives, and high dilution from the sponsor promote, often lead to a loss for SPAC investors owning shares at the time of the merger. Nevertheless, the group of investors with the option to redeem or sell their shares before the merger have performed very well. According to Ritter et al. (2021), the investors participating in the SPAC IPOs and sell their shares on the merger announcement data have on average received a 12% return between 2010 and 2018. The shareholders of a SPAC IPO are overwhelmingly large funds (Klausner et al., 2021). Historically, almost all shareholders from the pre-merger phase exit the SPAC before merger completion, either by selling their shares in the market or redeeming them. In other words, the IPO investors are generously paid for getting the SPAC on track as a public company before selling their shares to other investors.

3.3 The Relative Cost Difference of SPACs Compared to IPOs

Among the largest differences from a traditional IPO route is the embedded cost structure of the SPACs. The costs associated with traditional IPOs are two-fold: the direct costs of underwriter commissions and indirect costs from the underpricing. The SPAC pays a smaller part of the underwriting fee upfront, while a large part of the underwriting commission remains contingent on a successful merger[5]. For the SPAC structure, the underpricing element is usually not meaningful, as the offer price of $10 dollar only reflects the trust value of $10 dollar per unit, and no other assets.

For SPACs, the most essential cost elements are the dilutive effect from the sponsor shares, the underwriting commission and the publicly held warrants. The total cost related to dilution is, however, highly dependent on the redemption ratio for each individual case. Because the compensation to the sponsor generally does not scale down in proportion to redemptions, the redemptions reduce cash disproportionately greater than the overall reduction in shares outstanding. The underwriting fee also grows into a greater proposition as there are fewer shares outstanding. Klausner et al. (2021) show that the median of their sample of SPAC combinations, 73% of the IPO proceeds are returned to shareholders through redemptions. As redemptions reduces the amount of cash the SPAC can contribute to a new business combination, the SPAC usually must use additional funding sources (Klausner et al., 2021). Much of the funding lost to redemptions is replaced by investments through the sponsor itself, or by third parties. Moreover, they find that the median amount of cash provided to the merger of IPO proceeds is 64% while third-party PIPE investors contribute by 25% (Klausner et al., 2021).

Another source of dilution is the issuance of warrants, which are “free” for investors participating in the IPO process. While the investor can retrieve its entire investments through the redemption of common shares, the investor gets to keep the warrants. However, the fraction of a warrant offered in a SPAC unit has fallen dramatically from the beginning of 2018 to the beginning of 2021 (Ritter et al., 2021). The development can be seen as an indication of

[5] The SPAC usually pays 5.5% of the proceeds in underwriting commission, with 2% paid at the time of the IPO while the rest is deferred (Ritter et al., 2021)

sponsors finding it easier to attract IPO investors. The lower warrant fraction leaves a larger slice of the pie for other stakeholders. The cost of going public through a SPAC has thus lowered over the years.

Another implication of the cost structure is that the incentives embedded in the SPAC structure are highly skewed towards completing a transaction. The sponsors promote, and the deferred part of the underwriting fee is dependent on the SPAC being able to close a merger. The sponsor has no access to the trust account and will only be paid if the announced merger goes through. This might create an incentive to construct a deal with negative NPV dynamics, if the sponsor is not able to find a good investment. As Warren Buffett mentioned in the Berkshire Hathaway annual meeting in 2021 (McCrank, 2021):

"If you put a gun to my head and said you have to buy a big business in two years, I'd buy one, but it wouldn't be much of one."

Recent research concludes that a SPAC provides a more expensive listing process than a traditional IPO. According to the working paper by Ritter et al. (2021) on SPACs, the cost of going public through the median SPAC merger between January 2015 and February 2021 was 15.1% of post-transaction market capitalisation, while it was 3.3% for traditional IPOs. The median cost as a percentage of cash raised through the SPAC IPO was 47.6% in the study. In a similar study, Klausner et al. (2021) find median costs at 50.1% of cash raised and 14.1% of post-transaction market capitalisation respectively. The shareholders that choose not to redeem their shares in advance of the merger bear the most significant part of the overall dilution costs (Klausner et al., 2021).

In summary, there are significant costs associated with the SPAC structure compared to a traditional listing. However, the cost is highly individual, and the redemption ratio acts as a weighing machine of the impact these costs have on the shareholders that remain invested upon completion of the merger instead of redeeming their shares.

3.4 The Relative Advantages of SPACs

There are several reasons for the popularity of SPACs stated by popular press and SPAC stakeholders. However, some of the claims are highly disputed. We will present some of the arguments to balance the discussion of the different listing alternatives.

It is mentioned that SPACs deliver a higher degree of deal certainty and a greater price for the operating company compared to the regular IPOs. First, SPACs avoid the perceived underpricing seen in traditional IPOs that may shortchange issuers.[6] With a traditional IPO involving a book-building process, the offer price and proceeds are negotiated after conducting a roadshow and observing indications of interest from potential investors, making the terms uncertain until the very last day. Moreover, there is some uncertainty related to how many overallotment shares might be exercised through the Greenshoe option. In comparison, SPAC merger terms are negotiated before additional information about the market´s opinion is known. This includes an agreement of a pre-money valuation of the target company, which creates a valuation certainty. On the other hand, there still is an uncertainty related to the redemption rate, and the minimum cash delivered to the proposed business combination. However, the claim of this advantage may be appropriate for companies with information and a valuation which are difficult to convey for outside investors.

Further, based on our comparison of sponsors as specialised private equity actors, they can provide certification of the deal and advice to the company. There is a trend of this aspect being valued among younger companies. Venture capitalists not only provide capital but also bring operating knowledge and advice. Hsu (2004) documents that startup companies take offers at 10-14% pre-money valuation discounts compared to other investors if the VC firm has a high reputation. This shows that young companies value other traits from investors than just capital. Similarly, companies that choose to merge with a SPAC often mention the business insight from the sponsors as a prime motive for choosing this listing path (Ritter et al., 2021). However, it is hard to value these elements and compare them directly based on the different alternatives of going public.

At the time when a SPAC merges with its target, a private placement to one or more institutional investors is often made. This transaction serves as an additional certification of the attractiveness of the proposed business combination. The investors will examine confidential information concerning the target through a due diligence. Prior to the merger, these private placements are disclosed to the market, and hence have the purpose of validating the merger. In the case of a regular IPO, there is usually no similar examination of confidential information.

[6] Reference retrieved from a Financial Times article about how a SPAC skips the time-consuming and expensive IPO process. See “Can SPACs shake off their bad reputation?” written by Aliaj, Ortenca et al. in 2020.

Since this practice is commonly seen in SPACs and rare in regular IPOs, we consider this as an advantage of going public through SPACs.

A key difference between the traditional IPO process and a SPAC merger is the regulatory leniency towards a SPAC relative to an IPO in terms of forward-looking statements. A SPAC and its target can benefit from a safe harbor against liability under forward-looking statements such as the securities laws for projections if they are accompanied by cautionary language (Bai et al., 2021). In the U.S., companies pursuing an IPO are rarely able to give forecasts of future financials, but these are common with merger announcements for which a shareholder approval is required. These projections are further safeguarded from lawsuits with a 'safe harbor' provision in U.S. laws for mergers. However, public listings through regular IPOs are not protected by this safe harbor and seldom provide such information. Thus, certain companies wanting to make forward-looking statements to maximise their pre-money valuations can benefit from merging with blank check vehicles.

Another key difference in the regulatory environment is related to litigation risk of the certification intermediaries. SPAC sponsors face substantially lower litigation risk compared to investment banks, because they follow merger law rather than law related to public offerings rules. Thus, SPAC sponsors are far less exposed to underwriter liabilities under Section 11 of the U.S. Securities Act of 1933. Klausner et al. (2021) document that between 2015 to 2019, approximately 15% of traditional IPOs have been the target of shareholder suits under Section 11. Of those suits, 90% name the underwriter as a defendant.[7] Furthermore, there were no Section 11 suits related to SPAC IPOs, and there were only two Section 11 suits against post-merger SPACs between 2009 and 2019 (Klausner et al., 2021). Under Section 11, investors can sue underwriters for omissions of misstatements, and there is no need to prove causation or scienter. The litigation cost can be substantial for underwriters as not only do they have to provide direct costs of lawsuits, but they also face the indirect cost of losing market share. Hanley and Hoberg (2012) show that if a lead underwriter is sued under section 11 based on an associated IPO firm, the lead underwriter on average loses $59 million. The expected

[7] Investors can sue underwriters for misstatements or omissions under Section 11 without the need for proving scienter or causation.

litigation cost will generally be higher for IPO firms that require extensive due diligence, as this process also involves uncertainty.

Moreover, it is often emphasised that it is less time-consuming for a company to negotiate a merger with a SPAC, and win shareholder approval, compared to the traditional book-built IPO. To illustrate, a series of companies in the EV industry accessed the public market in mid-2020s by merging with SPACs. As a backdrop, the share price of Tesla had increased by several hundred percent during the year 2020. Thus, it is possible to argue that some of these companies chose the SPAC listing venue to be able to benefit from the favourable sentiment in the sector. While some merger negotiations can take a long time to materialise in a completed deal, there is a possibility that specialised sponsors with extensive industry experience are able to negotiate a deal more quickly. They might also be able to convince SPAC shareholders and PIPE investors who are not experts in the industry of the deal rationale by committing their own investment. Bazerman and Patel (2021) argue that the entire process could be completed within 3 to 5 months, while the traditional IPO route often takes 9 to 12 months to complete. It is tough to accurately measure if SPACs are faster than IPOs since both different processes would involve preparations before the deals are publicly announced. The listing process is likely somewhat dependent on the individual company going public and the claim is thus debatable.

To sum up, based on the highly individual nature of the companies going public, and lack of oversight of the whole process, it is complicated to conclude the magnitude of the relative advantages of going public through a SPAC. There is likely to be a set of features that makes SPAC a competitive listing venue compared to the traditional IPO route. These features include regulatory arbitrage, price and deal certainty and the potential for a speedier process. These potential advantages could potentially lead stakeholders to accept somewhat higher costs inherent in the structure. However, for the operating firm going public, several of the cost components are not relevant, making the potential advantages more important for the listing considerations.

Having presented an overview of the SPAC structure, costs, and advantages, we will describe our data sample in the next section.

4. DATA

In this section, we describe the initial sample selection of the SPACs and IPOs. Further, we present the screening criteria used for data cleaning and to identify our final samples for the empirical analysis. Lastly, we explain how we calculate returns for our SPAC sample, including warrants.

4.1 SPAC and IPO Sample

For our SPAC sample, we provide data back to 2010 in the USA. The paper focuses on the US SPAC market due to its size, maturity, and high SPAC IPO volume. Additionally, using only US data allows for a consistent analysis of the data available. As explained in section 3, the structure of the SPACs was different before 2010, which is why we exclude business combinations before this time. We exclude SPAC mergers with announcement after June 2021. This is because we want to have sufficient data to perform return calculations.

The data set of the SPAC mergers contains 306 SPACs which have been closed between January 1th, 2010, and November 1st, 2021. The sample of SPAC mergers is gathered and screened through several data sources. Primarily, we use three commercial databases for this purpose: SPAC Research, Gritstone Asset Management's OmniView and Refinitiv Workspace. We have further used Bloomberg, FactSet, SPAC Track Compustat and Capital IQ to crosscheck information as well as screening for variables. Due to the novelty of the SPAC craze, there is not always detailed information concerning metrics specific for the SPAC's structure in these databases. We have thus needed to crosscheck certain variables by manually going through the report. We manually extracted identifiers of derivative securities such as warrants, which was important to obtain daily and monthly warrant prices. Furthermore, there has been limited information on the number of warrants and/or rights from units except from new SPAC IPOs. Data related to redemptions for the different companies has, to a large degree, been obtained manually.

Furthermore, the three mentioned data sources offer pricing data on common shares, warrants, rights, and units, and information regarding the identity of the merging firms, the initial trust amount, the redemption history, SPAC sponsors, and dates of announcement and closing of merger. The data accuracy on the SPAC mergers is validated through cross-examining the three commercial databases. When irregularities or discrepancies are found, we investigate further

by using other data sources such as Bloomberg, Refinitiv Eikon, Pitchbook, Capital IQ, and EDGAR to adjust the provided data.

For our non-SPAC IPO sample, we extract data from US back from 2008 from Bloomberg. We cross-check our data with FactSet. We exclude offerings that were withdrawn, rejected, or postponed and retrieve 3195 IPOs. Because we want to compare our data sample of SPAC acquisitions with IPOs of operating firms, we exclude shell companies, carve-outs, direct listings, mutual funds, and unit offerings from the control sample. We are left with 1830 U.S. IPOs with pricing date from June 30th, 2009[8] to November 1st, 2021. The sample of IPOs excludes any initial capital raises of SPACs or other similar offerings, and thus serves as a comparison group for the target firms acquired by SPACs. The average and median proceeds across these IPOs are $2,047 million and $836 million respectively.

After screening which firms to include in our data set, and the following variables of relevance, we extract daily price data from 2010 from Refinitiv Eikon, both for SPAC mergers and regular IPOs. Subsequently, we calculate daily holding period returns followed by calculating returns for three months, six months, and a year on the time series data. Further, this data will be used in the examination of company characteristics which determine whether a SPAC will be successful based on returns. The construction of our monthly portfolio for performance evaluation is described in section 5.2.1.

As described in the previous chapter, the unit typically consists of a share in addition to a fraction of a warrant. For our return calculations, we provide both the return for the share and the warrant. We do not provide unit returns due to lack of data on amount of warrants per unit.

An important discussion regarding the data surrounding returns is whether to use announcement date or closing date as a proxy for the merged SPACs. Some of the SPACs could have substantial return based on the announcement of the proposed business combination. As an example, Digital World Acquisition Corporation, which is set to merge with Trump Media & Technology Group, rose 1,225% the same week as the merger announcement (Lipschultz, 2021). The return is thus affected if future potential or potential "synergies" could already be priced in before the merger. However, there is a significant cost related to dilution of sponsor's

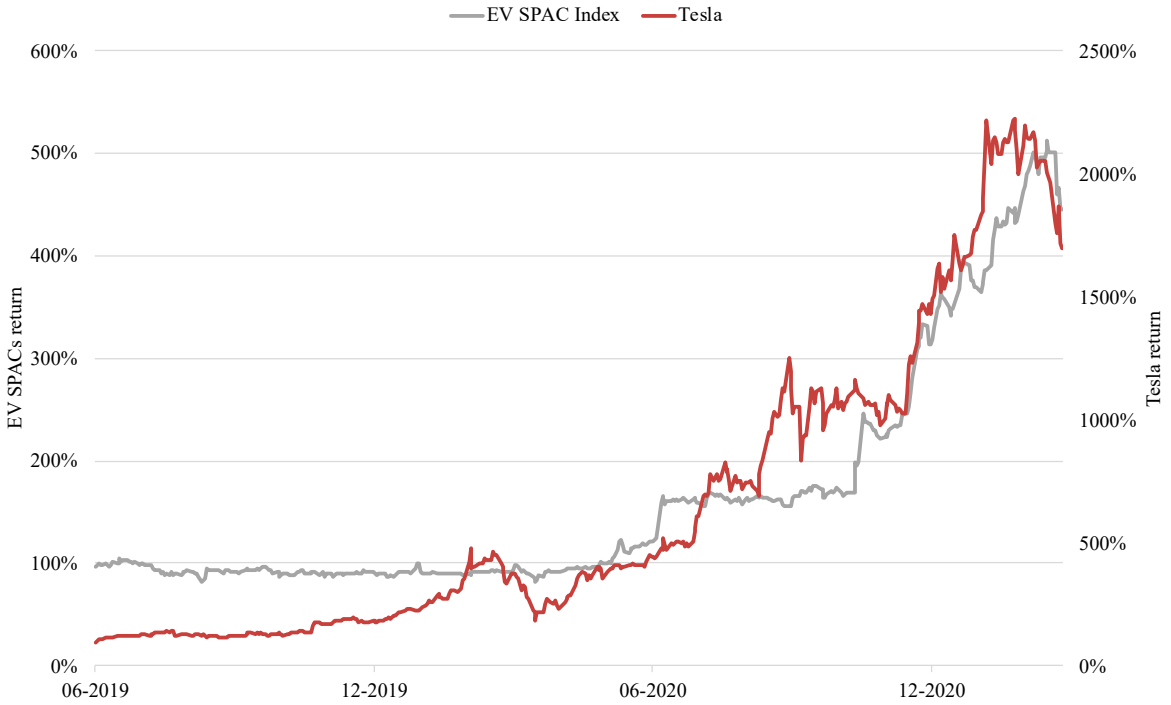
[8] There is a slight time difference for our IPO pricing dates and SPAC merger closes. The sample periods is however comparable when including the start of the lifecycle for our SPAC sample.

promote dependent on the redemption rate. This cost has a more precise estimate closer to the closing date of the merger, which the share would thus reflect. We decide to start our analysis by the closing date of the merger, consistent with related literature (Ritter et al., 2021).

4.2 Industry Distribution

We showcase a distribution of the sectors present for our samples because the sector composition is important for our further analysis. The sample overview is shown in Table 2. We use the general GIC sector codes as a main classification for our sectors. In addition, we extract software and semiconductors from information technology to be included as categories in addition to the main sector specification. We also include a categorization of EV companies into our category specification. This is extracted manually from the GIC sector code of automotive which is related to EVs. The reason for including extra categories in addition to the general GIC sector codes is to scratch the surface of our initial hypothesis that companies in emerging industries tend to be slightly more likely to consider a SPAC relative to traditional IPOs. The example of EV is especially clear in the sample. While only three companies between Q3 2008-Q3 2021 have gone public through an IPO, 33 SPACs have merged with companies in the EV industry since 2010. The announced Polestar listing through the SPAC of Gore Guggenheim is not present in our sample, due to the timing and not being closed. Figure 2 shows the return of Tesla versus the post-merger returns of SPACs in our sample that have merged with an electric vehicle company. The strong return of Tesla and other EV SPACs might have affected the decision for new companies to go public. Most of the newly listed companies chose a SPAC merger as the pathway to the public markets.

Figure 2. Average Electric Vehicle SPAC common stock return vs Tesla share price



We plot daily returns for all SPACs related to electric vehicles in our sample set to create a electric vehicle SPAC index. We construct a portfolio of these companies as they start to trade after completing their business combination. Our portfolio consists of equal weighted returns.

The EV industry provides a good example of companies that could be incentivised to go public through a SPAC. Most parts of the EV value chain are quite capital-intensive, and it is a long timeline between investor slide decks with pilot projects to a fully operating factory delivering a meaningful number of vehicles or battery components. However, SPACs have proven to be a successful way of raising money to fund the projects, even before several of the companies have generated any substantial revenues. This could perhaps be somewhat related to the ability to generate forward-looking statements since SPACs are protected by the Private Securities Litigation Reform Act from liability for projections and other forward-looking statements. However, as of 2021, the general press has started to warn about a "EV SPAC bubble" (Matosek, 2021). SPACs also have a larger software and information technology compared to traditional IPOs. Software and IT-related companies are generally viewed as more growth-oriented than traditional industries.

The rest of the distribution is showcased in our Table 2. Other interesting facts are that traditional IPOs are heavily skewed towards healthcare companies, compared to SPACs. Except from that, the distribution somewhat mirrors IPOs in traditional industries.

Table 2. Sample overview

Category	Subcategory	IPOs		SPAC mergers		Total	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Sector	Energy	77	4%	20	7%	97	5%
	Materials	31	2%	10	3%	41	2%
	Industrials	110	6%	43	14%	153	7%
	Software	166	9%	29	9%	195	9%
	Consumer Discretionary	185	10%	27	9%	212	10%
	Consumer Staples	74	4%	19	6%	93	4%
	Health Care	687	38%	52	17%	739	35%
	Financials	252	14%	23	8%	275	13%
	Information Technology	118	6%	32	10%	150	7%
	Semiconductors	29	2%	3	1%	32	1%
	Electric Vehicles	3	0%	33	11%	36	2%
	Communication Services	74	4%	11	4%	85	4%
	Utilities	9	0%	0	0%	9	0%
	Real Estate	15	1%	4	1%	19	1%
	Total	1830	100%	306	100%	2136	100%

This table contains the sample composition of the IPOs and SPAC mergers executed in the period of 3rd quarter 2010 to November 1st, 2021. GIC sector codes are used as main classification for dividing the sample into 15 sectors.

5. EMPIRICAL ANALYSIS

This section is split into three parts based on our problem statement. In the first part, we focus on the determinants of why companies merge with a SPAC relative to traditional IPO listings. We firstly show descriptive statistics of our samples on market-, sector-, deal- and-firm-specific variables coupled with t-tests and Wilcoxon tests. Lastly, we present a logit regression of the likelihood of a SPAC based on the variables presented.

In the second part of the section, we evaluate the performance of SPAC common shares and warrants. Firstly, we present descriptive statistics of abnormal buy-and-hold returns. Furthermore, we present a month over month analysis of the return of the total SPAC, warrant and traditional IPO sample. Lastly, we examine the monthly returns of the total samples against asset-pricing models.

In the third part, we focus on the determinants of the SPAC post-merger returns. We perform a regression analysis of SPAC and warrants returns based on deal-, firm- and market-specific variables.

5.1 The Likelihood of a SPAC

In the first part of our empirical analysis, we evaluate the determinants of why companies go public through a SPAC merger. Firstly, we present the variables that are used in our regression. Secondly, we provide summary statistics of our samples in addition to t-tests and Wilcoxon-Mann-Whitney tests. Further we provide a correlation matrix of our variables. Lastly, we showcase our main results in the logistic regression.

5.1.1 Market-, Deal-, Firm- and Sector-Specific Variables

We complement our data samples of SPAC acquisitions and IPOs with market-, deal-, firm- and sector-specific variables extracted from Refinitiv Workspace, Refinitiv Eikon, FactSet, Capital IQ, Compustat, Spactrack and Bloomberg.

After careful consideration, we ended up using market-based variables and sector-based variables with a one-quarter lag from announcement date. The reason is related to the fact that both IPO processes and SPAC merger negotiations start some time before they are publicly announced. To be able to review whether firms take relatively more advantage of favorably

sector or market sentiment compared to traditional IPOs, it makes sense to include a delay in these variables. This is consistent with the methodology of Bai et al. (2021) who also provide lagged variables when presenting their analysis of time-series variations of SPACs. We have performed a similar regression, to our main regression in Table 6, without time-lag of the market-based and sector-based variables in the appendix (Table 12). Our model with time-lag overall provides a higher explanatory power.

Market-Specific Variables

We include market-specific variables to be able to see how the overall market sentiment might affect the issuance of SPACs relative to traditional IPOs.

For the first of our market-related variables, we want to exploit market sentiment. Previous research into IPOs shows that market timing is essential for a successful execution of an IPO (Ritter, 1991). For illustration, Schill (2004) identifies that market volatility above the long-term average reduces the frequency of IPOs by approximately 13%. We use the Chicago Board Options Exchange (CBOE) volatility index to get a picture of the prevailing market sentiment. Because the VIX is derived from the prices of index options with near-term expiration dates, it generates a 30-day forward projection of the volatility. High volatility could decrease the probability of success for the IPO. Some argue that SPAC acquisitions are less vulnerable to turbulent market environments, since the SPAC already possesses liquidity at the time of acquisition. However, one would expect that the redemption rate of the SPAC could be somewhat affected if the investors raise their required return of investment in volatile times.

Further, we include the price-to-earnings ratio of the S&P 500 as a market variable. With a market trading at high multiples, one would expect public listings to be more attractive for private companies due to a potential value uplift compared to remaining as a private company with an implicit liquidity discount. Companies merging with a SPAC might be more easily able to take advantage of high valuations due to a potential short negotiation process and the ability to get better terms compared to a traditional listing (Bazerman, 2021). As an example, Polestar announced at the end of September a deal to merge with Gores Guggenheim in a deal that valued the company at $20 billion (Hu et al., 2021). While the transaction will likely not close before early 2022, Polestar has already confirmed a public valuation for the company based on the merger agreement. For traditional IPOs, the valuation and the amount of capital raised remains uncertain until the end of the process.

Moreover, the cost of debt is considered as a market indicator in this paper. Lewellen (2009) observed that several SPACs raised additional debt to acquire shares at the target company. Since some SPACs raises debt to finance acquisitions, one could expect that SPAC acquisitions would be more frequent during periods characterised by cheap debt. In recent years, many new business combinations involve syndicated loans as a source of funding (Ritter et al., 2021). We would, however, not expect the cost of debt to have a direct impact on regular IPOs. We consider the cost of debt through the Bank of America High Yield index extracted from the Federal Reserve Bank of St. Louis (2021). The index tracks the performance of US dollar-denominated, below investment-grade rated, corporate debt publicly issued in the US domestic market. The index considers securities that have greater than one year of remaining maturity, a fixed coupon schedule and a minimum amount outstanding of $100 million. The index reflects the cost of debt of companies through the general interest level and the added risk premium for issuing debt securities. The latter factor is the reason for not choosing a long-term government bond, which is viewed as a safer security.

Lastly, we consider the equity issues over total new issues in the United States. This indicator can be seen as a broader measure of equity financing activity and is a strong sentiment indicator (Baker, 2007). The indicator measures all equity financing, including both IPOs and seasoned offerings. We use all issues of equity and debt financing from corporations in U.S., extracted from the Federal Reserve Bulletin (2021). Baker and Wurgler (2002) show that high values of the equity share tend to foreshadow low stock market returns. They suggest that this pattern reflects the firm's willingness to switch between debt and equity to reduce the overall cost of capital. If management believe their stock is overpriced, they are relatively more likely to favour equity in the pecking order. However, the ratio does not imply that individual firms, nor their managers, are able to predict future stock prices. It suggests that in sum, correlated mispricing across firms may correlate managerial actions. Thus, the correlated correction of mispricing may in sum forecast the market return. A strong sentiment could be more likely to create mispricing and overheated valuations of securities, which is why we include it as a metric. The metric is specifically relevant for IPOs which is dependent on favourable sentiment for equity capital transactions. It may also be relevant for completion of SPAC mergers, since a lot of the mergers depend on PIPE transaction to retrieve enough cash to complete a transaction.

Deal-Specific Variables

Our first deal-specific variable is the time to resolution for SPAC and IPO companies. This is defined as the time the companies need to complete the transaction from the announcement date. For the SPAC companies, we use the date when a blank check company announces the potential target to the SPAC shareholders. For this variable, we take the viewpoint of the operating company to see how long a time it takes from the initial announcement date to be listed. For IPOs, we use the date of the going public announcement. Literature and popular press often suggest that SPACs are executed faster than IPOs (Huddleston, 2021). The proxy vote that SPACs are subject to complete may slow down the process. However, we acknowledge that there are lengthy processes on-going even before the public announcement dates, which may affect the real time to resolution for the individual observations.

The second deal-specific variable is involvement of private equity and venture capital companies. IPOs are one of the most important exit channels for PE and VC firms (Bayar et al., 2011). Due to defined lifetime of certain funds, the actors may be incentivised to cash out and realise returns as quickly as possible when reaching a certain valuation milestone. However, due to the signal effect of selling a large portion of its shares, they typically keep most of their holdings locked in a specified period after the IPO (Bayar et al., 2011). However, due to the fact of the inherent liquidity in the structure, SPAC acquisitions make it possible for PE actors to receive a large part of cash up front. Thus, one would expect these capital managers to prefer this type of exit route. However, there might be several reasons for PE and VC companies to want to exit through an IPO as well. This could be related to reputation or signalling effects or the fact that the structure itself might be a competitive entity for their own business.

Firm-Specific Variables

We include several firm-specific variables for our regression as well. Firstly, we employ size as a variable. Bai et al. (2021) argue that smaller companies are more likely to go public through a SPAC because underwriters prefer to take larger and less risky firms public. Due to the bond-like payment structure of investment banks, high-quality underwriters would prioritise other projects. The SPAC sponsor can act as a form of certification for the smaller companies entering the market. We use the natural logarithm of revenue and the natural logarithm of total assets as metrics to account for the size of the operating companies.

Secondly, we employ the debt ratio of the companies. Firms with high levels of debt may be too risky for a traditional IPO. However, highly levered firms are unattractive for SPAC sponsors who want to use debt for the acquisition because this debt would further increase the firm's debt ratio. If the target firm is already highly levered, additional debt could substantially increase the cost of capital and the bankruptcy risk of the company.

We further want to measure quality of the companies through their profitability level. We use return on assets to capture the inherent profitability of the companies. The variable might also be used as an indication to assess whether low-quality firms use SPACs as a way to enter the public markets (Brown et al., 2013). However low profitability might also indicate that there is a young company which is yet to reach sufficient scale. To capture this effect, we include age from the founding date of the companies.

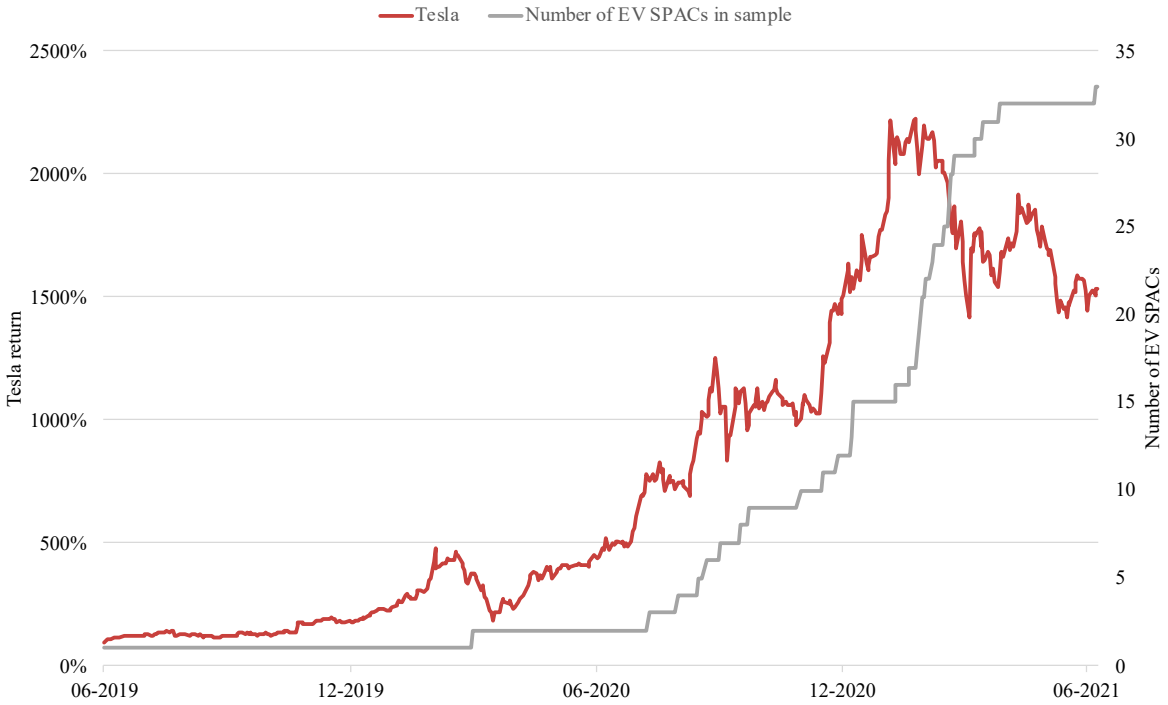
Lastly, we employ a metric of the market value of the company relative to its revenue (price to sales). This multiple is to be able to capture what is implicitly priced in of future prospects in the company valuation. A high price to sales ratio may indicate that the market expects the company to grow in the future years and vice versa. Given our data limitations, we view Price-to-sales as the most reliable metric for this purpose.

Sector-Specific Variables

Lastly, we have included three sector-specific variables in our regression. We use GIC sector codes and industry codes to divide the operating companies into different categories. The categories and sample distribution is showcased in Table 2.

Our first sector-specific variable includes the price to earnings ratio in the sector at the time of announcement date. We would expect companies in industries with high valuations to be more likely to consider an entrance into the public markets. Our second and third sector variable relates to the returns of the operating company´s sector and the return of the sector leader. The sector return is based on the S&P sector ETFs for the last six months. The sector leader is the defined as the return of the largest holding in the sector ETF for the last six months. As shown in Figure 3, there seems to be a strong correlation between the return of Tesla and the number of electric vehicle SPACs. As SPACs are claimed to be a faster way to achieve a public market valuation, it is possible that some of these companies merged with a SPAC to be able to benefit from the favourable sentiment in the sector.

Figure 3. Tesla share price vs number of electric vehicle (EV) SPACs announcing merger in our sample



This figure indicates how the return of the sector leader (in this case Tesla) affects the number of SPACs merging with EV companies. The number of EV SPACs relates to the SPAC mergers in our sample merging with a target company which is involved with electric vehicles and/or autonomous driving.

Table 3 summarizes the definitions of variables we use in our main regression and the sources we derive them from. As emphasized in our data part, we have used a range of different data sources and further cross-checked several of our accounting-related variables through different data providers.

Table 3. Variable definitions and sources

Variable name	Unit	Definition	Source
Market-specific variables			
VIX index	Ratio	Index reflecting the market expectations of volatility for the next 30 days based on option pricing.	Yahoo Finance
BofA high-yield index	%	Effective yield of the ICE BofA High Yield Index, which tracks the performance of USD denominated below investment grade rated corporate debt publicly issued in the US domestic market.	Federal Reserve Bank of St. Louis (FRED)
Equity share in new issues	%	The total volume of equity issues over the prior twelve months divided by the total volume of equity and debt issues over the prior twelve months.	Federal Reserve Bulletin
P/E S&P 500 index	Ratio	Price to earnings ratio of the S&P 500 index adjusted for dividends and stock splits.	Robert Shiller webpage, Yale
Deal-specific variables			
Time to resolution	Days	The time from announcement date to closing date for SPACs and pricing date for IPOs.	Refinitiv Eikon, Bloomberg
PE or VC backed	Dummy	The variable equals 1 if a PE or a VC firm is involved and 0 otherwise on completion date	Bloomberg, SPACtrack, Refinitiv PE Screener
Firm-specific variables			
Age	Years	Company age based on current date substracted by founding date.	Refinitiv Eikon, Factset
Price/sales	Ratio	Market value at the time of listing / merger divided by revenue from first annual report after listing.	Compustat US, Capital IQ, Refinitiv Eikon
Return on assets	%	EBIT last 12 months divided by total assets	Compustat US, Capital IQ, Refinitiv Eikon
Debt ratio	%	Total liabilities divided by total assets.	Compustat US, Capital IQ, Refinitiv Eikon
Revenue	Million US$	Logarithm of revenue last 12 months first report after listing.	Compustat US, Capital IQ, Refinitiv Eikon, Bloomberg
Total assets	Million US$	Logartihm of total assets first quarterly report after listing.	Compustat US, Capital IQ, Refinitiv Eikon
Sector-specific variables			
Sector valuation	Ratio	Sector price to earnings ratio at the time of listing.	Bloomberg
Sector return	%	Sector holding return based on S&P SPDR sector ETF in the last 6 months before listing.	Refinitiv Eikon
Sector leader return	%	Holding return of the leading company in the same sector, defined as the largest Sector ETF holding, last 6 months before listing.	Refinitiv Eikon

This table contains the full set of variables used in the regression of the likelihood of a SPAC acquisition relative to a regular IPO. We complement our data samples of SPAC acquisitions and IPOs with market-, deal-, firm- and sector-specific variables extracted from Refinitiv Workspace Refinitiv Eikon, FactSet, Capital IQ, Compustat, Spactrack and Bloomberg. A detailed definition and unit explanation is also included in the table.

5.1.2 Summary Statistics

Table 4 presents summary statistics for our SPAC and IPO sample. We include the median, mean, standard deviations and number of observations for all our variables. In addition, we extract values of the t-test and the Wilcoxon-Mann-Whitney (WMW) test that we run to compare the different variables between IPOs and the SPAC acquisitions. The data consists of 2136 observations in total. For some of the variables, we have fewer datapoints, which is reflected in column "N".

All the market-related variables are significant at 1% level in our t-tests. The volatility is somewhat higher when a SPAC merger in our sample is announced compared to traditional IPOs. The valuation of the index has been substantially higher, when a SPAC merger in our sample has been announced, than when an IPO is announced. Further, the cost of debt also seems to be lower when a SPAC transaction is announced. The equity share of total new issues seems has been at a similar level for both listing methods.

For the deal-specific variables, the observations show that IPOs in our sample tend to have shorter time to resolution than SPACs. This is contradictory to market commentators explaining that SPACs tend to have shorter time to market. The relative difference is significant at a 1% level. It should be said that the time from announcement to the closing date does not reflect the full process of taking a company public, as there is significant preparation before the public announcement of the transaction. Further, the deal terms are already negotiated for a SPAC at the time of the merger announcement, while the deal terms are uncertain until the end of the process for traditional IPOs. Our sample shows lower PE and VC exposure towards SPACs than in traditional IPOs. The data suggests that these actors prefer the traditional IPO route to exit their portfolio companies.

The summary statistics shows that the SPAC mergers in our sample are considerably smaller in terms of assets and revenue than the traditional IPOs. The typical IPO is approximately twice as large as the SPAC mergers. In terms of valuation, the median SPAC is valued at a higher Price/Sales multiple compared to the typical IPO. This development also applies for sector valuation at the announcement date.SPACs in our sample also have stronger sector returns and sector leader returns leading up to the announcement dates. The difference is significant at 1% level. This could indicate that operating companies that merge with SPACs take advantage of strong sentiment for their sector compared to traditional IPOs.

Table 4. Summary statistics for IPOs and SPAC merger

	Full sample				IPOs				SPAC mergers				WMW test	t-Test
Variable	Median	Mean	Stdev	N	Median	Mean	Stdev	N	Median	Mean	Stdev	N	z-Value	t-Value
Market-specific variables														
VIX index	16.76	18.43	6.65	2136	16.40	17.98	6.48	1830	21.34	21.12	7.01	306	-8.71***	-7.32***
BofA high-yield index	6.04	6.18	1.61	2136	6.15	6.33	1.64	1830	5.35	5.29	0.99	306	-11.81***	15.14***
P/E S&P 500 index	22.49	24.43	9.55	2136	22.15	23.60	9.77	1830	30.50	29.41	6.02	306	-15.39***	-14.06***
Equity share	0.12	0.12	0.04	2136	0.12	0.12	0.04	1830	0.12	0.11	0.03	306	-2.00**	4.66***
Deal-specific variables														
Time to resolution	46.00	91.58	111.92	1994	39.00	88.35	125.27	1828	144.50	147.42	54.46	290	-18.77***	-15.52***
PE or VC backed	0.00	0.49	0.50	2136	1.00	0.55	0.50	1830	0.00	0.12	0.33	306	-13.75***	19.14***
Firm-specific variables														
Age	9.00	14.64	16.75	1543	9.00	14.46	16.71	1377	10.00	16.20	17.03	166	-2.88***	1.67*
Price/sales	6.37	85.19	278.95	936	6.03	81.18	274.50	802	9.88	100.78	282.70	134	-2.86***	-0.77
Return on assets	-0.03	-0.24	0.86	1628	-0.03	-0.24	0.88	1509	-0.01	-0.13	0.41	119	-0.64	-2.41**
Debt ratio	0.52	0.69	1.52	1650	0.53	0.70	1.54	1509	0.43	0.61	1.03	141	-3.10***	0.82
Revenue	55.14	644.63	4111.04	1759	58.53	687.47	4312.23	1526	28.86	355.39	2322.38	233	-2.31**	1.75*
Total assets	204.38	1556.35	9696.27	1791	215.58	1651.63	10161.00	1526	104.38	658.90	2509.23	265	-5.70***	3.04***
Sector-specific variables														
Sector valuation	18.70	28.12	46.95	2024	18.30	27.17	41.03	1754	20.20	33.81	72.88	264	-4.64***	-1.46
Sector return	0.11	0.11	0.12	2130	0.10	0.10	0.10	1826	0.14	0.18	0.18	306	-7-20***	-7.21***
Sector leader return	0.10	0.12	0.22	2130	0.09	0.11	0.15	1826	0.13	0.22	0.42	306	-4.33***	-4.48***

The table presents summary statistics on our sample of IPOs and SPAC mergers. The median, mean, standard deviations and number of observations for all variables are included. In addition, we extract values of the t-test and the Wilcoxon-Mann-Whitney (WMW) test that we run to compare the different variables between IPOs and the SPAC acquisitions. The data consists of 2136 observations in total. Some of the variables contains fewer datapoints, which is reflected in column "N". All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively.

5.1.3 Correlation matrix

In Table 5, we present a pairwise correlation matrix of the variables to be used in the regression. All variables are defined in Table 3. The table indicates statistical significance at the 10%, 5% and 1% levels. The highest correlation in our table is between sector return and sector leader return, and revenue and total assets, which amount to 56% and 45%, respectively. Based on the correlation table, we view that multicollinearity should not affect our multivariate tests. If we remove revenue from our regression, the results will not change much.

Table 5. Correlation matrix

	VIX index	BofA high-yield index	P/E S&P 500 index	Equity share	Time to resolution	PE or VC backed	Age	Price/sales	Return on assets	Debt ratio	Revenue	Total assets	Sector valuation	Sector return	Sector leader return
VIX index	1.00														
BofA high-yield index	0.31***	1.00													
P/E S&P 500 index	0.38***	0.08***	1.00												
Equity share	0.25***	0.15***	0.23***	1.00											
Time to resolution	0.05**	0.19***	-0.17***	0.01	1.00										
PE or VC backed	-0.05**	0.17***	-0.13***	-0.04*	-0.12***	1.00									
Age	-0.04	0.19***	-0.08***	0.00	0.01***	-0.04	1.00								
Price/sales	-0.01	-0.06*	0.01	0.03	0.07**	-0.02	-0.08**	1.00							
Return on assets	0.04*	0.04	0.02	0.08***	0.02	0.01	0.15***	-0.25***	1.00						
Debt ratio	-0.05*	0.01	0.04	-0.02	0.04	-0.09***	0.03	-0.07**	-0.45***	1.00					
Revenue	0.04*	0.06**	-0.03	0.04*	0.03	0.01	0.21***	-0.04	0.05**	0.01	1.00				
Total assets	-0.01	0.02	-0.02	0.01	0.03	-0.04*	0.26***	-0.05	0.05*	0.01	0.45***	1.00			
Sector valuation	0.00	-0.09***	0.05**	-0.04*	-0.05**	0.02	-0.06**	-0.06*	0.00	0.00	-0.04	-0.03	1.00		
Sector return	0.15***	-0.24***	0.26***	0.17***	0.04	-0.11***	-0.05**	0.13***	0.02	0.03	0.01	0.01	0.01	1.00	
Sector leader return	0.08***	-0.03	0.18***	0.03	0.05*	-0.07***	0.03	0.10***	0.04	0.01	0.02	0.01	0.04*	0.56***	1.00

This table presents a pairwise correlation matrix of the variables to be used in the analysis of the SPAC acquisition and IPOs executed in the period of 3rd quarter 2010 to November 1st 2021. The variables are defined in detail in Table 3. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively.

5.1.4 Methodology

In order to model the likelihood of a SPAC acquisition relative to traditional IPOs, we use a logistic regression (logit model) with the dependent variable P(SPAC), which is a binary variable. It equals 1 if the operating company is listed through a SPAC merger and 0 for IPOs. In finance literature, the logit model is commonly used when the dependent variable is categorised as binary. There are various assumptions made in order to apply a logistic regression. First, logistic regressions require a relatively large sample size. Second, the regressions require independent observations. Third, there should be no outliers, which in this paper is solved by winsorizing most of the deal/firm specific variables. Finally, there should be low correlation levels among the variables, which is assessed by using a pairwise correlation matrix. Furthermore, we apply a probit regression (Table 13) as robustness check to our logistic regression. The probit regression showcased similar results as our logistic regression, indicating a robust regression output. The assumptions made when applying a probit model are similar to the assumptions associated with logistic regressions.

5.1.5 Main Results of Logistics Regression

In Table 6, we present the marginal effects and the standard errors of our regression in the likelihood of a SPAC acquisition relative to an IPO. We present our main specification in regression (4). Looking through our market-specific variables, we note that all variables are significant in our first specification (1). The market-related variables remain significant and have the same direction of the coefficients, looking at our specification (4). The regression shows that when market volatility increases, the overall likelihood of a SPAC, relative to a traditional IPO, will also increase. This gives indications that it may be more difficult to access public markets through a traditional IPO when market conditions are harsher. SPACs have already completed a large portion of their funding when raising money in a SPAC IPO, which might explain some of the ability to access targets in more volatile markets. Secondly, the SPAC sponsor needs to follow a certain timeline for completing its business combination, which might make it tougher to time market conditions. Further, sponsors usually give up a

sizable part of their pre-determined compensation, especially in weak deals, to successfully close a merger (Ritter et al., 2021).[9]

When debt becomes more expensive, the likelihood of SPAC acquisitions is lower. This supports the statement that SPAC companies are somewhat dependent on debt financing to finance the merger of a SPAC acquisition and supports our initial view that the sponsors are considering debt terms when choosing the optimal way of funding their targets. This is consistent with the observations of Lewellen (2009), which documented that several of the previous-generation SPACs utilised debt financing when acquiring new targets. The equity share of total new issues is also negatively correlated with completing an acquisition. This could also be related to the fact that IPOs have the largest deal equity sizes. Thus, traditional IPOs might be more dependent on the sentiment of the equity capital transaction market to complete a deal. Furthermore, the P/E ratio of S&P 500 shows significance with a positive coefficient. This could support the view that SPACs are claimed to be a faster way to access a public market valuation.

In our main specification (4), both of our deal-related variables show statistical significance. The time to resolution shows that SPACs take a longer time from the public announcement until the operating company is listed at the stock exchange. However, it is important to consider that the merger negotiations and time to obtain deal terms are claimed to be less time-consuming than the overall IPO preparations (Bazerman, 2021). We believe it is likely that the proxy vote causes delays in the process of completing the proposed business combination. The longer public process could also be a reason why the SPAC is less focused on timing the market sentiment when presenting the public announcement.

Our deal-specific variables also show that companies with PE or VC involvement are more likely to use the traditional IPO route. The variable is reliably different from zero in both our specifications (2) and (4) The natural logarithms of revenue and total assets are significant at a 5% level in our regression of deal- and firm-specific variables. As both are a measure of size, it is puzzling that the coefficients point in different direction. While an increase of assets showcases an increased likelihood of a SPAC relative to an IPO, lower revenue makes it more likely to be a SPAC. A possible explanation is that we measure the total assets after the

[9] In their sample, sponsors on average forfeit 18% of their common share promotes and 20% of their private placement warrants

proposed business combinations have been completed. Because of the merger, most SPACs need to include goodwill related to the difference in the purchase price and the book value of equity of the target prior to the transaction. However, traditional IPOs might also inherent intangibles assets that are not reflected in the book value of assets.

The sector-specific variables show limited explanatory power in specification (3). Sector valuation shows significance at a 5% threshold and sector leader return shows significance at a 1% threshold. This is in line with our expectations that operating companies take advantage of favourable sector sentiment when considering the SPAC listing method. As previously evidenced, some EV companies have likely taken advantage of the favourable sentiment of Tesla when considering their pathway to the public market. In our main specification, the sector return is also significant, although with a negative coefficient. This weakens the view that the sector leader return is more important for the likelihood of considering a SPAC. Because the variable was not significant in our specification (3), we do not consider this finding to be as robust as the sector leader return.

In summary, all our variables are significant in our main specification apart from age and sector valuation. The regression in our main specification indicates that SPAC mergers are more likely, relative to traditional IPOs, in somewhat rougher market conditions. This supports the claim that SPACs are a means of gaining valuable certainty in deals and terms, which shows the relative strength of SPACs versus IPOs during times of higher volatility. Furthermore, the regression gives an indication that valuation of the market and the return performance of the sector leader gives an increased likelihood of a SPAC acquisition, which might be attributable to the perceived relative faster process of going public through a SPAC merger. Although there is an option to cash out in a SPAC merger, the entity does not seem to attract VC or PE firms for an exit. It might be that the SPAC process is too unproven for the companies to use it in a broad fashion, or that the capital managers want to prioritise their reputation or the signalling effect. The SPAC route further seems to favour companies with lower revenue, which might be attributable to the ability to give forward-looking statements and comments about future financials in connection with the merger completion. The pseudo r-squared shows a level of 51% in our main specification, which shows a high explanatory power of our model.

Table 6. Likelihood of a SPAC acquisition

	(1) Market-specific variables	(2) Deal/firm-specific variables	(3) Sector-specific variables	(4) Main specification
VIX index	0.119***			0.082***
	(12.729)			(3.537)
BofA high-yield index	-1.062***			-0.872***
	(-12.811)			(-3.368)
P/E S&P 500 index	0.107***			0.329***
	(11.163)			(6.745)
Equity share	-44.802***			-58.921***
	(-11.643)			(-6.009)
Time to resolution		0.002		0.011***
		(1.544)		(7.971)
PE or VC backed		-2.403***		-2.020***
		(-3.810)		(-5.550)
Age		0.007		0.010
		(0.526)		(1.356)
Price/sales		-0.008		
		(-1.037)		
Return on assets		0.352		
		(0.476)		
Debt ratio		0.355		
		(0.817)		
Ln(revenue)		-0.526**		-0.137**
		(-2.207)		(-2.438)
Ln(total assets)		0.592**		0.177**
		(2.562)		(2.055)
Sector valuation			0.002**	0.004
			(2.224)	(1.526)
Sector return			-0.944	-6.734***
			(-1.549)	(-4.263)
Sector leader return			2.023***	2.842***
			(6.688)	(3.740)
Constant	4.405***	-3.648***	-2.095***	-2.451
	(7.319)	(-3.851)	(-23.157)	(-1.152)
N	2136	669	2128	1326
Pseudo R-sq	0.24	0.19	0.06	0.51

This table presents the marginal effects and the standard errors of our regression in the likelihood of a SPAC acquisition relative to an IPO. To model the likelihood of a SPAC acquisition relative to traditional IPOs, we use a logistic regression with the dependent variable P(SPAC), which is a binary variable. It equals 1 if the operating company is listed through a SPAC merger and 0 for IPOs. Specification (1), (2) and (3) includes market-specific, deal/firm-specific and sector-specific variables. The main specification is presented in regression (4) and includes all variables except price/sales, return on assets and debt ratio due to shortage of observations. Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include number of observations (N) and Pseudo R-squared (R^2)

5.2 Evaluation of performance

Further, we investigate how IPO and SPAC firms perform over time. Our analysis is so far consistent in that companies tend to use the SPACs in times of high valuation, but less dependent on favourable market environment than traditional IPOs. The analysis also gives indications that companies with lower revenue increase the likelihood of a SPAC merger. In

the evaluation of performance, we will first present monthly abnormal returns before we show a month over month analysis of our different portfolios. Further we will evaluate the portfolios using a Fama French five-factor model with momentum (Fama et al., 1993). Firstly, we will explain the portfolio construction.

5.2.1 Portfolio construction

Data of monthly share prices for IPOs, warrants and SPACs are extracted from Refinitiv Eikon Datastream. We create four portfolios based on different time-periods. The time periods are 6 months, 12 months, 24 months, and all post-merger dates of our sample. A company is added to the portfolio after a successful completion of a SPAC merger, or after going public through an IPO. Our sample period starts in March 2013 to have at least two SPAC observations in each month to form a portfolio. Firms are further added to the portfolio in the following month after a business combination. The portfolio is rebalanced every month. The equal-weighted is rebalanced equally among all companies in the portfolio, while the value-weighted portfolio is rebalanced based on market capitalization of the companies. The company stays in the portfolio for 6, 12, 24 months or to the end of our sample set based on the according portfolio, unless the company is delisted at an earlier point. Our sample period ends on the last trading day of October 2021, thus forming 104 monthly portfolios. While we use regular prices for warrants, since the security class does not pay a dividend, we use adjusted prices for dividends for common shares. We use both equal- and value-weighted portfolios in our evaluation of performance study. As we have limited data on the warrants outstanding, we use the market capitalisation of the common stock as a proxy to create value-weighted warrant portfolios. The return characteristics of our SPAC and warrant sample, based on the year of merger completion, is showcased in Table 18 in our appendix.

5.2.2 Buy-and-hold abnormal returns

In Table 7 we show the buy-and-hold abnormal returns for our value-weighted portfolios. We choose to emphasize our results in the value-weighted portfolios, as this is more similar to how investors would invest their own portfolios. We determine abnormal returns for IPO firms as well as the SPAC firms adjusted for the overall market performance. We use the market portfolio from Kenneth R. French´s Data Library (French, 2021). The number of observations differs between our SPAC common shares and SPAC warrants as showcased in Table 7. The reason is that in some cases we were only able to obtain reliable data on company warrants and

not common share prices. We measure value-weighted portfolios with periods of 6, 12, 24 months and for all dates. As we see in Table 7, both the median and mean have negative monthly abnormal returns for SPACs and IPOs. For SPAC warrants, the portfolio shows positive monthly abnormal returns in the sample period.

Figure 4. BHAR for value-weighted portfolios

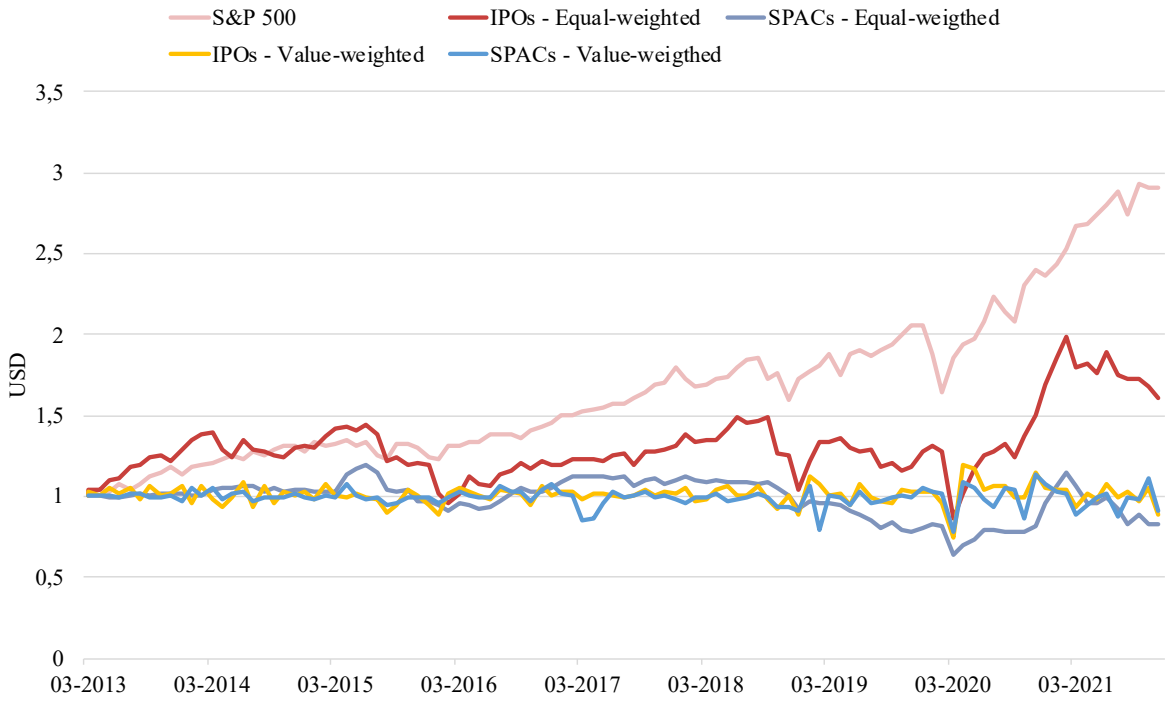
	SPACs				IPOs				SPAC warrants			
	Median	Mean	Stdev	N	Median	Mean	Stdev	N	Median	Mean	Stdev	N
6 months	-1.21%	-0.91%	5.17%	271	-1.34%	-1.09%	6.39%	1514	0.24%	6.10%	24.20%	286
12 months	-1.50%	-0.89%	6.38%	271	-0.43%	-0.29%	5.15%	1514	1.17%	9.00%	35.10%	286
24 months	-1.26%	-1.13%	5.19%	271	-0.44%	-0.31%	4.28%	1514	1.94%	8.17%	21.89%	286
All dates	-1.01%	-2.08%	5.15%	271	0.07%	-0.17%	3.08%	1514	1.46%	3.87%	13.32%	286

This table presents median, mean, standard deviation and the amount of the value-weighted portfolios SPACs, IPOs and SPAC warrants executed in the period of March 2013 to November 1st, 2021, over 6, 12, and 24 months, and all dates. Our sample period ends the last trading day of October 2021, thus forming 104 monthly portfolios. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings

5.2.3 Month over month analysis

Figure 4 shows how one dollar invested in the S&P 500 index would return compared to an equally weighted and value-weighted portfolio of traditional IPO issues and post-merger SPACs between March 1st, 2013 and November 1st, 2021. The SPAC portfolio only reflects common shares, as we do not have reliable data on the warrants distributed per unit for our entire sample to calculate unit returns. However, we provide a sperate month over month analysis for warrants in Figure 5. While the portfolio with S&P 500 would have generated $2.91, the equal-weighted IPO portfolio would have resulted in $1.61, and the equal-weighted SPAC portfolio would have generated $0.82. Our value-weighted IPO and SPAC portfolio have however performed overall quite similar. The value-weighted IPO portfolio would have generated $0.89, while the SPAC portfolio would have generated $0.91. It should be mentioned that because of our start date of March 1st, 2013, we have not included the IPO of Tesla and Facebook in our sample. These companies were listed in 2010 and 2012 respectively and would have been strong contributors for the value-weighted IPO portfolio. The equal-weighted IPO portfolio perform better than the value-weighted IPO portfolio, which indicates that smaller firms generate higher returns. This is consistent with the research of Fama and French (1993). However, we do not observe the same relationship for our SPAC portfolios.

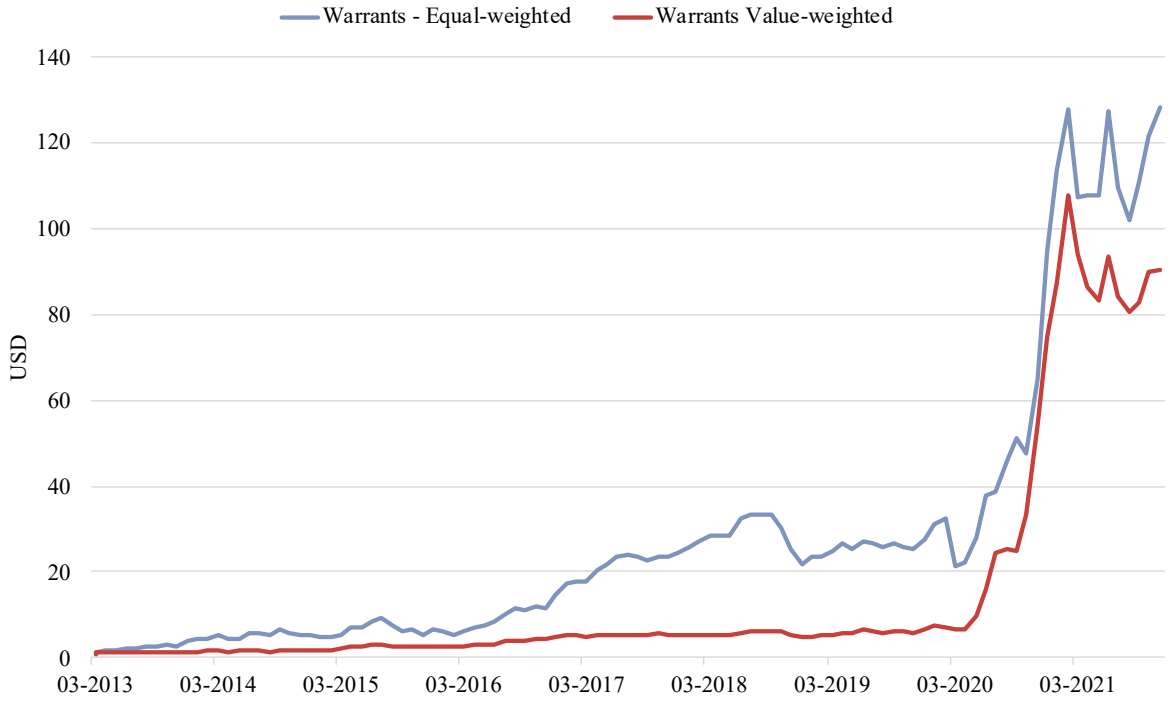
Figure 4. Month over month analysis of the total SPAC and IPO samples



The figure presents the month over month analysis of one dollar invested on March 1st, 2013 and held until 30th of November 2021. The samples are composed of U.S. SPAC common shares and IPOs from the same period. Companies are added to the portfolios after a completed merger/IPO issue. The S&P 500 index reflects the adjusted closing price (for dividends and stock splits) in the same period.

Furthermore, we show the performance of our portfolios for SPAC warrants in Figure 5. Figure 5 shows that one dollar invested in the warrant portfolio would create substantial terminal wealth in the period. A dollar invested in the equal-weighted portfolio of warrants would give a value of $128.2, while a similar investment in the value-weighted portfolio would result in $90.6. As shown in figure 5, the warrants in our sample provided strong returns during the second half of 2020. During this period, SPACs usually traded above their initial trust value of $10 (Klausner et al.,2021), and redemptions ratios were close to 0%. This may give indications of an overall strong sentiment for SPACs.

Figure 5. Month over month analysis of the total warrant samples



The figure presents the month over month analysis of one dollar invested on March 1st, 2013 and held until 30th of November 2021. The samples are composed of U.S. SPAC warrants from the same period. New warrants are added to the portfolios after a completed SPAC merger.

5.2.4 Fama French Five-Factor Model

We download monthly values of the five Fama-French factors and the momentum factor (Cahart, 1997) from Kenneth R. French´s Data Library (French, 2021). Asset pricing models usually provide the best results when the portfolios are well diversified. We acknowledge that this might not continually be the case in our portfolios. This is especially relevant in the first months of our portfolios with shorter duration, and for the SPAC and warrant sample. We use both equal- and value weighted portfolios.

Further, we regress monthly calendar portfolio excess returns towards the Fama French 5-factor model with momentum following this specification:

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + m_i MOM_t + e_{it}$$

Where R_{it} is the return on the portfolio and R_{ft} is the return of the risk-free asset, α_i showcases the portfolio excess return, R_{mt} is the market return, SMB_t shows the difference between a portfolio of small firms and a portfolio of large firms, the HML_t factor shows the difference between the return on high book-to-market and low book-to-market stocks, RMW_t is the difference between the returns of firms with robust and weak operating profitability, CMA_t is

the difference between the returns of firms that invest conservatively and firms that invest aggressively and MOM_t is the difference between the return on high prior return portfolios and low-prior return portfolios.

We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs and (5)-(8) for IPOs. Our results from the value-weighted portfolios indicates that common SPAC shares underperforms the index by -1.49% per month considering all dates. As several research previous papers document, we find that IPO firms tend to underperform the overall market (Ritter, 1991). Both the portfolios of SPACs and IPOs are positively exposed to the market. This is in line with our expectations since there tend to be more listings during strong market environments. It is worth mentioning that beta to market is relatively low, which is puzzling. However, the beta is at the highest value in our portfolio including all dates in specification (4). Our portfolios for the IPOs have a positive tilt towards SMB, given that relatively small firms tend to go public. Both the SPAC and the IPO portfolios show a positive tilt towards the value factor (HML), which is somewhat surprising given that the new listings tend to be more growth oriented. This positive tilt is stronger for SPAC portfolios compared to the IPO portfolios. The adjusted explanatory power amounts to 40% when including all dates, while it amounts to 79% in our IPO portfolio including all dates.

Table 8. Factor regressions – value-weighted SPAC and IPO samples

	SPACs				IPOs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	6 months	12 months	24 months	All dates	6 months	12 months	24 months	All dates
Intercept (alpha)	-0.525	-0.389	-0.973	-1.490**	-1.976**	-1.176*	-1.248**	-1.149**
	(-0.740)	(-0.493)	(-1.346)	(-1.995)	(-2.570)	(-1.899)	(-2.267)	(-2.486)
Mkt-RF	0.454***	0.325*	0.697***	0.807***	1.433***	1.410***	1.386***	1.319***
	(2.978)	(1.915)	(4.494)	(5.030)	(8.682)	(10.606)	(11.732)	(13.290)
SMB	0.325	0.330	0.313	0.315	1.112***	1.058***	1.002***	0.885***
	(1.235)	(1.126)	(1.169)	(1.139)	(3.901)	(4.607)	(4.912)	(5.167)
HML	0.616***	0.534**	0.435*	0.758***	-0.092	-0.071	-0.030	0.310**
	(2.744)	(2.137)	(1.905)	(3.211)	(-0.380)	(-0.361)	(-0.173)	(2.124)
RMW	-0.062	-0.548	-0.479	-0.474	-0.676*	-0.490	-0.134	0.032
	(-0,165)	(-1.319)	(-1.261)	(-1.207)	(-1.672)	(-1.504)	(-0.465)	(0.132)
CMA	-0.379	-0.373	-0.156	-0.190	-0.261	-0.137	-0.375	-0.385
	(-0.948)	(-0.837)	(-0.384)	(-0.452)	(-0.602)	(-0.393)	(-1.207)	(-1.479)
Mom	9.014	8.895	7.022	-2.972	4.687	4.957	5.114	9.059*
	(1.125)	(0.998)	(0.861)	(-0.353)	(0.540)	0.709	(0.824)	(1.737)
Adjusted R-sq	0.23	0.14	0.29	0.40	0.62	0.70	0.74	0.79

This table presents monthly values of the five Fama-French factors and the momentum factor from Kenneth R. French´s Data Library. We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs and (5)-(8) for IPOs. The independent variables represent the market excess return (Mkt-FR), the difference between returns on small and large firms (SMB), the difference between returns on a high book-to-market stock portfolio vs a low book-to-market stock portfolio (HML), the difference between the returns of firms with robust and weak operating profitability (RMW), the difference between the returns of firms that invest conservatively and firms that invest aggressively (CMA), and the difference between the return on high prior return portfolios and low prior return portfolios (Mom). Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include adjusted R-squared (R^2).

Our analysis further includes a hedged portfolio. A hedged portfolio consists of a long position in a SPAC value-weighted portfolio and a short-position in an IPO value-weighted portfolio. The portfolio is thus re-based every month. The results does not reliably tell that SPACs underperform IPOs since the alphas are not significant. The portfolio has a positive tilt towards the HML factor, indicating it is exposed towards high-book-to-market firms. This would suggest that the SPACs are more exposed to the value factor than the traditional IPOs.

Lastly, we have performed a similar analysis based on warrant returns. In our warrant samples, all intercepts are significant at a 1% threshold except the portfolio for 6 months. This means that alpha is significantly different from zero in all periods. The warrants showcase strong outperformance ranging from 6.1% to 13.2% every month. This is consistent with the strong return calculations in the sample showcased by Ritter et al. (2021). Although their paper to not evaluate warrants through an asset-pricing model. Our analysis also shows that warrants are reliably exposed to the market. This is not surprising as the underlying security showcases similar results. However, we would expect a higher beta for the warrant sample given the strong outperformance. Lastly, we want to emphasise that the average trading volume is lower in most of the warrants than the common shares to which they are exposed. This may have an effect in our results.

Table 9. Factor regressions – value-weighted hedged portfolio and warrant samples

	SPACs-IPOs				SPAC warrants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	6 months	12 months	24 months	All dates	6 months	12 months	24 months	All dates
Intercept (alpha)	0.787	0.124	-0.388	-1.004	6.147*	13.181***	10.180***	4.978***
	(0.783)	(0.132)	(-0.518)	(-1.313)	(1.889)	(2.793)	(3.479)	(2.767)
Mkt-RF	-0.740***	-0.847***	-0.450***	-0.273*	0.953	0.508	1.073*	1.087***
	(-3.425)	(-4.190)	(-2.799)	(-1.665)	(1.365)	(0.502)	(1.708)	(2.815)
SMB	-0.506	-0.448*	-0.409	-0.290	1.536	-0.552	1.542	1.305*
	(-1.357)	(-1.284)	(-1.472)	(-1.022)	(1.273)	(-0.315)	(1.421)	(1.956)
HML	1.164***	1.060***	0.920***	0.903***	1.024	1.448	0.504	-0.066
	(3.658)	(3.560)	(3.885)	(3.734)	(0.995)	(0.970)	(0.545)	(-0.115)
RMW	0.955*	0.283	-0.004	-0.165	-0.493	-3.106	-1.341	-0.495
	(1.805)	(0.571)	(-0.011)	(-0.411)	(-0.288)	(-1.252)	(-0.872)	(-0.524)
CMA	-0.036	-0.153	0.300	0.277	-2.006	-2.850	-0.623	0.545
	(-0.064)	(-0.289)	(0.711)	(0.643)	(-1.127)	(-1.071)	(-0.378)	(0.537)
Mom	9.867	9.478	7.448	-6.491	-0.928	-62.622	-36.893	-22.134
	(0.869)	(0.893)	(0.881)	(-0.752)	(-0.025)	(-1.176)	(-1.117)	(-1.090)
Adjusted R-sq	0.28	0.26	0.25	0.19	0.06	0.00	0.10	0.18

This table presents monthly values of the five Fama-French factors and the momentum factor from Kenneth R. French´s Data Library. We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs-IPOs and (5)-(8) for SPAC warrants. The independent variables represents the market excess return (Mkt-FR), the difference between returns on small and large firms (SMB), the difference between returns on a high book-to-market stock portfolio vs a low book-to-market stock portfolio (HML), the difference between the returns of firms with robust and weak operating profitability (RMW), the difference between the returns of firms that invest conservatively and firms that invest aggressively (CMA), and the difference between the return on high prior return portfolios and low prior return portfolios (Mom). Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include adjusted R-squared (R^2).

We find the deviation in results between SPAC common shares and warrants interesting. Warrants naturally exhibit a greater underlying risk, which thus should reflect a higher return potential. However, our Fama French analysis showcases a strong persistent outperformance of warrants using a longer period, while the common shares, using all dates, receive the opposite result.

A possible explanation could be that the warrant is undervalued in the inherent structure in terms of implied volatility. Between the time of the SPAC IPO and the announcement of the proposed target acquisition, the share price should theoretically be close to the intrinsic value of $10 per share, which is downside-protected by the redemption option. As the warrant and common shares start to reflect the volatility of the underlying operating business, the inherent volatility of the security could increase. Combined with a low strike price (usually at $11.5) and a rather long time to maturity, the warrants might be repriced. However, we find the deviation difficult to understand.

We have conducted a similar analysis for equal-weighted portfolios of IPOs, SPACs common shares and SPAC warrants. The results are in Table 16 and Table 17 in our appendix. Overall, we obtain similar results for our warrant samples. However, the coefficients are not significant for our IPO and SPAC sample. We choose to emphasize the analysis of the value-weighted portfolios, as they are more realistic to how investors would invest their portfolios.

5.3 The Determinants of the SPAC Share and Warrant Price Performance

In the previous section, we showcase that the stock returns of the SPAC have performed worse than the market over time, while the SPAC warrants outperformed the market. In this section we want to exploit the determinants of the SPAC returns to see if there are any factors that can predict the differences in returns between the different business combinations.

5.3.1 Description of Variables

For this section, we use several of the variables from our previous analysis, and further add deal-specific variables that are relevant for SPAC mergers but not applicable for the traditional IPOs.

We include the market- and sector-specific variables displayed in Table 3. This includes the VIX index, BofA high-yield index, P/E ratio of the S&P 500 index and equity share of total new issues as market variables. In this regression, we remove the time-lag from the variables which we included in the regression of likelihood of a SPAC. While a time-lag makes sense when determining the potential listing route, we believe it would not make sense when regressing on returns. We further include sector valuation and sector leader return as variables. We remove the time lag for these variables as well for the same reason as for our market-specific variables. We remove sector return, to remove the possibility of multicollinearity. We exclude all the firm-specific variables except for the natural logarithm of total assets (size). The reasoning is to have a larger number of observations available for our returns, and that we believe several of the firm-specific variables are not that relevant to explain the return dynamics of the post-merger SPAC. We keep PE/VC involvement and time to resolution as deal-specific variables.

The first of the new variables that we add to our regression is the redemption ratio of the SPAC merger. As previously explained, the redemption ratio is at the core of the calculation of the dilutive cost of a SPAC. A high redemption ratio also provides a signalling effect that the shareholder views the proposed business combination as unfavourable. The redemption ratio can thus be used as a proxy for the quality of the proposed merger (Jenkinson et al, 2012). We would expect SPAC mergers with high redemption ratios to perform worse than SPAC mergers with low redemption ratios. Low redemption ratios would give an indication that SPAC shareholders have positive views of the prospects for the new merged company.

Secondly, we add the months from the SPAC IPO until the sponsors have identified a suitable target. The sponsors usually have 18-24 months to identify a target. When approaching the end of the timeline, sponsors may push for low-quality firms because if the SPAC ends up being liquidated, their initial investments and promote will end up without value.

Thirdly, we include a ratio showcasing the enterprise value of the target company relative to the initial IPO proceeds. If a SPAC only acquires a smaller stake of the total business combination, the high cost of dilution will be a relatively smaller share of the post-merger market capitalisation of the new company. We would expect companies with higher cost of dilution to perform worse, if the market has not discounted the full cost of dilution at the time of merger.

We show summary statistics of our variables in the appendix in Table 14. The median IPO in our sample has a redemption rate of 46% and an average redemption ratio of 44%. While the redemption ratio indicates a certain scepticism towards the proposed merger candidate, our samples showcase a somewhat lower redemption ratio compared to Klausner et al. (2020). The median EV of the business combination is 3.78x as large as the proceeds from the SPAC IPO and 4.04x on average. There are two main explanations of the material difference between enterprise value and IPO proceeds. Firstly, the SPAC company usually does not buy 100% of the shares in the operating company. Secondly, the SPAC relies somewhat on funding sources other than IPO proceeds such as the debt market and PIPE transactions. The median time from IPO to announcement date is approximately 8 months while the mean is approximately 11 months. Both characteristics are comfortable within the usual 24-month timeline.

In Table 15 in our appendix, we present the correlation matrix for the new regression. It is low correlation between most of our variables although equity share, and cost of debt shows a correlation. However, when excluding either of the variables our results does not change much.

5.3.2 Main results

We present our findings in Table 10 for common shares and Table 11 for warrants. The regression output in Table 10 has 3-months and 1-year deSPAC returns as the dependent variables, while Table 11 has 3 months and 1 year warrant deSPAC returns.

Table 10. Traits and characteristics that determine the return of a SPAC

	3 months common stock return				1 year common stock return			
	(1) Market-specific variables	(2) Deal/firm-specific variables	(3) Sector-specific variables	(4) Main specification	(5) Market-specific variables	(6) Deal/firm-specific variables	(7) Sector-specific variables	(8) Main specification
VIX index	-0.002			-0.013***	0.010			0.036**
	(-0.536)			(-2.894)	(1.174)			(2.347)
BofA high-yield index	0.145***			0.304***	-0.177*			-0.629**
	(3.756)			(4.385)	(-1.809)			(-2.610)
P/E S&P 500 index	0.019***			0.034***	-0.009			-0.009
	(3.974)			(4.634)	(-0.687)			(-0.364)
Equity share	0.738			4.485**	-2.806			-50.813***
	(0.721)			(2.595)	(-0.708)			(-3.278)
Time to resolution		-0.001**		-0.001		0.001		0.000
		(-2.077)		(-1.073)		(0.477)		(-0.031)
PE or VC backed		-0.033		0.016		0.199		0.297
		(-0.464)		(0.239)		(1.079)		(1.519)
Redemption rate		-0.270***		-0.115*		-0.188		-0.408*
		(-4.247)		(-1.700)		(-1.048)		(-1.995)
EV to SPAC IPO		-0.026***		-0.018**		0.005		-0.001
		(-3.045)		(-2.135)		(0.186)		(-0.032)
Ln (months to acquisiton)		0.061		0.024		-0.220*		-0.280**
		(1.576)		(0.600)		(-1.924)		(-2.321)
Ln(total assets)		0.002		-0.015		0.033		0.048
		(0.091)		(-0.890)		(0.813)		(1.193)
Sector valuation			-0.001	0.000			0.001	0.001
			(-1.100)	(-0.187)			(1.269)	(1.174)
Sector leader return			0.082	-0.059			0.335	0.097
			(0.944)	(-0.618)			(1.287)	(0.286)
Constant	-1.351***	0.244	0.026	-2.573***	1.323	0.398	-0.117*	8.418***
	(-3.673)	(1.364)	(1.199)	(-4.031)	(1.504)	(0.914)	(-1.853)	(3.527)
N	279	169	241	141	148	69	135	61
R-sq	0.13	0.19	0.02	0.36	0.03	0.16	0.02	0.42
Adjusted R-sq	0.11	0.16	0.00	0.30	0.00	0.08	0.01	0.27

This table models the traits and characteristics that determine the return of a SPAC by using an ordinary least square (OLS) regression with 3-months common stock return and 1-year common stock return as dependent variables. Specifications (1) and (5), (2) and (6), and (3) and (7) include the market-specific, deal/firm-specific and sector-specific variables, respectively, towards the 3-months and 1-year post-merger returns. (4) and (8) include main specification for both post-mergers return periods. Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include number of observations (N), R-squared (R^2) and adjusted R^2.

In Table 10 specification (1), we showcase the market specific variables towards the 3- months and 1-year post-merger returns. Both the cost of debt and P/E ratio of S&P 500 show significance at 1% level. In our main specification, regression over the 3-months returns shows that a higher cost of debt and equity share of total new issues is correlated with producing stronger deSPAC returns. When looking at our main specification in the 1-year return, the coefficient turns negative. In other words, a lower cost of debt and a more dampened equity transaction market should provide stronger common stock returns. However, the explanatory power of the market-based specification is rather low in the 1-year return data. We believe the likely explanation is that the longer the return horizon, the less relevant are market-specific variables at the time of business completion. The direction of the coefficients in the 3-months

return regression is thus likely to have a more realistic explanation of the importance of market-related variables.

In specification (2) and (4), we find the same results as presented by Jenkinson and Sousa (2011). They show that high redemption ratios predict underperformance of the SPAC returns. The redemption ratio shows a stronger significance for 3 month returns. Furthermore, our Ln(months) variable shows in specification (6) and (8) that the longer it takes to complete an acquisition, the lower the subsequent deSPAC period return. Thus, we also achieve the same findings as presented by Dimitrova (2017). The variable predicts that a longer time to identify a target predicts lower one-year deSPAC returns. As mentioned previously in the paper, the sponsor is heavily incentivised to complete an acquisition, which might lead to rushed deals with mediocre companies towards the end of the deadline. Our sector-specific variables seem to have low explanatory power towards the results. A probable reasoning might be the fact that the returns of the sector-leader for the past six months leading up to the closing of the business combination is already priced into the deal terms of the merger.

When we include all variables in our main specification, the adjusted explanatory power of the regression increases to 30% for our 3-months regression and 27% for our 1-year common stock regression. Both regressions shows that the redemption ratio is significant at a 10% level. Additionally, the 1-year common stock regression retrieves 5% significance level on months to acquisition. Our constant in both regression is significant at a 1% threshold.

Table 11. Traits and characteristics that determine the return of a warrant

	3 months warrant return				1 year warrant return			
	(1) Market-specific variables	(2) Deal/firm-specific variables	(3) Sector-specific variables	(4) Main specification	(5) Market-specific variables	(6) Deal/firm-specific variables	(7) Sector-specific variables	(8) Main specification
VIX index	-0.010			-0.041***	0.032			0.207***
	(-0.883)			(-2.729)	(0.975)			(2.931)
BofA high-yield index	0.583***			0.847***	-0.307			-3.289***
	(4.536)			(3.708)	(-1.757)			(-2.951)
P/E S&P 500 index	0.053***			0.084***	-0.087*			-0.118
	(3.318)			(3.482)	(-1.670)			(-1.052)
Equity share	8.444**			14.553**	27.889			-145.550**
	(2.475)			(2.557)	(1.604)			(-2.029)
Time to resolution		-0.003*		-0.002		-0.003		-0.007
		(-1.838)		(-1.145)		(-0.608)		(-1.337)
PE or VC backed		-0.133		0.024		1.039		1.543*
		(-0.654)		(0.112)		(1.289)		(1.703)
Redemption rate		-0.726***		-0.389*		0.333		0.040
		(-3.952)		(-1.746)		(0.424)		(0.042)
EV to SPAC IPO		-0.043*		-0.034		0.049		-0.037
		(-1.749)		(-1.230)		(0.421)		(-0.280)
Ln (months to acquisiton)		0.177		0.072		-1.310**		-1.571***
		(1.584)		(0.551)		(-2.619)		(-2.817)
Ln(total assets)		0.051		0.027		-0.046		0.002
		(0.991)		(0.496)		(-0.262)		(0.010)
Sector valuation			-0.001	0.000			-0.001	0.004
			(-1.419)	(-0.341)			(-0.055)	(0.853)
Sector leader return			0.130	-0.247			-0.085	0.059
			(0.436)	(-0.783)			(-0.078)	(0.038)
Constant	-5.124***	0.365	0.280***	-7.212***	1.884	4.611**	0.978***	37.273***
	(-4.216)	(0.704)	(3.666)	(-3.431)	(0.517)	(2.424)	(3.647)	(3.375)
N	274	169	237	141	144	69	131	61
R-sq	0.11	0.16	0.01	0.27	0.04	0.14	0.00	0.34
Adjusted R-sq	0.09	0.13	0.00	0.20	0.01	0.06	-0.02	0.16

This table models the traits and characteristics that determine the return of a SPAC by using an ordinary least square (OLS) regression with 3-months warrant return and 1-year warrant return as dependent variables. Specifications (1) and (5), (2) and (6), and (3) and (7) include the market-specific, deal/firm-specific and sector-specific variables, respectively, towards the 3-months and 1-year post-merger returns. (4) and (8) include main specification for both post-mergers return periods. Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include number of observations (N), R-squared (R^2) and adjusted R^2.

In table 11, we see several of the same results as have been present for the SPAC returns. The coefficients of the market-related variables show the same directions as present in our data of common share returns. Related to our discussion of market-related variables above, we believe the regression on the 3-month return provides the more realistic overview of the impact from market-specific variables. We obtain similar results of the time to acquisition and redemption ratio. Longer time to acquisition predicts lower 1-year warrant returns, while a higher redemption ratio predicts lower 3-months return. Both constants in the main specifications are significant at a 1% threshold in these regressions as well.

In summary, we see that market-based variables are an important trait of the determinants of the returns of the SPAC short-term. Moreover, we document that deal-specific variables such as higher redemption ratios and the late timing of proposed business combination predict lower

post-merger SPAC returns. This is in line with the findings of Dimitrova (2017) and Jenkinson and Sousa (2011) towards previous generation SPACs. SPAC-related variables other than the one exhibited in our sample might also play an important role in the prediction of post-merger returns. Other research papers have looked at qualitative factors of the SPAC sponsors that can predict differences in post-merger SPAC returns. Lin et al. (2021). document that well-connected sponsors with a strong network have a higher likelihood of producing better period returns.

6. CONCLUSION

In this section, we summarize our finding and analytical discussion. Further, we include a cautionary comment related to the robustness of the analysis. In this thesis, we have investigated determinants of why companies go public relative to traditional IPOs, alongside analysis of post-merger returns and determinants of the performance. The field has received little scholarly attention, and we contribute to the literature in all three parts of our analysis. We use a sample of 306 special purpose acquisition vehicles and 1830 traditional IPO.

Our first analysis focuses on the likelihood of a SPAC compared to traditional IPOs. We find that SPAC mergers tend to be more likely in harsher market environments when it is likely tougher to access the traditional IPO channel. These findings might reflect that SPACs already have obtained conditional funding through their IPO proceeds, have flexibility to use more funding sources and a sponsor who is highly incentivised to complete a transaction within a certain timeline. Thus, deal certainty may be an important trait for companies choosing to go public through a SPAC merger, aligned with our findings of SPAC mergers showcasing higher robustness in rougher market environments relative to traditional IPOs.

Our analysis further indicates that the valuation of the S&P 500 positively impacts the probability of going public through a SPAC. This might reflect that SPACs might be a faster way for companies to access a public market valuation. The likelihood further increases when the cost of debt is lower, which may reflect that several business combinations in recent years involve syndicated loans as a source of funding. Further SPAC mergers are more likely for companies with lower revenues, which might reflect the ability to give forward-looking statements relative to the traditional IPO process. Moreover, we find that VC and PE involvement is more likely for the traditional IPO processes.

Secondly, we analyse the post-merger performance using month-over-month analysis and comparison of monthly portfolios to Fama French five factor with momentum. We find that our sample of SPAC mergers underperform the market over long time, while our sample of warrants outperform the market. While it is difficult to point to a single explanation for the outperformance, the market seems to undervalue warrants during the merger process. We would encourage future research papers to look further into the deviation between the security classes.

Thirdly, we examine the determinants of post-merger performance of SPACs and warrants. We find that higher redemption ratios and longer time to identify a business combination predict lower post-merger returns.

Lastly, our analysis should be viewed with caution related to the commentaries that the SPAC market might be in a bubble. Our recent cutoff date, combined with a market currently pursuing all-time highs might have an effect of our results. Since most of our SPAC merger examples are extracted from the last two years, we have not been able to stress-test our sample in a long-term bear market.[10] Going forward, it is a highly interesting question as to whether the current SPAC trajectory is sustainable. Negative media coverage and regulatory changes could potentially affect the reputation of the transaction process. SEC Chairman, Jay Clayton, has said that SEC is watching SPACs closely (Ho, 2020). He also said that he aimed to give SPACs the same rigorous disclosure that you get in connection with bringing an IPO to market. The SPAC vehicle might continue to play an important role for companies to access public markets, but future regulations and changes in the structure to align incentives and measures to reduce dilution might make the entity more sustainable.

Furthermore, limitations in the data availability and the short implicit time horizon might also have an effect of our results. To be able to create the regressions, we have had to rely on several data sources and a significant amount of time provided to perform data structuring. As databases get a stronger foothold in SPAC-related metrics, it will probably be easier to perform regressions into the future. Deal-related variables such as warrant tickers and redemption ratios for our samples are largely a product of manual input from SPAC filings.

A SPAC can in many ways be compared to the Kinder Surprise Egg. The chocolate-glazed egg is bought with no idea of what kind of surprise is inside. In comparison, SPAC investors do not know what kind of companies will merge with the vehicle they are buying into, with free warrants as a chocolate glaze. However, a key difference between a SPAC and a Kinder Egg Surprise is that the SPAC investor can get its money back if they are not happy with the proposed business combination, while the buyer of a Kinder Egg cannot replace the Kinder

[10] Although the rapid decline in the equity markets during March 2020 could be viewed as a short-term stress-test of our models.

Surprise toy. For investors that redeem their shares and keep their free warrants, the SPAC can be considered a money-market fund with a Kinder Surprise Egg style option embedded. The post-merger return of the median SPAC have showed an underperformance compared to the market over a time horizon of several years. In that regard, SPACs are Kinder Surprise Eggs with a bad after-taste for those who keep their shares after the merger.

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8. APPENDIX

8.1 Likelihood of a SPAC acquisition (without delays)

Table 12. Likelihood of a SPAC acquisition (without delays)

	(1) Market-specific variables	(2) Deal/firm-specific variables	(3) Sector-specific variables	(4) Main specification
VIX index	0.077***			0.136***
	(5.496)			(4.655)
BofA high-yield index	-1.155***			-2.417***
	(-7.624)			(-6.380)
P/E S&P 500 index	0.075***			0.020
	(4.152)			(0.507)
Equity share	-34.184***			-54.651***
	(-8.712)			(-6.051)
Time to resolution		0.002		0.010***
		(1.544)		(7.950)
PE or VC backed		-2.403***		-2.310***
		(-3.810)		(-5.863)
Age		0.007		0.009
		(0.526)		(1.240)
Price/sales		-0.008		
		(-1.037)		
Return on assets		0.352		
		(0.476)		
Debt ratio		0.355		
		(0.817)		
Ln(revenue)		-0.526**		-0.084
		(-2.207)		(-1.517)
Ln(total assets)		0.592**		0.116
		(2.562)		(1.407)
Sector valuation			0.003***	0.003
			(2.796)	(1.570)
Sector return			4.205***	0.036
			(6.131)	(0.024)
Sector leader return			-0.621	1.342
			(-1.286)	(1.254)
Constant	5.199***	-3.648***	-2.400***	12.683***
	(3.834)	(-3.851)	(-22.109)	(3.997)
N	2136	669	2024	1277
Pseudo R-sq	0.23	0.19	0.03	0.44

This table presents the marginal effects and the standard errors of our regression in the likelihood of a SPAC acquisition relative to an IPO without delays. To model the likelihood of a SPAC acquisition relative to traditional IPOs, we use a logistic regression with the dependent variable P(SPAC), which is a binary variable. It equals 1 if the operating company is listed through a SPAC merger and 0 for IPOs. Specifications (1), (2) and (3) include market-specific, deal/firm-specific and sector-specific variables. The main specification is presented in regression (4) and includes all variables except price/sales, return on assets and debt ratio due to shortage of observations. Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include number of observations (N) and Pseudo R-squared (R^2)

8.2 Robustness check using Probit

Table 13. Likelihood of a SPAC acquisition – robustness check using probit

	(1) Market-specific variables	(2) Deal/firm-specific variables	(3) Sector-specific variables	(4) Main specification
VIX index	0.065***			0.042***
	(12.713)			(3.385)
BofA high-yield index	-0.545***			-0.441***
	(-12.839)			(-3.251)
P/E S&P 500 index	0.055***			0.163***
	(11.127)			(6.760)
Equity share	-23.514***			-28.802***
	(-11.798)			(-5.895)
Time to resolution		0.001*		0.005***
		(1.896)		(7.490)
PE or VC backed		-1.053***		-1.058***
		(-4.216)		(-5.961)
Age		0.003		0.005
		(0.514)		(1.321)
Price/sales		-0.004		
		(-1.050)		
Return on assets		0.142		
		(0.433)		
Debt ratio		0.167		
		(0.832)		
Ln(revenue)		-0.234**		-0.058**
		(-1.983)		(-1.990)
Ln(total assets)		0.270**		0.091**
		(2.350)		(2.013)
Sector valuation			0.001**	0.002
			(2.287)	(1.369)
Sector return			-0.590*	-3.483***
			(-1.783)	(-4.252)
Sector leader return			1.161***	1.558***
			(7.151)	(4.107)
Constant	2.147***	-2.000***	-1.229***	-1.387
	(6.769)	(-4.538)	(-25.513)	(-1.231)
N	2136	669	2128	1326
Pseudo R-sq	0.24	0.19	0.06	0.50

This table presents the marginal effects and the standard errors of our regression in the likelihood of a SPAC acquisition relative to an IPO. To model the likelihood of a SPAC acquisition relative to traditional IPOs, we use a probit regression with the dependent variable P(SPAC), which is a binary variable. It equals 1 if the operating company is listed through a SPAC merger and 0 for IPOs. Specifications (1), (2) and (3) include market-specific, deal/firm-specific and sector-specific variables. The main specification is presented in regression (4) and includes all variables except price/sales, return on assets and debt ratio due to shortage of observations. Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include number of observations (N) and Pseudo R-squared (R^2)

8.3 Summary statistics for determinants of SPAC returns

Table 14. Summary statistics for traits and characteristics of a SPAC

	SPAC mergers			
Variable	Median	Mean	Stdev	N
Market spesific variables				
VIX index	21.34	21.12	7.01	306
BofA high-yield index	5.35	5.29	0.99	306
P/E S&P 500 index	30.50	29.41	6.02	306
Equity share	0.12	0.11	0.03	306
Deal spesific variabled				
Time to resolution	144.50	147.42	54.46	290
PE or VC backed	0.00	0.12	0.33	306
Redemption rate	0.46	0.44	0.38	306
EV to SPAC IPO	3.78	4.04	2.49	289
Months to acquisiton	7.97	11.18	7.97	220
Firm spesific variables				
Total assets	104.38	658.90	2509.23	265
Sector specific variables				
Sector valuation	20.20	33.81	72.88	264
Sector return	0.14	0.18	0.18	306
Sector leader return	0.13	0.22	0.42	306

The table presents summary statistics for traits and characteristics of a SPAC. We use several of the variables from our previous analysis, and further add deal-specific variables, such as redemption rate, EV to SPAC IPO and months to acquisition, that are present for SPAC mergers but are not relevant for the traditional IPOs. The median, mean, standard deviations and number of observations for all variables are included. The data consists of 306 observations in total. Some of the variables contains fewer datapoints, which is reflected in column "N". All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively.

8.4 Correlation matrix for logistic regression on determinants of deSPAC returns

Table 15. Correlation matrix

	VIX index	BofA high-yield index	P/E S&P 500 index	Equity share	Time to resolution	PE or VC backed	Redemption rate	EV to SPAC IPO	Months to acquisitions	Total assets	Sector valuation	Sector return	Sector leader return
VIX index	1.00												
BofA high-yield index	0.01	1.00											
P/E S&P 500 index	0.51***	-0.61***	1.00										
Equity share	0.15***	-0.78***	0.42***	1.00									
Time to resolution	-0.13**	-0.11*	-0.08	0.05	1.00								
PE or VC backed	-0.06	0.07	-0.03	-0.12**	-0.09	1.00							
Redemption rate	-0.25***	0.02	-0.38***	0.02	0.23***	-0.16***	1.00						
EV to SPAC IPO	-0.03	-0.22***	0.16	0.18***	-0.03	0.00	-0.12**	1.00					
Months to acquisiton	-0.15**	0.48***	-0.36***	-0.46***	-0.09	-0.01	0.17**	-0.21***	1.00				
Total assets	0.00	0.04	-0.01	0.06	-0.03	-0.01	-0.06	-0.07	0.03	1.00			
Sector valuation	0.06	0.01	0.08	-0.05	-0.04	-0.06	-0.03	0.01	0.09	-0.06	1.00		
Sector return	0.13**	-0.50***	0.49***	0.39***	0.06	-0.09	-0.18***	0.16***	-0.29***	-0.03	-0.12**	1.00	
Sector leader return	0.17***	-0.07	0.29***	0.01	-0.08	-0.02	-0.23***	0.05	0.00	-0.05	-0.14**	0.59***	1.00

This table presents a pairwise correlation matrix of the variables to be used in the OLS regressions of traits and characteristics that determine the return of a SPAC. Most of the variables are defined in detail in Table 3. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively.

8.5 Fama French 5-factor model with momentum using equal-weighted portfolios

We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs and (5)-(8) for IPOs. Although all of our coefficients are negative, our alphas are not reliably different from zero. Both the portfolios of SPACs and IPOs are positively exposed to the market. Our portfolios for both the SPACs and IPOs have a positive tilt towards SMB. This is not surprising given the small size of the listings in our sample. Both the SPACs and the IPO portfolios show a positive tilt towards the value factor (HML). This is somewhat surprising given that the new listings tend to be more growth oriented. The adjusted explanatory power amounts to 40% when including all dates, while it amounts to 65% in our IPO portfolio including all dates.

Table 16. Factor regressions – equal-weighted SPAC and IPO portfolios

	SPACs				IPOs			
	(1) 6 months	(2) 12 months	(3) 24 months	(4) All dates	(5) 6 months	(6) 12 months	(7) 24 months	(8) All dates
Intercept (alpha)	-1.320	-0.782	-0.546	-0.681	-1.259	-1.070	-1.142	-0.984
	(-1.603)	(-1.196)	(-0.780)	(-0.951)	(-1.443)	(-1.359)	(-1.528)	(-1.453)
Mkt-RF	0.532***	0.435***	0.490***	0.602***	0.914***	0.984***	1.024***	1.070***
	(3.006)	(3.101)	3.255	(3.911)	(4.877)	(5.819)	(6.384)	(7.365)
SMB	0.428	0.579**	0.581**	0.647**	1.368***	1.460***	1.274***	1.218***
	(1.579)	(2.388)	(2.235)	(2.437)	(4.229)	(4.999)	(4.597)	(4.854)
HML	0.351	0.373*	0.401*	0.658***	0.271	0.234	0.389	0.595***
	(1.347)	(1.804)	(1.812)	(2.902)	(0.982)	(0.941)	(1.648)	(2.779)
RMW	-0.336	-0.304	-0.247	-0.117	-0.580	-0.270	-0.383	-0.284
	(-0.776)	(-0.883)	(-0.670)	(-0.310)	(-1.263)	(-0.652)	(-0.974)	(-0.799)
CMA	0.664	0.574	0.431	0.167	-0.883*	-0.832*	-0.784*	-0.661
	(1.431)	(1.557)	(1.091)	(0.415)	(-1.796)	(-1.874)	(-1.862)	(-1.734)
Mom	13.379	9.932	2.110	-0.831	8.321	7.466	6.534	6.265
	(1.440)	(1.347)	(0.267)	(-0.103)	(0.845)	(0.840)	(0.775)	(0.820)
Adjusted R-sq	0.22	0.31	0.30	0.40	0.49	0.57	0.59	0.65

This table presents monthly values of the five Fama-French factors and the momentum factor from Kenneth R. French´s Data Library. We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs and (5)-(8) for IPOs. The independent variables represent the market excess return (Mkt-FR), the difference between returns on small and large firms (SMB), the difference between returns on a high book-to-market stock portfolio vs a low book-to-market stock portfolio (HML), the difference between the returns of firms with robust and weak operating profitability (RMW), the difference between the returns of firms that invest conservatively and firms that invest aggressively (CMA), and the difference between the return on high prior return portfolios and low prior return portfolios (Mom). Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include adjusted R-squared (R^2).

Moreover, our analysis includes a hedged portfolio. Our hedged portfolio consists of a long position in a SPAC equal-weighted portfolio and a short-position in an IPO equal-weighted portfolio. The portfolio is re-based every month. The portfolio has a positive tilt towards the HML factor, indicating it is exposed towards high-book-to-market firms. This would suggest that the SPACs are more exposed to the value factor than the traditional IPOs. The portfolio

further has a positive tilt towards the investment factor. This would suggest that the portfolio is betting towards more conservative results.

Lastly, we have performed a similar analysis based on warrant returns. In our warrant samples, all intercepts are significant at a 1% threshold. This means that alpha is significantly different from zero in all periods. The warrants showcase strong outperformance ranging from 6% to 9% every month. Our analysis also shows that warrants are reliably exposed to the market. This is not surprising as the underlying security showcases similar results. The analysis showcases a negative tilt towards profitability factor in our portfolios for 6, 12 and 24 months. This would suggest that the portfolios are exposed to less robust firms. Since the underlying security does not showcase similar results, we are cautious regarding concluding any causal relationship.

Table 17. Factor regressions - hedged and warrant portfolios

	SPACs-IPOs				SPAC warrants			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	6 months	12 months	24 months	All dates	6 months	12 months	24 months	All dates
Intercept (alpha)	-0.724	-0.374	-0.067	-0.360	6.485***	9.001***	8.218***	6.065***
	(-0.686)	(-0.452)	(-0.093)	(-0.540)	(2.631)	(3.562)	(3.603)	(3.169)
Mkt-RF	-0.143	-0.310*	-0.296*	-0.230	1.315**	1.331**	1.167**	1.241***
	(-0.632)	(-1.742)	(-1.900)	(-1.602)	(2.484)	(2.453)	(2.382)	(3.021)
SMB	-0.606	-0.601*	-0.413	-0.290	-0.242	-1.107	-0.216	0.431
	(-1.548)	(-1.955)	(-1.535)	(-1.173)	(-0.265)	(-1.181)	(-0.255)	(0.607)
HML	0.535	0.594**	0.467**	0.518**	0.723	1.241	1.054	0.505
	(1.602)	(2.265)	(2.036)	(2.453)	(0.927)	(1.553)	(1.461)	(0.835)
RMW	0.584	0.307	0.476	0.508	-2.862**	-3.996***	-2.493**	-1.220
	(1.052)	(0.705)	(1.249)	(1.448)	(-2.207)	(-3.007)	(-2.078)	(-1.213)
CMA	1.630***	1.488***	1.297***	0.911**	0.192	0.262	-0.489	-0.512
	(2.739)	(3.185)	(3.174)	(2.422)	(0.138)	(0.184)	(-0.380)	(-0.475)
Mom	10.598	8.007	1.117	-1.555	-25.001	-48.555*	-42.483	-35.225
	(0.890)	(0.856)	(0.137)	(-0.206)	(-0.899)	(-1.703)	(-1.651)	(-1.631)
Adjusted R-sq	0.20	0.30	0.29	0.25	0.09	0.12	0.12	0.16

This table presents monthly values of the five Fama-French factors and the momentum factor from Kenneth R. French´s Data Library. We perform regressions for IPO firms and SPAC firms where we present the results in specifications (1)-(4) for SPACs-IPOs and (5)-(8) for SPAC warrants. The independent variables represents the market excess return (Mkt-FR), the difference between returns on small and large firms (SMB), the difference between returns on a high book-to-market stock portfolio vs a low book-to-market stock portfolio (HML), the difference between the returns of firms with robust and weak operating profitability (RMW), the difference between the returns of firms that invest conservatively and firms that invest aggressively (CMA), and the difference between the return on high prior return portfolios and low prior return portfolios (Mom). Standard errors are provided in parentheses. All the data are cleaned and winsorized to avoid outliers that may have negative impact on our results and findings. The statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and ***, respectively. Additionally, we include adjusted R-squared (R^2).

8.6 Return characteristics

Table 18. Return characteristics

		3 months return				1 year return			
		Common		Warrant		Common		Warrant	
Year	Number	Average	Median	Average	Median	Average	Median	Average	Median
2012	3	13,6%	1%	92%	40%	27,8%	-15%	32,3%	-64%
2013	3	-31,4%	-20%	238%	170%	-38,5%	-24%	711,9%	419%
2014	2	0,0%	0%	-11%	-11%	-17,5%	-18%	3,4%	3%
2015	4	2,0%	1%	112%	35%	-22,7%	-25%	133,9%	200%
2016	11	4,5%	1%	30%	11%	-0,1%	-13%	92,5%	57%
2017	17	-0,6%	0%	10%	15%	-4,5%	-2%	13,9%	-2%
2018	26	0,4%	1%	-5%	-3%	-23,6%	-42%	-5,1%	-15%
2019	35	-0,3%	1%	24%	16%	6,9%	-10%	120,0%	20%
2020	94	27,1%	5%	81%	38%	3,2%	-11%	169,9%	0%
2021	111	-12,1%	-6%	-14%	-25%	-	-	-	-

This table shows return characteristics from 2012 to 2021 both for common stocks and warrants. “Number” reflects the number of observations of SPAC mergers from each year.