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Special Purpose Acquisition Companies deal announcement market reaction and performance

Empirical evidence from the U.S. SPACs during 2020 - 2021

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ABSTRACT:

The special purpose acquisition company (SPAC) boom has been highly active since the beginning of 2020. Yet, SPACs are studied quite narrowly. The study aimed to examine how the market reacts when SPAC makes the deal announcement and to find out possible abnormal returns during the event. The study was performed for 40 SPACs. Abnormal returns were calculated for the event study, +/-3 days from the deal announcement. Also, abnormal returns were calculated for 1 week -, 2 weeks -, and one month from the announcement. The returns were risk-adjusted by the S&P500 index for the same periods for each SPAC. K-means clustering was executed for the SPACs by using min, max, and mean returns as explanatory variables and abnormal returns as target variables. The observation periods for the clusterings were a deal announcement day, 1-week -, 2 weeks -, and 1-month -post-announcement days. The results indicate that most of the SPAC companies had similar behavior between the observation periods and different explanatory variables. Yet, there were no similarities inside the clusters, and the two dummy variables, deal value, and SPAC's target company industry could not either explain the abnormal returns during the observation periods. The study included two hypotheses: H1 assumed that SPACs do not generate abnormal returns on the day after the announcement date. H2 instead assumed that SPACs generate abnormal returns on the announcement date. Based on the results, H1 and H2 both were accepted. Also, it should be noted that the amount of available data for this thesis is quite narrow due to timeliness and data limitations. As a further research proposal, the number of samples should be raised, and the observation period should be increased after the data is available in order to create more significant results.

KEYWORDS: Special Purpose Acquisition Company, deal announcement, market reaction, SPAC, performance

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1 INTRODUCTION

Special purpose acquisition company (SPAC) initial public offerings (IPO) have been highly active since the beginning of 2020. Covid-19 pandemic, political tensions especially in the U.S., low-interest rates, and the optimistic sentiment of investors are some of the reasons that have provided favorable market conditions for companies to have better valuations. This in turn correlates positively with SPAC and traditional IPO volumes. The previously explained phenomenon is called the hot IPO market, which occurred in 2020 and continued even actively for the 2021 first quartile.

There are several reasons for a company to go public, such as once a company's share has been listed and there is a constant market value, the conditions for effective equity financing exist. A share can also be used effectively as a means of payment, for example in an acquisition, when the value of the share can be easily demonstrated to both the buyer and the seller. In this case, the shareholders of the acquired company will also be able to benefit from the future increase in the value of the share and other synergies that will arise in the acquisition.

Special purpose acquisition companies are blank-check companies whose purpose is to raise capital by IPO and find a company or companies to acquire. SPAC has no actual business at the time of listing, and its management team, called as sponsors, must complete that acquisition within a specified period, usually 24 or 36 months. The funds raised in the share issue, or a significant majority of them, are in the escrow account during the exploration phase and are not available for the company’s normal operating expenses during that period. If the object of purchase cannot be found within the time limit, the funds will be returned to the shareholders. The SPAC company may specialize in companies in a particular industry or indicate that it is looking for suitable target companies regardless of industry.

In the U.S., SPACs have been very popular over the past couple of years, and in 2020, as many as half of all listings in the U.S. were SPACs. In Figure 1, it is shown how the number

of SPAC IPOs has developed between 2009 and 2021 in the U.S stock market. 2021 data is collected until September 2021 and the presented number of SPAC IPOs might rise in the last quartile of 2021. The main finding of Figure 1 is the explosion of SPAC volumes in 2020, and the fact that the SPAC boom is not slowing down, but instead, the number of SPAC IPOs is rising further.

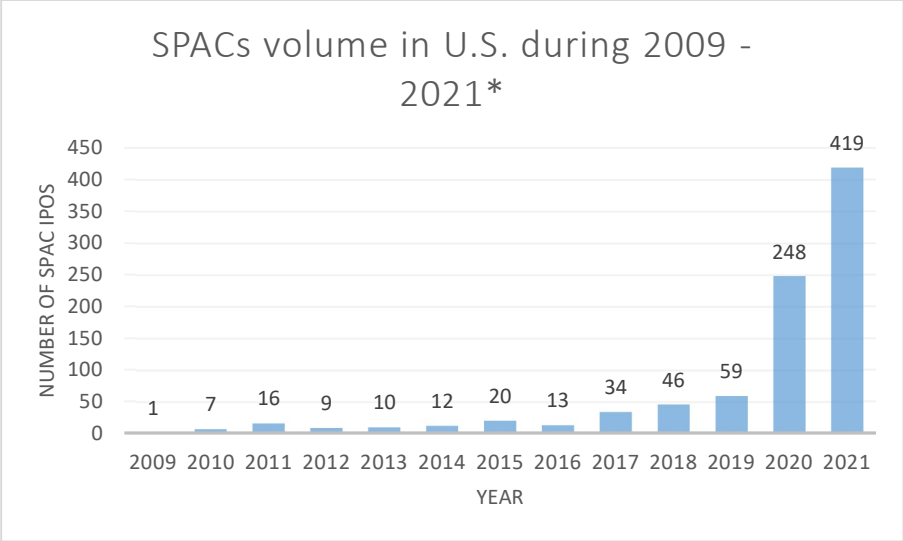

Figure 1. SPACs volume in the U.S. during 2009 – 2021* (Statista 2021).

In addition to the U.S., SPACs have also become more common in Europe. Coming from the beginning of 2021 to the end of August 2021, there have been 26 SPAC-based IPOs, raising a total of 5,67 billion euros. When compared to the same period in 2020, there was only one IPO which raised 0,57 billion euros. When the SPAC market in the United States started to boom in 2020, most European sponsors decided to list their SPACs on the hot US stock markets. Over fifty-five percent of SPAC IPOs were executed by European sponsors in 2020 in the U.S. exchange. Furthermore, the U.S. exchange raised a combined amount of 2,06 billion dollars which European sponsors accounted for three-quarters of the funds raised. Yet, when coming to the end of the present year, 2021, the participation of Europe-based sponsors in the SPAC listings of the American stock exchange has fallen to 19% and only 17,3% of the total SPAC IPO funds were raised by

European sponsors. Figure 2 demonstrates the current boom in SPAC volumes. When coming to the end of August, 26 SPACs have been seen since the beginning of 2021. There is markable raise in the SPAC volumes when compared to the previous years. The European and U.S SPAC IPO data will be handled more specifically later in this study.

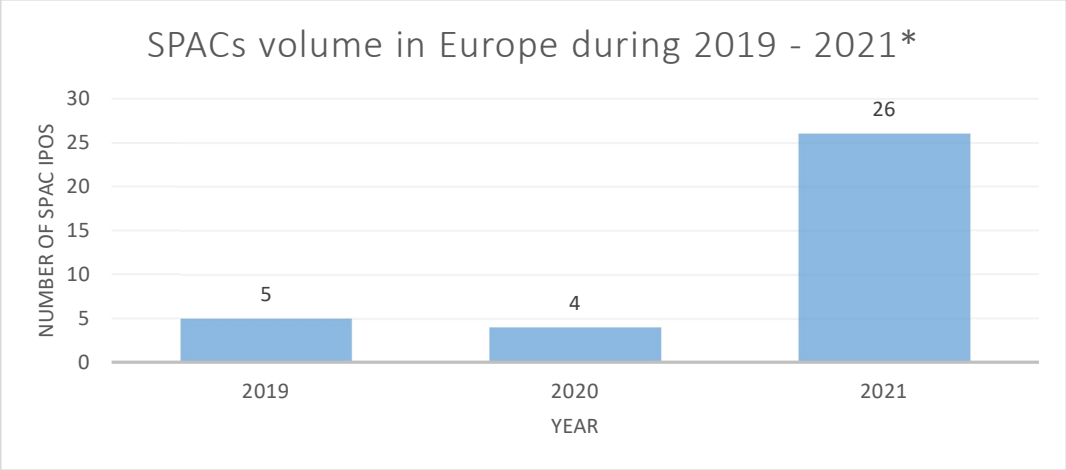

Figure 2. SPACs volume in Europe during 2019 – 2021* (White & Case 2021).

As mentioned, SPAC IPO volumes have reached historical records in past few years, and the European SPAC market is currently growing by the European sponsors that would have earlier considered listing SPAC in U.S. markets. This study focuses on studying the reaction of SPACs share prices after the company has made the deal announcement of a merging company. The data are collected from 2019 to 2021 by combining the data set from the U.S. and EU SPAC markets. Previous studies considering SPACs have been published very narrowly and the data set in this study is unique. The thesis will provide new results for a topical form of IPOs and mergers and will be a guideline for future studies.

1.1 Purpose of the study

The purpose of this study is to examine how the market reacts to SPAC companies' deal announcements and what happens to the company's share price. Also, is there a possibility to gain abnormal returns after the SPAC has published the deal announcement? Also, the deal value and SPACs target company industries' effects on generating

abnormal returns are being researched. The data period is between the years 2020 and 2021 when the SPAC boom has developed and extensively boomed in the U.S. To conclude, this study aims to provide an answer to the question of whether there is an abnormal return in the short term after the company has made the deal announcement.

1.2 Hypotheses

Several studies and theories are explaining IPOs and their phenomena, for example, underpricing and performances with different periods. SPACs related studies instead are hardly available due to their timeliness. Based on the fact, that little of these studies have been published, the hypotheses of this study are based on studies conducted on non-SPAC IPOs and their results. Hypotheses cover widely different aspects of SPAC announcements reactions which might provide important information for investors interested in listing companies in the U.S.

The first hypothesis looks at a widely studied phenomenon related to initial public offerings (IPOs). In previous literature, IPOs are underpriced on average (Loughran & Ritter 2004; Loughran, Ritter and Rydqvist 1994). When SPAC is being publicly traded its stock price is normally 10 dollars, and the share price fluctuates almost non-existent before deal announcement. For this reason, the IPO underpricing is being applied in the deal announcement, so the first hypothesis is as presented:

H_1: On the trading day after the SPAC's deal announcement, SPACs do not create averagely abnormal returns.

The second hypothesis applies to the date of the deal announcement. The hypothesis is based on the previous literature and on the idea that the market sees the release as a positive thing, which would correlate positively to SPACs share price. The second hypothesis is as presented:

H_2: SPACs generate averagely abnormal returns on the announcement date.

1.3 Motivation

The motivation behind this study pursues from the fact that the subject is currently relevant also in the European IPO market. The SPAC boom has started to arise in the U.S. last year and now it is rapidly growing and starting to consolidate its place in the IPO market of Europe.

Table 1. SPACs in European Stock Exchanges by a nation in Europe from January 2021 to August 2021 (White & Case 2021).

Primary exchange nation	Number of SPACs
Netherlands	10
France	4
Sweden	4
Germany	3
Italy	2
United Kingdom	2
Finland	1

The allocation of listings in European Stock Exchanges between issuer nations is presented in table 1. Netherland has become the main European center of SPAC IPOs during the year 2021. More specifically, Amsterdam has become the most active SPAC sponsor center in Europe, both by a number of transactions and by value. Europe-based sponsors have raised 2,95 billion dollars in Amsterdam's Exchange for SPAC IPOs. Overall, when all the exchanges have been considered, the Netherlands has raised a total of 3,10 billion dollars for European SPAC IPOs, which is approximately 47% of the total amount raised in Europe for SPAC IPOs. By volume, Amsterdam has delivered more than a third of the European SPAC listings, surpassing France, and Sweden, which have delivered four listings each. However, although the UK was Europe's busiest jurisdiction for SPAC

operations in 2019 and 2020, it has only listed two SPACs this year. To conclude, SPACs are relatively understudied today, yet the number of SPAC IPOs are rising rapidly in Europe.

1.4 Structure of the study

The thesis conducts from six main chapters. As presented, the first chapter includes the introduction, purpose of the study, motivation, and determines the hypotheses. The second chapter delves into the main topic and presents special purpose acquisition companies through the previous literature. The aim is to give a broad overview of SPACs, covering their history and current situation on markets. The third chapter discusses more of the listing process of traditional companies, which can be seen as the SPACs target companies, but also listing is a relevant part of the SPACs. In addition, the third chapter presents how the SPACs target company is valuated.

The fourth chapter starts the empirical part of the study. It presents the data used in this research and the methodology of the study. The fifth chapter presents the results of the event study for market reaction, short-term performance, and returns, and for the statistical test k-means clustering. Finally, the last chapter number 6 provides a conclusion and recommendations for further research.

2 SPECIAL PURPOSE ACQUISITION COMPANY

The Special Purpose Acquisition Company (SPAC) is a company established with the aim of acquisition that raises capital from investors in a public offering to finance a subsequent acquisition. When listed, the company does not have its own business but intends to make one or more acquisitions within a predetermined, typically maximum of 36 months. The structure of SPAC includes that if the company does not complete acquisition within 24-36 months from SPAC's listing, SPAC will be wound up.

In the acquisition, an unlisted company will be selected as the target company, which will be merged into the listed SPAC company. By merging an unlisted company into a SPAC company, the company is admitted to public trading without the traditional listing process. Such a process offers an unlisted company the opportunity to have their share publicly traded as if “through the back door”. Yet, the target company must meet all the qualitative listing criteria, as they would be listed individually.

The use of SPACs as an alternative to traditional listing has become more common internationally, especially in recent years. The development has been mainly driven by the desire of several private company shareholders to relinquish their holdings, as well as the uncertainty in the IPO market caused by the interest rate pandemic. In the United States, there were even more SPAC listings in 2020 than traditional IPOs, which raised approximately the same amount of capital.

A group of SPAC's founding shareholders and potential sponsors is primarily responsible for locating, carefully analyzing, and executing acquisitions. The SPAC model is a framework around which it is possible to build companies with very different investment profiles and the structure of a company depends a lot on the areas of expertise and strengths of the sponsor and founders who founded it. The listing of a SPAC company serves as an alternative to the traditional listing process, in which the SPAC company provides the target of the acquisition with a listing framework that gives the target company immediate access to the capital market. At the same time, the form of investment

offers companies in need of capital the opportunity to utilize the resources of SPAC and the experience of SPAC's management in expanding, developing, and increasing profitability.

2.1 SPAC performance based on previous literature

Available academic literature on SPAC performance in the market is limited. Table 1. lists the most significant studies on the performance of SPACs. The previous literature is divided into two different eras, which are presented in Figure 3. The modern SPAC era began in 2003 when the first firms used the new type of blank checks (Vulanovic 2016). Before the modern-SPAC period, certain blank-check firms functioned similarly to SPACs, and the first blank-check companies were created in the '60s. Furthermore, in late 2013, EarlyBirdCapitals developed the current form of blank check firms, which may be viewed as the beginning of SPACs. (Vulanonic 2016; Lewellen 2007) Figure 3 depicts the short history of SPACs and the eras of the previous literature.

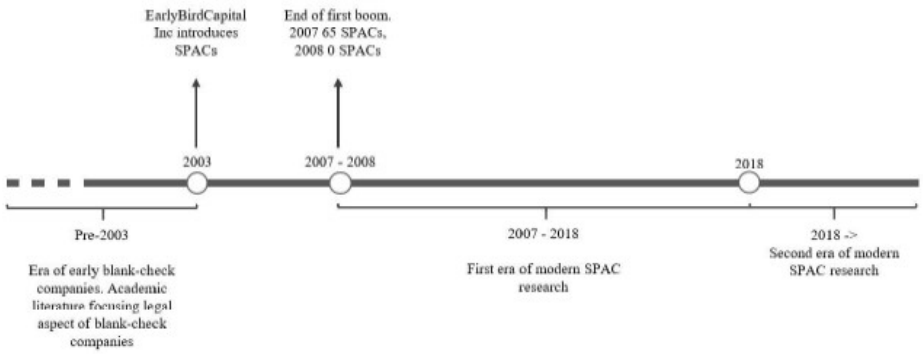

Figure 3. History of SPACs previous literature.

The first era began in 2006 when the first scientific study on the topic was published. The first research concentrated on describing the new asset class and its composite structure. Bergen (2008) was the first to do full research. He produced a very extensive article on the construction of SPACs, complete with illustrated examples. Bergen was the first author to provide insight into the IPO benefits of SPACs for target firms and compare these

findings to standard IPOs. He noted that SPAC might be a suitable alternative when a company's condition is complex or capital-raising options are restricted. Several studies have since confirmed that SPACs are an appropriate vehicle for small organizations with limited empirical coverage or that require a fast-track for financing. (Howe & O'Brien, 2012; Hyunseok et al., 2020; Rodrigues & Stegemoller, 2013; Shachmurove & Vulanovic, 2017).

The first writers to examine SPAC performance by comparing it to market performance were Jog and Sun (2007), Boyer and Baigent (2008), and Lewellen (2009). The first state investigated the performance of SPACs and how the instrument provides abnormal returns for management. The primary emphasis of their research was on the conflicts that the earliest writers, who claimed negative abnormal returns for public shareholders encountered. They demonstrated that abnormal returns occur in both instances, ex-post from the announcement of the target and after the corporate merger. Jog and Sun also stated that the structure of SPACs creates a significant incentive problem, with SPAC founders achieving approximately 2,000 percent annualized profits while ordinary shares have negative annualized yields.

Boyer and Baigent (2008) explained the benefits of SPACs and provided useful insight into their structural advantages in comparison to other financial assets such as private equity. Their study concentrated on early-stage yields and demonstrated that SPAC IPOs are underpriced less than regular IPOs. They also proved that the average yield of SPACs is lower than the market return. Their study was a little sparse, and it seems that they did not properly comprehend SPACs structure since Lewellen (2009) emphasized the causes for their findings and evaluated the performance with significant coverage one year later.

Lewellen (2009) carried conducted an exhaustive analysis indicating that SPAC must be recognized as a different asset class due to its distinct characteristics when compared to conventional common stocks. He developed a framework for the lifetime of SPACs and

exhibited predicted returns at various stages of the lifecycle. Lewellen was the first author to demonstrate that investors may earn positive anomalous returns by trading across various stages of a SPAC's lifetime. In his research, he identified a positive monthly four-factor portfolio alpha of about 2 percent at the moment ex-ante of the acquisition.

Jog and Sun (2007), Boyer and Baigent (2008), and Lewellen (2009) established a foundation for SPAC performance investigations. Many subsequent research concentrated on a specific variable of SPAC performance. Table 1 is a summary of significant research. The rising number of SPAC IPOs has prompted writers to do more study. Researchers have carried out empirical investigations with greater sample sizes, improved regressions, and extended time spans. Kolb and Tykvová (2016), Lakicevic and Vulanovic (2012), Vulanovic (2016), Rodrigues and Stegemoller (2012 & 2014), and Dimitrova (2017) looked at research that evaluated SPAC IPOs to traditional IPOs or SPAC performance to regular shares.

Kolb and Tykvová (2016) evaluated 127 SPACs to over 1000 normal initial public offerings. The research contained structural evaluation as well as analyzing the performances. Rodrigues and Stegemoller (2012 & 2014) concentrated on threshold characteristics including, for example, underwriting fees, but they also conducted performance studies. In their initial analysis, they presented information on the evolution of sponsor investment and profits. According to the article, sponsors modified their compensation structure to assure greater profits for shareholders. The next research by Rodrigues and Stegemoller presented higher abnormal returns on the announcement day, they reported that underwriting fees are in line with SPACs and ordinary Initial public offerings. They claimed the same types of results as Lewellen at various stages of the lifespan (2007). Lakicevic and Vulanovic (2013) investigate the performance of SPACs at key points in their lifetime. The analysis said that warrants had a larger reaction than regular equities and provided knowledge of high returns throughout the transaction announcement phase. After three years, Vulanovic (2016) applied post-IPO survival hypotheses to the SPAC situation. Finally, Dimitrova (2017) investigated a thorough empirical long-term performance

research and was among the first writers to integrate accounting performance in the investigations.

Research that examined certain sector or nation were placed by Ignatyeva et al. (2013), Shachmurove & Vulanovic (2016), and Shachmurove & Vulanovic (2015). Ignatyeva et al. (2013) became the first to explore the structural distinctions between SPACs and other financial instruments in capital markets of Europe. Shachmurove and Vulanovic (2016) examined SPACs with a strong emphasis on China, whereas Shachmurove and Vulanovic (2015) investigated SPACs with a strong emphasis on the shipping sector. There was a modest difference in performance looked against the overall SPAC market in the analyses, but no strong proof of structural advantages or performance drivers was observed.

With only minor changes in empirical variables, size of the sample, and emphasis regions, all research published during the first decade of contemporary SPACs have yielded the same fundamental conclusion: SPACs outperform traditional IPOs or the general market in the long run. As a result, the positive trend of SPACs has become a puzzle. The relevant academic studies of the first era of SPACs are presented below in Table 2.

Table 2. Relevant studies from the first era of SPACs

Author(s)	Period	SPACs	Observations
Jog and Sun (2007)	2003 – 2006	62	The study was first to demonstrate large positive abnormal profits for sponsors, while public stockholders confront negative yearly accounts.
Boyer and Baigent (2007)	2003 - 2006	87	Stock price and the amount of IPO return have a positive correlation. SPACs are underpriced less than normal IPOs.
Lewellen (2008)	2003 – 2008	158	SPACs form their asset class. The lifecycle is very foreseeable, with changing yields at varying stages.
Jenkinson & Sousa (2011)	2003 – 2009	161	There is a significant correlation between the performances on post-announcement and de-SPAC. They analyzed how the share value following the announcement mirrors the value at post-merger. In addition, there was a dichotomy into 2 categories: good or bad SPAC depending on if the share price was much higher than the trust's worth and near to or equal to it.
Howe and O'Brien (2021)	2003 – 2008	158	The research examined the structure of SPACs, and their influences on performance, particularly from the viewpoint of ownership. In addition, long- and short performance analyses were carried out, and the results were similar to earlier research reporting negative abnormal results for SPACs in the long term. In Addition, past studies have underlined managers have a tremendous inducement to execute bad transactions.
Lakicevic and Vulanovic (2013)	2003 – 2009	161	Outcomes were similar to earlier research. They claimed that de-SPAC underperformed. Lewellen examined trading behavior at several stages of the life cycle and observed similar findings (2007).
Rodriques and Stegemoller (2013)	2003 – 2008	243	Qualitative research that analyzed the evolution of SPACs from 2003 to 2008. The writers provided a full overview of current developments. According to the statement, the expansion of SPACs has resulted in increasing trust account amounts and investment from sponsors, which should lead to higher returns for shareholders.
Rodriques and Stegemoller (2014)	2003 – 2011	260	The authors evaluated the personalities and activities of SPACs to those of regular publicly listed firms. According to the study, the market impact of M&A announcements is greater in SPACs. Furthermore, they compared underwriting fees to normal IPOs and concluded that SPACs pay the same amount of fees as regular IPOs.

Cumming, D. Haß, L.H. Schweizer, D. (2014)	2003 - 2010	139	The authors examined numerous different criteria for association with transaction acceptance in the study, which yielded linear regression. One of the earliest research concentrated on the involvement of hedge funds and private equity in the SPAC process. They discover that "block holding" investors reduce the likelihood of a deal being approved.
Kolb and Tykvova (2016)	2003 – 2015	127	The writers gave valuable insights, such as cash-out amounts, market volatility, and debt ratio. The analysis provides useful insight into why the Private Equity and Venture Capital industry have not utilized SPACs more often.
Vulanovic (2016)	2003 – 2015	105	SPACs survivability analysis emphasized managers' involvement in SPAC performance, but also, for example, underwriters have an important influence on SPAC performance.
Dimitrova (2017)	2003 – 2010	73	Descriptive research that found several characteristics in SPACs had developed since Lewellen's (2007) research was released. Yet, the managers' incentive remains unbalanced. The author claims that this creates a problem in which the incentive to execute a bad transaction leads to negative abnormal profits for de-SPAC owners.

Based on my view, the second era which could be called 'the modern era of SPACs' began three years ago, in 2018, once the first de-SPACs were topical due to SPAC IPOs. Several writers from leading universities, especially from finance and law units, have recently released SPAC research. Table 3 summarizes the most relevant studies. Bai, Ma, and Zheng (2020) examined SPAC IPO businesses against the regular companies and discovered the same types of characteristics as previous studies, but they suggested that SPAC firms develop quicker after the IPO than other companies. Dimic, Lawrence, and Vulanovic (2020) presented detailed data on the withdrawal of SPACs from the IPO. Gahng, Ritter, and Zhang (2021) conducted market performance evaluations on over 100 SPACs from 2010 to 2018. Their overall outcome was consistent with earlier research. They did, however, acknowledge that while de-SPAC yields underperformed, market earnings are not as low as prior research has indicated.

Perhaps the most significant study "A Sober look of SPACs" was released by Klausner, Ohlrogge, and Ruan (2021), which had a lot of attention in media. The paper summarizes SPAC structural issues and comprehensively validates earlier research findings. According to Klausner et al. (2021), the recent surge of SPAC IPOs corresponds to bubble characteristics. They determined that SPACs are a bad investment for shareholders who continue with the firm after the merger, but for investors who make the redemption before the merger, SPACs may provide risk-free returns. They also gave fresh insights into hedgefunds' behaviors throughout the funds' lifetime, as well as how SPAC sponsors have an important part in the overall SPAC process.

The current positive trend of SPACs is being led by hedge funds that are capitalizing on the market's momentum to generate risk-free returns. SPAC sponsors were marketing the IPO to this "SPAC Mafia" during the pre-IPO process in order to have a larger IPO. According to Klausner et al. (2021), these investors had no plan of sticking in the investment for the entire lifetime, resulting in dilution during the merger period and, eventually, generating one of the major causes for SPACs' poor performance. The authors also noted that current SPACs have improved their offering with a stronger structure to address this issue, but the writers remain dubious of the asset class, speculating that when the bulk of investors grasps SPAC structural issues, the asset class will burst. According to their findings, a great number of shareholders would suffer losses as a result of this trend.

Table 3. Relevant studies from the second era of SPACs

Author(s)	Period	SPACs	Observations
Klausner, Ohlrogge, and Ruan (2020)	2019 - 2020	47	Excellent study based on the most current statistics. Shareholders that are sticking n 'holding strategy' have weak abnormal profits, which is similar to previous era studies. The study delivered for the first time statistical-backed results that PIPE-investors and hedge funds played their part in affecting SPAC IPOs. The writers also claimed that the structure of SAPCs

			had been largely misinterpreted previously, and that reform was required.
Dimic, Lawrence, and Vulvanovic (2020)	2003 - 2019	370	The goal of this research was to figure out what factors influence the probability of SPAC withdrawals. With several independent factors, the writers utilize linear regression. They discovered a link between the amount of volatility on the day of the IPO/withdrawal and whether the acquisition objective is a private equity firm.
Gahng, Ritter and Zhang (2021)	2010 – 2018	114	The study is a 'data update' for previous studies. DeSPAC investors get negative -16.5 percent purchase and hold returns, whereas investors who solely invest during the SPAC period gain 9.3 percent risk-free profits, according to the paper. These results are in line with previous research. The writers, on the other hand, highlighted the profitability riddle of warrants and reported a 44 percent positive profit for de-SPAC warrants.
Bai, Ma, and Zheng (2020)	2003 – 2020	500	The purpose of the article was to analyze and explain the current rise in the SPAC sector. The purpose of the article was to analyze and explain the recent rise in the SPAC sector. The writers gave a high-level study of several kinds of market stakeholders, as well as the responsibilities of underwriters and the function of financial advisers in SPAC deals.

To conclude earlier literature, I believe that SPAC research provides sponsors and target organizations with unexpectedly consistent SPAC benefits. Different stakeholders have been well-represented in the study, and also how different aspects have been situated in the lifecycle. The existing studies consistently show that SPACs can provide abnormal revenue in the short run, but that profits are in the long run nearly always negative. The writers also thoroughly discussed how many aspects influence performance. Current literature, on the other hand, has underlined the context of the current SPAC rise and has supported SPACs' role in the financial market. All the 'SPACs second-era authors agree that SPACs have established their position in financial markets, and that structural improvement will make them a more useful way to raise funds and list growth firms.

2.2 SPAC returns depending on the lifecycle

The ability of investors to redeem their shares prior to the acquisition voting phase gives SPACs a special structure. Because of the right to redeem, rather than holding ordinary stock, SPAC investors now possess a zero-coupon bond with the ability to take any action until the deal is announced. (Jenkinson & Sousa, 2011). According to Jenkinson and Sousa, SPACs should trade higher than the pro-rata trust value discounted from the SPAC's expiry date, while the company is on the targetless period (Lewellen, 2007; Jenkinson & Sousa 2011). Because the total dilution is uncertain until the voting outcome, SPAC must trade to pro-rata trust-value at all moments before the investor vote date. However, this is not the case, and when a probable target is announced, the market assesses the forthcoming de-SPAC value. If the market views the business combination as a value generator, the share price will rise. (Jenkinson and Sousa, 2011).

Before the merger company is found, share prices fluctuate. The right of shareholders to vote against the merger ensures that the trust value is restored, allowing every share to trade near its discounted trust value. Several shares, however, are trading at a modest discount. (Jenkison & Sousa 2011; Lewellen 2007). According to Lewellen (2007), common stocks trade at a discount in over 80 percent of situations, with a mean discount of 3.9 percent in the sampling. Before the target discovered phase, Jog & Sun (2007) recorded -2 percent anomalous profits. SPACs are zero-coupon bonds before the target announcement, and several writers have stated that large price movements or underpricing are unlikely during this time.

Many variables contribute to minor underpricing. The transaction cost, according to Lewellen (2007), might justify a portion of the discount, but not totally, given the average transaction cost is in the 1-2 percent range. The asset's lack of liquidity is another sensible element that might explain the underpricing. During the targetless period, the number of SPAC trades are low, making it difficult to sell the holding before the target is published. (Jog & Sun 2007; Lewellen 2007; Jenkinson & Sousa 2011; Lewellen 2007). This could justify the observed discount. Several papers, including Lewellen (2009), Jenkinson

& Sousa (2011), and Jog & Sun (2007), have shown that SPACs do not encounter underpricing early in their lifetime due to its special structure, which limits trading before the target is determined. (Cizmovic et al., 2013; Chakraborty et al., 2011; Rodrigues & Stegemoller, 2012; Rodrigues & Stegemoller, 2012.)

2.2.1 Returns after the announcement period

Sponsors post the initial agreement once they have completed negotiations and due diligence with the possible target company. The proposed deal is evaluated by the SPAC's investors. Shareholders can determine their next steps with the instrument based on the value. Investors have a wide range of possibilities because of specific rights granted to public shareholders. Shareholders can choose to keep their money in the company, sell their shares on the open market, or attend an investor meeting and vote against the merger. Voting against the deal assures that the investor receives a prorated trust value. (Jog and Sun, 2008; Jenkinson and Sousa, 2011). The stock price movement between the targeted announcement date and the decision date represents investors' value of a suggested deal. In the deal discovery period, SPACs should never trade far below the trust value during the transaction discovery period, and if the stock price is near to the real trust value, shareholders are likely to view the deal as a value killer. If, on the other hand, the stock price is significantly higher than the trust value, it is reasonable to predict that investors would view the subsequent merger as a value generator and that a significant number of investors will more likely execute a redemption on their shares. Dimitrova (2017) observed that cumulative abnormal yields in the target discovery period were considerably greater in situations where the purchase deal was eventually authorized. SPAC's stock price rises when shareholders see the suggested deal as a value generator and the valuation reveals that the stock price is near to discounted trust value for expected outcomes.

In an efficient economy, it would be straightforward to assert that investors may value the suggested target before the merger. However, it is difficult to predict the diluting impact before the vote results. This produces a trend in which share prices might be

greater than the trust value, indicating that the market views the agreement as a value generator before the voting date, but it ultimately turns out to be a value killer. (Dimitrova, 2017; Jenkinson and Sousa, 2011).

The stock price and fundamentals, according to Jenkinson and Sousa (2011), might determine if the SPAC would produce value. The negative dilution effect from outstanding warrants and promoting stocks, on the other hand, often makes the entire effect negative. They split SPACs into two groups in their study: "GoodSpac" and "BadSpac." SPACs in the GoodSpac category had a trust value per share of more than 100 percent before the voting date, and conversely. GoodSpacs had an average trust price per stock of 110 percent at the vote date, fared better following the merger, but shareholders still saw a -6 percent cumulative abnormal yields after 168 days. The results are in accordance with those of Lewellen (2007), who found that after the disclosure of suggested target stocks, the prices tend to rise. He claimed that the 3.9 percent discount during the targetless period seems to turn to a 0.5 percent gain on an announcement day and that the average payout was above 8 percent by investors' voting day. The portfolio of SPACs in the target found period had a positive excess return of 2.4 percent per month, whereas the portfolio of an acquisition finished SPACs achieved a negative excess return of -3.7 percent for each month. The same sort of gains was also provided in the post-merger phase (Klausner et al. 2020) and emphasized that even in the prime years, SPACs underperformed the market by a mean of 10 percent, with several years having negative excess returns of more than 40%. These findings are in line with those of Jog & Sun (2007), who reported an annual return of -17 percent for SPACs in the finished acquisition period.

Several current studies have examined the mystery of variable returns in various periods. Fresh research has revealed new information regarding trading behavior at various stages. SPACs were a lucrative investment for investors who attended the IPO but then redeemed or sold their holdings before the merger, according to Klausner et al. (2020). Lewellen (2007) acknowledged the hypothesis where shareholders take a long position for all SPACs in the target found period and a short position for all SPACs in the acquisition

finished phase in previous investigations. Going long for the finished acquisition period creates negative yields but going long for the acquisition period creates roughly 55 percent yearly yields.

Lewellen (2007) presents that yields in the target discovery period are complicated for various reasons. One of the reasons is that the structure of SPACs is not yet well recognized in the market, which may lead to shareholders, for example, jumping on the bandwagon when an appealing target is declared without understanding the process structure. Also, the structure that requires a minimum percent of investors to vote for the acceptance in order to obtain a merger mandate might lead to a situation where SPAC sponsors acquire shares from the market to secure a high enough number of "yes" votes. In addition, hedge funds take advantage of the effect by purchasing enormous blocks of stock. This raises stock prices in the run-up to the election. Because hedge funds possess a substantial percentage of SPACs after the IPO, they plan to create profit by selling stocks before the voting date. When managers are required to acquire stocks in order to assure adequate substantial vote outcomes, the effect is considerably stronger.

2.3 Relevant factors behind value-destroying deals

It is appropriate to emphasize that the SPAC market has been inefficient over the past decade, with fluctuating profits at various points of the lifecycle indicating that investors do not fully comprehend the structure of SPACs. Several prior research between 2008 and 2021 support the negative post-merger performance outcomes given in the previous chapter. The great majority of past studies on SPAC performance have consistently referred to the same kind of variables that contribute to week performance during the de-SPAC period. There are many hypotheses published in the literature, and this section provides a survey of aspects discussed in recent literature.

Several articles have identified explanations for underperformance, with some focused-on trading patterns and others on SPAC structural features. The mix of a retail investor who does not completely understand the structure of SPACs combined with highly

motivated investors and early-stage growing enterprises, in my opinion, produces a situation in which the common shareowner pays the bill.

2.3.1 Single-shot motivated sponsors

The motivation for sponsors to do SPACs stems from the rewarding structure in which sponsors receive 20% of the SPAC's stocks after combining them with an acquiring firm. Sponsors often receive a 20% SPAC equity payout as a significant bonus, and they normally have 24 months to close the sale (Nilsson, 2018). The pressure to locate a target in a short amount of time, along with the pay structure, produces a circumstance where sponsors are motivated to close a transaction even if the conditions are unfavorable. (Klausner et al. 2020.)

Sponsors use warrants, waivers, and lock-up methods to solve the motivation challenge. Warrants and rights protect first-wave stockholders as well (Nilsson 2018). The imbalance between managers' salaries and incentives for value generation has been identified by several writers. Nilsson (2018), for example, pointed out that in most situations, management is primarily paid for finding a target and closing acquisitions, with remuneration for value creation being restricted. He proposed that the pay structure include an artificial compensation model similar to that used in the private equity business. The pay model in the PE and VC industries is more long-term wealth generation driven. The fund's general partners are rewarded based on the profit they generate. The majority of previous studies have focused on transaction-based substantial compensation as a key factor influencing weak post-merger earnings. In addition, this chapter is pointing out that the compensation model has a diluting effect on other investors.

2.3.2 Dilution of sponsors' option model

Dilution for common shares after the merger is one of the key reasons for post-merger performance, according to published research. Klausner et al. (2020) recently demonstrated that non-redeeming stakeholder failures are substantially connected with SPAC

dilution, and they underlined those favorable returns prior to the voting period are not free. They pointed out that investors who did not sell their stocks before voting paid the price, referring to this as the consequence of broad redemption rights. Several writers have studied this in the past, and variables that induce common share dilution following a merger have frequently been highlighted.

Firstly, sponsors' share bonus after the merger is not the only motivation for them to accomplish the deal. It also deducts the value of a common stock. (Lewellen 2007.) Secondly, the value of public investors' redemption rights and warrants loses value (Klausner et al. 2020). Finally, deferred fees paid by underwriters increase the diluting impact when public stockholders redeem their shares (Klausner et al., 2020).

According to Nilsson (2018), managers are driven by a significant compensation incentive, which only arises if the merger is completed, as presented in the previous chapter. This offers motivation for sponsors to pursue partnerships even if the conditions aren't ideal. Even if the acquisition is a value-destroying agreement for stockholders, the sponsors get a 20% ownership stake. Because of the dilution effect, merging with a target firm will immediately lower the value of securities. If the conditions of the deal are averse to SPAC, the value will be further eroded. This occurs as a result of the redeeming rights. If a sufficient portion of stockholders do not appreciate the proposed target and elect to redeem their shares, they will receive the pro-rata value of the trust sum of funds returned, resulting in even more dilution for investors who remain with the firm. This occurs because the overall amount of outstanding securities will be reduced, but the number of shares held by the SPAC sponsors will remain constant. (Nilsson 2018) The cost is paid by an investor who voted in favor of the merger. This means that the shareholders who have supported the merger have to pay the bill. The reward system for sponsors generates a loop in which the motivation of negotiating deals with unfavorable conditions leads to greater redemption rates on voting day. Higher redemption rates result in more dilution, which is carried by common stockholders. (Klausner et al. 2020; Lewellen 2007.) In principle, the sponsors' hypothetical capacity to identify more

attractive targets, negotiate better contracts, and generate value after the merger must equal the 20% dilution, but previous publications indicate that this idea does not hold up in most circumstances.

2.3.3 Redemption of investors' warrants

The right of redemption enhances the diluting impact on the right of warrants. Redeeming investors can maintain warrants that will be realizable after the merger. Several research has suggested different strategies for reducing the dilution impact to address this problem, and some of the recent papers are proposing that SPACs have already deployed mechanisms to tackle the issues. Warrants or additional bonus rights provided for common stockholders participating in an IPO are justified as a "bonus" for IPO participation, with the initial objective to distinguish SPACs from other offerings. Sponsors as well makes effort to make the offering more interesting than other SPACs. As Nilsson (2018) describes, this shaped the industry standard. As demonstrated, it's not the greatest way to guarantee long-term success for common stocks. Studies have suggested, and several current SPACs have indicated, that performance-based or stricter standards should be used to determine where these bonus units are allocated.

Greater warrant exercise prices, according to Nilsson (2018), might lessen the diluting impact caused by warrants and rights. He pointed out that the market has adopted this strategy, with current SPACs implying increased strike prices for warrants. A new trend is to divide warrants so that holders can only purchase half a unit with a single warrant. Likewise, SPACs have also provided warrants that have the right for redemption if the share price rises over a certain level. Likewise, SPACs have also provided warrants that have the right for redemption if the share price rises over a certain level. Klausner et al. (2020) have pointed out a modern trend, finding that some SPACs are trying to fix the problem by using a reduced dilutive structure. The SPAC market is becoming more sustainable, according to Gahng et al. (2021), and recent SPACs are considering questions about conditions of redemption rights and after merger performances.

2.3.4 Postponed underwriting costs

Underwriting costs have a diluting impact as well. Changes made in underwriting charges have expanded the use of deferred payments, which means underwriters get paid only a small part of their commission after the IPO but a greater proportion after the merger is completed. When the number of redemptions rises, the number of underwriting commissions paid per share rises as well. (Nilsson 2018) Deferred payments may boost underwriters' motivation to promote value-destroying offers for sponsors, according to authors. When a bigger percentage of investors make the redemption before the vote, the dilution level might increase. (Nilsson, 2018; Klausner et al., 2020.) In the research, Klausner et al. (2020) dilution impact was brought into practice. The authors examined that a normal underwriting cost of 5% is appropriate and lower than in normal IPOs, but the actual fee is substantially greater due to the deferred cost structure. They presented an example, where 50% of investors made redemption, and the effective charge rise by 11% compared to normal IPOs. Yet, the present study is inconclusive when it comes to analyzing the underwriters' efforts and incentives. Gahng et al. (2021) performed a thorough analysis, emphasizing that underwriters' drive to create value-creative solutions remains strong. They pointed out that in common situations, deferred charges for underwriters are covered half by cash and half by warrants or shares. Also, if the ratio of redemption rises beyond the industry mean, underwriters' costs are reduced. Several articles have emphasized that underwriters' prior performance corresponds with future transaction sizes and frequency, which supports the idea of underwriters' motivation for value-destroying ventures. (According to Higgins and Gulati, 2003.) According to Bai et al. (2021), underwriters' have a smaller role in the SPAC process than in normal IPOs, which may result in bad performance because underwriters do not have a significant presence in post-IPO. Therefore, the involvement of underwriters in the SPAC process has grown during the last decade. First studies stated that SPACs are mostly structured by minor underwriters and that well-known underwriter was more value-destroying than producing. (Sun & Jog, 2007.) Subsequently, when SPAC-IPO revenues increased, bigger investment banks were attracted by SPACs, and writers discovered that often SPACs are supported by major, respectable investment banks, with a modest correlation

between SPAC profitability and underwriter rating. As a result, the underwriters' position has evolved to include a normal IPO role as well as assisting sponsors with target discovery and other responsibilities. Due to the increasing responsibilities of underwriters, deferred payments now account for the majority of advising costs. (Bai et al. 2021; Gahng et al. 2020; Cizmovic et al. 2013).

2.3.5 Hedge Funds as known as the “SPAC mafia”

Hedge funds and their "games" in the industry were briefly discussed in the previous chapter. Hedge funds have had a large effect on SPAC IPOs past few years, and retail investors should study carefully how hedge funds' motivations impact SPAC success and the incentives of other participants. Hedge funds were infrequently examined in the early SPAC studies, and only a few publications in the field illustrate hedge funds' involvement comprehensively. This is due to two factors. Firstly, with the recent growth in SPACs, hedge funds' influence has grown, and their actions are hard to track (Klausner et al. 2020). Hedge funds have been drawn to SPACs because of their risk-free income. Sponsors' eagerness to place SPACs, as well as their continuing desire to place also greater SPACs, necessitated the assistance of hedge funds. (Klausner and colleagues, 2020.)

Hedge funds assist sponsors in placing SPACs, and several SPACs would not have formed if hedge funds had not provided huge bridging loans. The latest studies have presented the evolution of hedge funds' function, and it appears that while hedge funds' position has grown, sponsors, institutions, and retail investors are paying the bills. Large institutions and investors that are holding their position, in particular, should be mindful of activities taken as a result of hedge fund incentives. (Klausner and colleagues, 2020.) Hedge funds' inconsistency in motivation with other investors, as discussed in the preceding chapter, causes problems for investors that do not have the intention to realize their position in a short term.

Figure 4. is an applied version of Klausner et al.'s (2020) research. It demonstrates hedge funds' investing activities and procedures. 1st section, sponsors present specifically their SPAC project including financial estimates and overall process to guarantee that the SPAC will be a success. The audience includes typically Hedge Funds and institutional players. From almost any point of view, SPACs may be viewed as an appealing investment for hedge funds, who perceive SPACs as a risk-free fixed-income alternative with excellent upside potential. (Klausner et al. 2020.) Once the IPO is in its 2nd section, warrants and equities are often traded independently. If hedge funds notice mispricing in the 2nd section, they may trade. SPACs and other products trade with small mispricing during the targetless period since the trading activity is low before the deal announcement (Lewellen 2007; Jenkinson & Sousa 2014; Klausner et al. 2020). This provides the possibility for Hedge funds to make a profit.

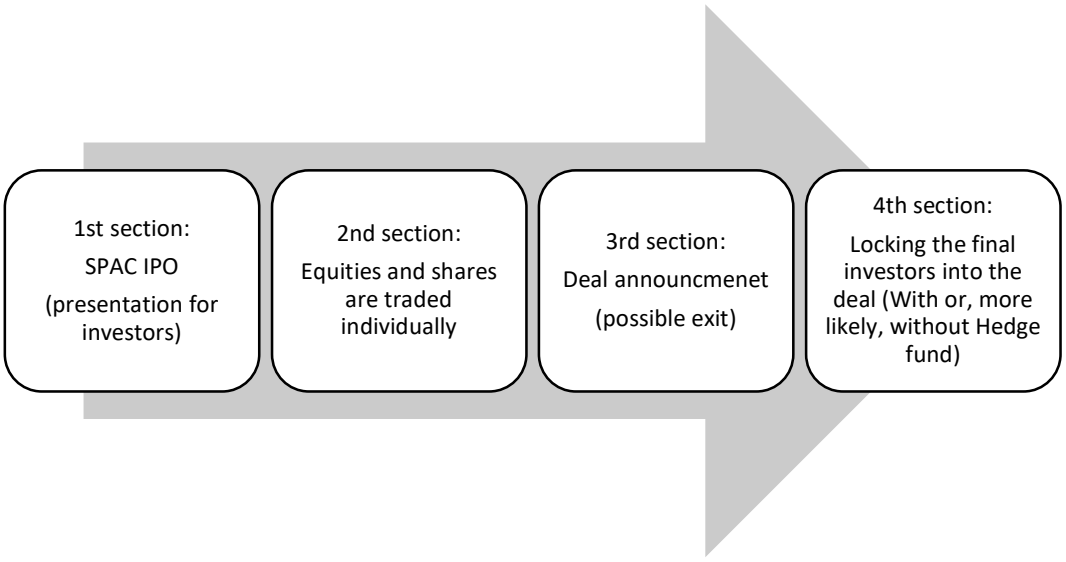

Figure 4. Hedge funds' investing activities and procedures in the SPAC process

Once the target company has found and the deal is closed, it is time for the SPAC company to make the deal announcement. With this said, hedge funds take advantage of market response to generate a risk-free dividend. Share prices rise when the market anticipates that the transaction proposal will produce value in the future, and hedge funds

take advantage of this chance to exit. With stocks and warrants, hedge funds are able to generate a risk-free return. If the stock price does not rise, they will cast their vote against the proposal, gain pro-rata trust value, and hold warrants with upside potential. Yet, as mentioned in earlier chapters, hedge funds may consider another option which is described in section 4. A hedge fund may sell huge series of shares to sponsors or syndicates that are interested in purchasing shares in order to assure a big enough percentage of favor votes. Hedge funds are not usually willing to continue with the SPAC at post-merger, according to the writers. Klausner et al. (Klausner et al., 2020).

Hedge funds assist sponsors prior to the IPO and facilitate the formation of SPACs. Following that, during the target-finding period, the incentives of sponsors and hedge funds are aligned, and hedge funds, as sponsors, hope to find a solid objective. The motive of hedge funds thus obstructs the activity of sponsors as well as the yield of retail investors and institutions. The bigger is the hedge fund's stake, the greater the diluting effect on the voting if hedge funds vote not to merge. As said in the last chapter, a greater rate of redemption rises all of the dilution-causing elements. Furthermore, earlier research has shown that active engagement in the SPAC process boosts sponsors' activities before the voting day, resulting in a reduction in money ownership following the merger. 2021) (Gahng et al.).

As discussed in earlier chapters, the structure of SPACs produces several distinct variables that might cause underperformance either individually or in combination. The significant incentive for sponsors to complete the merger is indeed contributing to the issue of side payments and ownership cuts recently noted by Gahng et al (2020). The study discovered SPACs in which managers are supposed to acquire stocks or investors until the voting day in order to make sure that transaction acceptance requirements are met. However, convincing investors to engage in the SPAC may be difficult if the market implies that the upcoming post-merger combo would be a value-destroying transaction. The authors discovered trends that sponsors are offering side payments or committing

warrants in an attempt to induce investors to participate and stick with the firm in post-merger. This method might have ramifications for after merger performance and retail investors. First and foremost, a retail investor should be familiar with the framework through which sponsors purchase stocks or promote the SPAC to investors until voting. This will reduce sponsors' real income from the merger, as well as their desire to expand the operating company in the post-merger because they no longer have significant up-sides. Gahng et al. (Gahng et al., 2021.) Manager s' 20 percent ownership pay is frequently justified by the skills that the managers will provide to the firm following the merger (Lewellen 2007). One important element is the market's missignaling before voting. Because managers may purchase stocks, the share price may rise, which might be seen as a bullish market perspective and influence investor decisions not to execute a redemption.

3 INITIAL PUBLIC OFFERING

This section delves deeper into initial public offering (IPO) by going through the overall process of going public and describing how IPOs are valued and what is regulation behind the IPO process. Anomalies linked with IPOs are also presented. Previously extensively studied underpricing theories and existing academic research on aftermarket performance are introduced at a broad level, and then at a more particular level, with an emphasis on SPACs.

Although the listing itself is not the most eye-catching moment for the SPAC company, it is of great importance, especially for the target company, as they end up being publicly traded. Consequently, SPAC's IPO is not as relevant as the announcement of the deal of the target company itself, as it is the company that is being publicly traded on the stock exchange.

3.1 Process of traditional IPO

Going public is a huge decision for a company and it involves a few or several external players depending on the factors of an IPO. Once the decision has been made the listing company is being called the issuer. The listing company must decide the method of the IPO, and which lead underwriter they are going to involve. The lead underwriter in an IPO is an investment bank or depending on the size of an IPO it can be two different investment banks. The lead underwriter is also being called book manager or bookrunner. When the group of underwriters is gathered, they are called a syndicate. Most IPOs had one underwriter between 1980 and 1990. Yet, coming to the period between 2010 and 2018, the average amount of underwriters has increased to 6,5 (Ritter 2019).

The issuer has to decide the type of IPO contract. Typically, issuers are picking up between the firm commitment and best-efforts contract with the chosen underwriter companies. A firm commitment contract means that the issuer is going to buy all the shares that are being issued. This type of agreement naturally increases the risk of the

underwriter, as a result, the issuer has to compensate the risk with higher fees. If the underwriters are not willing to take a high risk on firm commitment risk, and the issuer is willing to carry more of the risk, there is the possibility to choose another option: a best-effort contract. The best-effort contract reduces the risk of an underwriter since the underwriter is selling the shares forward. This sets the fees lower for the issuer but on the other hand, the risks are increasing. Aside from these types of fees, the initial underpricing, also known as leaving money on the table, is an expenditure for the listing company. The amount of initial underpricing may be estimated by multiplying the number of shares traded by the difference between the bid and closing price on the first day. Leaving money on the table indicates that the listing company did not comprehend the full amount of money available and that the issuance was underpriced. (Cho 2001).

Contracts may have restrictions or options that become active in specific conditions, altering the fees made to the underwriter. Minimum sales restrictions are usually included in contracts for best efforts, allowing the issuer to withdraw the offering if the underwriter is unable to sell a specific amount of shares. When the demand for the issued shares is low, minimum sales limits may be a factor. The company's commitment often includes an over-allotment option that permits the underwriter to purchase up to 15% shares from the issuer. When there appears to be a large demand for the shares, the over-allotment options are executed. According to Welch (1991), minimum sales limits are more commonly related to the requirement for funding, instead of the risk involved with IPO. When the minimum sales limitations are higher, underwriters earn more remuneration in the form of commission fees. Yet, the underwriter fees are cheaper when the contract incorporates over-allotment options. (Welch 1991).

According to Bhabra and Pettway (2003), When launching an IPO, a complete initial registration statement must be compiled and filed with the SEC. The announcement is the final version of the statement that has been created and accepted by the SEC. An announcement offers up-to-date information on the company's history and development, financial data, ownership structure, and potential dangers associated with an investment.

To obtain SEC clearance, the announcement must be accurate, and hence it generally provides the most detailed and exact information about the firm that is available to outsiders. Management and owners may attempt to make their firm appear more professional. To obtain SEC clearance, the announcement must be accurate, and hence it generally provides the most detailed and exact information about the firm that is available to outsiders. Management and owners may attempt to make their firm appear better on paper than it is, causing investors to be wary of the absolute information supplied in the announcement. (Bhabra and Pettway 2003).

Most IPOs contain a lock-up clause to prevent firm owners from profiting from IPOs. The lock-up agreement makes it illegal for pre-IPO stockholders to sell their shares during the lock-up period, which normally lasts 6 months but can vary. The lock-up period is intended to reassure the markets that insiders are not going to realize their possessions if unfavorable information about the firm becomes public. In addition, the lock-up period ensures that staff will stay with the organization for the next 6 months. The announcement contains a detailed explanation of the specific terms of the lock-up period. (Field and Hanka 2001).

Higher underpricing stems from greater uncertainty between the firm going public and investors since investors must be paid for their knowledge asymmetry. According to Arthurs, Busenitz, Hoskisson, and Johnson (2009), there are three strategies to prevent underpricing and hence enhance the total amount raised by the firm from the IPO. The reputation of the underwriter is a major clue to investors that the IPO is not only about the founder cashing in. A prominent underwriter is a symbol of confidence since the insurer's history may be researched and the underwriter may engage in the support purchase operation following the post-IPO. Having venture capital (VC) backing is another method for reducing underpricing. If an outside VC-backed firm holds a stake in the issuing business, it sends a strong signal to possible new investors. In the absence of a prominent underwriter or venture capital investment, the lockup period serves as a

substitute. Acceptance of a prolonged lockup period serves as a quality signal to investors. (Arthurs, Busenitz, Hoskisson & Johnson, 2009).

3.2 Impact of regulation on the listing company

One of the most significant differences between the main list of the stock exchange and the alternative market is the amount of regulation of companies. Vismara et al. (2012) found that young and emerging companies were listed as an alternative to less regulated marketplaces. Of the more than 2,000 European alternative market listings they examined between 1995 and 2009, 71.5% would not have met the main market listing criteria, so a less regulated market was the only option for these companies. Doukas and Hoque (2015), on the other hand, only examined the listings of the alternative AIM market on the London Stock Exchange between 1995 and 2014 and found that only about half of the companies would not have also met the criteria for the main market. Moreover, as noted by Jenkinson and Ramadorai (2013), for example, most companies that have traded between the main market of the London Stock Exchange and the alternative market have switched specifically from a “down” regulated market to a less regulated one.

In the light of the studies, listing in an alternative marketplace for the long-term success of the companies does not seem to have been profitable. Vismara et al. (2012) examined European listings between 1995 and 2009 and found that companies listed on an alternative marketplace had produced significantly fewer than companies listed on the main market between the three years of research. Similarly, Doukas and Hoque (2015) found that companies listed on the London Stock Exchange for the main market had significantly better-operating results than those companies that would have met the criteria for the main market but chose to list on an alternative marketplace. Jenkinson and Ramadorai (2013) found that on the London Stock Exchange when companies announced a move from the main market for the alternative market, the impact on the share price was negative, while when moving in the other direction, it was positive. Based on the results, they concluded that, on average, the reaction of investors to the

transition to a less regulated market is negative and to the transition to a more tightly regulated market positive.

It is natural for investors to value regulation, especially when it comes to information disclosed by companies. However, Admati and Pfleiderer (2000) noted that companies rarely disclose more information than is required by their regulation to disclose. For these reasons, the first estimate the costs associated with the disclosures, which may arise, for example, from the approval of the information to be disclosed by the accounting firm. Second, companies are often reluctant to disclose additional information, as this can lead to a loss of competitive advantage over other companies.

3.3 Valuation of a SPAC's target company

The valuation of a SPACs target company is an important part when considering the market reaction, as it affects the demand of investors and the subscription price they pay. Valuation varies between industries and typically simpler valuation methods are used for smaller target companies. Several valuation methods are more likely to be used if the target company operates in several different business areas. (Espinasse, 2014.)

The valuation process is dynamic and is constantly being refined as the listing project progresses (Pörssisäätiö, 2016). In its book "The Lister's Handbook", the Stock Exchange Foundation (2016) has divided the valuation process into three different stages:

1. Preparation phase. In the first stage, the lead arranger of the listing, typically the bank, forms a preliminary valuation fork based on a preliminary valuation analysis based on discussions with the listed company.

2. Pre-marketing phase. In the second stage, feedback from investors is considered. Valuation is typically specified based on feedback from potential investors.

3. Subscription time. In the last step, the subscription price is set. It is either set to fixed or the price range is set. If a price range is set, the final price is determined by demand in the so-called book-building procedure. Book-building means an offer book procedure in which the lead arranger collects bids from investors for shares to be sold within a set price range.

The valuation can be done by evaluating only SPAC's target company, but it can also include a comparative analysis in which the listed company is compared with already listed companies for which a price has already been formed in the market. (Espinasse, 2014.) The most typical methods used in valuation are benchmark company analysis, analysis of completed acquisitions, and a valuation model based on future cash flows.

Benchmarking

In the benchmark company analysis, the relationship between the market price and the financial ratios of the benchmark companies is analyzed and, on that basis, the possible valuation of the listed company is estimated. According to the Exchange Foundation (2016), the indicators to be analyzed are, for example, EV / turnover, i.e., the ratio of debt-free goodwill to turnover. Enter-prize value EV is obtained by calculating the market value of the share capital + (interest-bearing liabilities - liquid assets). Goodwill describes the market value of a listed company plus interest-bearing net debt. EV / turnover gives the investor an idea of how much it would cost to buy the company's turnover.
EV / EBITDA, i.e., the ratio of debt-free goodwill to EBITDA. EBITDA refers to profit before interest, taxes, depreciation, and amortization. The EV / EBITDA figure shows how many years a company would make an amount of EBITDA equal to its debt-free value.

EV / EBIT, i.e., the ratio of debt-free goodwill to operating profit (EBIT). Operating profit differs from EBITDA in that it does not consider depreciation and impairment losses. The EV / EBIT figure shows how many years a company would make an operating profit equal to its debt-free value if the operating profit remained unchanged.

P / E, i.e., the ratio of the market value of a share (P, price) to earnings per share (E, earnings). The figure can be calculated at either the per share or company level. The P / E ratio shows how many years a company would make a profit equal to its market value if the profit remained unchanged. The higher the growth-oriented company or industry, the higher the P / E ratio.

Acquired acquisitions

In the method of completed acquisitions, the valuation of a listed company is based on the analysis of the realized valuation coefficients of acquisitions made in the business of the listed company. The same indicators are used as in the benchmark company analysis. The indicators are used to assess the value of a listed company.

Valuation model based on future cash flows

A valuation model based on future cash flows is particularly suitable for companies that provide good long-term visibility with predictable cash flows. According to the Stock Exchange Foundation (2016), of the valuation methods described above, benchmark analysis is the most important method in valuing a listed company. It is important for a listed company to identify the most relevant comparison companies listed on the stock exchange, to analyze the business of the comparison companies, and to position the listed company correctly based on these (Pörssisäätiö, 2016). This is also done by investors and analysts who compare a listed company and its listing price to the closest comparison companies.

3.4 IPO anomalies

Ritter (1991) presents three different anomalies that are typically linked in IPOs: the hot issue market -, underperformance on a long-term -, and underpricing -an anomaly. The hot issue market anomaly refers to multiple periodical business cycles characterized by

increasing volumes and initial profits on IPO listings. Long-term underperformance anomaly implies that the markets are going to beat the IPOs performance during the company's first years.

3.4.1 Underpricing

Boyer & Baigent (2008) explained the benefits of SPACs and provided useful information of its structural advantages over other asset classes, for example, private equity investment. The empirical analysis studied early-phase returns and showed that SPAC IPOs are generally less underpriced than regular IPOs.

One of the earliest studies considering specific IPO theories and especially underpricing was published by Reilly (1973) and Ibbotson (1975). They proved that the issuing company's share price was significantly greater than the initial offer price on the first trading day. Earlier research that explained underpricing relied on asymmetric information between the issuing business, underwriter, and investors, while more current studies have concentrated on examining investor behavior. Rock's (1986) Winner's Curse hypothesis is among the first information asymmetries theories that explain the occurrence. According to the theory, there are two sorts of IPO traders: informed and uninformed investors. The former investors have superior knowledge about the issuing firm's likely cash flows, whereas the uninformed investors lack informed accessibility. According to Rock, informed investors buy in appealing and underpriced IPOs, while uninformed investors participate in expensive IPOs. Firms offer their shares at a discount to their basic worth to keep uninformed investors from quitting the market.

Baron (1982) presents an alternative model which is based on information asymmetry, in which the issuers of the business have little info about the fundamental value and demand of the company's current stock compared to investment bankers who offer advisory and distribution channels to the issuing firms. Uninformed issuers must rely on the information provided by the bankers and compensate them irrespective of the investment bankers' doubtful efforts. When investment bankers know more than issuers,

new offerings are underpriced since the securities will trade on the first trading day. Muscarella and Vetsuypens (1989) utilized Baron's findings to investigate whether the theory remains true when applied to investment bank IPOs and once the investment bank acts as an underwriter. Following Baron's conclusions, the valuation of the investment bank should be accurately valued in the given circumstances. Muscarella and Vetsuypens, on the other hand, discovered that IPOs of investment banks were far more underpriced than IPOs of investment banks which do not issue their shares, despite the investment bank backing their issuance.

Habib and Ljungvist (2001) offer an additional reason for the extent of IPO underpricing and why issuers often allow it. If issuers have little motivation to care about the amount of underpricing, IPOs will be much more underpriced. As there are more shares to sell and thus lose, issuers are concerned about the amount of underpricing and strive to influence it. Issuers can influence the extent of underpricing by selecting the underwriter and the market on which to list their shares. According to Loughran and Ritter (2004), the management team, CEOs, or financial sponsors, behind the issuing business favor underwriters with a history of underpricing since they can get extra bonuses.

Yet, Jenkinson and Sousa (2011), Jog and Sun (2007), and many other types of research have shown that SPACs do not encounter underpricing early in their lifetime due to their unique structure, which limits trading before the target is determined.

3.4.2 Hot issue market

As mentioned in the previous paragraph, Ibbotson and Jaffe were the first pioneers in many IPO studies. They were first to explain the phenomenon of hot and cold issue markets (1975). They define hot issue markets as periods when new stock issues have significantly greater initial returns and a larger volume of new listings than is typical. Furthermore, Ibbotson and Jaffe found that if an investor can identify a hot issue time, they can make abnormal profits.

According to Ljungqvist and Wilhelm (2003), severe levels of underpricing are described by investor behavior rather than information asymmetries models. During the tech bubble, also called as dot-com bubble in the ‘00s, the IPO markets saw significant underpricing and many listings. As a result, the tech bubble might be seen as a hot issue market. Investors were growing excited about the firms and their future potential, prompting stock values to skyrocket. According to Ljungqvist and Wilhelm, the amount of underpricing was near 8x times higher during the boom than the typical level of 13 % underpricing in the U.S. IPO markets.

3.4.3 Long-term underperformance of IPOs

Aside from the underpricing -and hot issue markets -phenomena, the long-term aftermarket performance of IPOs has also been thoroughly researched. Theories describing the long-term profitability of IPOs are focused on an investor's aberrant behavior and investor sentiment. Yet, some theories argue that the long-term underperformance of IPOs does not occur.

According to Miller's (1977) divergence of opinion hypothesis, investors have divergent views on the pricing of an IPO. The optimistic investors lead the stock prices to rise on the first trading day, but their attitudes shift to those of the pessimist investors as time passes, causing the stock prices to decline. The findings of Purnanandam et al. (2004) supported the idea. Shiller (1990) proposed the fads hypothesis, which claims that underpricing is not the cause of the positive atypical initial returns on the IPO's first day of trading. IPOs can be accurately priced before listing, but investors overvalue the IPO after listing because of irrational over-optimistic expectations known as "the fads."

The overconfidence theory proposed by Daniel, Hirshleifer, and Subrahmanyam (1998) contends that investors respond overconfidently to private information but not to public information. The corporation is overpriced before the IPO and remains to be overpriced after the first day of trade, according to the idea. Yet, the overvaluation will not last for years, leading the IPO to underperform over time. Purnanandam et al. (2004)

corroborated this idea by finding that their sampling of IPOs was overpriced at the offer price and even in the shorter term but reverted to fair value in the long run.

Research in Europe is following the lead of the data from the United States. Espenlaub, Gregory, and Tonks (2000) examined the long-run performance of 590 IPOs in the United Kingdom from 1985 to 1992 using a variety of alternative approaches as benchmarks, including CAPM, the Fama-French model, size effects, and the RATS model. In addition, both event-time and calendar-time returns were determined. They discovered that when businesses used the event-time strategy, they had considerably negative anomalous returns as compared to all other benchmarks. Alternatively, employing the calendar-time technique resulted in a much worse lack of performance. Alvarez and Gonzáles (2005) investigated IPOs in Spain from 1987 to 1997, with time frames of three and five years. Even though the data only contained 112 IPOs, the findings are comparable with earlier research on the long-term success of IPOs. Thomadakis, Nounis, and Gounopoulos (2011) used a similar technique to Ritter (1991) and Espenlaub et al. to study IPOs between the years 1994 and 2002.

4 Data and methodology

Chapter 4 will go through the data that were utilized in this research, the collection process of the data, and how the SPAC firms were chosen. In addition, some simple statistical analytics are presented.

The data were collected in a collaboration with our university professor who has access to several databases. The data includes 40 SPAC companies that have made the deal announcement at least one month ago. The observation period is between 2020 to 2021.

4.1 Data description

The total amount of companies utilized in the study is 40. 28 of the companies are listed in Nasdaq and 12 are listed in the New York stock exchange. The requirements for the data set were defined and they included U.S. acquirers which have executed the deal announcement at least one month ago, on the period between 2020 – 2021. In addition to the price data, a target macro-industry and the target companies' deal value are available for the data set.

A professor from the University of Vaasa collected the raw data from Eikon which included all the M&A deals made by U.S. acquirer. Markets were sorted into S&P 500 and Nasdaq. The total amount of this raw data was approximately 50.000 M&A deals for the period of 2020 – 2021. The data were manually sorted and analyzed by using 700 SPAC company names against the 50.000 M&A deals, and the final list with required data contained 40 SPAC companies that have made the deal announcement at least one month ago. The stock price data were collected manually from DataStream for each SPAC company. The prices of the benchmark index S&P 500 were collected for the same period, company-specific, from Yahoo Finance. Stock prices and S&P 500 index prices were closing prices for the presented day. The collecting price data proved to be more challenging

than expected, as SPAC companies will exchange stock tickers quite soon after the acquisition and the available data is quite narrow.

Target Macro Industry	% of the total
Consumer Products and Services	7,50 %
Telecommunications	2,50 %
Energy and Power	7,50 %
Financials	7,50%
Healthcare	10,00 %
High Technology	32,50 %
Industrials	7,50 %
Materials	2,50 %
Media and Entertainment	12,50 %
Retail	10,00 %

Figure 5. Data set by target macro industry.

To widen the perspective of the study, the target companies' macro-level industries are analyzed beside the main research question. Figure 5 illustrates the ratio of the macro industries of the target companies. The main macro industry in the target companies is high technology that includes IT Consulting -, software -, electronics -, and E-commerce companies. The high ratio in hi-tec can be explained by the fact that SPACs are searching for targets that have the potential to grow the company's size by two to three times. Another factor that is being noticed in the study is the deal values. The average deal values are divided between the target companies' macro-level industries.

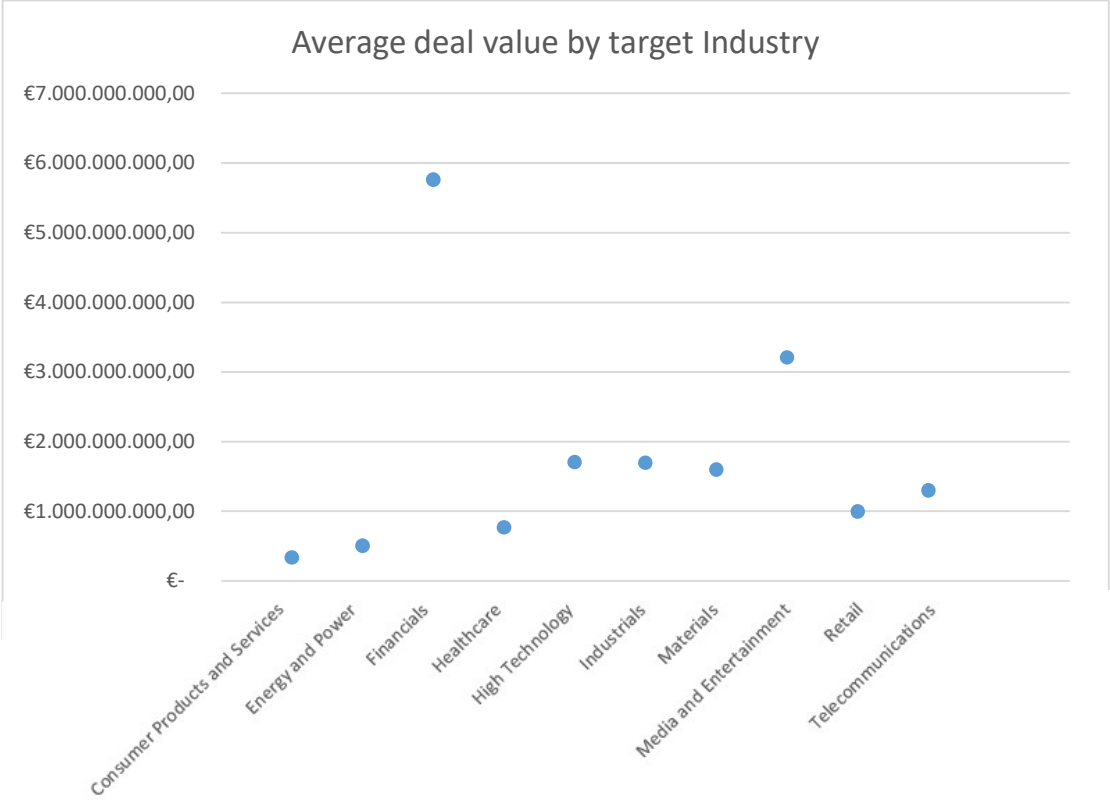

Figure 6. Average deal value by target macro industry.

The average deal value of the SPACs was from 500 million to 6billion. The highest deal value, and the average, is in the Financials. The highest deal was set up by Fintech Acquisition Corp V which merged with eToro Group Ltd. The value of the given deal was 10,33billion dollars.

4.2 Methodology

Special purpose acquisition companies' abnormal return was market-adjusted by the S&P 500 -index and examined by event study. Event study was conducted around the date of deal announcement to +/- 3 days. Also, the short-term abnormal returns after the deal announcement were examined and compared for four different observation periods. The abnormal returns were analyzed by a statistical method called k-means clustering which was executed in Matlab. The observation periods were deal announcement

day, 1-week -, 2 weeks -, and 1-month -post-announcement days. These observation periods were used as target variables. Min, max and mean returns were explanatory variables. The SPAC companies were divided into four different clusters that could be used to identify the similarities and how these factors affected the formation of abnormal returns.

4.2.1 Return calculations

The event study has an estimation period, -3 days before the deal announcement date, and four different observation periods. 1st observation period is +3 days from the deal announcement, 2nd period is one week after the deal announcement, 3rd period is 2 weeks from the deal announcement, and the 4th period is 1 month from the deal announcement. Returns are calculated by using the risk-adjusted returns Model (RAR) for each day of the +/-three days and then for the three observation periods of 1 week, 2 weeks, and 1 month. The S&P 500 is used as a benchmark index in the risk-adjusted returns model.

$$AR_{it} = R_{it} - [\alpha_i + \beta_i R_{mt}] \quad (1)$$

Where AR_{it} is the abnormal return of $_i$ (SPAC company) on given $_t$ (time). $\alpha_i + \beta_i R_{mt}$ -part of the equation tells the expected return of the market. R_{it} is the return, alpha is the intercept term, estimated B for stock $_i$, and R_{mt} is the return of market index in each event window.

As mentioned in earlier chapters, the first-day performance in IPOs is widely studied in the literature of finance. It is interesting to examine if there are significant abnormal returns on the first days after the SPAC company publishes the deal announcement and how strongly investors believe the SPAC managers, target company, and the value it can the coming company can generate. In addition, short-term performance and the market reaction to the deal announcement are examined. Figure 6 presents the average returns for each day on the estimation and observation period. Average returns are calculated from the day's closing price.

As one SPAC company's abnormal return for the event windows does not tell a lot, the average abnormal returns are calculated for each period:

$$AR_s = \frac{\sum_{j=1}^{N_s} AR_{js}}{N_s} \quad (2)$$

Where N is the number of events and $_s$ describes the event period. The complete calculations for the abnormal returns are presented in Appendix I.

The average abnormal returns for the estimation period and the observation periods are shown in Figure 6.

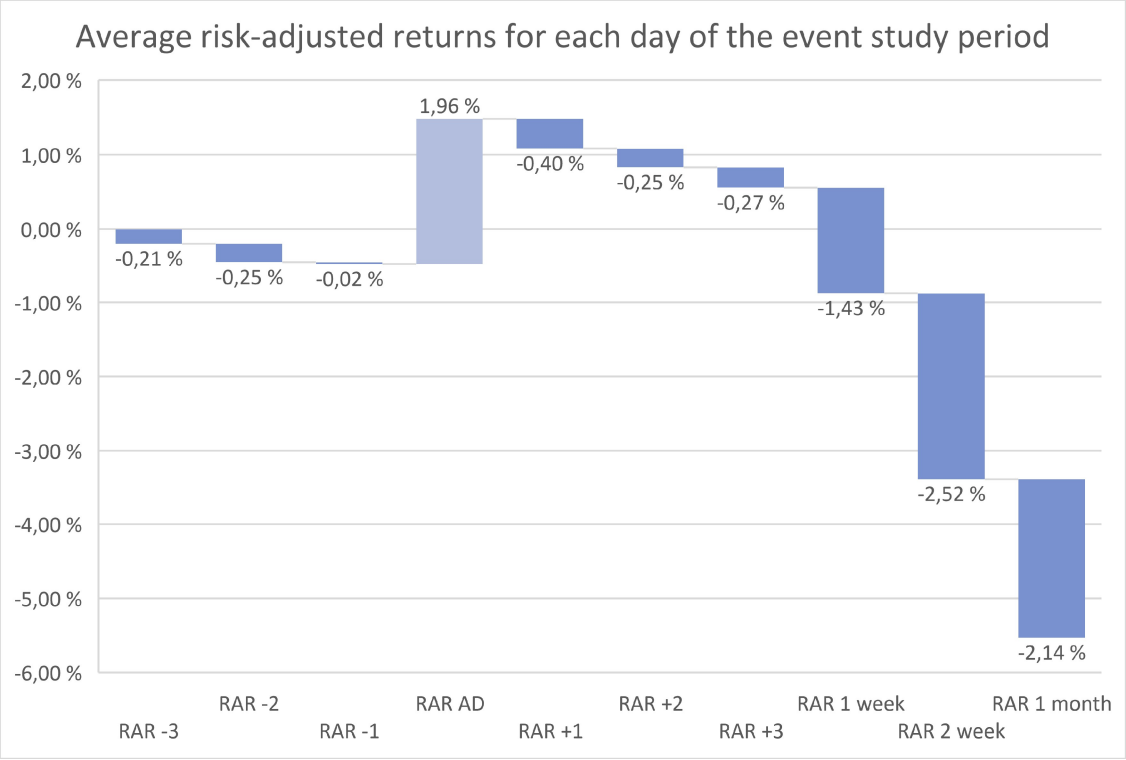

Figure 7. Average risk-adjusted returns for each day of the event study.

As Figure 6 shows, only the announcement date is providing abnormal returns for the observed companies. There is a significant drop in average abnormal returns after one week from the deal announcement day (-1,43%), after 2 weeks (-2,52%), and after one month (-2,14%). Before the deal announcement day, the SPAC company's share price is moving almost non-existent. Based on the study's sampling and the results in the estimation period (-3 days) it could be stated that the markets are quite efficient before the announcement date as it seems there is no significant growth in stock price until the announcement is published.

CAR = SUM(AR) for deal value & target companies' industry.

4.2.2 K-means clustering

K-means clustering is an unsupervised machine learning algorithm that analyses and allocates datapoints to groups that have commonalities in n-dimensional space. These groups are called clusters. The quantity of centroids is used as an input, and these determine the clusters. To create the clusters, K-means requires two steps: allocate and minimize. The algorithm allocates every datapoint to the centroid that is closest to it during the allocation period. During the minimize period, centroids shift such that the total of all datapoint ranges is as small as possible. The ranges are calculated using the Euclidean technique. The operator decides the amount of centroids, K. (Badillo, Banfai, and Birzele et al. 2020, Skansi 2018).

The process behind the algorithm, in order to define the clusters, contains 4 steps:

1. The algorithm consists of centroids based on the data and number of clusters, and then calculates the x -and y -values.

2. Every datapoint is determined in the axis and the range between the centroids and datapoints are determined.

3. The ending requirement has been met if the datapoint is in the cluster closest to its centroid. If this is not the case, the datapoint must be shifted to the closest cluster, and the centroids must be re-determined.

4. Steps 2 and 3 must be reperformed if the ending requirements are not satisfied.

When the datapoint reaches the closest cluster, it meets the ending requirement. 277) (Kubat 2017).

When deciding the number of clusters, there are a few methods to determine the optimal amount. These methods are, for example, silhouette and elbow -graphs. Figure 7. shows the elbow graph that points to the optimal number of clusters, which is 4 in this study. By using the data set of the study, Matlab has been used to generate the elbow graph.

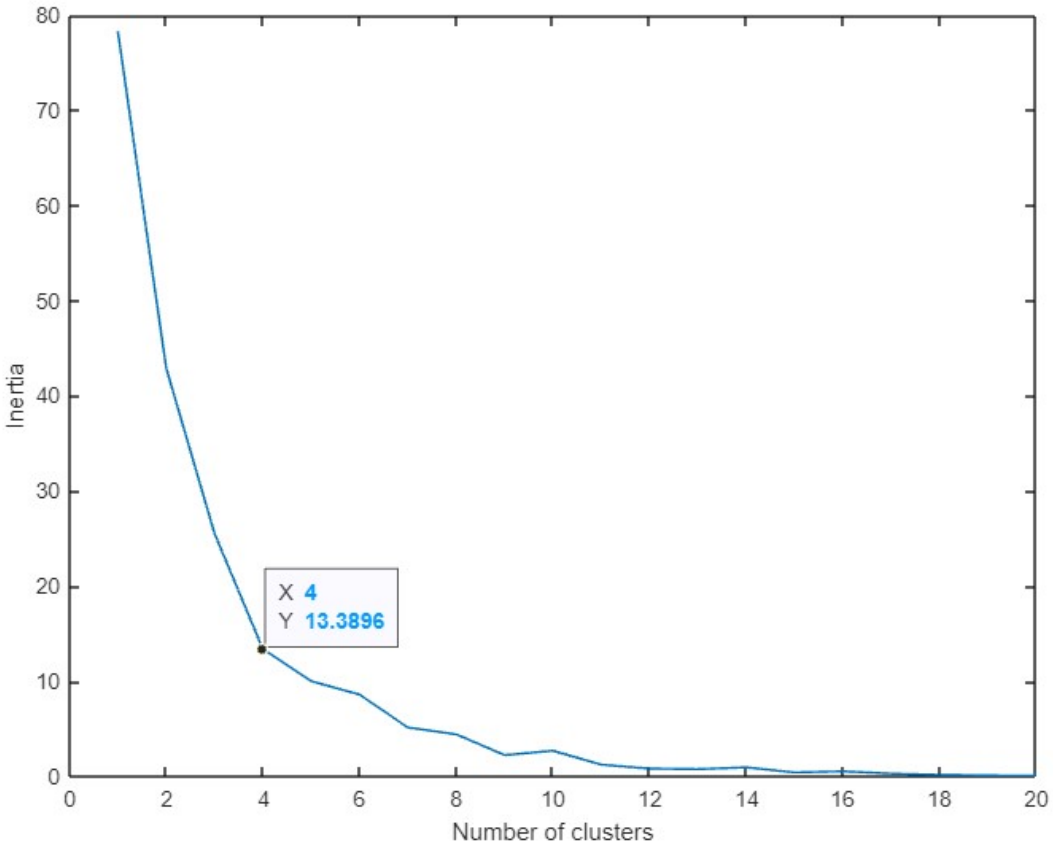

Figure 8. The optimal number of clusters determined in Matlab.

5 Results and analysis

Returns for the SPAC companies were calculated for several observation periods from the deal announcement date. On the estimation period, -3days before the announcement date, the returns were insignificant as expected. The announcement date showed abnormal returns, while other observation periods showed averagely negative returns for the observed companies.

Table 4. Risk-adjusted returns by days from the deal announcement.

Days from the announcement	Average risk-adjusted return
-3	-0,21 %
-2	-0,25 %
-1	-0,02 %
0	1,96 %
1	-0,40 %
2	-0,25 %
3	-0,27 %
7	-1,43 %
14	-2,52 %
30	-2,14 %
RAR	**-5,53 %**

Table 4 shows the average returns that are risk-adjusted by the market, S&P 500 index. The market reaction is quite significant on the announcement date but there is also a significant repair shop afterwar. Especially when looking RAR averages after 7 days (-1,43 %), 2 weeks (-2,52 %), and 1 month (-2,14 %). All the other days, except the announcement date, performed negatively by an average RAR. The observation period showed also a high level of volatility in a single company's returns.

5.1 Returns by target industry

The risk-adjusted returns for the SPAC target company macro industry are presented in table 5. Also, Cumulative abnormal returns (CAR) are calculated.

Table 5. Risk-adjusted returns by macro industry of target company for an observation period.

Target macro industry	0	1	2	3	7	14	30	**CAR**
Consumer Products and Services	-0,19 %	-0,18 %	-0,52 %	-0,37 %	-0,46 %	0,02 %	0,55 %	**-1,17 %**
Energy and Power	-1,67 %	-4,83 %	-3,55 %	-2,51 %	-8,38 %	-6,31 %	1,97 %	**-25,27 %**
Financials	1,56 %	-1,58 %	0,57 %	-0,84 %	-2,70 %	-5,60 %	-4,17 %	**-12,76 %**
Healthcare	-1,16 %	0,41 %	-0,51 %	-0,61 %	1,10 %	-1,35 %	-1,25 %	**-3,37 %**
High Technology	3,39 %	-0,98 %	0,02 %	0,01 %	-0,84 %	-1,33 %	-2,72 %	**-2,45 %**
Industrials	3,62 %	6,18 %	0,20 %	-0,37 %	0,13 %	-9,11 %	-12,84 %	**-12,19 %**
Materials	2,01 %	1,16 %	0,63 %	0,75 %	1,89 %	1,62 %	-0,20 %	**7,86 %**
Media and Entertainment	1,42 %	0,99 %	0,00 %	0,99 %	-0,82 %	-1,95 %	1,04 %	**1,68 %**
Retail	4,44 %	-2,48 %	0,03 %	-0,46 %	-3,76 %	-2,06 %	-1,86 %	**-6,14 %**
Telecommunications	2,28 %	0,24 %	0,91 %	-0,17 %	0,58 %	1,28 %	0,88 %	**6,00 %**

There were 10 different macro industries in SPACs target companies. The cumulative abnormal return (CAR) is calculated from SPACs announcement day and the end date is 30 days after, and the industry's day-level risk-adjusted returns, in table 5, are averages of the target companies' industries. There is a significant difference between the cumulative abnormal returns by the target company's industries. Also, the returns differ a lot on a daily level. The best performed (CAR 7,86%) target company industry is materials. Yet, there is skewness in the result as only 2,5% of the target companies operate in the industry of materials (paper & forest products). The second highest CAR (6,00%) for the observation period is generated by the SPACs that made a deal with target companies that operates in the telecommunications industry. Also, positive CAR (1,68%) for the observation period is generated by the target companies that are in the industry of media and entertainment. Media and entertainment are the second-largest target company industry of the observed industries (12,5%). All the other target company industries

performed negatively when considering the cumulative abnormal returns during the observation period. The lowest CAR (-25,27%) was in the target company industry energy and power.

5.2 Returns by deal value

The risk-adjusted returns by SPAC deal value are presented in table 6. Also, Cumulative abnormal returns (CAR) are calculated. The aim is to analyze is there a significant pattern in the returns depending on the SPACs' deal size.

Table 6. Risk-adjusted returns by SPAC deal value for the observation period

Deal Value	0	1	2	3	7	14	30	CAR
1.500.000.000 - 10.366.000.000	-0,5 %	-1,4 %	-0,9 %	-1,0 %	-2,2 %	-3,1 %	-0,8 %	-9,76 %
550.000.00 - 1.500.000.000	3,7 %	-1,0 %	0,0 %	0,1 %	-0,9 %	-1,3 %	-2,9 %	-2,20 %
< 550.000.000	2,8 %	1,2 %	0,0 %	0,3 %	-1,0 %	-2,6 %	-2,0 %	-1,43 %

The SPAC deal values for the observed SPAC companies are divided into three groups. The biggest group 1 has deal values of over 1,5billion but under 10,37billion. The second biggest value group 2 has deal sizes from 550million to 1.5billion and the smallest value size group 3 has deal sizes under 550million.

The SPACs data used in this study indicate that the averagely the smaller the deal, the bigger cumulative abnormal returns during the observation period. Yet, there are no positive CAR values on any value group. The announcement day shows positive risk-adjusted returns for groups 2 and 3. Group 3 is the only one that generates positive RAR on the next day after the deal announcement day. As presented several times in an earlier study, the deal value perspective also indicates that holding the SPAC stock a short period after announcement day, +3 days to 1 month, is not profitable based on averages.

Based on the results by the deal value, it seems that there might be higher expectations for SPACs that have raised a higher amount of funds for the deal. As table 6 indicates, group 1 shows a faster drop in RAR averages after the announcement date, when compared to groups 2 and 3.

5.3 K-means clustering

The risk-adjusted returns were evaluated by k-means clustering in Matlab. The observation periods were deal announcement day, 1-week -, 2 weeks -, and 1-month -post-announcement days. These observation periods were used as target variables. Min, max and mean returns were explanatory variables. There were also two dummy variables: deal value (previously presented groups 1, 2, and 3, and industry of target company (10 different). The observations were normalized in clustering. By executing Iteration, the most well-backed and long-distance collection of clusters was discovered. k-means repeats the clustering procedure beginning from unique randomly picked centroids for every replicate if one or more replicates are specified. The result with the smallest total sum of ranges across all replicates is then returned by the k-means algorithm. The number of replicates in this experiment was fixed at ten. As presented in figure 7, the optimal k was determined by executing an elbow graph based on imported data in Matlab. The elbow graphs showed that K=4 was an optimal number of clusters.

The 1st clustering was executed for all four observation periods by using the mean of returns as the explanatory variable and returns as target variables. Clusters are presented in figure 8. In practice, the figures illustrate how the specified daily abnormal returns differ from overall mean returns when moving beyond the deal announcement day. It can be generalized that, with a few exceptions, abnormal returns between SPAC companies on the announcement day are fairly in line with mean returns for each other. There is one company (Cluster 4) whose income differs significantly from the others. That company is SVF Investment Corp 3 (SVF), which made a deal worth of 4,5billion. The SPAC's target company was Walmart-backed robotics and automation technology

company called Symbotic (Reuters 2021). Despite the big positive bounce in share price on announcement day, SVF has performed badly on mean returns, as can be seen from figure 8. In the 1-week return, SVF changes cluster group as its return level stabilizes after announcement day and ends up close to the average revenues in the data set. The two SPAC companies that reached the highest mean returns on the announcement date formed their own cluster (cluster 1) in the 1-week graph have made the best return as well as the mean return one week after the deal announcement. Clear linearity is also observed in the graph. The 2-weeks graph forms the clearest clusters and linearity from the four graphs. What is interesting, the SVF has changed the cluster again and has now values of second-lowest mean returns and second-lowest returns for 2 weeks after the announcement. Yet, most of the SPAC companies are positioned around the coordinate values of (0,0) in the graph. In the last event window -graph, returns after 1-month from the announcement, there is a clear scatter within the clusters, although in other respects the distribution strongly resembles a two-week table, and all the SPAC companies remain in the same clusters.

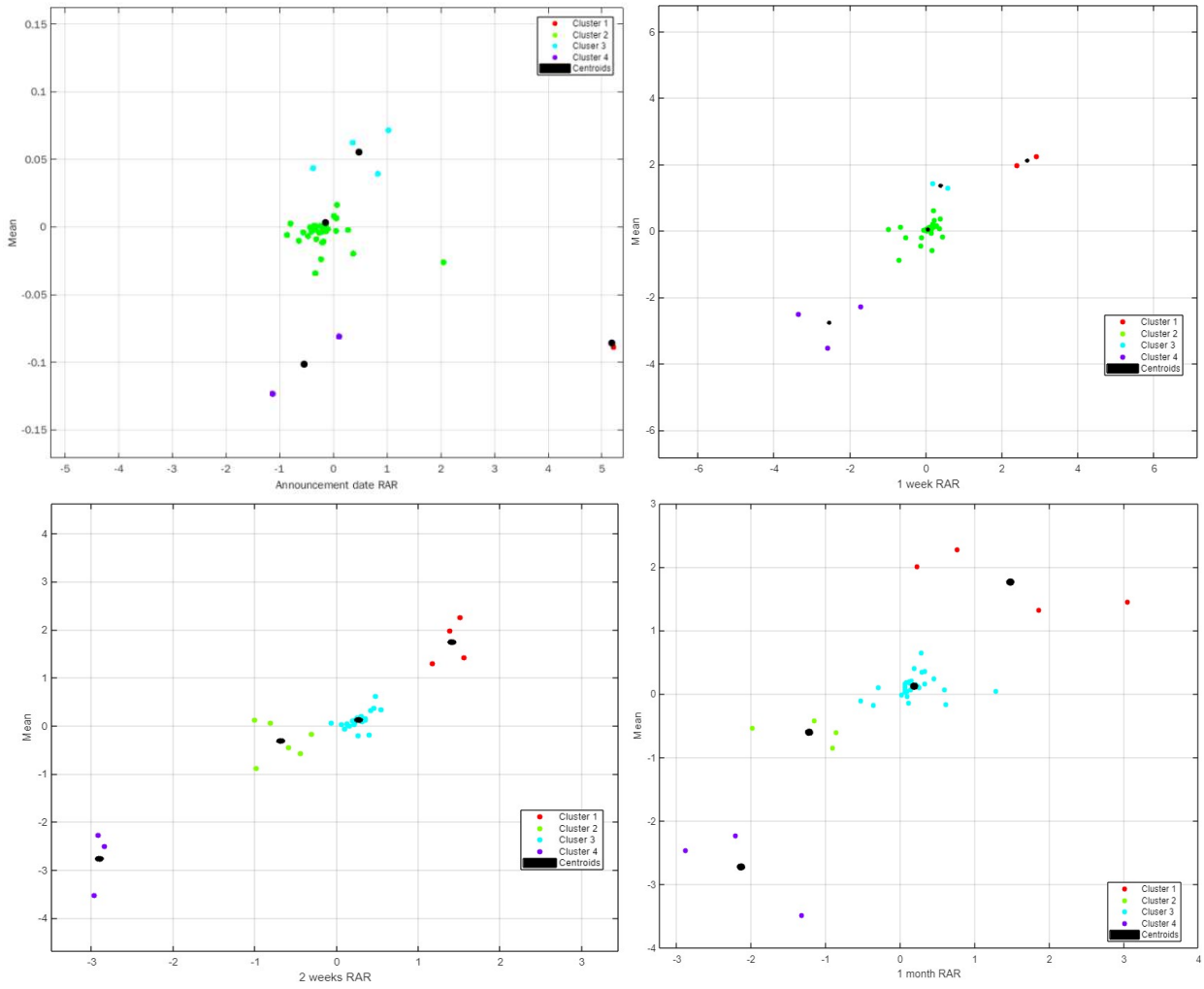

Figure 9. 1st clusterings, where mean of returns as an explanatory variable and returns as target variables.

In Figure 9, the max of returns is as an explanatory variable and returns are as target variables. The clusterings strongly resemble mean return -graphs, but clusters are significantly more dispersed. SPAC companies at the edges of cluster groups have increased the distance to the centroids. This indicates that there is greater volatility in the daily minimum returns than in mean returns. On the announcement date -graph, SVF is again in its own cluster with the highest announcement date returns but at the same time has the lowest minimum value of the observed companies. Overall, it can be stated that

companies with high returns relative to the data set are also at the top of the minimum returns and vice versa. The SPAC companies remain, with a few exceptions, in the same clusters between the observation periods.

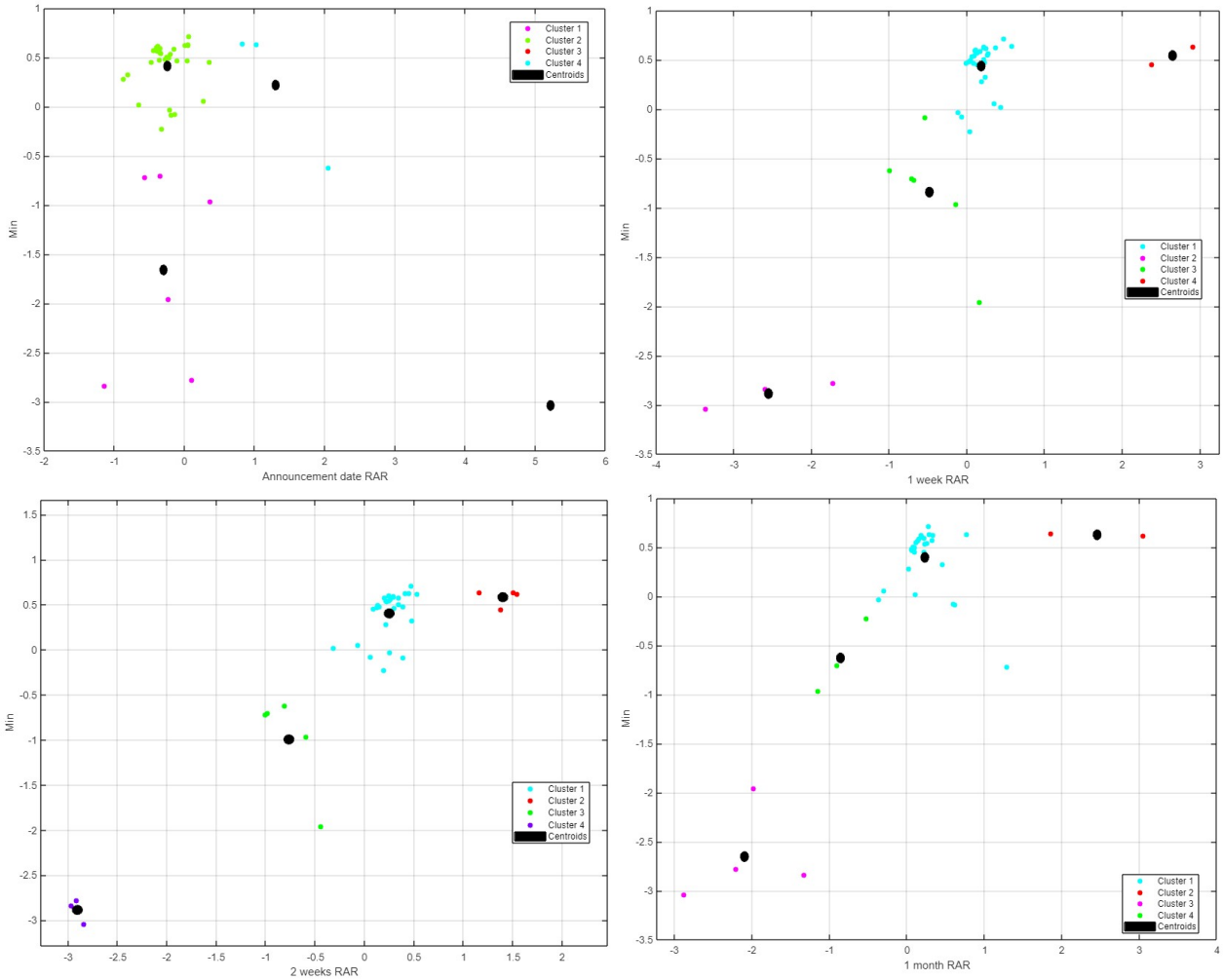

Figure 10. 2nd clusterings, where min of returns as an explanatory variable and returns as target variables.

The 3rd clusterings were evaluated by the max as an explanatory variable. Interestingly, but presumably based on the previous findings, SPAC companies with low returns on the announcement date also have the lowest max values of the SPAC companies. As previously shown in the study, the graphs in Figure 10 also illustrate that the most severe daily

returns are made on the deal announcement date. As previously shown, the company SVF, which deviates from the data set, makes the highest return on the data set on the announcement date but then underperforms the most in all other event windows except the 2-weeks graph, where its returns are also among the lowest returns of the SPAC companies. As can be read from figure 10, there are high volatility between the companies returns and max returns when moving forward from the announcement date. Some of the companies change clusters between the event windows but most stay in the same cluster as in the previous clusterings. Overall, most of the companies followed the same line between the observation periods, forming the largest cluster group (cluster 3/green), where returns were on both sides of the x-value 0, but in the lower end of the data set when measured in max returns, and the values thus remain below 0 on the y-axis.

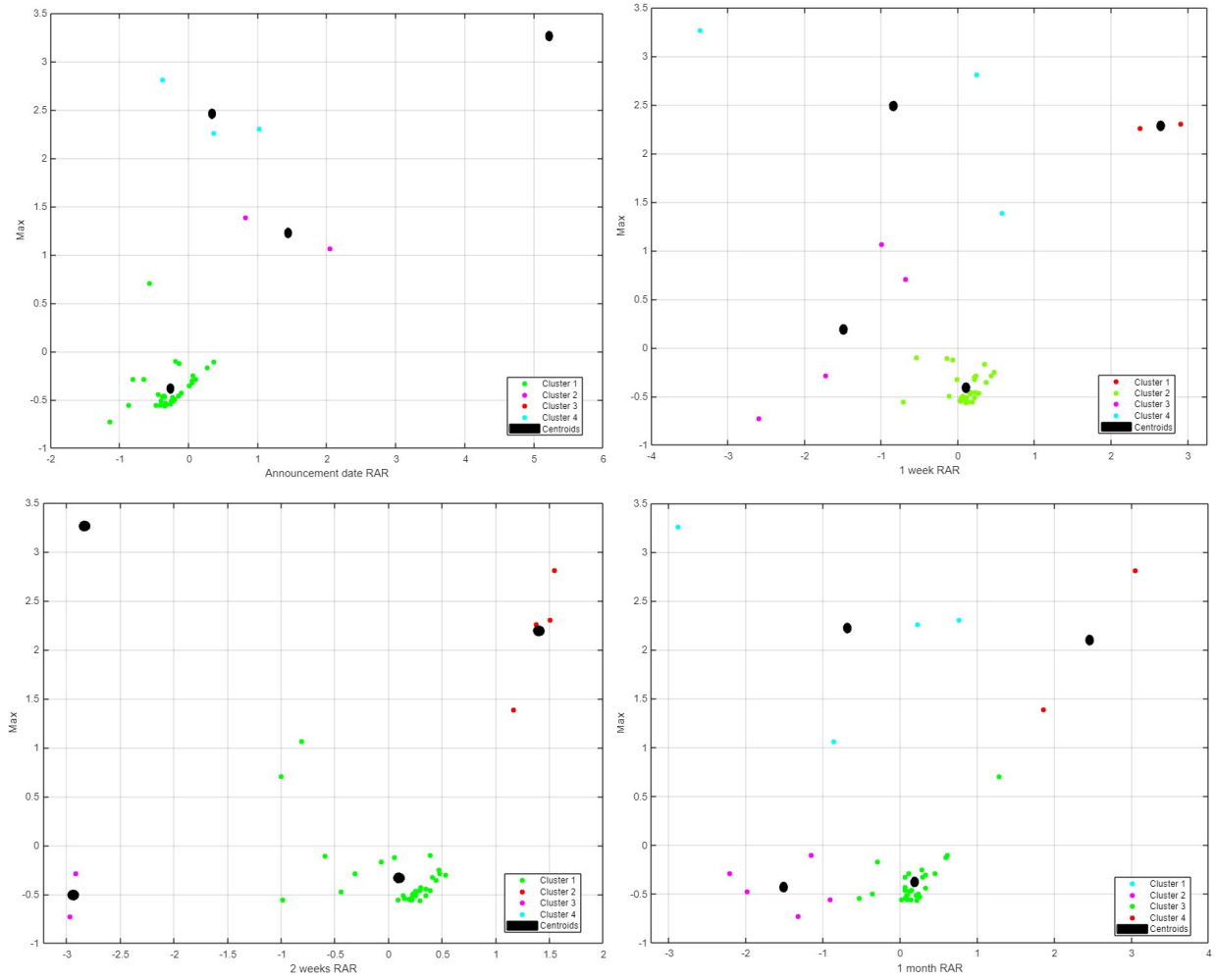

Figure 11. 3rd clusterings, where the max of returns as an explanatory variable and returns as target variables.

To conclude all the above-presented clusterings, most of the SPAC companies behaved quite similarly between the observation periods and different explanatory variables. These companies also stayed mostly in the same clusters. There were also exceptions and one company that differed significantly from the other SPAC company's results. Most of the clusters had clear concentrations and clear linearity. The biggest scatter in the clusters was seen a month after the deal announcement. Overall, the clustering results were logical and expanded the result of the study by providing more detailed information about the SPAC companies used in the study. In Table 7 the clustering results are

presented on a SPAC level. As some SPACs changed clusters between the observed periods and explanatory variables, clusters are explained in general based on the announcement date.

Table 7. The explanation of clusters based on the announcement date

Cluster	Acquiror Ticker Symbol	Acquiror Stock Exchange	Target Name	Deal Value	Target Macro Industry
1	SVFC	Nasdaq	Symbotic LLC	4.500.000.000,00 €	High Technology
2	LFAC	Nasdaq	Vintage Estate Homes LLC	54.600.000,00 €	Industrials
2	ARYD	Nasdaq	Amicus Therapeutics Inc-Gene Therapy	156.000.000,00 €	Healthcare
2	SKIL	New York	Global Knowledge Training LLC	233.000.000,00 €	Consumer Products and Services
2	AMCI	Nasdaq	Advent Technologies Inc	250.000.000,00 €	Energy and Power
2	DYNS	Nasdaq	Senti Biosciences Inc	260.800.000,00 €	Healthcare
2	BOAS	New York	Selina Holding Company	285.000.000,00 €	Media and Entertainment
2	LNFA	New York	ID Experts Holdings Inc	338.750.000,00 €	High Technology
2	HLXA	Nasdaq	MoonLake Immunotherapeutics AG	360.000.000,00 €	Healthcare
2	CCV	New York	Thrasio Holdings Inc	400.000.000,00 €	Retail
2	GPCO	Nasdaq	MC Hologram Inc	440.640.000,00 €	Consumer Products and Services
2	GLSPU	Nasdaq	Gorilla Technology Group	657.000.000,00 €	High Technology
2	PTOC	Nasdaq	The Tomorrow Cos Inc	683.900.000,00 €	High Technology
2	VELO	Nasdaq	BBQ Holding LLC	687.000.000,00 €	Retail
2	ACKIU	Nasdaq	North Atlantic Imports LLC	709.000.000,00 €	High Technology
2	HYAC	Nasdaq	Arko Holdings Ltd	717.300.000,00 €	Energy and Power
2	SCLE	Nasdaq	Voltus Inc	750.000.000,00 €	High Technology
2	LNFA	New York	ZeroFox Inc	866.250.000,00 €	High Technology
2	ENNV	Nasdaq	Fast Radius Inc	900.000.000,00 €	High Technology
2	ESSC	Nasdaq	JHD Holdings (Cayman) Ltd	1.000.000.000,00 €	Retail
2	TREB	New York	System1 LLC	1.130.000.000,00 €	High Technology
2	FTAA	Nasdaq	Pico Quantitative Trading LLC	1.265.000.000,00 €	High Technology
2	TWNT	New York	Terran Orbital Corp	1.300.000.000,00 €	Telecommunications
2	GIIX	Nasdaq	Footprint International Holdco Inc	1.598.350.000,00 €	Materials
2	ATSPU	Nasdaq	SoundHound Inc	2.000.000.000,00 €	High Technology
2	COVA	Nasdaq	PT Global Ticket Network	2.000.000.000,00 €	Consumer Products and Services
2	CPAA	Nasdaq	Advantage Solutions Inc	2.271.200.000,00 €	Media and Entertainment
2	KVSA	Nasdaq	Valo Health LLC	2.299.500.000,00 €	Healthcare
2	PRPB	New York	Getty Images Inc	4.800.000.000,00 €	Media and Entertainment
2	NSTB	New York	Apex Clearing Holdings LLC	5.146.500.000,00 €	Financials
2	FST	New York	Fertitta Entertainment Inc	6.192.000.000,00 €	Media and Entertainment
2	EJFA	Nasdaq	Pagaya Technologies Ltd	7.973.000.000,00 €	High Technology
2	FTCV	Nasdaq	eToro Group Ltd	10.366.000.000,00 €	Financials
3	SBEA	Nasdaq	Black Rifle Coffee Co LLC	1.306.000.000,00 €	Retail
3	FPAC	New York	Global Blue SA	1.768.230.000,00 €	Financials
3	ADER	Nasdaq	Tiger Resort Leisure & Entertainment Inc	2.500.000.000,00 €	Media and Entertainment
4	CFVI	Nasdaq	Rumble Inc	400.000.000,00 €	High Technology
4	ACEV	Nasdaq	Tempo Automation Inc	549.000.000,00 €	Energy and Power
4	SPAQ	New York	Fisker Inc	1.750.000.000,00 €	Industrials
4	VTIQ	Nasdaq	Nikola Corp	3.281.000.000,00 €	Industrials

As Table 7 shows, there are no clear similarities between the different clusters. The explanatory factors, deal value, and SPACs target company industries, do not explain the

distribution of abnormal returns between the SPAC companies on the deal announcement date.

6 Conclusions

This thesis aimed to examine whether there are abnormal returns on the announcement date -window or not. Also, the overall market reaction on the SPACs share price was under investigation. The study presented previous literature and earlier studies on SPACs and took into consideration the size of the deal value and the target companies' industry. The observation periods for calculating the abnormal returns were set for four different days which were the announcement date, one week from the announcement date, two weeks from the announcement date, and one month from the announcement date. By executing the statistical method, k-means clustering, the SPACs similarities, and the impact of these factors on abnormal returns were studied against the above-presented observation periods.

In the first chapter of the thesis, in section 1.2., the study's two hypotheses were determined. The first hypothesis assumed is that the SPACs do not averagely create abnormal returns on the trading day after the deal announcement. The average risk-adjusted returns for the observed SPACs on the day after the announcement date was -0,40 %. As the returns were risk-adjusted by the S&P 500 index, there are more variables affecting the returns. Even though the results are insignificant for SPACs, the results indicate that the SPACs were not able to create abnormal returns the day after the deal announcement date. Therefore, the H1 of the study could be accepted.

The second hypothesis was also associated with the date of the deal announcement. The hypothesis was based on the previous literature and on the idea that the market sees the deal announcement as a positive thing, which would correlate positively to SPACs share price. The second hypothesis assumed that SPACs could averagely generate abnormal returns on the deal announcement date. The average risk-adjusted returns for the observed SPACs on the deal announcement date was 1,96 %. Therefore, the results are in line with the H2, and the H2 can be accepted.

There were 10 different macro industries in SPACs target companies, and these were compared by calculating cumulative abnormal returns (CAR) for the observation period. The main macro industry in the target companies was high technology that includes IT Consulting -, software -, electronics -, and E-commerce companies. The CARs differed a lot on a daily level. The best performed (CAR 7,86%) target company industry was materials. In a turn, the lowest CAR (-25,27%) was in the target company industry of energy and power.

The SPAC deal values for the observed SPAC companies were divided into three groups. The biggest deal value was in group 1 and the smallest deal value was in group 3. The results indicate that the averagely the smaller the deal, the bigger cumulative abnormal returns during the observation period. Yet, there are no positive CAR values on any value group. The announcement day shows positive risk-adjusted returns for groups 2 and 3. Based on the results by the deal value, it seems that there might be higher expectations for SPACs that have raised a higher amount of funds for the deal as the market reacts quite sharply downwards after the deal announcement on the observation periods. These results are in line with the other assumptions and calculations presented in this study.

The risk-adjusted returns were evaluated by k-means clustering in Matlab. The observation periods were deal announcement day, 1-week -, 2 weeks -, and 1-month -post-announcement days. These observation periods were used as target variables. Min, max and mean returns were explanatory variables. The results indicate that most of the SPAC companies had similar behavior between the observation periods and different explanatory variables. Yet, there were no similarities inside the clusters that could have explained the abnormal returns during the observation periods. The observed SPACs also stayed mostly in the same clusters. There were also exceptions and one company that differed significantly from the other SPAC companies' results. Most of the clusters had clear concentrations and clear linearity. The biggest scatter in the clusters was seen a

month after the deal announcement. Overall, the clustering results were logical and expanded the result of the study on a more detailed level.

Finally, results indicate that holding the SPAC stock a short period after announcement day, +3 days to 1 month, is not profitable based on averages. Yet, there is a possibility to gain abnormal returns on the SPAC's deal announcement date. Also, it should be noted that the amount of available data for this thesis is quite narrow due to its timeliness and data limitations. Nevertheless, the results were satisfactory with the data set used in the study.

As a further research proposal, the number of samples should be raised, and the observation period should be increased after the data is available. Additional explanatory variables should be included in order to expand the research and make it more detailed from different perspectives. With larger observations, the study could be more significant and the key factors which lead to abnormal returns on SPACs deal announcement date could be recognized. Also, these key factors could tell which SPACs would be profitable to invest in when considering the deal announcement. These further proposals are challenging to execute with the used data set and clustering. Alternative clustering or machine learning approaches could be more appropriate for this kind of research.

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Appendices

Appendix 1. S&P 500 benchmark returns (Excel: =LN(return$_t$/return$_{t-1}$))

	AD	16.1.2020	3.3.2020	13.7.2020	13.7.2020	8.9.2020	13.10.2020	13.10.2020	7.1.2021	1.2.2021	18.2.2021
	Ticker	FPAC	VTIQ	HYAC	SPAQ	CPAA	AMCI	SKIL	ACEV	FST	ESSC
ESTIMATION	S&P500 -3	-0,0007907	0,00959217	0,00255736	0,00255736	0,00722846	0,08968316	0,08968316	0,00736792	-0,00220	0,00298
PERIOD	S&P500 -2	-0,0005442	-0,004481	-0,0019644	-0,0019644	0,01486927	0,011469	0,011469	-0,0064944	0,00750	0,01585
INDEX	S&P500 -1	-0,0028295	-0,0166495	0,0015634	0,0015634	0,01118782	0,06054383	0,06054383	0,01235178	0,01525	0,01598
	S&P500 AD	0,00687167	-0,0016067	0,0007113	0,0007113	0,00332013	-0,0342678	-0,0342678	-0,0037573	-0,03576	-0,00482
	S&P500 +1	-0,0038881	-0,003026	0,00083674	0,00083674	-0,0054155	0,03296662	0,03296662	0,00764119	-0,00817	0,00822
OBSERVATI	S&P500 +2	-0,0011321	0,00371342	0,007666	0,007666	0,00729965	-0,0161424	-0,0161424	0,00715537	-0,02815	0,00528
ON PERIOD	S&P500 +3	-0,0065455	-0,0244265	0,000503	0,000503	0,00168707	-0,0451463	-0,0451463	0,00360545	0,01994	-0,00962
INDEX	S&P500 +1we	-0,0043502	-0,0069316	0,00523829	0,00523829	0,00729894	0,04536164	0,04536164	0,0345896	-0,01571	0,03284
	S&P500 +2we	0,0180934	-0,0340522	0,00603211	0,00603211	-0,1161927	0,12315697	0,12315697	0,03885964	-0,06223	0,02705
	S&P500 +1mc	0,03569662	0,02437221	0,04030422	0,04030422	-0,4023854	0,12161119	0,12161119	0,04143126	-0,00818	0,06870
		15.10.2021	28.10.2021	2.11.2021	16.11.2021	1.12.2021	2.12.2021	2.12.2021	7.12.2021	10.12.2021	22.2.2021
		ADER	TWNT	SBEA	ATSPU	SCLE	BOAS	CFVI	PTOC	NMMC	NSTB
ESTIMATION	S&P500 -3	-0,00340	0,00146	0,01143	0,00299	0,00055	0,00720	0,00720	-0,00140	0,00229	0,00822
PERIOD	S&P500 -2	-0,00132	-0,00278	-0,01307	-0,00107	0,00720	-0,00001	-0,00001	-0,00320	-0,02299	0,00528
INDEX	S&P500 -1	-0,00462	-0,02057	0,01047	0,00474	-0,00001	0,00386	0,00386	0,00166	0,01311	-0,00962
	S&P500 AD	-0,00775	0,00157	0,00409	0,00182	0,00386	-0,00261	-0,00261	0,00229	-0,01914	0,01781
	S&P500 +1	0,00227	-0,01198	0,00826	-0,00506	-0,00261	0,00338	0,00338	-0,02299	-0,01189	-0,01407
OBSERVATI	S&P500 +2	-0,00576	0,01143	-0,00192	0,00978	0,00338	-0,00140	-0,00140	0,01311	0,01409	0,01725
ON PERIOD	S&P500 +3	0,00844	-0,01307	-0,00689	0,00195	-0,00140	-0,00320	-0,00320	-0,01914	-0,00848	0,00798
INDEX	S&P500 +1we	-0,02369	0,00729	0,02441	0,02275	-0,02287	-0,00715	-0,00715	-0,02363	0,02176	0,02322
	S&P500 +2we	-0,03446	0,03608	0,04727	0,02334	-0,00301	0,00267	0,00267	0,00178	0,00022	0,01652
	S&P500 +1mc	0,02391	0,06436	0,07524	0,02005	-0,00813	-0,02408	-0,02408	-0,07622	-0,03004	0,05728
		18.5.2021	9.6.2021	12.6.2021	29.6.2021	19.7.2021	20.7.2021	20.12.2021	20.12.2021	22.12.2021	8.3.2021
		COVA	KVSA	CCV	TREB	ENNV	VELO	DYNS	LNFA	GLSPU	FTCV
ESTIMATION	S&P500 -3	0,01380	0,01931	0,00601	0,01434	0,00274	-0,00670	-0,00721	-0,00721	-0,00918	0,00472
PERIOD	S&P500 -2	0,00101	-0,00537	0,01034	-0,00097	-0,00670	0,00070	0,00950	0,00950	-0,00750	-0,00220
INDEX	S&P500 -1	0,01079	0,01406	0,00101	0,00147	0,00070	0,00813	-0,00918	-0,00918	0,01622	0,00521
	S&P500 AD	0,00389	0,00601	0,00647	0,00421	0,00813	0,00735	-0,00750	-0,00750	-0,00878	0,00344
	S&P500 +1	0,00737	0,01034	-0,00157	0,00769	0,00735	-0,01049	0,01622	0,01622	-0,01034	-0,01876
OBSERVATI	S&P500 +2	-0,00111	0,00101	0,00288	-0,00020	-0,01049	-0,00871	-0,00878	-0,00878	-0,01145	-0,00303
ON PERIOD	S&P500 +3	-0,00035	0,00647	-0,01487	0,00329	-0,00871	-0,02168	-0,01034	-0,01034	0,01762	-0,03593
INDEX	S&P500 +1we	0,01138	0,00366	-0,02031	0,01600	-0,00916	-0,02506	0,01959	0,01959	0,02489	-0,02816
	S&P500 +2we	-0,01966	0,01521	0,02709	0,02078	-0,00134	-0,00752	-0,02211	-0,02211	-0,05974	0,02046
	S&P500 +1mc	0,00608	0,06968	0,05257	0,01422	0,00550	0,00326	0,00000	0,00000	-0,07071	0,06612
		23.12.2021	4.8.2021	10.9.2021	15.9.2021	29.9.2021	4.10.2021	10.12.2021	14.12.2021	23.4.2021	16.3.2021
		ACKIU	FTAA	GPCO	EJFA	ARYD	HLXA	PRPB	GIIX	LFAC	SVFC
ESTIMATION	S&P500 -3	-0,00750	-0,00213	-0,01600	0,00238	0,00161	0,00811	0,00229	-0,01189	0,00353	-0,01220
PERIOD	S&P500 -2	0,01622	0,00187	0,01505	-0,00472	0,00262	0,00849	-0,02299	0,01409	0,00868	0,01224
INDEX	S&P500 -1	-0,00878	0,00116	0,00821	-0,00019	-0,00709	0,00149	0,01311	-0,00848	-0,00223	0,01764
	S&P500 AD	-0,01034	0,00077	0,00201	0,00420	-0,01081	0,00222	-0,01914	0,01166	0,00134	0,02181
	S&P500 +1	-0,01145	-0,00049	0,01009	-0,00542	0,00126	-0,00584	-0,01189	0,02050	0,00642	0,01927
OBSERVATI	S&P500 +2	0,01762	0,00145	0,00238	-0,00184	0,00811	0,00877	0,01409	0,00308	-0,01486	-0,00029
ON PERIOD	S&P500 +3	0,01013	-0,00364	-0,00472	0,00817	0,00849	0,00430	-0,00848	-0,00721	0,00706	0,01163
INDEX	S&P500 +1we	0,03664	0,00367	0,00450	0,00298	0,02449	0,00869	0,02176	0,02541	0,01794	0,04033
	S&P500 +2we	-0,04663	-0,00900	0,01701	-0,00428	0,02553	-0,00345	0,00022	0,04254	0,03192	0,05425
	S&P500 +1mc	-0,02301	0,03968	0,03773	0,01116	-0,00987	-0,02360	-0,03004	-0,04311	0,05234	0,07440

Appendix 2. Data set of SPACs

Acquiror name	Acquiror Ticker Symbol	Acquiror Stock Exchange	Target Name	Announcement Date	Deal Value	Target Macro Industry	Target Mid Industry
ACE Convergence Acq Corp	ACEV	Nasdaq	Tempo Automation Inc	14.10.2021	549.000.000,00 €	Energy and Power	Other Energy & Power
Ackrell SPAC Partners I Co	ACKIU	Nasdaq	North Atlantic Imports LLC	23.12.2021	709.000.000,00 €	High Technology	Electronics
26 Capital Acquisition Corp	ADER	Nasdaq	Tiger Resort Leisure & Entertainment Inc	15.10.2021	2.500.000.000,00 €	Media and Entertainment	Casinos & Gaming
AMCI Acquisition Corp	AMCI	Nasdaq	Advent Technologies Inc	13.10.2020	250.000.000,00 €	Energy and Power	Power
Arya Sciences Acq Corp IV	ARYD	Nasdaq	Amicus Therapeutics Inc-Gene Therapy	29.9.2021	156.000.000,00 €	Healthcare	Biotechnology
Archimedes Tech SPAC Partners	ATSPU	Nasdaq	SoundHound Inc	16.11.2021	2.000.000.000,00 €	High Technology	Software
BOA Acquisition Corp	BOAS	New York	Selina Holding Company	2.12.2021	285.000.000,00 €	Media and Entertainment	Hotels and Lodging
Churchill Capital Corp V	CCV	New York	Thrasio Holdings Inc	12.6.2021	400.000.000,00 €	Retail	Internet and Catalog Retailing
CF Acquisition Corp VI	CFVI	Nasdaq	Rumble Inc	2.12.2021	400.000.000,00 €	High Technology	Software
COVA Acquisition Corp	COVA	Nasdaq	PT Global Ticket Network	18.5.2021	2.000.000.000,00 €	Consumer Products and Services	Travel Services
Conyers Park II Acquisition	CPAA	Nasdaq	Advantage Solutions Inc	8.9.2020	2.271.200.000,00 €	Media and Entertainment	Advertising & Marketing
Dynamics Special Purpose Corp	DYNS	Nasdaq	Senti Biosciences Inc	20.12.2021	260.800.000,00 €	Healthcare	Biotechnology
EJF Acquisition Corp	EJFA	Nasdaq	Pagaya Technologies Ltd	15.9.2021	7.973.000.000,00 €	High Technology	Software
ECP Envi Growth Opportunities	ENNV	Nasdaq	Fast Radius Inc	19.7.2021	900.000.000,00 €	High Technology	IT Consulting & Services
East Stone Acquisition Corp	ESSC	Nasdaq	JHD Holdings (Cayman) Ltd	18.2.2021	1.000.000.000,00 €	Retail	Internet and Catalog Retailing
Far Point Acquisition Corp	FPAC	New York	Global Blue SA	16.1.2020	1.768.230.000,00 €	Financials	Other Financials
FAST Acquisition Corp	FST	New York	Fertitta Entertainment Inc	1.2.2021	6.192.000.000,00 €	Media and Entertainment	Casinos & Gaming
FTAC Athena Acquisition Corp	FTAA	Nasdaq	Pico Quantitative Trading LLC	4.8.2021	1.265.000.000,00 €	High Technology	Software
Fintech Acquisition Corp V	FTCV	Nasdaq	eToro Group Ltd	16.3.2021	10.366.000.000,00 €	Financials	Brokerage
Gores Holdings VIII Inc	GIIX	Nasdaq	Footprint International Holdco Inc	14.12.2021	1.598.350.000,00 €	Materials	Paper & Forest Products
Global SPAC Partners Co	GLSPU	Nasdaq	Gorilla Technology Group	22.12.2021	657.000.000,00 €	High Technology	IT Consulting & Services
Golden Path Acquisition Corp	GPCO	Nasdaq	MC Hologram Inc	10.9.2021	440.640.000,00 €	Consumer Products and Services	Professional Services
Helix Acquisition Corp	HLXA	Nasdaq	MoonLake Immunotherapeutics AG	4.10.2021	360.000.000,00 €	Healthcare	Biotechnology
Haymaker Acquisition Corp II	HYAC	Nasdaq	Arko Holdings Ltd	13.7.2020	717.300.000,00 €	Energy and Power	Oil & Gas
Khosla Ventures Acquisition Co	KVSA	Nasdaq	Valo Health LLC	9.6.2021	2.299.500.000,00 €	Healthcare	Biotechnology
Landsea Homes Corp	LFAC	Nasdaq	Vintage Estate Homes LLC	27.4.2021	54.600.000,00 €	Industrials	Building/Construction & Engineering
L&F Acquisition Corp	LNFA	New York	ZeroFox Inc	20.12.2021	866.250.000,00 €	High Technology	Software
L&F Acquisition Corp	LNFA	New York	ID Experts Holdings Inc	20.12.2021	338.750.000,00 €	High Technology	IT Consulting & Services
Northern Star Invt Corp II	NSTB	New York	Apex Clearing Holdings LLC	22.2.2021	5.146.500.000,00 €	Financials	Other Financials
CC Neuberger Principal II	PRPB	New York	Getty Images Inc	10.12.2021	4.800.000.000,00 €	Media and Entertainment	Motion Pictures / Audio Visual
Pine Tech Acq Corp	PTOC	Nasdaq	The Tomorrow Cos Inc	7.12.2021	683.900.000,00 €	High Technology	Software
SilverBox Engaged Merger Corp	SBEA	Nasdaq	Black Rifle Coffee Co LLC	2.11.2021	1.306.000.000,00 €	Retail	Internet and Catalog Retailing
Broadscale Acquisition Corp	SCLE	Nasdaq	Voltus Inc	1.12.2021	750.000.000,00 €	High Technology	Software
Skillsoft Corp	SKIL	New York	Global Knowledge Training LLC	13.10.2020	233.000.000,00 €	Consumer Products and Services	Educational Services
Spartan Energy Acquisition	SPAQ	New York	Fisker Inc	13.7.2020	1.750.000.000,00 €	Industrials	Automobiles & Components
SVF Investment Corp 3	SVFC	Nasdaq	Symbotic LLC	13.12.2021	4.500.000.000,00 €	High Technology	Software
Trebia Acquisition Corp	TREB	New York	System1 LLC	29.6.2021	1.130.000.000,00 €	High Technology	E-commerce / B2B
Tailwind Two Acquisition Corp	TWNT	New York	Terran Orbital Corp	28.10.2021	1.300.000.000,00 €	Telecommunications	Space and Satellites
Velocity Acquisition Corp	VELO	Nasdaq	BBQ Holding LLC	20.7.2021	687.000.000,00 €	Retail	Internet and Catalog Retailing
VectoIQ Acquisition Corp	VTIQ	Nasdaq	Nikola Corp	3.3.2020	3.281.000.000,00 €	Industrials	Automobiles & Components

Appendix 3. Clustering data

Ticker	RAR AD	RAR 1 wee	RAR 2 wee	RAR 1 mo	Mean	Min	Max	Median	Deal value
ACEV	-0,04792	-0,24837	-0,30038	-0,15698	-0,12328756	-0,30038	-0,0121	-0,10251	3
ACKIU	-0,00855	-0,00213	-0,01665	-0,01104	-0,00674503	-0,01665	0,0027	-0,00543	2
ADER	-0,01391	-0,07575	-0,11821	0,110874	-0,00404254	-0,11821	0,1109	-0,00084	1
AMCI	-0,0028	0,008022	0,118168	0,291515	0,043509907	-0,0028	0,2915	0,00434	3
ARYD	0,004974	0,005374	0,0068	-0,01265	0,000687489	-0,01265	0,0068	0,002785	3
ATSPU	0,02262	0,005478	0,024274	0,01306	0,006737231	-0,0024	0,0243	0,002324	1
BOAS	0,010868	0,001448	0,002111	-0,00523	0,001706852	-0,00523	0,0109	0,001408	3
CCV	0,008455	-0,06313	0,011235	0,042048	-0,01092446	-0,06313	0,0420	-0,00714	3
CFVI	0,080551	0,248294	0,114389	0,057441	0,071547105	-0,00117	0,2483	0,061029	3
COVA	0,022541	-0,01532	-0,0135	-0,01433	-0,00289018	-0,01535	0,0225	-0,00055	1
CPAA	0,005948	0,000105	-0,06631	-0,22471	-0,02377183	-0,22471	0,0100	0,00605	1
DYNS	-0,01883	0,025597	-0,05441	-0,00974	-0,01024844	-0,05441	0,0256	-0,00756	3
EJFA	0,013381	-0,00694	0,00282	-0,01389	-0,00158476	-0,01594	0,0134	0,000185	1
ENNV	-0,00474	-0,00264	-0,00609	-0,0063	-0,00336196	-0,0063	0,0027	-0,00325	2
ESSC	0,003904	-0,0119	-0,01146	-0,01464	-0,00426415	-0,01464	0,0039	-0,00167	2
FPAC	-0,00051	-0,0782	-0,11644	-0,11394	-0,03419208	-0,11644	0,0027	-0,00921	1
FST	0,068804	0,037924	0,082773	0,169494	0,039201144	-0,00087	0,1695	0,011527	1
FTAA	-0,00127	0,006325	0,011011	-0,01478	8,34738E-06	-0,01478	0,0110	-0,00054	2
FTCV	0,035818	0,017318	-0,03166	-0,0513	-0,00216521	-0,0513	0,0358	-0,00061	1
GIIX	0,020092	0,018864	0,016201	-0,00201	0,008162504	-0,00201	0,0201	0,006928	1
GLSPU	-0,00392	-0,00392	-0,00196	0	-0,00063894	-0,00392	0,0064	0	2
GPCO	-0,00015	-0,00562	-0,00491	0,005015	-0,00205898	-0,00893	0,0050	-0,0016	3
HLXA	-0,00096	0,010249	-0,00187	-0,00859	0,001116894	-0,00859	0,0102	0,000425	3
HYAC	0,00062	-0,01096	-0,00716	-0,07531	-0,00902786	-0,07531	0,0037	-0,00091	2
KVSA	-0,03175	0,002772	-0,00469	-0,01885	-0,00601992	-0,03175	0,0028	-0,00104	1
LFAC	0,041539	-0,02742	-0,08024	-0,13929	-0,01984737	-0,13929	0,0415	-0,00398	3
LNFA	-0,00632	-0,00281	0,006815	0,012678	-0,00020817	-0,00632	0,0127	-0,00203	2
NMMC	-0,00278	0,010677	-0,00059	-0,00746	0,000303708	-0,00746	0,0107	-0,00015	1
NSTB	0,01145	-0,02007	-0,01986	0,040142	-0,00327577	-0,06234	0,0401	0,000122	1
PRPB	-0,00056	-0,0049	0,002336	0,001539	-0,0007657	-0,0049	0,0023	-0,00058	1
PTOC	0,007165	-0,02435	-0,00148	-0,05841	-0,01149501	-0,05841	0,0081	-0,00276	2
SBEA	0,14163	-0,10434	-0,10038	-0,10931	-0,02599423	-0,10931	0,1416	-0,00121	2
SCLE	0,00774	-0,0085	-0,00448	0,00283	-0,00139341	-0,0095	0,0077	-0,00119	2
SKIL	-0,02808	0,007025	0,018969	0,025668	0,002542692	-0,02808	0,0257	0,005227	3
SPAQ	0,025868	-0,16961	-0,29546	-0,24778	-0,08106531	-0,29546	0,0259	-0,0247	1
SVFC	33,03 %	-31,79 %	-28,82 %	-31,70 %	-0,08877505	-0,31789	0,3303	-0,04938	3
TREB	0,006473	-0,01015	-0,01279	-0,01119	-0,00375283	-0,01279	0,0065	-0,00296	2
TWNT	0,022758	0,005782	0,01284	0,008787	0,006405921	-0,0017	0,0228	0,0045	2
VELO	0,023627	0,028962	0,01837	0,007662	0,016339692	0,005605	0,0290	0,017718	2
VTIQ	0,041135	0,201054	0,102447	0,001871	0,062250115	-0,01704	0,2442	0,022759	1