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SPAC merger vs traditional IPO

-An event study comparing the performance of companies going public via SPAC merger to a traditional IPO in the year of 2020.

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Abstract

Special Purpose Acquisition Companies are surging in popularity as a way for companies to go public. As half of the initial public offerings on US stock exchanges were SPACs in 2021 there seems to be no indication of SPACs slowing down. This thesis examines the performance of companies that went public via a business combination with a SPAC in the year 2020 compared to companies that decided to take the traditional route with an IPO of their own. The paper focuses on two major events in the SPACs lifecycle, the definitive agreement and the merger. For the traditional IPOs it focuses on their performance during their first day of trading on a public US market. In order to capture the abnormal returns of the short- and long-term during these events, cumulative abnormal return and buy-and-hold abnormal returns are used. Furthermore, the results are discussed using the efficient market hypothesis and principal-agent theory. The sample data in this paper includes 64 companies that went public via a SPAC business combination in the year 2020 and 224 companies that went public via a traditional initial public offering in 2020. The paper finds that traditional IPOs outperform SPACs in both the short- and long-term with evidence that SPACs show positive abnormal returns in the short-term after the definitive agreement but show significant negative abnormal returns shortly after the merger. The traditional IPOs also perform its best during its earlier stages with significant abnormal returns after its first day of trading but then sees a decline as time goes on. Concluding, in line with previous research, that companies that decides to go public via a SPAC generally performs worse both in the short- and long-term compared to companies going public via a traditional IPO.

Keywords: Event Study, SPACs, Special Purpose Acquisition Companies**,** Initial Public Offerings, Abnormal Returns, CAR, BHAR, Principal-Agent Problem, EMH

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Chapter 1. Introduction

A Special Purpose Acquisition Company (SPAC) is a company whose sole purpose is to acquire another company in the future. Thus, a SPAC has no traditional operating business and when investing you are solely betting on the SPAC's management (the sponsors). SPACs has become a popular vehicle for companies that want to go public without having to go through the traditional process (SEC, 2021a).

Special Purpose Acquisition Companies (SPAC) saw a boom in 2020 with completed SPAC mergers more than doubling since 2019. According to Alexander Osipovich (2020) this boom can be partly accredited to the Covid-19 pandemic. With high volatility in financial markets, the option to go public via a business combination (DE-SPAC) attracted a lot of companies in 2020. The prospect of not having to do road shows and various pitching to investors during a pandemic proved to be a very attractive offer in 2020. According to SpacTrack (2021) 64 DE-SPACs were completed in 2020 alone.

Not only SPACs saw a spike in popularity in 2020, but traditional Initial Public Offerings (IPOs) also saw an increase by 106.9% in 2020 compared to 2019 according to StockAnalysis (2021). However, a lot of these initial public offerings were Special Purpose Acquisition Companies. According to Rudden (2021) in 2020 more than half of the IPOs on US markets were SPACs. Thus, the increase of traditional IPOs can be partly accredited to the increase of SPACs.

How does this surge in SPACs as a way of going public compare to companies that decides to undertake the process of going public themselves rather than to unload the costly and time-consuming process to a Special Purpose Acquisition Company? Is the SPAC more than just a great tool to go public during difficult times when a traditional initial public offering is costly, as Kolb and Tykvová (2016) suggest?

The purpose of this paper is to compare the performance of companies going public via a SPAC merger to companies going public the traditional way during the year 2020 with an event study where the impact of the initial public offering (IPO), definitive agreement (DA-SPAC) and business combination (DE-SPAC) on the stock price will be analyzed in the short- and long-term. *How does a company newly listed on US exchanges in 2020 perform compared to the market benchmark during these events? (Initial Public Offering, SPAC Definitive Agreement, SPAC Business Combination).*

Previous research suggests that companies that go public via a business combination with a SPAC generally underperform the tradition IPO in both the short-term and long-term. However, most of the previous research dates years back. Thus, the decision was made to look at SPAC business combinations and initial public offerings in the year 2020 leaving enough room for 225 trading days long-term buy-and-hold abnormal return event study.

The results showed that previous research still holds true, SPACs generally perform worse than traditional IPOs both in the short- and long-term. Where different anomalies can be explained using relevant theory in order to understand why SPACs and IPOs perform the way they do during the outlined events.

The rest of the paper is structured as follows - chapter 2 outlines the previous research, theory and hypothesis. Chapter 3 describes the event study methodology and the two different methods of estimating abnormal returns in the short- and long-term. For the results of the paper in chapter 4 the event study is used to calculate the average cumulative abnormal return of the sample SPACs and traditional IPOs during their events for the short-term event study and for the long-term average buy-and-hold abnormal returns are used. In this chapter the results of the event study are discussed and analyzed. Chapter 5 contains the conclusion of this paper.

Chapter 2. Previous research, theory and hypothesis

2.1 IPO

An Initial Public Offering or an IPO is when a company decides to go from a pre-IPO private company to a publicly traded company. In the United States a company must go through a process in order to register with the SEC according to federal securities laws (SEC, 2019).

For a company to register an offering the company must file a registration statement to the SEC, typically using a Form S-1. A major part of the registration statement is the prospectus. The prospectus is the offering document that describes the company, the terms of the IPO and other information that investors can use when deciding whether to invest or not (SEC, 2019).

The registration statement for the IPO is then subject to review by the SEC to monitor compliance with applicable disclosure laws. Often resulting in changes to the prospectus although the ultimate responsibility lies on the company itself that the prospectus is in line with disclosure that is deficient in explanation, clarity and applicable accounting standards (SEC, 2019).

Once the SEC comments have been cleared and the SEC issues the registration statement effective, the company hires an underwriter, typically an investment bank who manages and sells the IPO for the company. The underwrites will then organize roadshows in order to gain interest among potential investors and provide information about the offering (SEC, 2019). During the Covid-19 pandemic these roadshows were usually held digitally.

When the underwriter typically will have obtained indications of interest from investors, they will use this information to recommend an offering price to the issuer who will decide the price of the IPO, this is called the “offering price” and is the price that investors will pay per share if they decide to directly participate in the IPO (SEC, 2019).

An IPO will help a company to establish a trading market for its shares and will usually in conjunction with the IPO apply to list on an established stock exchange such as the New York

Stock Exchange (NYSE) or NASDAQ. Plans for exchange listing are usually disclosed in the IPO's prospectus (SEC, 2019).

2.1.1 IPO Underpricing

Underpricing is the percentage difference between the offer price of the IPO and the price that the shares later trade for on the open market. In well-developed capital markets the extent of the underpricing becomes clear quickly, even by the end of the first day of trading. The US has the most active IPO market in the world and averages an IPO underpricing between 10 and 20 percent. However, this does not always hold true and at times IPOs are even overpriced. During the peak of the Dotcom bubble the average US IPO was underpriced as high as 71% which left significant amounts of money on the table (Ljungqvist, 2007).

Rock (1986) winner's curse assumes that some investors are better informed on the true value of the shares than others. Informed investors bid only for appealingly priced offers while the uninformed investors bid randomly. Thus, imposing a "Winner's Curse" - in unappealing offers uninformed investors get all the shares that they bid for, and all the appealing offers are soaked up by the informed (Ljungqvist, 2007).

Rock's model assumes one more thing - that firms wanting to enter the public market benefit from underpricing. It ensures continued participation in the IPO market by the uninformed. On the flip side, the underpricing of an IPO offering is also clearly costly to the firm going public. Thus, making firms free ride by underpricing "too little" (Ljungqvist, 2007). Furthermore, Beatty and Ritter (1986) claim that investment banks have an incentive to purposely lead issuers into underpricing the offering. The findings of IPOs being underpriced in general explains why shares traded publicly for the first time in the open market generally overperform in their first days of trading.

2.2 SPAC

Special Purpose Acquisition Companies (SPACs) are companies formed with the intent to raise capital in an IPO with the sole purpose of acquiring another company in the future (Layne, Lenahan, Bokosha, Boxwala & Swartz, 2018). This lets companies that want to go public to fast

track their own public listing letting them essentially skip the traditional IPO process described in 2.1.

The key players in a SPAC are its sponsors. The sponsors are typically well known and reputable in the industry, and it is not uncommon for SPACs to seek endorsements from celebrities in order to further the amount raised (SEC, 2021b). It is essential for the SPACs' survival and success to have well known sponsors as investors are basically investing in them. As stated, the SPAC lacks any real operational business and investors are betting on that the sponsors will be able to find and acquire a company that will yield a return on their money (SEC, 2021a).

The SPAC undertakes going through the process of the typical IPO, filing for registration with the SEC, clearing SEC comments, marketing the IPO and securing investors. The proceeds of the SPAC IPO are then held in a trust account until it will be used to fund the business acquisition or if no acquisition is able to be made, it will be used to redeem the shares sold during the SPAC IPO (Layne et al. 2018).

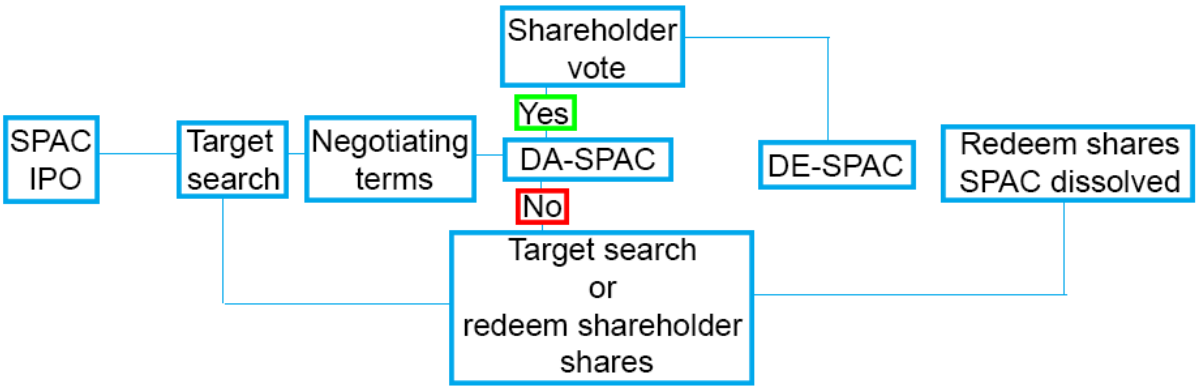


Figure 1 displays the stages of a special purpose acquisition company.

Once the sponsors have pinpointed a suitable business combination, the SPAC management negotiates terms with the operational business. When the terms have been negotiated, a definitive agreement will be entered by both parties. The SPAC then usually undergoes a shareholder vote if the vote is in favor the SPAC and target business will later proceed with the business combination also known as the DE-SPAC. This process can take several months to complete (Layne et al. 2018). However, if the shareholders deem the target business non palatable and the

shareholder's vote falls through, the SPAC can search for a new target, or the SPAC will redeem its shareholder's shares (SEC, 2021a).

The SPAC sponsors can purchase sizeable amounts of shares paying only a nominal amount for shares that equals to 25% of the shares being offered to the public (Layne et al. 2018). Thus, creating an incentive for sponsors to complete the SPAC business combination as this essentially guarantees them profit.

2.3 Efficient Market Hypothesis

In accordance with Efficient Market Hypothesis all stocks are traded at their fair value on public exchanges making arbitrage impossible - that share price reflects all available information (Fama 1970).

The Efficient Market Hypothesis had been widely accepted among scholars but starting in the early 2000s the intellectual rule had lost traction and many economists started to believe that the stock market could be at the very least partially predictable. Citing psychological and behavioral elements of stock-price calculation (Malkiel, 2003).

Fama (1970) categorizes the efficient market hypothesis into three categories - the *weak- form*, the *semi-strong-form* and the *strong-form*. In the *weak-form,* the available information is set to just historical prices, in the *semi-strong-form* all obviously public available information are taken into consideration as for example announcements of annual earning, stock splits and mergers. In the *strong-form* all available information is taken into consideration including monopolistic information (such as inside information) has been taken into consideration in the price. This, however, is not a fair representation of reality. Fama (1970) refers to Niederhoffer and Osborne who have pointed out that specialists on the New York Stock Exchange use their access to information to be able to generate monopolistic profits. Fama (1970) refers further to Scholes' evidence that suggest high-up employees also have access to monopolistic information in their respective firms.

At the time of the DE-SPAC the available information should already have been considered. When the DA-SPAC happens, investors have already received all information necessary and thus a hypothesis can be formed - that the statistical significance at the DE-SPAC short-term event window would show that it is not statistically significantly different from zero.

2.4 Agency Theory

In Special Purpose Acquisition Companies, the Principal-Agent Problem can arise. Jensen and Meckling (1976) first outlined the principal-agent problem in their paper, stating that the separation of control when a principal hires an agent and then the principal gives the agent the ability and right to make decisions on their own behalf while the principal still retains ownership and losses. Thus, the principal hires an agent to act on their behalf. In a SPAC this could be the relationship between the SPACs sponsors and its investors as the investors invest in a pool of money that the sponsors control.

Jensen and Meckling (1976) further argue that the principal can limit these separations of interest by establishing appropriate incentives for the agent to act further in line with the principals' interests. In SPACs there are incentives in place for the sponsors to create value for the investors as it increases their own profits as well as having to convince the investors that the acquisition is of value in the shareholder's vote. However, as previously mentioned in chapter 2.2 describing SPACs, the sponsors can purchase substantial amounts of shares at a significant discount compared to its investors. Acquiring a company even if it is a bad one can therefore generate profits to the SPACs sponsors. Jenkinson and Sousa (2011) further argue that the sponsors significant stake in the SPAC essentially becomes worthless if no business combination is completed. This creates extreme financial incentives for the sponsors to complete a business combination even if it is not a good one as their payoff depend on completing an acquisition. Because of the structure of the modern SPAC the acquisition usually must pass through a shareholder's vote to determine if the investors tolerate the proposed business combination or not. However, Jenkinson and Sousa (2011) state in their paper that these votes can be easily manipulated by the sponsors by simply purchasing larger stakes in the SPAC just ahead of the vote. Thus, manipulating the shareholder's vote in order to push through an acquisition even if it

is a bad one as the sponsors have a financial motivation to pass the shareholder's vote rather than liquidating the SPAC and redeeming its shareholder's shares.

2.5 Previous Research

Previous research on SPACs are relatively limited compared to other types of securities and there are few papers that look at the performance of more recent SPACs. The idea of comparing companies that goes public via a SPAC business combination to companies that decides to take the traditional IPO route has been done in previous research. However, at the time of writing this paper there was a clear lack of papers comparing the performance of SPAC business combinations and traditional initial public offerings completed in the year 2020.

Jenkinson and Sousa (2011) report that the average cumulative abnormal return of SPACs 6 months after the merger amounted to negative 24% getting worse after one year of trading after the merger event, showing a negative cumulative abnormal return of 55%. Howe and O'Brien (2012) found in their study that SPACs generally performs bad in the long-term showing a negative abnormal return of 14% after its first months of trading after the business combination and a negative abnormal return of 33% at the one-year mark.

Previous research suggests that companies going public via a SPAC generally underperform compared to companies that go public via a traditional IPO process. Kolb and Tykvová (2016) did a study in 2016 that compared 127 SPAC mergers with 1128 traditional IPO's that showed that SPACs significantly underperformed its traditional IPO counterpart. Moreover, Kolb and Tykvová (2016) also argue that SPAC mergers are a good tool that allows companies to go public in difficult times when the traditional IPO is costly. Datar, Emm and Ince (2012) also show that SPACs perform poorly in the long run compared to traditional IPOs. During the period 2003-2008 analyzing 156 SPACs benchmarked against 794 traditional IPOs during the same period, SPACs performed worse than the benchmark and showed signs of lower growth opportunities.

Chapter 3. Methodology

3.1 Event Study Methodology

An event study measures the impact of a specified event on the value of a firm. An event study is a versatile way to study the effect an event can have on a security. Event studies are frequently used to help get a better understanding of specific events' effects on stock prices (MacKinlay, 1997).

The usefulness of an event study counts on the effective market hypothesis so that the effect of said event is immediately reflected upon in the security pricing. Thus, making the measurement of an event's impact on a firm possible using security prices observed under a relatively short period of time (MacKinlay, 1997).

The first step in conducting an event study is to specify the event or events of interest and pinpoint the period over which events take place. This period is often multiple days, including the days leading up to the event. After the event has been identified it is necessary to decide the selection criteria for the included firms in the sample. This may involve being listed on a certain exchange, data availability or other restrictions. It is important to address and take note of any potential bias that has been introduced with the selection criteria (MacKinlay, 1997).

In order to understand an event's impact on a firm a measure of the firm's abnormal return is required (MacKinlay, 1997). The event study is divided into short-term and long-term, where the short-term event study is suitable for event windows spanning from just a day before and after the event up to a couple of weeks (MacKinlay, 1997). While the long-term event study is suitable to measure the effects of an event up to several years (Barber and Lyon, 1997). The cumulative abnormal return (CAR) that is used to measure the abnormal return in the short-term event windows ignore compounding while the buy-and-hold abnormal return includes the effect of compounding. Meaning that the CAR method of calculating abnormal returns will on average show greater abnormal returns than the BHAR method (Barber and Lyon, 1997). Furthermore,

Barber and Lyon (1997) argues that both cumulative abnormal return and buy-and-hold abnormal return suffers from *new listing bias*, *rebalancing bias* and *skewness bias*. *New listing bias* arises in long-term event studies because sampled firms generally have a long post-event history of returns while the benchmark in our case, the index, usually contains new firms. However, as this thesis are looking at relatively new securities this should not be as pronounced in this event study. The *rebalancing bias* surfaces because the benchmark index usually is rebalanced periodically while the sample firms are compounded without rebalancing. The long-term event study in this paper is only spanning across 225 trading days, making this bias less pronounced. The *skewness bias* occurs because long-term event studies are positively skewed but as just mentioned, the event study in this paper span only across 225 trading days, making this bias less pronounced as well. These two different methods of calculating abnormal returns will be described in the following subchapters.

3.1.1 Abnormal Return (AR)

Abnormal returns are the difference between the actual return and the expected return and are generally used to measure financial performance for events in both the short and long-term. The market model is a relatively simple methodology and is well specified and powerful under a wide variety of conditions.

The market model is specified by the following equation according to MacKinlay (1997):

$$R_{it} = \alpha_i + \beta_i \times R_{mt} + \varepsilon_{it}$$

Where,

R_{it} = period-t returns on a security i.

R_{mt} = period-t returns on the market portfolio m (benchmark).

ε_{it} = zero mean disturbance term.

α_i = adjusted excess return.

Furthermore, Mackinlay (1997) show that the abnormal return is given by the following equation:

$$AR_{it} = R_{it} - \alpha_i - \beta_i \times R_{mt}$$

Considering that a listed SPAC lacks any real operational business prior to the DE-SPAC and that a traditional IPO has no historical performance that can be easily obtained it makes sense to use the adjusted market model instead. Abnormal return can be calculated by the following equation according to Barber and Lyon (1997):

$$AR_{it} = R_{it} - R_{mt}$$

For the market portfolio *m*, the Russel 2000 small cap index has been selected as the benchmark. Mainly because the mean market cap of the holdings in the index corresponds the closest to the data in the study out of the other major small cap indices (S&P Small Cap 600 & MSCI USA Small Cap index).

3.1.2 Short-Term

Cumulative Abnormal Return (CAR)

The Cumulative Abnormal Return (CAR) is the sample cumulative abnormal return from the period T1 to T2 and is given by the following formula according to MacKinlay (1997):

$$CAR_i(T1,T2) = \sum_{T=T1}^{T2} ARit$$

Moreover MacKinlay (1997) says that the Average Cumulative Abnormal Return ($\overline{CAR}$) can be calculated by forming the CARs security by security and then aggregate through time in order to calculate the average of CAR for each time, T:

$$\overline{CAR}(T1,T2) = \frac{1}{n} \sum_{i=1}^{n} CARi(T1,T2)$$

Following this, the variance of CAR for each period (T=T1+1,...,T2) can be calculated using the following formula:

$$\text{Var(CAR(T1,T2))} = \frac{1}{n-1}\sum_{i=1}^{n}(CARi(T1,T2) - \overline{CAR}(T1,T2))^2$$

From this the standard deviation of the sample can be calculated by the square root of the variance:

$$\text{SD(CAR(T1,T2))}=\sqrt{\text{Var(CAR(T1,T2))}}$$

From the standard deviation, the standard error of the sample can be derived using the following formula:

$$\text{SE(CAR(T1,T2))} = \frac{SD(CAR(T1,T2))}{\sqrt{n}}$$

From this, by using a one-sample T-test, a null hypothesis can be formulated according to Barber and Lyon (1997) in order to test if the average cumulative abnormal return ($\overline{CAR}$) are equal to zero for a sample of *n* firms:

$$t_{\overline{CAR}} = \frac{\overline{CAR}(T1,T2)}{\frac{SD(CAR(T1,T2))}{\sqrt{n}}}$$

or (for simplicity):

$$t_{\overline{CAR}} = \frac{\overline{CAR}(T1,T2)}{SE(CAR(T1,T2)}$$

3.1.3 Long-Term

Buy-And-Hold Abnormal Return (BHAR)

Barber and Lyon (1997) argues that cumulative abnormal returns are more biased in the long-term and suggest using buy-and-hold abnormal returns to detect long-term abnormal returns. Therefore, in order to measure long-term abnormal returns BHAR is used instead of CAR. BHAR can be estimated using the following formula according to Barber and Lyon (1997):

$$BHAR_{it} = \prod_{i=1}^{\tau}[1 + R_{it}] - \prod_{i=1}^{\tau}[1 + E(R_{it})]$$

Where,

R_{it} = period-t returns on a security i.

$E(R_{it})$ = the month t expected return of the sample firm.

However, for the purposes of this model $E(R_{it})$ is assumed to be equal to R_{mt} (our benchmark).

R_{mt} = period-t returns on the market portfolio m (benchmark).

Therefore:

$$BHAR_{it} = \prod_{i=1}^{\tau}[1 + R_{it}] - \prod_{m=1}^{\tau}[1 + R_{mt}]$$

From this, the average Buy-and-Hold Abnormal Return ($\overline{BHAR}$) can be calculated by forming the BHARs security by security and then aggregate through time in order to calculate the average of BHAR for each time, T:

$$\overline{BHAR}(T1,T2) = \frac{1}{n}\sum_{i=1}^{n} BHARi(T1,T2)$$

The variance of BHAR can then be calculated for each period in the same manner as for CAR:

$$Var(BHAR(T1,T2)) = \frac{1}{n-1}\sum_{i=1}^{n}(BHARi(T1,T2) - \overline{BHAR}(T1,T2))^2$$

From this the standard deviation can be derived:

$$SD(BHAR(T1,T2))=\sqrt{Var(BHAR(T1,T2))}$$

And from this, the standard error can be calculated:

$$SE(BHAR(T1,T2)) = \frac{SD(BHAR(T1,T2))}{\sqrt{n}}$$

Now a T-test can be formulated to test if the $\overline{BHAR}$ is equal to zero for the sample of *n* firms in the same fashion as for CAR according to Barber and Lyon (1997):

$$t_{\overline{BHAR}} = \frac{\overline{BHAR}(T1,T2)}{\frac{SD(BHAR(T1,T2))}{\sqrt{n}}}$$

or (for simplicity):

$$t_{\overline{BHAR}} = \frac{\overline{BHAR}(T1,T2)}{SE(BHAR(T1,T2)}$$

3.1.4 Event Window

The event window is the days surrounding the events outlined in this paper. MacKinlay (1997) argues that in order to make sure that the event in captured it is reasonable to set the event window to a few days prior to the event, as it is possible that information regarding the event may leak to the market and its therefore important to capture the whole event. For the SPACs the

event window in the short-term event study has been set to capture the days leading up to the event and after the event.

The decision was therefore made to look at event windows [-3,3], [-5,5], [-10,10] and [-20,20] to capture the short-term average cumulative abnormal return for the SPACs in the sample. This is in line with previous research. For the traditional initial public offering the event windows are set to start at the respective IPOs first trading day since extending the event window prior to the IPO is very difficult as any previous stock pricing cannot easily be sourced. Thus, the decision was made to look at event windows [0,3], [0,5], [0,10] and [0,20] to capture the short-term average cumulative abnormal return for the IPOs in the short-term event study.

In the long-term event window, the timeline starts on the day of said event, looking at the at the 45-, 90-, 135-, 180- and 225-trading days event windows. The decision to only span the long-term event study to 225 trading days was simply made because the study looks at SPACs that completed a business combination in 2020 and stocks having their first public trading day in 2020 on the US markets. Making it the longest possible time frame given the selection criteria.

3.2 SPAC data

The SPAC data was collected from SpacTrack (2021) completed with data from the SEC's Electronic Data Gathering, Analysis, and Retrieval system (EDGAR). The sample includes all companies that went public via a business combination with a SPAC in the fiscal year of 2020 and are still trading on the US stock market as of 2021-12-03 with complete historical data. The decision was made to only focus on US exchanges because of the lack of information on SPACs listed on other exchanges, the lack of sample size on non-US SPACs and because of the difference in regulation on different markets. According to SpacTrack (2021) there were 64 SPACs that completed a business combination in the year 2020. Table 1 shows the total amount of SPACs completed in 2020 and how many SPACs that had data matching the selection criteria for each event for both the short- and long-term event study.

Considering that the data only includes SPACs that successfully completed a business combination in the year 2020 that are still active on a US stock exchange as of 2021-12-03 this

introduces survivor's bias to the sample data that positively skews the result (Anarkulva, Cederburg and O'Doherty, 2021).

SPAC's 2020 Short-term	*Completed total*	*DA-SPAC complete data*	*DE-SPAC complete data*	*DA-SPAC missing data*	*DE-SPAC missing data*
(n) observations	**64**	**60**	**64**	**4**	**0**
SPAC's 2020 Long-term	***Completed total***	***DA-SPAC complete data***	***DE-SPAC complete data***	***DA-SPAC missing data***	***DE-SPAC missing data***
(n) observations	**64**	**63**	**64**	**1**	**0**

Table 1 shows the number of observations matching the selection criteria for the short- and long-term event study for each event.

3.3 IPO data

The IPO data was collected from StockAnalysis (2021), the IPOS with incomplete data and SPAC-IPOs were manually removed according to Yahoo Finance Asset Profiles.

The data of the IPOs completed in the year 2020 was collected from StockAnalysis (2021). The decision was made to exclude SPAC-IPOs from the sample in order to look at companies with an operational business that went public via a traditional IPO. The IPOs with missing or incomplete data were also removed from the sample in accordance with Yahoo Asset Profiles, this includes, but not limited to, IPOs that went public in 2020 but went back to being a privately traded company before 2021-12-03. Therefore, the IPO sample only contains IPOs that are not special purpose acquisition companies, completed in the fiscal year of 2020 that are still trading on a public US stock exchange as of 2021-12-03 with complete historical data. The reason for only including initial public offerings on US stock exchanges is for comparison reasons with the SPAC that lacks sizable samples from different markets and the trouble of making a fair comparison given the difference in regulations of SPACs in different countries. According to StockAnalysis (2021) there were 480 IPOs completed in the year 2020. Table 2 shows the total of IPOs and the total of IPOs matching the selection criteria in the short- and long-term event study.

It is worth noting that this also introduces a survivor's bias that positively skews the results (Anarkulva, Cederburg and O'Doherty, 2021). Considering that the study only includes companies that made its initial public offering in the year 2020 but does not include companies that went out of business, went back to private or are special purpose acquisition companies.

IPOs 2020 Short-term	***Completed total***	***Completed total fitting selection criteria.***
(n) observations	**480**	**224**
IPOs 2020 Long-term	***Completed total***	***Completed total fitting selection criteria.***
(n) observations	**480**	**224**

Table 2 shows the number the total number of IPOs completed in the year 2020 and the total number of IPOs fitting the selection criteria used in the short- and long-term event study.

All the historical security price data fitting the selection criteria for both the SPACs and the traditional IPOs were collected from Yahoo Finance and completed with historical data from MarketWatch.

Chapter 4. Results & discussion

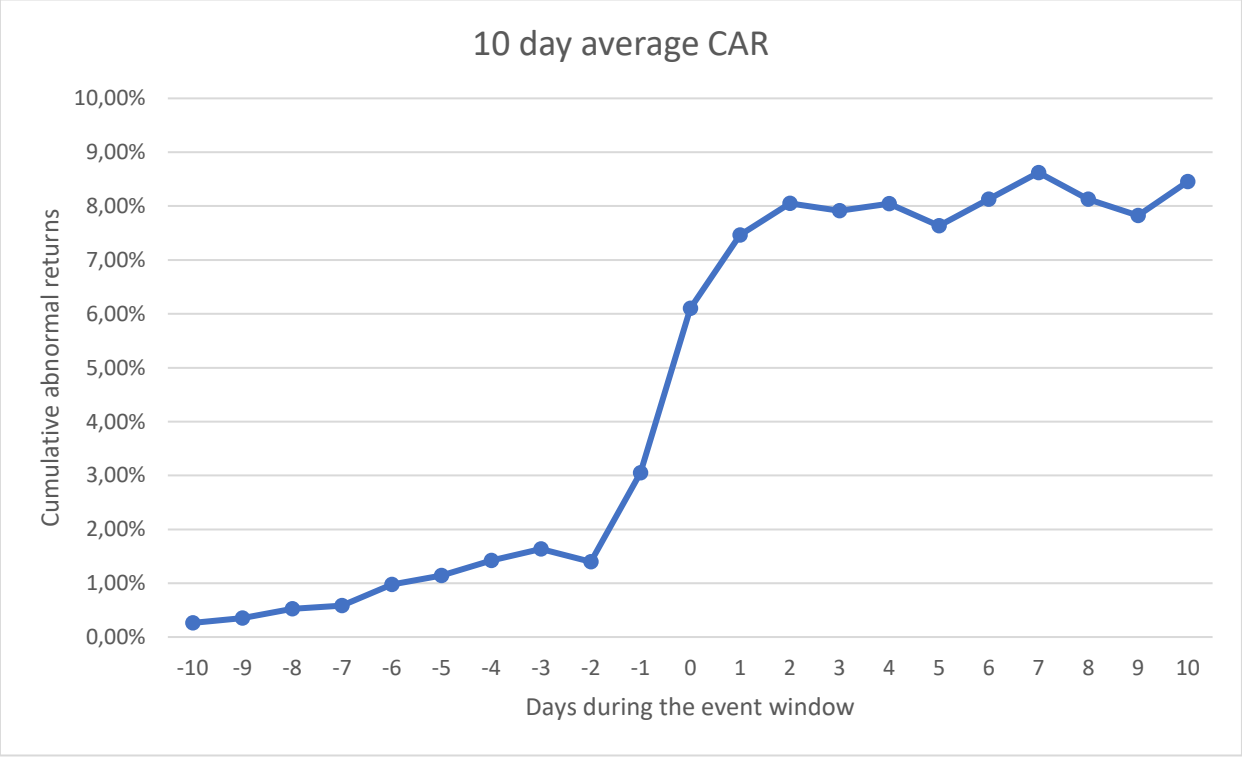
4.1 Short-term results & discussion

The short-term cumulative abnormal returns were calculated for each SPAC and IPO at each event window. The event day (0) in this event study equals the time of the definitive agreement and business combination for each of the SPACs and the time of the IPOs first trading day. The dates of said SPAC events were collected from SpacTrack.com and SEC Edgar while the dates of the IPOs first trading days were collected from Yahoo Finance. The exact dates used for each event in the SPAC and IPO can be found in appendix B. The study for the SPACs span prior to the event day (0) and for the IPOs only span post the event day (0). Since the SPACs short-term event study starts at different days, -20, -10, -5 and -3, the result CARs for each event window will differ. The IPOs short-term event study will provide coherent results for each event window as all of them starts at day (0). In this chapter it will also be discussed on whether the theoretical hypothesis outlined in chapter 2 agrees with the results found in the event studies. The previous research on SPACs and IPOs performance will also be discussed along with how both compares. The efficient market hypothesis along with the principal-agent problem will be used to try to explain how and why the market reacts the way it does.

4.1.1 Definitive Agreement

During the definitive agreement the market reacts to new information as seen in table 6, 7, 8 and 9 found in appendix A. This is in line with previous research that the definitive agreement yields positive abnormal returns during the event window. Given that investors gain new information on what company their initial investment will go to. Considering that the goal from the start for the SPAC was to identify a company and agree upon a business combination the market would react depending on the qualities of the target business and the probability that the business combination would be tolerated by the shareholder's vote, however in the sample all 60 SPACs analyzed in the short-term definitive agreement event study agreed to merge with the located company. The initial investment made by investors in the SPAC generally leaned upon the assumption that the SPAC's sponsors would be able to locate and acquire a company that would create value for the SPAC's shareholders.

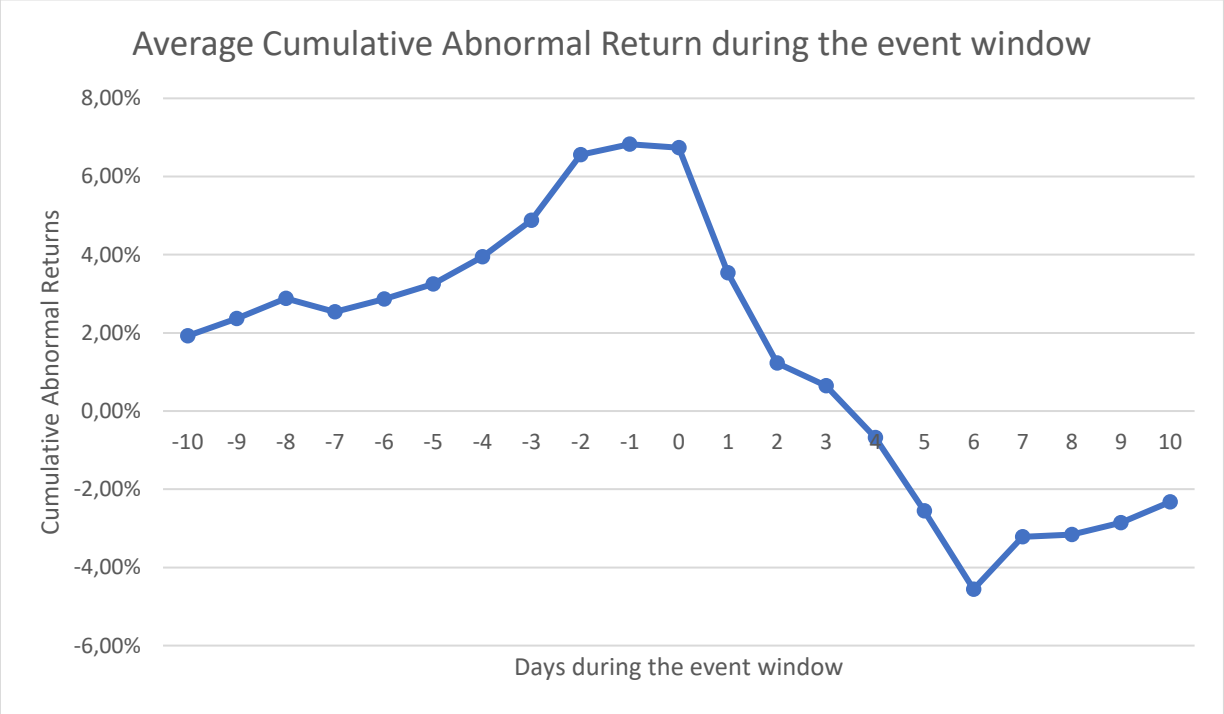
Around the days of the event study the average cumulative abnormal returns show positive abnormal returns around the days of the definitive agreement. Indicating, in line with previous research, that the new information of the definitive agreement attracts a positive response from the market. Looking at the event window [-20,20] in table 6 found in appendix A the study indicates statistical significance of the average cumulative abnormal return after day (0). Indicating that the market generally obtained the information around the same time and responded positively. However, the day before the announcement also showed positive abnormal returns. The event windows [-10,10], [-5,5] and [-3,3] (table 7, 8 and 9 found in appendix A) show statistical significance for the day before the announcement of the definitive agreement. This could indicate that some form of monopolistic knowledge could have played a part among investors - that inside information was used among investors prior to the public announcement. In graph 1 you can see a relatively steep increase in abnormal returns the day prior to the definitive agreement.



Graph 1 shows the average cumulative abnormal return during the definitive agreement event window [-10,10].

4.1.2 Business combination

At the business combination event window, the study looks at abnormal returns during the days leading up to and after the merger event. However, no major new information is being disclosed at this stage. The market already knows what company the SPAC will merge with and when. Moreover, all 63 SPACs in short-term merger event study completed their business combination as the selection criteria was that the SPACs in the sample had to have completed their DE-SPAC merger in the year 2020. It is worth taking into consideration that this does not hold true for all SPACs in the real world, some SPACs fail to find a target business to acquire, or the target business is not tolerated by the shareholders thus leading the SPACs to redeem its shareholders' shares.



Graph 2 shows the Average Cumulative Abnormal Return during the business combination event window [-10,10]

The statistical significance shown in table 10, 11, 12 and 13 found in appendix A for the average cumulative abnormal return in the event window shows no statistical significance post day 0 thus indicating that a few companies perform very poorly bringing the average cumulative abnormal return down in the sample. Furthermore, the event window [-20,20] and [-10,10] show statistical

significance most of the days leading up to and on day 0. Both event windows [-20,20] and [-10,10] show statistical significance for day 0 with positive average cumulative abnormal returns. Event windows [-5,5] and [-3.3] show no statistical significance before, on or after event day 0 indicating that only a few companies perform good at day 0 and thus inflates the average cumulative abnormal returns in the sample.

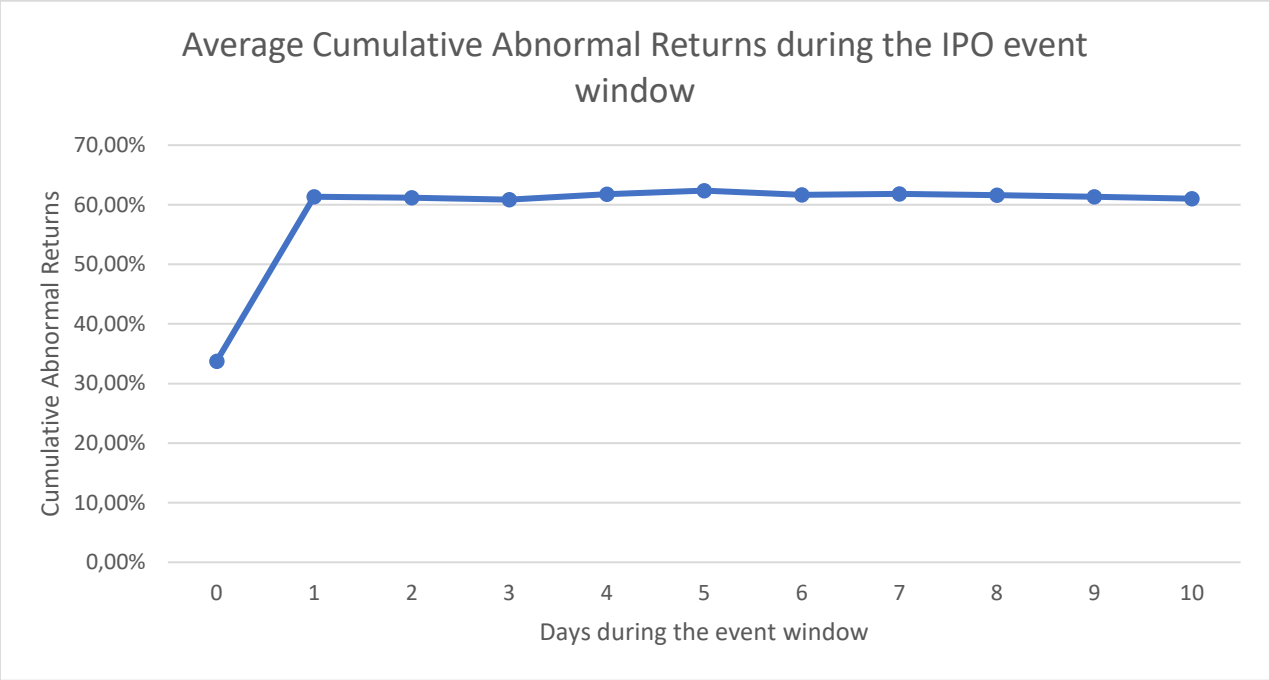
One reason for the negative cumulative abnormal returns during the merger event window is that the sponsors buy more shares in order to push through bad acquisitions as discussed earlier. The sponsors have an incentive to push through even bad acquisitions as their profits for their involvement in the SPAC relies in completing a business combination. Thus, introducing the principal-agent problem to the SPAC as the principals' interests might differ from the agents.

As discussed in the previous chapter the main reason that the study shows greater average abnormal returns around the definitive agreement is because new important information is made public. The market has already reacted to the business combination prior to the business combination is finalized.

4.1.3 Initial Public Offering (IPO)

The initial public offering event window captures the days after the 224 initial public offerings in the sample. As seen in table 14, 15, 16 and 17 found in appendix A, the initial public offering yields high average cumulative abnormal returns during the short-term event study. Given that this is the company's first days of trading in public markets the market reacts positively in accordance with previous research. According to Ljungqvist (2007) the average IPO on US stock exchanges were underpriced between 10-20 percent and at the peak of the dotcom bubble as high as 71%. The result in the event study suggests a high level of IPO underpricing. However, as previously mentioned in chapter 3.2, the sample of the 224 IPOs only includes IPOs still trading on the open market as of 2021-12-03 that were not special purpose acquisition companies. Because of this the results might not fully reflect the whole picture as several companies also go back to private amid bad performance, debt or private acquisitions to name a few reasons. The short-term IPO event study starts at day (0) unlike the SPACs that span pre-events.

The event-study shows high positive average cumulative abnormal returns for the sample IPOs with statistical significance for all four event windows [0,20], [0,10], [0,5] and [0,3].



Graph 3 shows the average cumulative abnormal returns for the initial public offerings in the sample during the [0,10] event window.

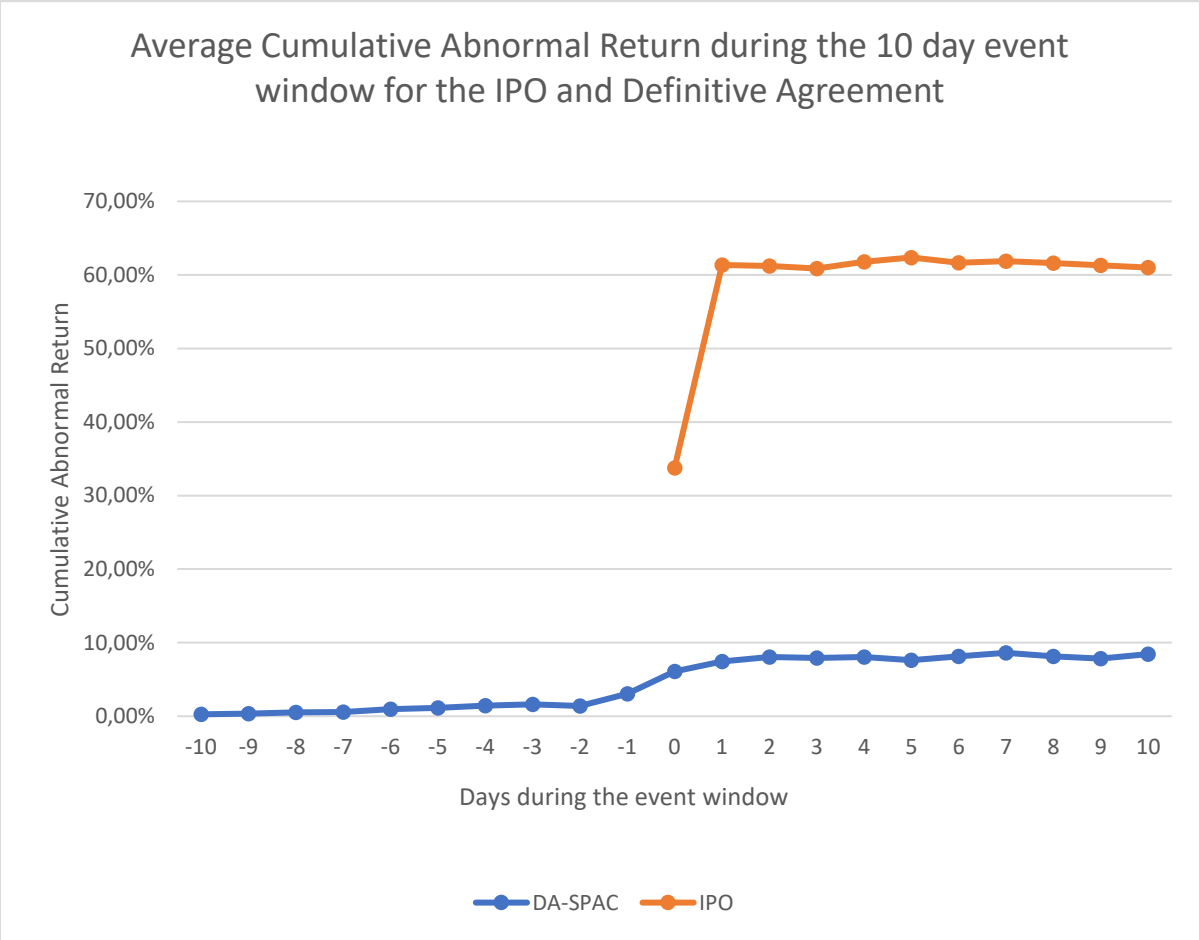
As seen in graph 3 the IPOs in the sample heavily outperforms the market benchmark in the [0,10] event window. Thus, holding true to previous research that IPOs outperform the market short-term.

4.1.4 SPAC vs Initial Public Offering

Companies that decided to go public via the traditional initial public offering yielded much greater short-term abnormal returns. When comparing the definitive agreement with the IPO short-term event study it becomes clear that companies that go through with the relatively long and costly traditional IPO process also gain value from their efforts. The result is in accordance with Kolb and Tykvová's (2016) research that compared 127 SPAC mergers with 1128 traditional IPOs. The companies that went public via a traditional IPO severely outperformed its

SPAC counterpart. During the definitive agreement event window, the 224 IPOs in the sample showed higher average cumulative abnormal returns than the 60 companies in the SPAC sample.

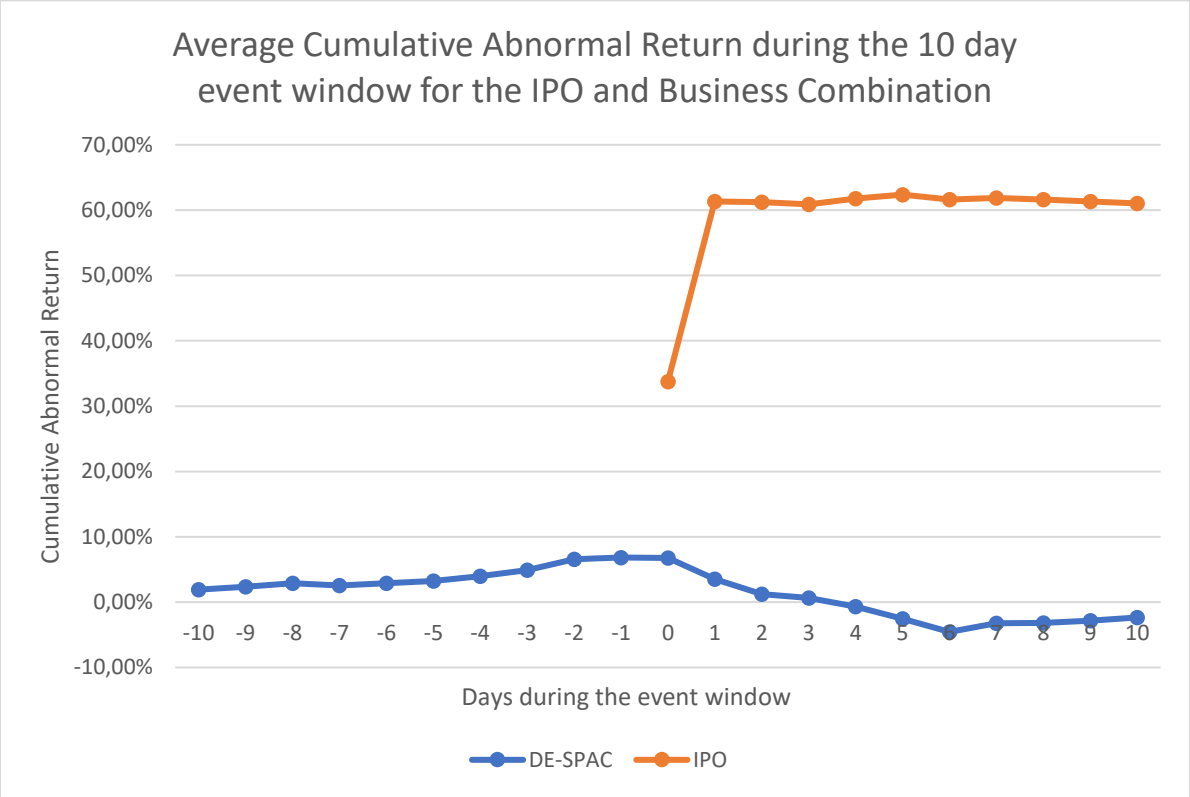
Looking at graph 4 it becomes clear that the short-term abnormal return favors the companies that went public via a traditional IPO. With the definitive agreement's highest abnormal return during the event window at around 8% the IPO had abnormal returns as high as 61%.



Graph 4 shows the average cumulative abnormal returns for the initial public offerings and the SPAC definitive agreement in the sample during the [0,10] and [-10,10] event window respectively.

The case remains the same when comparing the 63 SPAC business combinations with the traditional 224 IPOs in the short-term event study. The IPOs once again outperforming the SPAC in the short-term as shown in graph 5. However, as previously discussed the merger event-window provides no new major information to investors thus rendering this comparison

somewhat trivial due to no statistical significance in the days post day (0) for the merger event-window. Nonetheless it will still be included in this paper.



Graph 5 shows the average cumulative abnormal returns for the initial public offerings and the SPAC business combination in the sample during the [0,10] and [-10,10] event window respectively.

4.2 Long-term results & discussion

For the long-term event study, the buy-and-hold abnormal return was calculated from the day (0) of the event separated in five periods. 45, 90, 135, 180 and 225 days. The long-term result discussion focuses on the results obtained in the long-term event study using the buy-and-hold abnormal return method. Also discussing how and what can explain how the market reacted in the long-term during the timelines.

4.2.1 Definitive Agreement

As seen in table 3 showing the buy-and-hold abnormal return during the 45, 90, 135, 180 and 225 timelines. It becomes clear that SPACs show positive abnormal returns during their first couple of months after the definitive agreement during the 45, 90, timeline. However, at the 135, 180

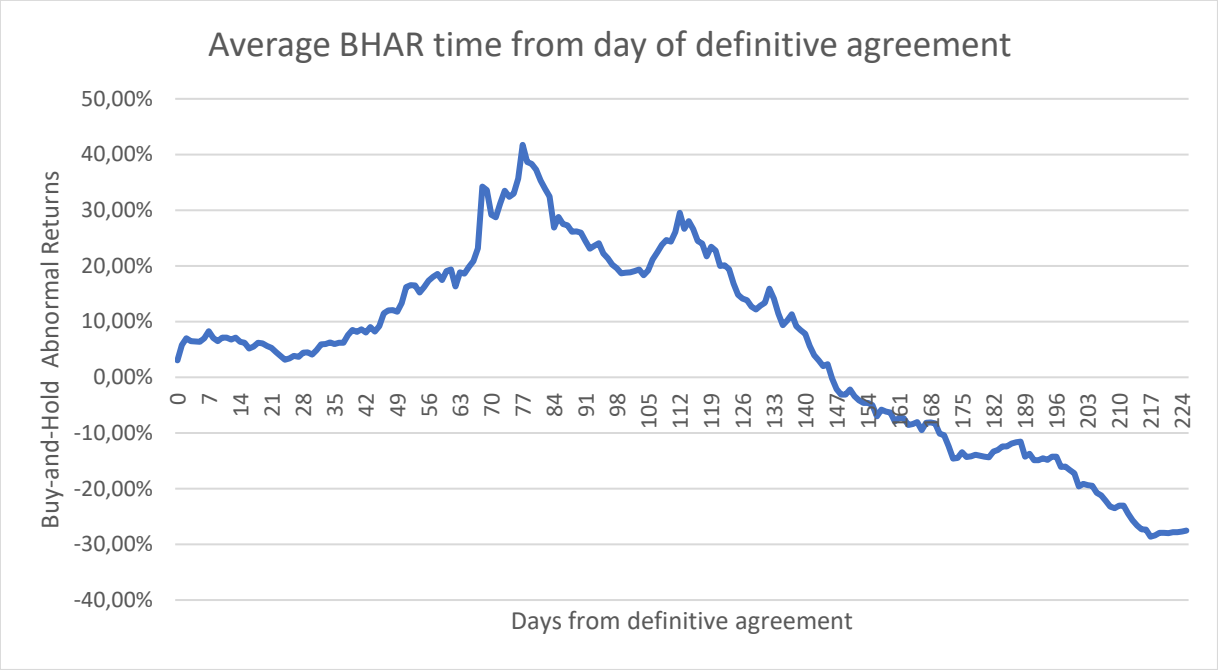
and 225 windows SPACs show statistically significant negative buy-and-hold abnormal returns indicating that SPACs, in line with previous research, generally underperform in the long-term.

Datar, Emm and Ince (2012) suggest that SPACs perform poorly in the long-term and show signs of low growth possibility. When looking at graph 6, SPACs generally have a positive average buy-and-hold abnormal return during the first 135 days of the definitive agreement. However, it sees a steep decline after the 135 days mark and shows negative average buy-and-hold abnormal returns at the 180- and 225-day mark. Indicating that SPACs perform quite well during its first 5 months of trading after the definitive agreement but underperform during the latter months of the study.

As mentioned in the previous subchapters it is important to keep in mind that survivorship bias also plays a role in the results found in the long-term event study. The study includes 63 SPACs that completed a merger in the year 2020 but does not include SPACs that failed to acquire a company in its lifespan. However, even though this positive skewness of the result, SPACs performed poorly in the long-term, further strengthening the findings that SPACs generally perform bad long-term.

Buy-and-Hold Abnormal Return TIME	Average	T-test	STDEV
$\overline{BHAR}$ 45	9,19%	2,145**	0,337
$\overline{BHAR}$ 90	25,97%	1,942*	1,053
$\overline{BHAR}$ 135	9,36%	0,831	0,888
$\overline{BHAR}$ 180	-14,26%	-1,485	0,756
$\overline{BHAR}$ 225	-27,55%	-2,863***	0,758

*Table 3 shows the average Buy-and-Hold abnormal return, T-test and the standard deviation of the sample for the event window at the definitive agreement at 45, 90, 135, 180 and 225 estimation windows with levels of statistical significance defined as *** 1%, ** 5% & * 10%.*



Graph 6 shows the average Buy-and-Hold abnormal return of the sample companies during the days from the definitive agreement.

4.2.2 Business Combination

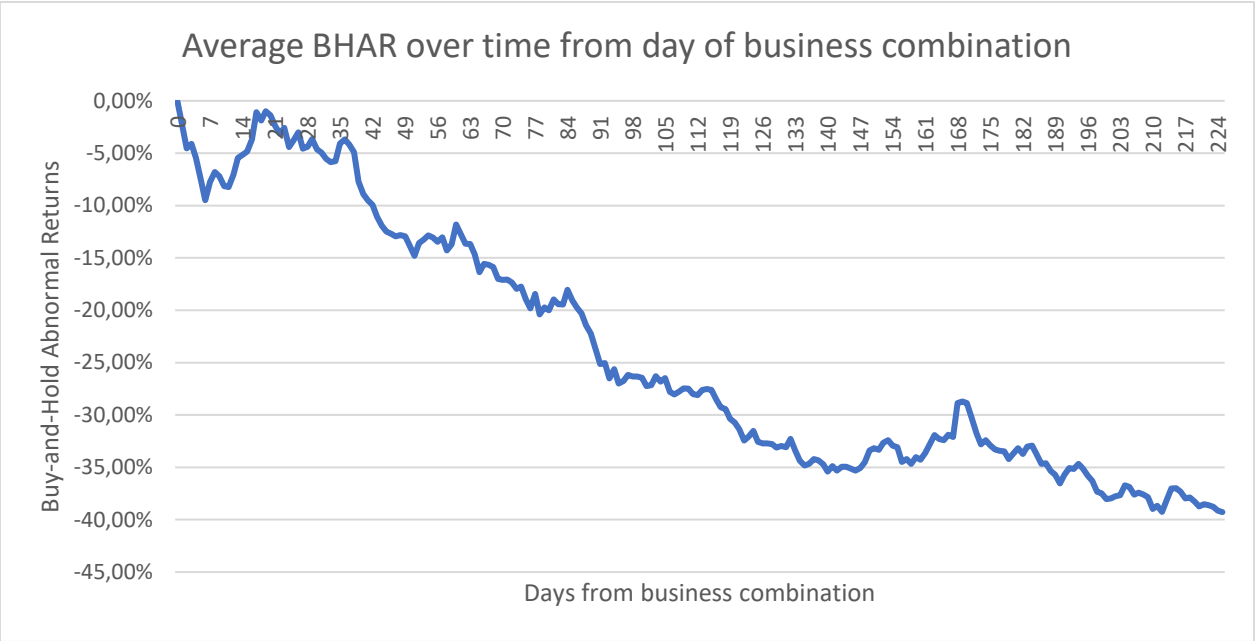
The average buy-and-hold abnormal return during the timelines after the business combination shown in table 4 shows a steep downwards curve following the merger. With negative average buy-and-hold abnormal returns continuously increasing as time passes showing statistical significance for all five timelines (45, 90, 135, 180 and 225 days). In the 45-days timeline SPACs showed a negative average buy-and-hold abnormal return of 12.49% incrementally increasing in each timeframe. The longest time frame possible in this given the data selection criteria shows a negative average buy-and-hold abnormal return of 39.28% with statistical significance indicating that the SPACs in the sample performs badly in the long-term. The findings are in accordance with the previous research done by Datar, Emm and Ince (2012) - that SPACs generally perform bad in the long-term.

Jenkinson and Sousa (2011) reported that six months after the merger in their study SPACs experienced a negative average cumulative abnormal return of 24% getting worse with time and

showing a negative return of 55% after one year of trading post the business combination. Howe and O'Brien (2012) also find negative returns for SPACs in the long-term with an average negative return of 14% after six months of trading and an average one-year return of -33%. The average buy-and-hold abnormal return after 225 days in the long-term event study in this paper shows a negative average buy-and-hold abnormal return of almost 40% after almost a year of trading as shown in graph 7. Concluding that the findings in this paper's long-term event study is in line with previous research.

Buy-and-Hold Abnormal Return TIME	Average	T-test	STDEV
$\overline{BHAR}$ 45	-12,49%	-2,258**	0,443
$\overline{BHAR}$ 90	-23,72%	-3,775***	0,503
$\overline{BHAR}$ 135	-34,82%	-5,269***	0,529
$\overline{BHAR}$ 180	-33,68%	-4,077***	0,661
$\overline{BHAR}$ 225	-39,28%	-3,729***	0,843

*Table 4 shows the average Buy-and-Hold abnormal return, T-test and the standard deviation of the sample for the event window at the business combination at 45, 90, 135, 180 and 225 estimation windows with levels of statistical significance defined as *** 1%, ** 5% & * 10%.*



Graph 7 shows the average Buy-and-Hold abnormal return of the sample companies during the days from the business combination.

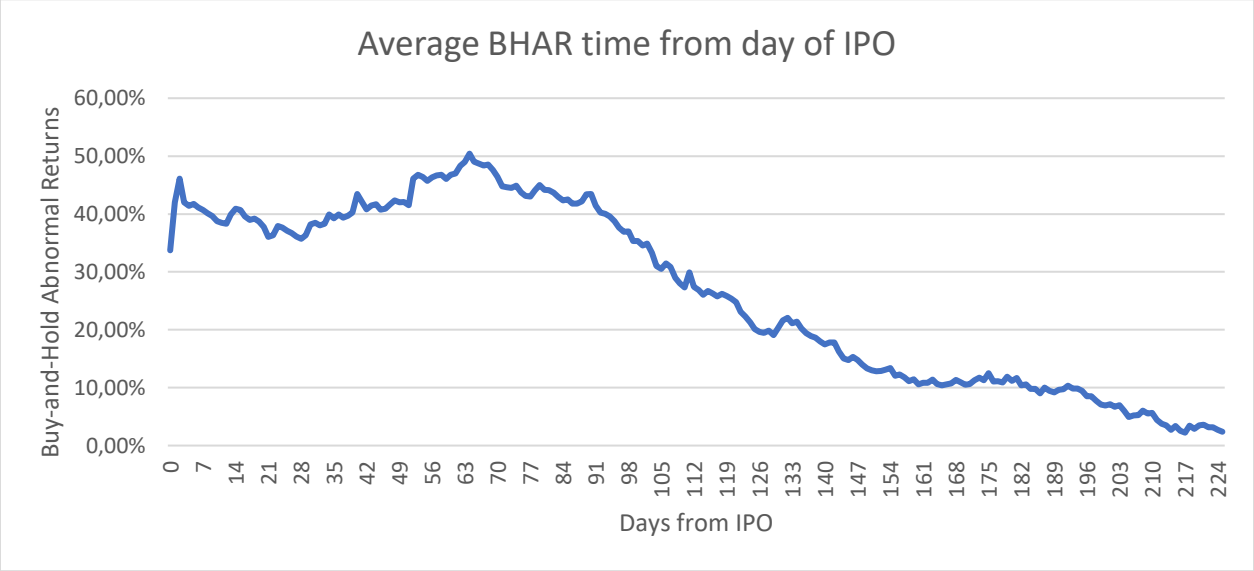
4.2.3 Initial Public Offering

The long-term event study conducted on the 224 sample IPOs showed highly positive average buy-and-hold abnormal returns during the first five months of trading. Peaking at the 90-day mark with an average buy-and-hold abnormal return of 43.43% with the 45-day mark shortly behind with an average buy-and-hold abnormal return of 40.72% with a statistical significance at the 1% level as seen in table 5. However, a drop of over 50% of the positive average buy-and-hold abnormal returns to 20.23% showed at the 135-day mark. The average buy-and-hold abnormal returns then sees a further decline as time goes on at the 180 and 225-days timeline but does not show any statistical significance at these two marks indicating that a few companies stock prices tanked and therefore lowers the positive average buy-and-hold abnormal return to 11.18% and 2.36% respectively as shown in graph 8.

The phenomenon that IPOs are generally underpriced at their first days of trading is nothing new. Ritter (1991) suggest that initial public offerings often are overpriced in the long run which is in line with this paper that IPOs in general perform great at the start but then sees a decline in abnormal returns as time goes on. Although the results of the study might be positively skewed due to the buy-and-hold abnormal return method and survivor's bias.

Buy-and-Hold Abnormal Return TIME	Average	T-test	STDEV
$\overline{BHAR}$ 45	40,72%	7,623***	0,800
$\overline{BHAR}$ 90	43,43%	6,517***	0,997
$\overline{BHAR}$ 135	20,23%	3,039***	0,996
$\overline{BHAR}$ 180	11,18%	1,354	1,236
$\overline{BHAR}$ 225	2,36%	0,244	1,448

*Table 5 shows the average Buy-and-Hold abnormal return, T-test and the standard deviation of the sample for the event window at the initial public offering (IPO) at 45, 90, 135, 180 and 225 estimation windows with levels of statistical significance defined as *** 1%, ** 5% & * 10%.*

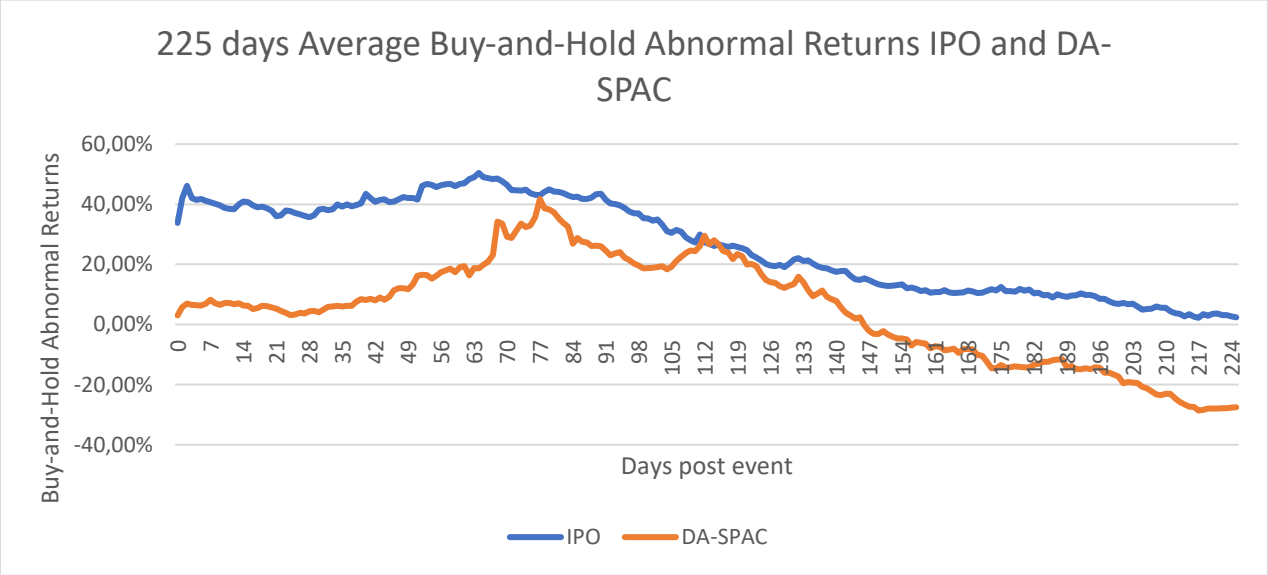


Graph 8 shows the average Buy-and-Hold abnormal return of the sample companies during the days from the IPO.

4.2.4 SPAC vs Initial Public Offering

The long-term buy-and-hold event studies conducted on the SPACs definitive agreement and business combination showed, as discussed in previous chapters, that SPACs perform the best five months post the definitive agreement and show poor performance after the business combination. The IPOs also performed the best in the first five months of the long-term event study.

As seen in graph 9 the SPAC definitive agreement average Buy-and-Hold abnormal return touches the IPO average buy-and-hold abnormal return around the 75-day mark and the 115-day mark. However, even though the SPACs performance increases in its first months of trading it sees a steeper decline than its IPO counterpart in the latter stages of the event study.

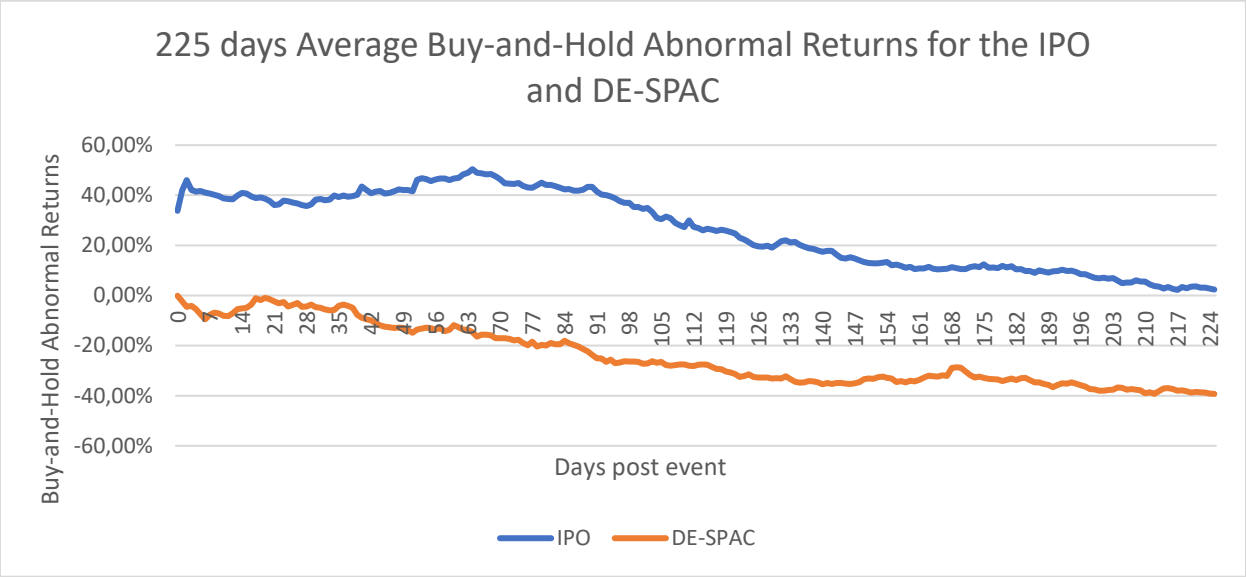


Graph 9 shows the 225 days average Buy-and-Hold abnormal return for the IPO starting at the time of its first trading day and the SPAC at the time of the definitive agreement.

These results are in line with Datar, Emm and Ince (2012) that suggests that SPACs performs worse in the long-term compared to its IPO counterpart.

The story gets worse for SPACs when comparing the average Buy-and-Hold abnormal return for the IPO with the average buy-and-hold abnormal return from the day of the DE-SPAC merger.

As seen in graph 10 the average buy-and-hold abnormal returns post the day of the merger shifts downwards to negative average buy-and-hold abnormal returns while the IPO shifts downwards it still maintains positive average buy-and-hold abnormal returns throughout the event study.



Graph 10 shows the 225 days average Buy-and-Hold abnormal return for the IPO starting at the time of its first trading day and the SPAC at the time of the business combination.

However, as previously discussed, no new major information has been introduced at the time of the merger. The decrease in the average buy-and-hold abnormal return in the sample could come as a result of the principal-agent problem that arises in a SPAC. The fact that sponsors have an incentive of pushing through bad acquisitions. Sometimes even increasing their stake in the SPAC in order to get a favorable vote in the shareholder's vote since an acquisition, even a bad one, creates more value for the sponsors than liquidating the SPAC.

Chapter 5. Conclusion

The purpose of this essay was to analyze the performance of SPACs and IPOs in both the short-term and long-term timespan. The study has been conducted using an event study methodology which has been a popular method of analyzing abnormal returns during different events in both the short- and the long-term. The study was conducted on SPACs that completed a DE-SPAC merger in the year 2020 and IPOs that had their first day of trading in 2020. Then comparing the results of these two ways of entering the public market using relevant theory to try to understand why the results look like they do. The results are compared to previous research to see if anything has changed during the SPAC-boom in 2020.

The results suggest that SPACs perform better during its definitive agreement event window than it does during the DE-SPAC merger event window. Finding that SPACs show positive abnormal returns in both the short-term and up to five months long-term during the definitive agreement and that the DE-SPAC merger shows negative abnormal returns in the long-term. Thus, suggesting that the market responds positively to the DA-SPAC announcement but poorly to the DE-SPAC merger. Moreover, the IPO shows high positive abnormal returns in both the short-term and during the early months of the long-term event study outperforming the SPAC through its various stages. Showing that the traditional initial public offering way of going public offers companies that can do so greater performance on the stock market.

The paper discusses the positive skewness introduced by and selection criteria and why it was necessary to make these delimitations. Furthermore, the paper discusses the flaws of the cumulative abnormal return and buy-and-hold abnormal return methods of measuring abnormal returns and how this might have influenced the results in the paper.

The result discussion discusses how the efficient market hypothesis can explain why the market reacted prior to the day of the definitive agreement announcement and why the business combination does not get the same response as the definitive agreement. The essay discusses the principal-agent problem that arises in a SPAC. The results that are found in the paper are in line

with previous research suggesting that going public via a SPAC merger is still the worse alternative compared to going public the traditional way of an initial public offering.

The SPAC-boom in 2020 is probably only the beginning for the SPACs as the number of SPAC-IPOs has further increased significantly in 2021. For further research on this topic, it would be encouraged to also look at other markets than the US market as information and sample sizes becomes more available as time goes on. To dive into the US SPACs once again once the sample size has increased and SPACs have established themselves even further as a mainstream way of going public is also encouraged.

References

Anarkulova, Aizhan., Cederburg, Scott & O'Doherty. S, Michael. (2021). Stocks in the long run? Evidence from a broad sample of developed markets, *Journal of Financial Economics*, pp. 409-433

Barber, M. Brad & Lyon, D. John. (1997). Detecting long-run abnormal stock returns: The empirical power and specification of test statistics, *Journal of Financial Economics*, pp. 341-372

Datar, Vinay., Emm, Ekaterina,. Ince & Ufuk, Ince. (2012). Going public through the back door: A comparative analysis of SPACs and IPOs, *Banking and Finance Review*

Fama, F. Eugene. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work, *The Journal of Finance*, Vol. 25, No. 2 (May,. 1970), pp. 383-417

Howe, S. John & O'Brien, W. Scott. (2012). SPAC Performance, Ownership and Corporate Governance, *Advances in Financial Economics*, Volume 15, pp. 1-14

Jenkinson, Tim & Sousa, Miguel. (2011). Why SAC investors should listen to the market. *Journal of Applied Finance*, Volume 21, Issue 2, pp. 38-57

Kolb, Johannes & Tykvová, Tereza. (2016). Going public via special purpose acquisition companies: Frogs do not turn into princes, *Journal of Corporate Finance*, pp. 80-96

Layne, Ramey., Lenahan, Brendan., Bokosha, Terry., Boxwala, Mariam & Swartz, Zach. (2018). Special Purpose Acquisition Companies: An Introduction Harvard: *Law School Forum on Corporate Governance*, Available Online: https://corpgov.law.harvard.edu/2018/07/06/special-purpose-acquisition-companies-an-introduction/ [Accessed 2021-12-15]

Ljungqvist, A. (2004). IPO Underpricing: A Survey, *Handbooks in Finance: Empirical Corporate Finance*, Chapter 3.4

MacKinlay, A. Craig. (1997). Journal of Economic Literature, *American Economic Association*, Vol. 35, No. 1 (Mar,. 1997), pp. 13-39

Malkiel, G. Burton. (2003) The Efficient Market Hypothesis and Its Critics, *Princeton University* No. 91

MarketWatch. (2021). Historical Stock Data, Available online: https://www.marketwatch.com/ [Accessed 2021-12-03]

Osipovich, Alexander. (2020) Blank-Check Boom Gets Boost From Coronavirus, *The Wall Street Journal*, Available online: https://www.wsj.com/articles/blank-check-boom-gets-boost-from-coronavirus-11594632601 [Accessed 2021-12-20]

Ritter, Jay. R & Beatty, Randolph. P. (1986) Investment banking, reputation and the underpricing of initial public offerings, *Journal of Financial Economics*, pp. 213-232

Rudder, Jennifer. (2021) Distribution of traditional IPOs and special purpose acquisition company (SPAC) IPOs in the United States from 2016 to H1 2021, *Statista*, Available Online: https://www.statista.com/statistics/1234111/number-traditional-spac-ipo-usa/ [Accessed 2021-12-16]

SEC. (2019). Investor Bulletin, *Securities and Exchange Commission*, Available online: https://www.sec.gov/files/ipo-investorbulletin.pdf [Accessed 2021-12-10]

SEC. (2021a) What You Need to Know About SPACs – Updated Investor Bulletin, *Securities and Exchange Commission*, Available online: https://www.sec.gov/oiea/investor-alerts-and-bulletins/what-you-need-know-about-spacs-investor-bulletin [Accessed 2021-12-11]

SEC. (2021b) Celebrity Involvement with SPACs – Investor Alert, *Securities and Exchange Commission*, Available online: https://www.sec.gov/oiea/investor-alerts-and-bulletins/celebrity-involvement-spacs-investor-alert [Accessed 2021-12-14]

SEC. (2019). Investor Bulletin, *Securities and Exchange Commission*, Available online: https://www.sec.gov/files/ipo-investorbulletin.pdf [Accessed 2021-12-10]

SpackTrack. (2021). SPACs closed in 2020. Available online: https://spactrack.io/earnings/ [Accessed 2021-12-03]

StockAnalysis. (2021). All 2020 IPOs. Available online: https://stockanalysis.com/ipos/2020/ [Accessed 2012-12-05]

Yahoo Finance. (2021). Historical Stock Data. Available online: https://finance.yahoo.com/ [Accessed 2021-12-03]

Appendix A

Definitive Agreement

Average cumulative abnormal return around the definitive agreement event window with standard deviation and T-test for each event windows.

Time	Car	T-test	STDEV
-20	-0,10%	-0,39836	0,0185496
-19	-0,67%	-2,25619**	0,0231628
-18	-1,12%	-3,81875***	0,0226868
-17	-1,16%	-3,19247***	0,0280291
-16	-1,19%	-2,42333**	0,0380401
-15	-0,99%	-1,95542*	0,0393847
-14	-0,67%	-1,32082	0,0391461
-13	-0,46%	-0,78353	0,0451526
-12	-0,17%	-0,30071	0,043163
-11	-0,43%	-0,57613	0,0580695
-10	-0,17%	-0,1868	0,0699186
-9	-0,08%	-0,0845	0,0716267
-8	0,09%	0,083911	0,0852288
-7	0,15%	0,123547	0,0936991
-6	0,54%	0,454051	0,0929099
-5	0,71%	0,60903	0,0905371
-4	0,99%	0,715885	0,1072602
-3	1,20%	0,766308	0,1213134
-2	0,97%	0,702368	0,1067016
-1	2,61%	1,5414	0,1313874
0	5,67%	2,349372**	0,1868833
1	7,03%	2,894049***	0,1881873
2	7,62%	3,032796***	0,1946258
3	7,48%	2,960846***	0,1956817
4	7,61%	2,769185***	0,2129135
5	7,21%	2,646887***	0,2108564
6	7,70%	2,66744***	0,2235554
7	8,19%	2,585929***	0,2453474
8	7,70%	2,582394***	0,2309149
9	7,39%	2,639266***	0,2169677
10	8,02%	2,600604***	0,2388759
11	8,05%	2,686511***	0,2320505
12	7,81%	2,685848***	0,2251078
13	7,87%	2,641394***	0,2308191
14	7,42%	2,476696**	0,2319517
15	7,40%	2,502846**	0,2288995
16	6,74%	2,482678**	0,2101919
17	6,79%	2,393217**	0,2198875
18	7,29%	2,543325**	0,2218854
19	7,17%	2,434194**	0,2280751
20	6,84%	2,356002**	0,224767

*Table 6 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the definitive agreement [-20,20] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-10	0,26%	0,905972	0,0225111
-9	0,35%	0,640228	0,0428022
-8	0,52%	0,713233	0,0569337
-7	0,58%	0,672049	0,0670066
-6	0,98%	1,111925	0,0680273
-5	1,14%	1,324539	0,0668876
-4	1,42%	1,682405	0,065526
-3	1,63%	1,56801	0,0806238
-2	1,40%	1,470342	0,0737238
-1	3,05%	2,375095**	0,0993543
0	6,10%	3,079624**	0,1534323
1	7,46%	3,606497***	0,1602882
2	8,05%	3,528805***	0,1767499
3	7,91%	3,429045***	0,1787199
4	8,04%	3,220054***	0,1934913
5	7,64%	3,06078***	0,1932737
6	8,13%	2,951497***	0,2133751
7	8,62%	2,790119***	0,2393828
8	8,13%	2,79992***	0,2249239
9	7,82%	2,862399***	0,2117423
10	8,45%	2,799682***	0,2338399

*Table 7 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the definitive agreement [-10,10] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-5	0,17%	0,473203	0,0273751
-4	0,45%	0,6411	0,0539699
-3	0,66%	0,721446	0,0703831
-2	0,42%	0,618365	0,0529751
-1	2,07%	2,001195**	0,0801195
0	5,12%	2,691101***	0,1474759
1	6,49%	3,222048***	0,1559373
2	7,08%	3,201429***	0,1711968
3	6,94%	3,100748***	0,1732477
4	7,07%	2,867944***	0,1908723
5	6,66%	2,685194***	0,1921378

*Table 8 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the definitive agreement [-5,5] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-3	0,21%	0,553639	0,0292203
-2	-0,02%	-0,05189	0,0354978
-1	1,62%	1,827671*	0,068795
0	4,68%	3,030696***	0,1195344
1	6,04%	3,672954***	0,1273736
2	6,63%	3,527345***	0,1455697
3	6,49%	3,420281***	0,1469462

*Table 9 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the definitive agreement [-3,3] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Business Combination

Average cumulative abnormal return around the merger event window with standard deviation and T-test for each event windows.

Time	Average CAR	T-test	STDEV
-20	0,70%	1,668028*	0,033674
-19	1,26%	2,092307**	0,048243
-18	0,82%	1,023906	0,063829
-17	1,36%	1,628642	0,066876
-16	2,61%	2,241658**	0,093114
-15	4,20%	2,341045**	0,143587
-14	4,62%	2,405797**	0,153661
-13	3,53%	2,049271**	0,137695
-12	3,27%	1,644069	0,158925
-11	2,60%	1,351445	0,153958
-10	4,52%	1,974739**	0,183256
-9	4,96%	2,072066**	0,191616
-8	5,48%	2,044006**	0,214623
-7	5,14%	1,837193*	0,223622
-6	5,47%	1,963077**	0,222872
-5	5,85%	2,084211**	0,224692
-4	6,55%	2,208127**	0,237158
-3	7,48%	2,296175**	0,260547
-2	9,16%	2,414014**	0,303457
-1	9,43%	2,338742**	0,322459
0	9,34%	2,046218**	0,364999
1	6,14%	1,06166	0,462633
2	3,83%	0,632839	0,484431
3	3,24%	0,471348	0,550758
4	1,92%	0,27414	0,559352
5	0,05%	0,007015	0,554083
6	-1,96%	-0,2803	0,5588
7	-0,62%	-0,08544	0,577588
8	-0,56%	-0,07515	0,599376
9	-0,26%	-0,03459	0,593202
10	0,27%	0,037992	0,573026
11	0,47%	0,067376	0,561648
12	1,49%	0,207173	0,574872
13	2,56%	0,346239	0,591382
14	2,19%	0,290963	0,602613
15	2,42%	0,314977	0,615503
16	2,79%	0,357161	0,625556
17	4,06%	0,508279	0,638381
18	4,15%	0,519187	0,640139
19	4,48%	0,553663	0,646693
20	4,38%	0,544992	0,642286

*Table 10 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the merger [-20,20] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-10	1,92%	1,905183*	0,080736
-9	2,36%	1,80213*	0,104862
-8	2,88%	1,879645*	0,122696
-7	2,53%	1,490104	0,136079
-6	2,87%	1,729399*	0,132676
-5	3,25%	1,829813*	0,142223
-4	3,95%	1,990207**	0,158581
-3	4,88%	2,145061**	0,181905
-2	6,56%	2,449827**	0,21409
-1	6,83%	2,352348**	0,232143
0	6,74%	1,985609**	0,271354
1	3,54%	0,748808	0,378058
2	1,23%	0,246152	0,400164
3	0,64%	0,111737	0,461198
4	-0,68%	-0,11628	0,470625
5	-2,55%	-0,43537	0,468975
6	-4,56%	-0,76806	0,474833
7	-3,22%	-0,5196	0,49541
8	-3,16%	-0,48711	0,519611
9	-2,86%	-0,44799	0,510255
10	-2,33%	-0,37763	0,493332

*Table 11 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the merger [-10,10] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-5	0,38%	0,742426	0,041473
-4	1,08%	0,960314	0,08972
-3	2,01%	1,323178	0,121485
-2	3,69%	1,784761*	0,165307
-1	3,96%	1,668934*	0,189721
0	3,87%	1,361651*	0,227189
1	0,67%	0,157142	0,341365
2	-1,64%	-0,35534	0,368522
3	-2,22%	-0,4193	0,424321
4	-3,55%	-0,65305	0,43515
5	-5,42%	-0,99204	0,43711

*Table 12 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the merger [-5,5] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
-3	0,93%	1,108136	0,067309
-2	2,61%	1,653132*	0,126351
-1	2,88%	1,488122	0,154875
0	2,79%	1,094587	0,203907
1	-0,41%	-0,09974	0,326012
2	-2,71%	-0,59659	0,363914
3	-3,30%	-0,62177	0,424717

*Table 13 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the merger [-3,3] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Initial Public Offering

Average cumulative abnormal return around the IPO event window with standard deviation and T-test for each event windows.

Time	Average CAR	T-test	STDEV
0	33,75%	9,293808***	0,543573
1	61,34%	2,603532***	3,526359
2	61,21%	2,593025***	3,53269
3	60,89%	2,580259***	3,531873
4	61,78%	2,613254***	3,538284
5	62,37%	2,636585***	3,540638
6	61,64%	2,603845***	3,54313
7	61,85%	2,615828***	3,538965
8	61,63%	2,609517***	3,534593
9	61,32%	2,596668***	3,534439
10	61,02%	2,584264***	3,533742
11	60,82%	2,574199**	3,536339
12	60,78%	2,573349**	3,53511
13	61,92%	2,62352***	3,532586
14	62,34%	2,640528***	3,533714
15	62,22%	2,634258***	3,535043
16	62,07%	2,627992***	3,535124
17	61,92%	2,619813***	3,537352
18	62,14%	2,630666***	3,535164
19	61,90%	2,618827***	3,537608
20	61,31%	2,595814***	3,53502

*Table 14 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the initial public offering (IPO) [0,20] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
0	33,75%	9,293808***	0,543573
1	61,34%	2,603532***	3,526359
2	61,21%	2,593025***	3,53269
3	60,89%	2,580259***	3,531873
4	61,78%	2,613254***	3,538284
5	62,37%	2,636585***	3,540638
6	61,64%	2,603845***	3,54313
7	61,85%	2,615828***	3,538965
8	61,63%	2,609517***	3,534593
9	61,32%	2,596668***	3,534439
10	61,02%	2,584264***	3,533742

*Table 15 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the initial public offering (IPO) [0,10] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
0	33,75%	9,293808***	0,543573
1	61,34%	2,603532***	3,526359
2	61,21%	2,593025***	3,53269
3	60,89%	2,580259***	3,531873
4	61,78%	2,613254***	3,538284
5	62,37%	2,636585***	3,540638

*Table 16 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the initial public offering (IPO) [0,5] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Time	Average CAR	T-test	STDEV
0	33,75%	9,293808***	0,543573
1	61,34%	2,603532***	3,526359
2	61,21%	2,593025***	3,53269
3	60,89%	2,580259***	3,531873

*Table 17 shows the average cumulative abnormal return, T-test and the standard deviation of the sample for the event window around the initial public offering (IPO) [0,3] with levels of significance defined as *** 1%, ** 5% & * 10%.*

Appendix B

Special Purpose Acquisition Companies

Ticker	DA-SPAC	DE-SPAC
ADV	September 8, 2020	October 28, 2020
ALTG	December 12, 2019	February 14, 2020
ARKO	September 8, 2020	December 22, 2020
ASLE	September 8, 2020	December 22, 2020
ATCX	August 12, 2019	February 14, 2020
ATNF	July 27, 2020	November 6, 2020
AVCT	July 24, 2019	April 7, 2020
BFI	June 29, 2020	December 17, 2020
BWMX	August 2, 2019	March 13, 2020
CERE	July 29, 2020	October 27, 2020
CLNN	September 1, 2020	December 30, 2020
CLVR	July 27, 2020	December 18, 2020
CURI	August 10, 2020	October 14, 2020

DKNG	December 23, 2019	April 23, 2020
DM	August 26, 2020	December 10, 2020
DMS	April 23, 2020	July 15, 2020
DNMR	October 5, 2020	December 29, 2020
EOSE	September 8, 2020	November 16, 2020
EQOS	July 9, 2019	October 1, 2020
FREE	December 19, 2019	June 25, 2020
FSR	July 10, 2020	October 29, 2020
GB	January 16, 2020	August 28, 2020
GCMG	August 3, 2020	November 17, 2020
GDYN	November 13, 2019	March 5, 2020
GNOG	June 29, 2020	December 29, 2020
GOEV	August 17, 2020	December 21, 2020
GSMG	September 6, 2019	February 18, 2020
HOFV	September 16, 2019	July 1, 2020
HPK	May 4, 2020	August 21, 2020
HTOO	June 6, 2020	December 10, 2020
HYLN	June 18, 2020	October 1, 2020
HYMC	January 13, 2020	May 29, 2020
ID	September 18, 2020	November 20, 2020
IGIC	October 10, 2019	March 17, 2020
IMTX	March 17, 2020	July 1, 2020
LAZR	August 24, 2020	December 2, 2020
LGHL	March 10, 2020	June 16, 2020
LPRO	January 6, 2020	June 10, 2020
METX	December 12, 2019	March 30, 2020
MP	July 15, 2020	November 17, 2020
MPLN	July 13, 2020	October 8, 2020
NKLA	March 2, 2020	June 3, 2020
OPEN	September 15, 2020	December 18, 2020
PAE	November 1, 2019	February 10, 2020
PAYA	August 3, 2020	October 16, 2020
PRCH	July 30, 2020	December 23, 2020
QS	September 2, 2020	November 27, 2020
RIDE	August 3, 2020	October 23, 2020
RMO	October 5, 2020	December 29, 2020
RSI	July 27, 2020	December 29, 2020
RVPH	July 20, 2020	December 14, 2020
SFT	June 29, 2020	October 13, 2020
SJ	October 28, 2019	May 7, 2020
SKLZ	September 1, 2020	December 16, 2020
TLMD	July 29, 2020	October 30, 2020
TRIT	July 29, 2020	November 10, 2020

TTCF	June 11, 2020	October 15, 2020
UK	June 29, 2020	November 17, 2020
UTZ	June 5, 2020	August 28, 2020
VINC	September 25, 2020	December 23, 2020
VLDR	July 2, 2020	September 29, 2020
VRT	December 10, 2019	February 7, 2020
VVNT	September 16, 2019	January 17, 2020
XL	September 17, 2020	December 21, 2020

Table 18 shows the tickers, DA- and DE-SPAC dates (adjusted to next trading day) of all SPACs used in the study

Traditional Initial Public Offerings

Ticker	Full Name	IPO-Date	Offer-Price
ABCL	AbCellera Biologics	Dec 11, 2020	$20.00
ABCM	Abcam	Oct 22, 2020	$17.50
ABNB	Airbnb	Dec 10, 2020	$68.00
ACCD	Accolade	Jul 2, 2020	$22.00
ACI	Albertsons Companies	Jun 26, 2020	$16.00
ADCT	ADC Therapeutics	May 15, 2020	$19.00
ADTX	Aditx	Jun 30, 2020	$9.00
AFIB	Acutus Medical	Aug 6, 2020	$18.00
AI	C3.ai	Dec 9, 2020	$42.00
AKUS	Akouos	Jun 26, 2020	$17.00
ALGM	Allegro MicroSystems	Oct 29, 2020	$14.00
ALGS	Aligos Therapeutics	Oct 16, 2020	$15.00
ALVR	AlloVir	Jul 30, 2020	$17.00
ALXO	ALX Oncology Holdings	Jul 17, 2020	$19.00
AMST	Amesite	Sep 25, 2020	$5.00
AMTI	Applied Molecular Transport	Jun 5, 2020	$14.00
AMWL	American Well	Sep 17, 2020	$18.00
ANNX	Annexon	Jul 24, 2020	$17.00
ANPC	AnPac Bio-Medical Science Co.	Jan 30, 2020	$12.00
ANVS	Annovis Bio	Jan 29, 2020	$6.00
API	Agora	Jun 26, 2020	$20.00
ARQT	Arcutis Biotherapeutics	Jan 31, 2020	$17.00
ARRY	Array Technologies	Oct 15, 2020	$22.00
ASAN	Asana	Sep 30, 2020	$21.00
ASO	Academy Sports and Outdoors	Oct 2, 2020	$13.00
ATHA	Athira Pharma	Sep 18, 2020	$17.00
AUVI	Applied UV	Aug 31, 2020	$5.00
AVIR	Atea Pharmaceuticals	Oct 30, 2020	$24.00
AVO	Mission Produce	Oct 1, 2020	$12.00

AYLA	Ayala Pharmaceuticals	May 8, 2020	$15.00
AZEK	The AZEK Company	Jun 12, 2020	$23.00
AZYO	Aziyo Biologics	Oct 8, 2020	$17.00
BCAB	BioAtla	Dec 16, 2020	$18.00
BDSX	Biodesix	Oct 28, 2020	$18.00
BDTX	Black Diamond Therapeutics	Jan 30, 2020	$19.00
BEAM	Beam Therapeutics	Feb 6, 2020	$17.00
BEKE	KE Holdings	Aug 13, 2020	$20.00
BIGC	BigCommerce Holdings	Aug 5, 2020	$24.00
BLCT	BlueCity Holdings	Jul 8, 2020	$16.00
BLI	Berkeley Lights	Jul 17, 2020	$22.00
BNL	Broadstone Net Lease	Sep 17, 2020	$17.00
BNR	Burning Rock Biotech	Jun 12, 2020	$16.50
BQ	Boqii Holding	Sep 30, 2020	$10.00
BSY	Bentley Systems	Sep 23, 2020	$22.00
CALT	Calliditas Therapeutics AB	Jun 5, 2020	$19.50
CCCC	C4 Therapeutics	Oct 2, 2020	$19.00
CD	Chindata Group Holdings	Sep 30, 2020	$13.50
CDAK	Codiak BioSciences	Oct 14, 2020	$15.00
CERT	Certara	Dec 11, 2020	$23.00
CLEU	China Liberal Education Holdings	May 8, 2020	$6.00
CMPI	Checkmate Pharmaceuticals	Aug 7, 2020	$15.00
CMPS	COMPASS Pathways	Sep 18, 2020	$17.00
CRSR	Corsair Gaming	Sep 23, 2020	$17.00
CSPR	Casper Sleep	Feb 6, 2020	$12.00
CVAC	CureVac	Aug 14, 2020	$16.00
DADA	Dada Nexus	Jun 5, 2020	$16.00
DASH	DoorDash	Dec 9, 2020	$102.00
DCBO	Docebo	Dec 3, 2020	$52.21
DCT	Duck Creek Technologies	Aug 14, 2020	$27.00
DNB	Dun & Bradstreet Holdings	Jul 1, 2020	$22.00
DYN	Dyne Therapeutics	Sep 17, 2020	$19.00
EAR	Eargo	Oct 16, 2020	$18.00
EBC	Eastern Bankshares	Oct 15, 2020	$10.00
EBON	Ebang International Holdings	Jun 26, 2020	$5.23
EDTK	Skillful Craftsman Education Technology	Jul 23, 2020	$5.00
FDMT	4D Molecular Therapeutics	Dec 11, 2020	$23.00
FHTX	Foghorn Therapeutics	Oct 23, 2020	$16.00
FMTX	Forma Therapeutics Holdings	Jun 19, 2020	$20.00
FOUR	Shift4 Payments	Jun 5, 2020	$23.00
FRLN	Freeline Therapeutics Holdings	Aug 7, 2020	$18.00

FROG	JFrog	Sep 16, 2020	$44.00
FTHM	Fathom Holdings	Jul 31, 2020	$10.00
FUSN	Fusion Pharmaceuticals	Jun 26, 2020	$17.00
GAN	GAN Limited	May 5, 2020	$8.50
GATO	Gatos Silver	Oct 28, 2020	$7.00
GBIO	Generation Bio Co.	Jun 12, 2020	$19.00
GBS	GBS, Inc.	Dec 23, 2020	$17.00
GDRX	GoodRx Holdings	Sep 23, 2020	$33.00
GFL	GFL Environmental	Mar 3, 2020	$19.00
GHLD	Guild Holdings Company	Oct 22, 2020	$15.00
GLSI	Greenwich LifeSciences	Sep 25, 2020	$5.75
GLTO	Galecto	Oct 29, 2020	$15.00
GOCO	GoHealth	Jul 15, 2020	$21.00
GOED	1847 Goedeker	Jul 31, 2020	$9.00
GP	GreenPower Motor Company	Aug 28, 2020	$20.00
GRAY	Graybug Vision	Sep 25, 2020	$16.00
GRIL	Muscle Maker	Feb 13, 2020	$5.00
GTH	Genetron Holdings	Jun 19, 2020	$16.00
HCDI	Harbor Custom Development	Aug 28, 2020	$6.00
HRMY	Harmony Biosciences Holdings	Aug 19, 2020	$24.00
HUIZ	Huize Holding	Feb 12, 2020	$10.50
HYFM	Hydrofarm Holdings Group	Dec 10, 2020	$20.00
IBEX	IBEX Limited	Aug 7, 2020	$19.00
IH	iHuman	Oct 9, 2020	$12.00
IKT	Inhibikase Therapeutics	Dec 23, 2020	$10.00
IMAB	I-Mab	Jan 17, 2020	$14.00
IMNM	Immunome	Oct 2, 2020	$12.00
IMRA	IMARA	Mar 12, 2020	$16.00
INBX	Inhibrx	Aug 19, 2020	$17.00
INZY	Inozyme Pharma	Jul 24, 2020	$16.00
ITOS	iTeos Therapeutics	Jul 24, 2020	$19.00
IVA	Inventiva	Jul 10, 2020	$14.40
JAMF	Jamf Holding	Jul 22, 2020	$26.00
JUPW	Jupiter Wellness	Oct 30, 2020	$7.50
KBNT	Kubient	Aug 12, 2020	$5.00
KC	Kingsoft Cloud Holdings	May 8, 2020	$17.00
KNTE	Kinnate Biopharma	Dec 3, 2020	$20.00
KRBP	Kiromic BioPharma	Oct 16, 2020	$12.00
KRON	Kronos Bio	Oct 9, 2020	$19.00
KROS	Keros Therapeutics	Apr 8, 2020	$16.00
KYMR	Kymera Therapeutics	Aug 21, 2020	$20.00

LEGN	Legend Biotech	Jun 5, 2020	$23.00
LESL	Leslie's	Oct 29, 2020	$17.00
LI	Li Auto	Jul 30, 2020	$11.50
LIZI	Lizhi	Jan 17, 2020	$11.00
LMND	Lemonade	Jul 2, 2020	$29.00
LSF	Laird Superfood	Sep 23, 2020	$22.00
LSPD	Lightspeed Commerce	Sep 11, 2020	$30.50
LTRN	Lantern Pharma	Jun 11, 2020	$15.00
LU	Lufax Holding	Oct 30, 2020	$13.50
LUNG	Pulmonx	Oct 1, 2020	$19.00
LXEH	Lixiang Education Holding Co.	Oct 1, 2020	$9.25
LYRA	Lyra Therapeutics	May 1, 2020	$16.00
MASS	908 Devices	Dec 18, 2020	$20.00
MAX	MediaAlpha	Oct 28, 2020	$19.00
MCFE	McAfee	Oct 22, 2020	$20.00
MDWT	Midwest Holding	Dec 17, 2020	$70.00
MEG	Montrose Environmental Group	Jul 23, 2020	$15.00
MNSO	Miniso Group Holding	Oct 15, 2020	$20.00
MRM	Medirom Healthcare Technologies	Dec 29, 2020	$15.00
MRVI	Maravai LifeSciences Holdings	Nov 20, 2020	$27.00
MSP	Datto Holding	Oct 21, 2020	$27.00
MTCR	Metacrine	Sep 16, 2020	$13.00
NARI	Inari Medical	May 22, 2020	$19.00
NBTX	Nanobiotix	Dec 11, 2020	$13.50
NCNO	nCino	Jul 14, 2020	$31.00
NGMS	NeoGames	Nov 19, 2020	$17.00
NKTX	Nkarta	Jul 10, 2020	$18.00
NNOX	Nano-X Imaging	Aug 21, 2020	$18.00
NREF	NexPoint Real Estate Finance	Feb 7, 2020	$19.00
NRIX	Nurix Therapeutics	Jul 24, 2020	$19.00
NTST	NetSTREIT	Aug 13, 2020	$18.00
NUZE	NuZee	Jun 19, 2020	$9.00
OCG	Oriental Culture Holding	Dec 15, 2020	$4.00
OLMA	Olema Pharmaceuticals	Nov 19, 2020	$19.00
OM	Outset Medical	Sep 15, 2020	$27.00
ONCR	Oncorus	Oct 2, 2020	$15.00
ONEM	1Life Healthcare	Jan 31, 2020	$14.00
ONEW	OneWater Marine	Feb 7, 2020	$12.00
OPT	Opthea	Oct 16, 2020	$13.50
ORIC	Oric Pharmaceuticals	Apr 24, 2020	$16.00
ORPH	Orphazyme	Sep 29, 2020	$11.00

OSH	Oak Street Health	Aug 6, 2020	$21.00
OZON	Ozon Holdings	Nov 24, 2020	$30.00
PASG	Passage Bio	Feb 28, 2020	$18.00
PCVX	Vaxcyte	Jun 12, 2020	$16.00
PLRX	Pliant Therapeutics	Jun 3, 2020	$16.00
PLTR	Palantir Technologies	Sep 30, 2020	$7.25
PMVP	PMV Pharmaceuticals	Sep 25, 2020	$18.00
PPD	PPD, Inc.	Feb 6, 2020	$27.00
PRAX	Praxis Precision Medicines	Oct 16, 2020	$19.00
PRFX	PainReform	Sep 1, 2020	$8.00
PRLD	Prelude Therapeutics	Sep 25, 2020	$19.00
PROG	Progenity	Jun 19, 2020	$15.00
PSTX	Poseida Therapeutics	Jul 10, 2020	$16.00
PTVE	Pactiv Evergreen	Sep 17, 2020	$14.00
PUBM	PubMatic	Dec 9, 2020	$20.00
PYPD	PolyPid	Jun 26, 2020	$16.00
QH	Quhuo	Jul 10, 2020	$10.00
REYN	Reynolds Consumer Products	Jan 31, 2020	$26.00
RKT	Rocket Companies	Aug 6, 2020	$18.00
RLAY	Relay Therapeutics	Jul 16, 2020	$20.00
RNA	Avidity Biosciences	Jun 12, 2020	$18.00
RNLX	Renalytix	Jul 17, 2020	$13.50
ROOT	Root, Inc.	Oct 28, 2020	$27.00
RPRX	Royalty Pharma	Jun 16, 2020	$28.00
RPTX	Repare Therapeutics	Jun 19, 2020	$20.00
RVMD	Revolution Medicines	Feb 13, 2020	$17.00
RXT	Rackspace Technology	Aug 5, 2020	$21.00
SBTX	Silverback Therapeutics	Dec 4, 2020	$21.00
SCPS	Scopus Biopharma	Dec 16, 2020	$5.50
SDGR	Schrodinger	Feb 6, 2020	$17.00
SEER	Seer, Inc.	Dec 4, 2020	$19.00
SGTX	Sigilon Therapeutics	Dec 4, 2020	$18.00
SHC	Sotera Health Company	Nov 20, 2020	$23.00
SLQT	SelectQuote	May 21, 2020	$20.00
SNOW	Snowflake	Sep 16, 2020	$120.00
SPRB	Spruce Biosciences	Oct 9, 2020	$15.00
SQFT	Presidio Property Trust	Oct 7, 2020	$5.00
SQZ	SQZ Biotechnologies Company	Oct 30, 2020	$16.00
STEP	StepStone Group	Sep 16, 2020	$18.00
STTK	Shattuck Labs	Oct 9, 2020	$17.00
SUMO	Sumo Logic	Sep 17, 2020	$22.00

SYTA	Siyata Mobile	Sep 25, 2020	$7.25
TARS	Tarsus Pharmaceuticals	Oct 16, 2020	$16.00
TIG	Trean Insurance Group	Jul 16, 2020	$15.00
TLS	Telos	Nov 19, 2020	$17.00
TSHA	Taysha Gene Therapies	Sep 24, 2020	$20.00
U	Unity Software	Sep 18, 2020	$52.00
UCL	uCloudlink Group	Jun 10, 2020	$18.00
UPST	Upstart Holdings	Dec 16, 2020	$20.00
VEL	Velocity Financial	Jan 17, 2020	$13.00
VERX	Vertex	Jul 29, 2020	$19.00
VIAO	VIA optronics AG	Sep 25, 2020	$15.00
VIRI	Virios Therapeutics	Dec 17, 2020	$10.00
VITL	Vital Farms	Jul 31, 2020	$22.00
VMAR	Vision Marine Technologies	Nov 24, 2020	$10.00
VRM	Vroom	Jun 9, 2020	$22.00
VSTA	Vasta Platform	Jul 31, 2020	$19.00
VTRU	Vitru	Sep 18, 2020	$16.00
VVOS	Vivos Therapeutics	Dec 11, 2020	$6.00
WIMI	WiMi Hologram Cloud	Apr 1, 2020	$5.50
WISH	ContextLogic	Dec 16, 2020	$24.00
WMG	Warner Music Group	Jun 3, 2020	$25.00
WNW	Wunong Net Technology Company	Dec 15, 2020	$5.00
XPEV	XPeng	Aug 27, 2020	$15.00
YALA	Yalla Group	Sep 30, 2020	$7.50
YGMZ	MingZhu Logistics Holdings	Oct 21, 2020	$4.00
YQ	17 Education & Technology Group	Dec 4, 2020	$10.50
YSG	Yatsen Holding	Nov 19, 2020	$10.50
ZCMD	Zhongchao	Feb 24, 2020	$4.00
ZGYH	Yunhong International	Feb 13, 2020	$10.00
ZI	ZoomInfo Technologies	Jun 4, 2020	$21.00
ZNTL	Zentalis Pharmaceuticals	Apr 3, 2020	$18.00

Table 19 shows the tickers, IPO-date and Offer-Price for all traditional IPOs used in the study.