DANCING IN THE DARK

A STUDY OVER SPAC PERFORMANCE

JONATHAN ELOFSSON

OLIVER LÖNNBERG

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Dancing in the dark: A study over SPAC performance

Abstract:

This paper aims to examine what factors that determine default-free SPAC period returns and explore why the popularity of SPACs has drastically increased in recent years. This is done using a dataset of 345 SPACs listed on the New York Stock Exchange and the NASDAQ. We proceed to calculate the returns using a tailored SPAC period model and compare them with the yield of 2-year US Treasury Notes. We further develop a regression model in order to explain what factors that influence SPAC period returns, such as underwriter ranking and derivative security structure. We find that default-free SPAC period returns on average outperform 2-year US Treasury Yields under the studied period with strong statistically support, however we yield limited insights when examining what components that explain SPAC period returns.

Keywords:

Special Purpose Acquisition Companies, SPACs, SPAC period returns, Treasury Yield, Default-free investments, Underwriter ranking, SPAC wave, United States

Authors:

Jonathan Elofsson (24793)
Oliver Lönnberg (24731)

Tutors:

Ran Guo, Visiting Teacher, Department of Finance

Examiner:

Adrien d'Avernas, Assistant Professor, Department of Finance

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1. Introduction

The process of initial public offerings (IPOs) plays a central role in companies' ability to receive financing from a wider array of investors. When the company is transformed from a private company to a public company, its shares reach both new institutional investors and retail investors. In this process, the company provides itself with capital for potential future growth plans or general working capital. The special purpose acquisition company's (SPAC) IPO process differs from a traditional IPO in the sense that the offering constitutes a blank check company, that at a future date after the public offering acquire a private company and, in the process, take that company public. For SPAC IPOs this inherit characteristic results in two central periods, Gahng, Ritter and Zhang (2021) call them the "*SPAC* period" and the "*De-SPAC* period*"* which are illustrated in figure 1 below:

Figure 1. Timeline and lifecycle of SPAC IPOs

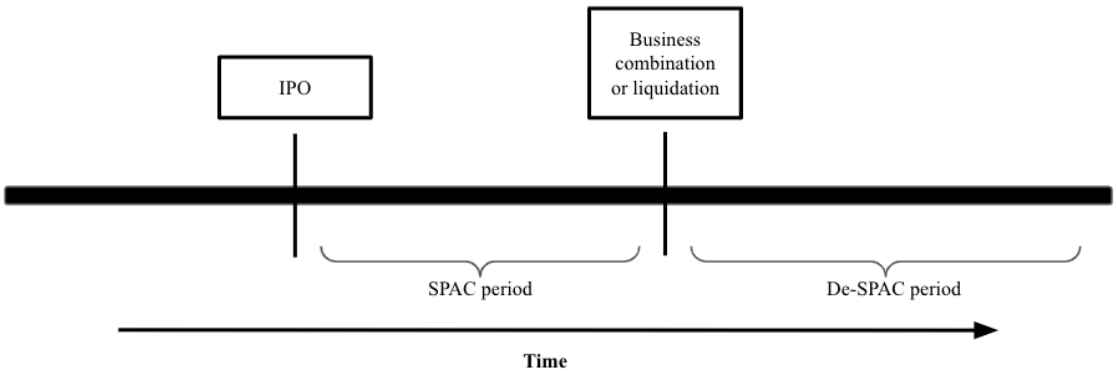

Figure 1 illustrates the two essential periods to fully understand SPACs. The SPAC period is the period before a merger is pursued. The De-SPAC period begins when the merger is completed, and the company starts to trade under a new ticker.

The SPAC period begins when the company is listed on the stock exchange and ends when the company either liquidates or completes a merger. The De-SPAC period begins when the merger is completed, and the company begins to trade under a new ticker. Another notable characteristic is that the SPAC is created by a sponsor who provides capital in the pre-IPO stage. Then, before the SPAC goes public it usually seeks underwriters and institutional investors. The SPAC IPO is also characterized by listing units instead of just common shares at the time of IPO, which later (usually between 45-90 days after the time of IPO) is split up. Units are composed of a common share and usually some kind of derivative securities. Most often a fraction of a warrant is included, and in some rarer cases also a right. The money that is raised through the IPO process is then placed in a trust account in which it earns interest until the money is used for a merger or returned to the investors in case of liquidation.

SPACs usually have between 18 and 24 months to complete a merger with a private company (Gahng et.al, 2021). If a merger is not pursued within the time horizon the SPAC must liquidate. If liquidation occurs, the SPAC must redistribute the proceeds from the IPO to the investors with accrued interest. Further, if an investor does not want to pursue with the business combination it always has the right to redeem its share and in turn receive their part of the cash in the trust account. This amounts to the price of one unit at the IPO plus the interest it has accrued during the SPAC period. Due to the risk of investors redeeming their shares and exhausting the trust account, sponsors often invite PIPE (Private Investment in Public Equity) investments to offset redemptions from other investors and secure funds for the business combination. PIPE investors also act as a certification effect, signaling to investors not to redeem their shares in the first place.

As a result of the possibility to redeem your common shares in exchange for the cash that you are entitled to from the trust account, an investment in a SPAC during its SPAC period can be viewed as investing in a default-free convertible bond with some derivative securities generally included (Gahng et.al, 2021). Worth noting is that this return is gross of any fees associated with, for example, underwriters since these fees are not borne by the investors but rather the sponsors. However, investing in the SPAC cannot be seen as completely risk-free since the investor is both exposed to an illiquidity risk due to the common shares not being possible to redeem at any given moment, and a risk of a fire-sale at the time of redemption. However, due to the money-back guarantee it can still be regarded as a default-free investment.

One important change in the framework of SPAC IPOs occurred in 2010 when the voting right and the redemption right were unbundled and became two separate decisions (Gahng et.al, 2021). Prior to this change, if one voted in favor of a specific business combination then they could not choose to redeem their shares and vice versa. This meant that an investor who wanted to utilize the default-free characteristics of investing in a SPAC was required to vote against a business combination. Further it implies that the derivative securities included in the SPAC unit - such as warrants and rights - become worthless if the SPAC is forced into liquidation, this type of investor now has an incentive to vote in favor of a business combination even if they regard it as being a “bad merger”, since at least some value in the derivative securities will remain and they will thus yield a higher return.

During recent years, markets located in the United States have seen a rapid increase in the number of SPAC IPOs executed each year, see Figure 2 (Statista, 2022).

Figure 2. Development of the number of SPAC IPOs in the United States, 2009-2015

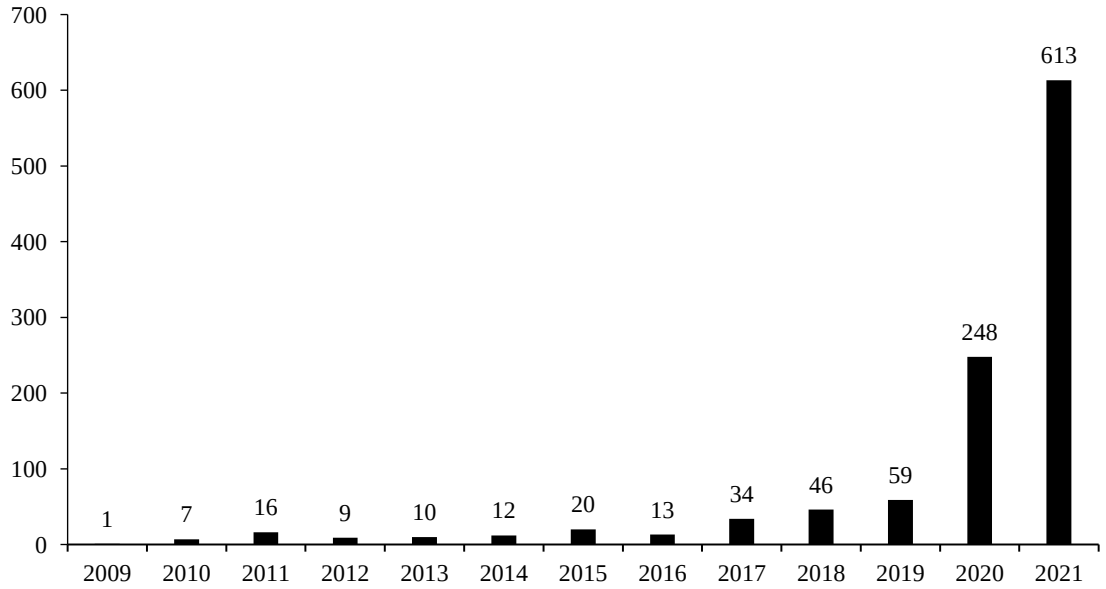

Figure 2 illustrates the total number of SPAC IPOs per year between 2009 and 2021 in the United States.

However, we do not identify any immediate trend in the average size of SPACs, see Figure 3.

Figure 3. The average size of SPAC IPOs in the United States, 2009-2015

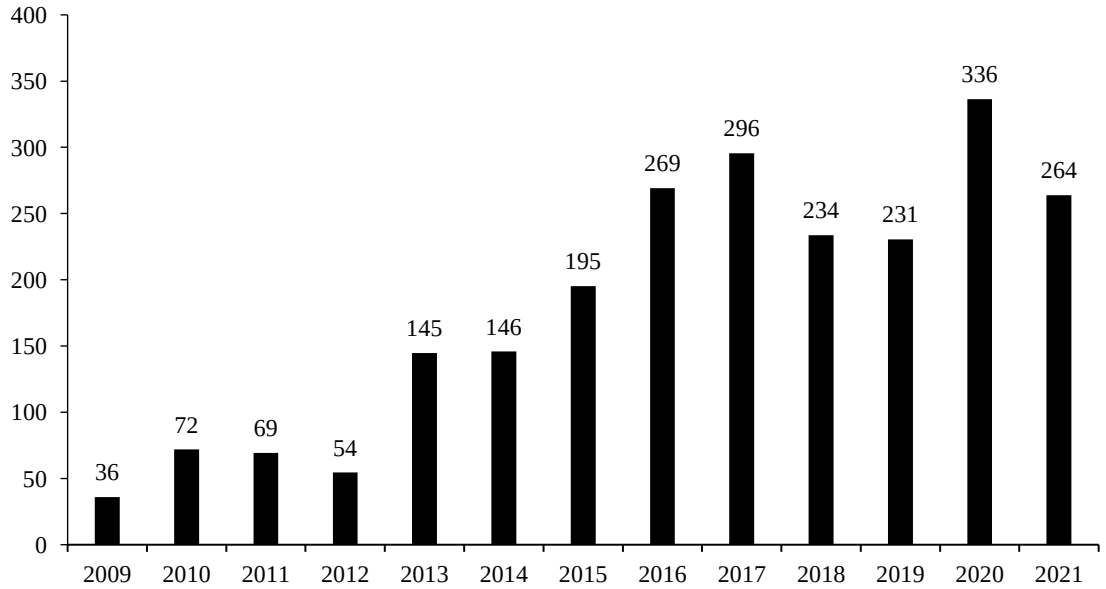

Figure 3 illustrates the average size of SPAC IPOs per year in the United States. The values are in millions of US Dollars.

Looking at the development of SPACs, one immediately notices the sharp increase in SPAC IPOs, from 1 SPAC IPO in 2009 to 613 in 2021. One should however note - although this increase remains substantial - that the market has seen a very high number of all types of IPOs in recent years, especially in 2020 and 2021. Nonetheless, the data still supports a drastic increase in the share of SPAC IPOs in relation to the total number of IPOs. (See figure 4)

Figure 4. The total number of IPOs and the share of SPAC IPOs in relation to the total number of IPOs in the United States, 2009-2015

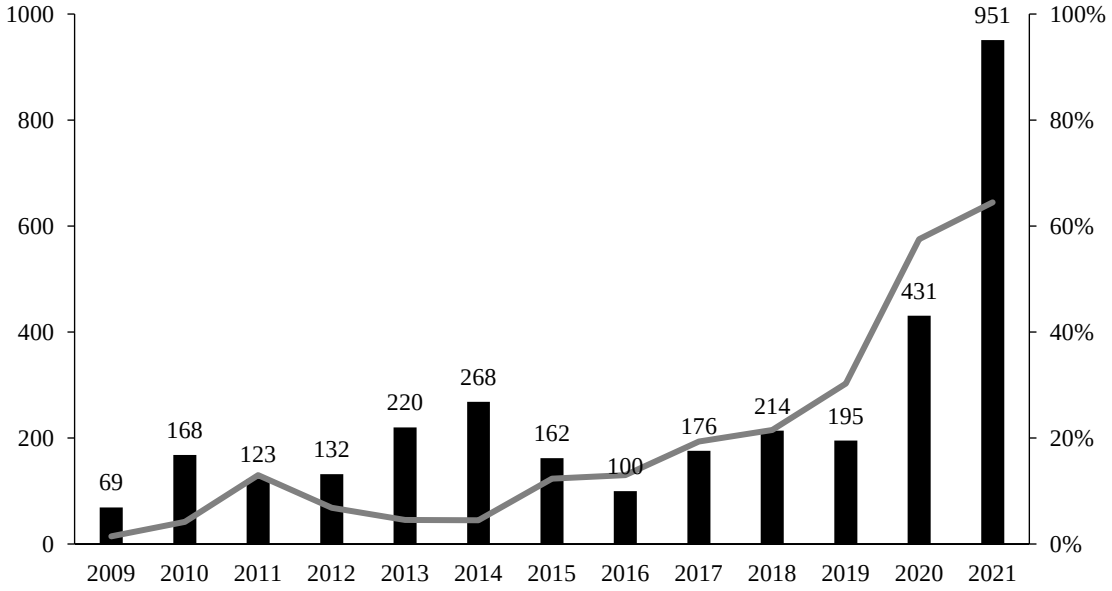

Figure 4 illustrates the total number of IPOs per year between 2009 and 2021 in the United States. The line in the diagram illustrates the development of the share of SPAC IPOs in relation to the total number of IPOs. We see that SPAC IPOs have become a larger portion of total IPO market in recent years.

Gahng et.al (2021) note that in the time-period 2017-2019, nine SPACs were liquidated. Further, 44 out of 64 - i.e., 69% - completed business combinations had a redemption percentage of over 50%. The mergers were possible to pursue due to PIPE investments offsetting some or all of the money that was redeemed. According to them, this changed drastically in 2020 where only two SPACs were liquidated and only 25 out of 62 – i.e., 40% - had a redemption percentage of over 50%. Zooming in on the fourth quarter of the same year, 0 SPACs were liquidated and only 10 out of 37 – i.e., 27% - had a redemption percentage of over 50%. This underpin their argument that the boom in SPAC popularity is due to a change in investor sentiment and that recent high-profile deals have led to an inflow of retail investors looking to chase past returns. They also believe that investors becoming increasingly positive towards potential mergers led to less cash being redeemed and that sponsors could complete more mergers. The substantial pool of cash delivered, and the probability of a successful deal consequently led to SPACs being a more attractive opportunity for operating companies.

However, we believe that there might be other reasons to why SPACs became so popular during these years other than those proposed by Gahng et al. (2021). That investor sentiment and generally more positive attitudes toward the potential business combinations are not the only possible explanations as to why SPAC popularity has grown in recent years.

During this time-period interest rates dropped to record low levels, see Figure 3 for the development of the yield of 2-year US Treasury Notes between 2018 and 2021.

Figure 5. 2-year US Treasury Note yield, 2018-2021

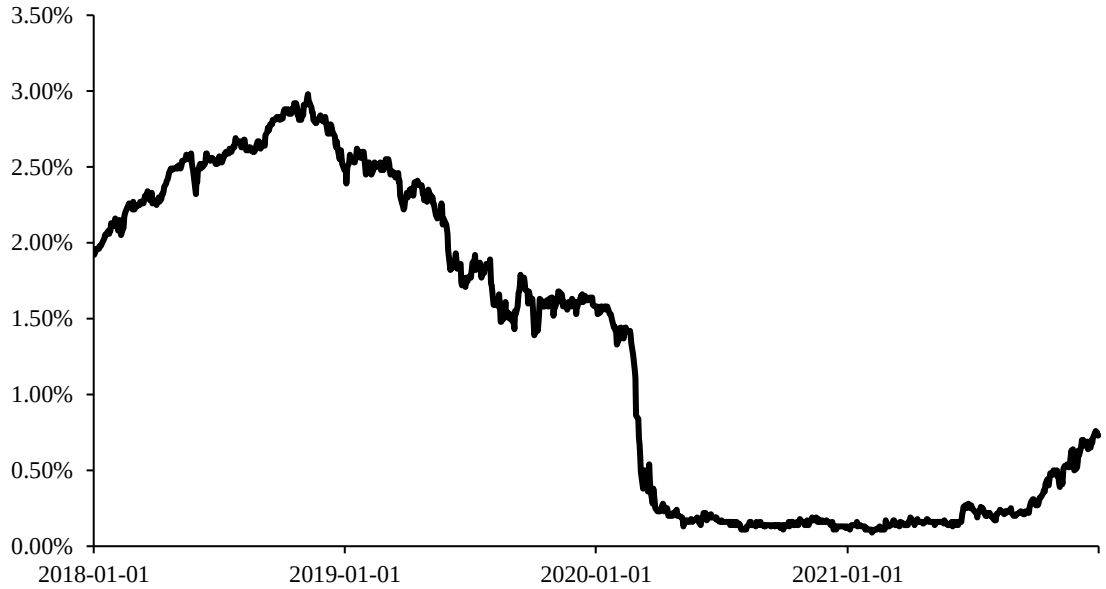

Figure 5 illustrates the development of the 2-year US Treasury Note yield from January 2018 to January 2022.

Due to the characteristics of the SPAC period investment explained in section 1 and it being a default-free investment, this sparked the idea of comparing the current SPAC period returns with the alternative of investing in default-free US Treasury Notes. Further, we also wanted to study which factors that could explain differences between SPAC period returns prior to the announcement of a business combination, such as quality of underwriters, size of IPO, etc.

We are not the first ones to acknowledge a possible discrepancy between default-free interest and SPAC period returns. Whenever a common stock (or unit) trades below IPO price, one could always invest in it and then redeem it at a later point for an ensured positive return. This opportunity has been exploited by various hedge funds and other investors who have been given the epithet “SPAC mafia”, implying that they are taking part of this free-money game (Reuters, 2021). According to Gahng et al. (2021), the top 20 members of this so-called SPAC mafia had over 56,552 million US Dollars in assets under management invested in SPACs at the end of September 2021. They further conclude that (although noting that it may be a simplification) that the default-free convertible bond (i.e., the investment in the SPAC common share) is approximately worth

the IPO price, with the derivative securities being a “free-lunch”. This further spurred our interest in examining the returns during the SPAC period prior to the announcement of a business combination and try to understand its specific nature rather than studying the De-SPAC period which bears more similarity to “regular” IPOs.

Based on these findings and the questions that arose among them, our contribution would then be the following:

What could explain the rise in popularity of SPACs in recent years and what determines SPAC period returns prior to the announcement of a business combination?

2. Literature review

Since SPACs have gathered significant popularity in recent years and prior to that being a quite un-researched topic, the current literature regarding the subject is sparse. The number of papers published in top finance journals is limited and the academic knowledge is thus consequently low. Therefore, it was difficult to find relevant papers published in financial journals that focuses on SPAC IPOs.

One related paper is Gahng, Ritter and Zhang (2021) titled “*SPACs”* which is an un-published working paper. They go through and measure the returns of SPACs in the SPAC period and the De-SPAC period. Their sample size is 905 SPACs for the period between January 2010 and September 2021 and their method of measuring returns factor in both the return of common shares as well as stated fractions of warrants and rights in the specific units. Their method of measuring SPAC unit return bears similarities with the method that we use in our paper and acted as inspiration. The mentioned paper is - as stated earlier - one of the first in this newly found area of study and their research approach is broad, covering a wide area of topics regarding SPACs while omitting depth on specific parts.

Our extension to their paper would be to try and explain the differences between returns in the SPAC period, this by using a regression model with the aim of exploring which factors that influence SPAC period returns. This is something that is not included in their paper and which we believe could yield interesting insights that are valuable for practitioners. Further, we also aim to seek answers to the question of why SPAC popularity has surged in recent years. Gahng et al. (2021) gives a shallow answer to this question which is not underpinned by any statistical analyzes, and as mentioned in section 1 we believe that there are other undiscovered answers to this question. We aim to engender some of those answers in this paper by comparing investments in SPACs to other investments that exhibit similar characteristics. This is done through return calculations and rigorous statistical analyzes in conjunction with observed investor behavior. We also apply our and Gahng et al. (2021) combined findings to our hypothesis about future SPAC period returns and associated investor attractiveness where fresh SPAC data from 2022 is used to support our view.

Therefore, our core contribution to the literature would be through citing variables that explain differences in SPAC period returns and analyze their influence. Our paper thus both contributes to the literature through more specific in-depth analyzes and

clarifying if specific findings and relations are statistically significant. Further, we also investigate alternative answers to present questions, most notably why SPACs became so increasingly popular in recent years. It is our belief that these contributions are relevant for practitioners and could facilitate future research.

3. Data and Methodology

3.1 Identifying SPACs and collecting SPAC data

The SPAC data was collected from SPAC Track (2022) and contains 345 SPACs that went public between 2019-05-14 and 2021-03-30 that has not yet executed a business combination or been liquidated. Further we have limited us to SPACs listed on either the New York Stock Exchange or the NASDAQ in the United States. To determine which stock exchange each SPAC is traded on, Yahoo Finance was used. Since our goal is to calculate the annualized returns of the SPACs between going public and today it is appropriate to examine those SPACs that have been trading for more than one year before our examination date which is 2022-04-01. This implies that our data set includes all SPACs that are currently listed on the mentioned markets where at least one year has lapsed since their IPO date. We are aware that making this exclusion might lead to survivorship bias i.e., bias as a result of excluding some observations that were difficult to observe. If we had included SPACs that have been trading for less than one year, their annualized returns would have been arbitrarily enhanced compared to other SPACs that have been trading for longer. Therefore, we conclude that including only SPACs that have been trading for at least one year will lead to the smallest bias in our study and the fairest result. An optional way would have been to include all SPACs that have either done a delisting or a business combination. This process had several issues as well, mainly that it was difficult to access historical data on warrant and right structure and the historical price of these, as well as prices of common shares before either delisting or performing a business combination. As a result, we had to choose our current methodology which we determine to be suitable for the purpose of analyzing SPAC period returns and to answer our research question.

The US market has been the dominant market regarding SPACs with the majority of the total SPACs in the world being listed either on the New York Stock Exchange or on the NASDAQ. For example, in 2020 there were 256 SPAC IPOs in the United States and only 3 in all of the European markets combined (Statista, 2022). Examining SPACs only from the US gives us a more consistent data set while only excluding a handful of IPOs from other countries and markets. Further, we later also compare the performance of SPACs with US Treasury Notes, hence making it additionally appropriate to examine SPACs that are listed on markets based in the United States.

The data obtained from SPAC Track include the names of the SPACs as well as their ticker. Further, it also contains information regarding IPO date, IPO Size in US Dollars, the current Trust Value in US Dollars, the current price of one common share, the warrant structure as well as its corresponding warrant price and the right structure. The data was then supplemented with the right price which was collected from Yahoo Finance. We also drew samples to check whether it was correct by comparing the data from SPAC Track to various other sources such as mentioned Yahoo Finance and CRSP.

Further, we also examined SEC Filings and S-1 documents to check whether warrant structure, IPO Size, unit structure, etc. were in fact correct.

Our data set was then complemented with information regarding the underwriters of each SPAC as well as how many units each bank contributed with. The information regarding which underwriters acted as bookrunners was included in our data set from SPAC Track, but unfortunately it lacked information about the number of units each underwriter contributed with. This data was instead found on SPAC Research which provided this information to our thesis. Moreover, it acted as a suitable way to cross-check whether the data regarding which underwriters were responsible for each SPAC where consistent between the two.

3.2 Underwriter Ranking

Underwriter ranking data was collected from the updated appendix "IPO Underwriter Reputation Rankings (1980 – 2020)" of the paper "Why Has IPO Underpricing Changed Over Time?" (Loughran and Ritter, 2004). This ranking is mainly based on how many shares an investment bank underwrites when looking at IPO prospectus. More specifically, in mentioned prospectus lead underwriters are mentioned first, then co-managing underwriters and lastly other syndicate members. The non-managing underwriting section of each prospectus contains different brackets of underwriters, where a higher bracket indicates that the bank is underwriting more shares than a bank in a lower bracket. The number of times a bank appears in a higher bracket determines its ranking on a scale between 1.001-9.001. If a bank does not appear in the examined prospectus the score is instead determined by an industry expert. If the industry expert would not possess any material knowledge about the bank its score is instead based on the offer prices of the IPOs that it has underwritten. The underwriters in our study were then simply assigned the latest available score.

11 of the 47 banks in our data set did not have any assigned score based on the earlier mentioned ranking. These banks only appeared as bookrunners 16 times out of 553 total (recall, an IPO can have multiple joint bookrunners), i.e., the banks only acted as bookrunner a total of 1-3 times each. Due to these banks having appeared unfrequently in IPO prospectus (a natural implication of them being excluded in the ranking), as well as them being involved in a minimal number of deals in our data set, we assigned them the lowest possible score of 1.001.

However, this is not applicable in all cases. There are also banks in our study that have emerged in recent years that are regarded as "prominent banks" by the general world of finance but lack any assigned score in the ranking. One example of this is PJT Partners which made its appearance in 2015 when it was spun-off from Blackstone, which it was originally a part of. In 2021, PJT Partners was ranked as the 18th bank with highest deal value in Europe. (Mergermarket, 2022). Thus, giving them the lowest score possible might not reflect their true reputation or skillfulness.

However, since league table rankings such as that one just mentioned are not based on thorough academic research, their volatility from year to year and us wanting to keep stringency throughout the study, we believe it is most appropriate to be consistent by giving them the lowest possible score instead of labeling them with a half-qualified guess.

We also need to mention the fact that some of the banks in our study suffer from older rankings that have not been updated in multiple years. Most of the score rankings in our study derives from the time-period of 2018-2020, however there are some banks in our thesis which score has not been updated since 2010-2011. This can of course be misleading since banks reputation may change over time and the rankings that they have been assigned in this study are out of date. However, we still believe that it is a better approximation of their current status instead of trying to estimate a new score or giving them the lowest possible score of 1.001.

In the cases when a SPAC has had multiple joint bookrunners, we have weighted the total underwriter score of the SPAC according to how many units each bank has been responsible for in relation to the total number of units issued in the IPO. i.e.:

$$\sum_{i=1}^{n}\left(\frac{U_1}{(U_1+\cdots+U_n)}\times Score_1\right)+\cdots+\left(\frac{U_n}{(U_1+\cdots+U_n)}\times Score_n\right)$$

Where:

U_n = The number of units an underwriter is responsible for

$Score_n$ = The underwriter's assigned score

Hence, the more units an underwriter is responsible for relative to the total number of units offered in the IPO, the more weight its score bears.

A list of all underwriters included in our study with their assigned score as well as the number of IPOs they act as underwriters on can be found in Exhibit A in Appendix.

3.3 Treasury rates

Data over historical US Treasury yields were collected from NASDAQ. The data consists of daily updated yields for Treasury Bills, Treasury Notes and Treasury Bonds over the time-period between 1991-01-02 to 2022-02-04. However, only a small amount of this data was used when conducting this thesis. More specifically, the data that was used includes the yield of 2-year US Treasury Notes over the time-period between 2018-01-01 to 2021-12-31.

3.4 Methodology

3.4.1 Calculating SPAC period returns

Our annualized SPAC period returns, $R_{SPAC,}$ has been calculated in the following way:

$$\frac{P_s}{P_i} = (1 + R_{SPAC})^T \tag{1}$$

Where:

$$P_s = max(Common_t, Trust_t) + Price\ Structure\ of\ Warrant\ \times Price\ of\ Warrant_t + Number\ of\ Rights\ \times Price\ of\ Right_t \tag{2}$$

$$P_i = IPO\ Price\ of\ a\ Unit$$

And:

Table 1. Definition of variables used in equation (1) and (2)

Variable	Definition
t	The current date (our examination date, April 1st, 2022)
T	The number of months between t and the SPAC IPO date
$Common_t$	The price of one common share at time t
$Trust_t$	The money a holder of one common share is entitled to in the trust account
Price Structure of Warrant	The fraction of warrant that a specific SPAC unit includes
Price of $Warrant_t$	The price of one warrant at time t
Number of Rights	The number of rights that a specific SPAC unit includes
Price of $right_t$	The price of one right at time t

Table 1 defines variables used in equation (1) and (2).

Since the SPACs in our study has not yet proposed a business combination or announced liquidation, the holder of a common share cannot redeem this for the trust value and collect the return at time *t.* Further, this implies that the trust account has more time to gather interest and is subject to changes in rates and other parameters affecting investments, however our annualization mitigates this bias somewhat. Additionally, you can always collect the return of the common, warrant and right immediately by selling them, or just realize the derivatives and then collect the value of the trust that you are entitled to later.

Furthermore, when a SPAC announces its proposed business combination this may cause the share price to "spike" upwards or diminish heavily. In the case of a fierce increase in the share price an investor can choose to collect this return, and in the case of a decrease the investor is protected by the option to redeem his share. According to Gahng et al. (2021) this spike is in some cases accountable for a large part of the total return during the SPAC period. Since our method disregards this effect, one could interpret our

calculations as the *baseline* return of the SPAC prior to an announced business combination or liquidation. What we mean with baseline return is, for example, that an investor always can sell their warrants and rights at time t and invest the cash at the risk-free rate, and then collect their trust value or sell their common at the point of business combination or liquidation – alternatively they can also sell their common at the prevailing price at time t.

Additionally, the price of the warrants and rights are based on their price at our examination date, which is set at April 1st, 2022, a date that is an arbitrarily number of days away from either a business combination or liquidation. Hence, we do not take into consideration how long the SPAC has been traded for. This might for example result in the SPACs that have been struggling to find a satisfactory target having their securities decrease in value. This due to, for example less confidence in the SPAC merger resulting in an accreditive trade leading to more people selling their warrants which may decrease their value. Further, at the time of business combination the price of warrants can also drop if many investors disagree with the decision to merge with a specific company and thus decide to sell their warrants, consequently pushing down prices. However, as mentioned above, it is in this case always possible to trade their warrants or rights to immediately realize returns. Further, there is no way to accurately estimate how long time it will take for a certain SPAC to De-SPAC. We decided it would not be appropriate to predict the time left before a business combination or liquidation by using, for example, the average trading period of SPACs since this varies. This further implies that we cannot draw any conclusions about when an investor that wants to redeem their common shares can do so.

Lastly, one of the key reasons to why we choose to build our model and calculate the returns accordingly is that the majority of SPAC IPOs executed during the time-period that we are interested in - i.e., when SPACs rose so substantially in popularity - has yet to perform a business combination or liquidation. We call on other practitioners to examine this when the data allows for it, more on this can be read in section 5.2.

To conclude, for the purpose of our research question and hypothesis, we believe that this is an appropriate measure for SPAC period returns and that it is also adequately comparable with Treasury Notes.

3.4.2 Statistical method and approach

The data in our study consists of 345 SPACs. Since these SPACs are limited to companies that have been in the SPAC period for more than a year, we are aware that potential survivorship bias is present, but as we argued above, we think that our current approach is the one with the least biases present. On the other hand, since our study only focuses on data from the middle of 2019 to the middle of 2021 it might suffer from time-period bias, but since the study have a focus on the actual period itself, we argue that the time-period bias is less important to consider in our study.

The statistical method of our study is based on the correlation family to determine the effect size of our chosen parameters. As mentioned in the literature, the r family measures the specific association between two or more variables. In our analysis we have

done a multiple linear regression with five variables to try and explain the SPAC period returns. To measure the strength of our regression analysis, we have included the coefficient of multiple determination (R^2).

The part of the study that is based on the d family, we did a standardized t-test to explore the idea that there is a difference in the mean return of 2-year US Treasury Notes and SPAC period returns.

To validate our regression model and different tests performed we have executed robustness testing for both statistical approaches used in this thesis. For the regression model we ran tests to see whether our model fits the assumptions of the ordinary least square's regression model. This includes testing for multicollinearity, autocorrelation, and heteroscedasticity. For our t-test we test the assumption of normality and complement the test with the non-parametric Mann-Whitney U-test, which does not assume an underlying normal distribution.

3.4.3 Regression model

To examine what determines the return of SPACs during the SPAC period we use the following regression model:

$$R_{SPAC} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_2 \times Right\_included_{it} + \beta_3 \times Warrant\_Structure_{it} + \beta_4 \times Underwriter\_Score_{it} + \beta_5 \times IPO\_Size_{it} + \varepsilon_i$$

R_{SPAC} is the annualized return of the SPAC during its SPAC period prior to announcing a business combination or liquidation described in section 3.4.1

We start of our analysis by defining a simple dummy variable (Market_Place) to distinguish between if the SPAC is currently trading on the NASDAQ or on the NYSE.

Further, we have identified some variables that we believe would have an impact on SPAC period returns:

Right included (Right_Included) is a dummy variable that determines if the SPAC unit offered at the time of IPO includes a right.

Warrant structure (Warrant_Structure) describes how large the fraction of the warrant included in a unit is. For example, if you receive one half of a warrant when buying the unit, the warrant structure is ½. Some SPAC units have no warrant included and if this is the case the fraction is equal to zero.

Underwriter score (Underwriter_Score) is the score of the underlying bookrunner, or in the cases where there are more than one responsible bookrunner this represents the weighted average score described in section 3.2

Size of IPO (IPO_Size) is the size of the SPAC IPO measured in million US Dollars, defined by the number of units offered at IPO times its price. Since IPO price in all our

cases amounts to 10.00 US Dollars, the Size of the IPO is equal to the number of units times 10.00 US Dollars.

Epsilon (ε_i) represents the error term in the regression.

3.4.4 Testing the difference in return between SPACs and 2-year US Treasury Notes

The hypothesis that we want to examine is whether the annualized SPAC period returns outperform the corresponding yield of 2-year US Treasury Notes.

The reason that we specifically choose the 2-year US Treasury Note is both that the asset is considered default-free, in agreement with the SPAC period returns (that, as previously mentioned, are not completely risk-free). Additionally, as mentioned in section 1, a SPAC usually has a time frame of 18-24 months during which it must perform a business combination before being liquidated. Our belief is that a 24-month time-period adequately corresponds to the frame period of a SPAC and that it is suitable to use for our examination.

We have structured our data so that every SPAC IPO date has been matched with the corresponding annual yield of the 2-year US Treasury Note at that specific date to examine and compare the appropriate returns.

Firstly, we perform a t-test to test whether there is a difference in mean return between the two groups consisting of 2-year US Treasury Notes and the annualized returns of the SPACs. To perform a valid t-test it is required to assume that the two populations follow a normal distribution. In accordance with the central limit theorem, assuming that our sample of 345 observations follow an approximate normal distribution is not illogical. However, since the return is capped at a minimum of 0% this distorts the normal distribution mechanics somewhat, and when plotting a histogram of the SPAC returns, we observe the following:

Figure 6. Histogram over calculated SPAC period returns

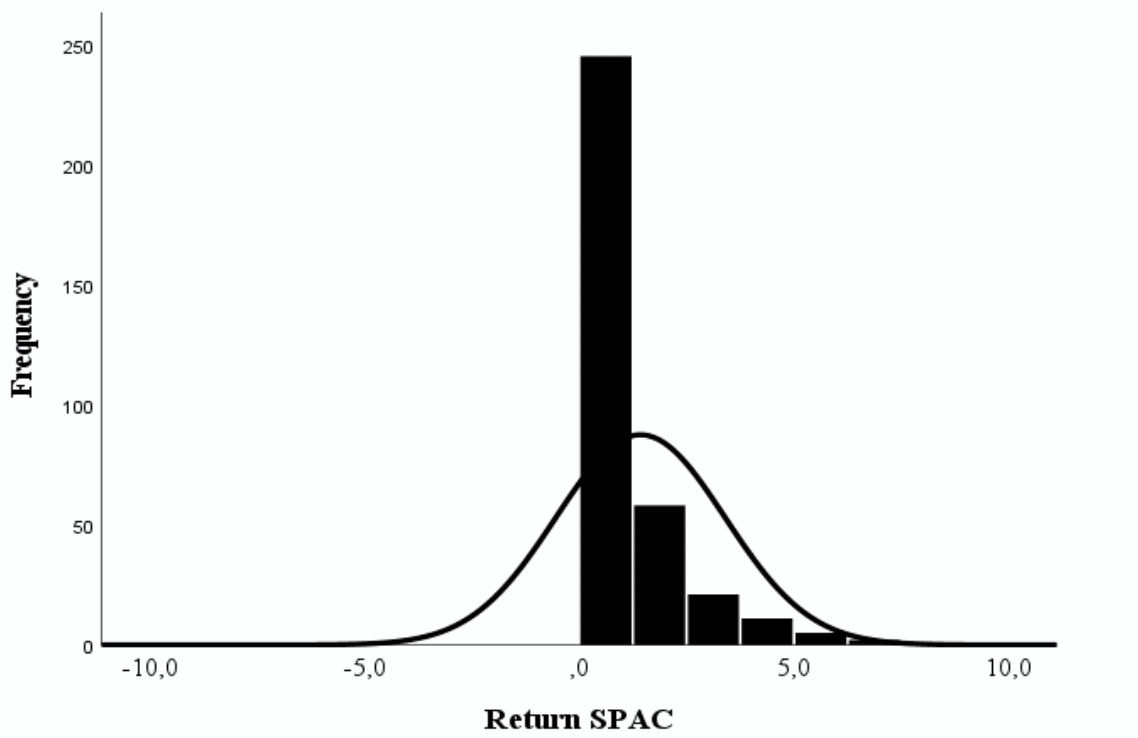

Figure 6 illustrates the distribution of annualized SPAC period returns in our data sample. Here we illustrate the point above that not a single SPAC during the SPAC period earned a negative return. Therefore, the distribution is skewed toward positive returns. Annualized return is calculated according to equation 1 above.

Further, checking the data for skewness and kurtosis results in the following statistics:

Table 2. Skewness and kurtosis of calculated SPAC period return sample

Skewness		**Kurtosis**	
Statistics	Std. Error	Statistics	Std. Error
7.350	0.131	71.940	0.262

Table 2 shows the results when checking for skewness and kurtosis in our sample of calculated SPAC period returns. n = 345.

This points towards the case that there is a potential risk present that the data over SPAC returns may not follow a normal distribution in a sufficiently satisfactory way. This poses a risk that performing a t-test assuming a normal distribution might cause incorrect results and faulty conclusions. To mitigate this risk and to further strengthen our analysis we chose to extend the examination by performing a non-parametric Mann-Whitney U test, which does not require an assumption about the underlying probability distribution. When performing this test, the data has been structured in the same way as described above and the argument for using 2-year US Treasury Notes as a comparable security applies for this test as well.

Additionally, to further avoid deceptive results we perform an additional t-test where the SPAC returns have been edited by removing 5% top highest returns and their corresponding 2-year US Treasury Note yields, this due to the data set containing some SPACs return outliers with abnormally high returns. Removing the top 5% more than halves the standard deviation and adequately removes the outliers in our data set. It is our opinion that this can yield us more robust results and lead to better analyzes and conclusions. The cut-off at the 95% percentile results in removing the 17 highest SPAC returns which will be excluded in our secondary t-test.

4. Empirical Results and Analysis

4.1 Descriptive Statistics

Table 3. Descriptive statistics of SPAC sample

Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
R_{SPAC}	345	1.43%	1.97%	0.00%	24.05%
Weighted Underwriter Score	345	7.481	1.7500	1.001	9.001
Warrant Structure	345	0.368	0.207	0	1
Elapsed Time (Days)	345	447.569	79.77	366.014	1051.403
IPO Size ($M)	345	319.506	192.24	40.60	1380.00
Common Price ($)	345	9.885	0.22	9.74	11.87
Redemption value ($)	345	10.007	0.027	10.000	10.232
Warrant Price ($)	327	0.411	0.34	0.07	3.44
Right Price ($)	10	0.213	0.08	0.12	0.36

Table 3 presents the descriptive statistics of our SPAC sample. It includes the number of observations, mean values, standard deviation, minimum and maximum values for relevant variables in our study.

Table 3 summarizes the descriptive statistics and overall data that has been collected regarding the SPACs in our study. As previously mentioned, our data set consist of 345 observations and the average SPAC IPO size is $320m. The average return of the SPACs during their SPAC period prior to a business combination or liquidation is equal to 1.43%. Due to the money-back guarantee and default-free nature of investing in a SPAC during this period the minimal return observed is 0%. This is further reflected in the minimal redemption value amounting to 10.00 US Dollars with the average redemption value being equal to 10.007 US Dollars. The average elapsed time since IPO is 448 days with the minimal amount being 366 days, this is due to us only wanting to examine SPACs that have been public for at least one year. Further, there were 327 observations that contained warrants and 10 observations that contained rights.

In addition, the average common share is trading at a price level of 9.88 US Dollars, a price that is lower than the IPO price of 10.00 US Dollars. This – as mentioned earlier – implies that an investor can choose to buy one share of common stock and then at a later date redeem it for a certain positive return. However, buying just the common share does not entitle the investor to any derivative securities since the unit, at that point, has been split up and the securities are now trading under separate tickets. Further, we

observe that on the scale between 1.001 and 9.001 the average SPAC has a weighted underwriter score of 7.481.

4.2 Regression analysis

To assess our hypothesis regarding explanatory variables for SPAC period returns, we present our empirical findings in table 4 below.

Table 4. Model summary and goodness-of-fit

	R	R Square	Std. Error of the estimate	df	F	p-value
Model summary	0.307	0.094	1.886			
Regression				5	7.048	< 0.001***

Table 4 presents the overall results of our model. The R square of 0.094 indicate that our current explanatory variable explains 9.4% of the total variance in the dependent variable. * Indicates p-values below 10%, ** indicates p-values below 5% and *** indicates p-values below 1%.

Table 4 illustrates a summary of our regression model. R^2 amounts to 0.094 and our p-value is lower than 0.001. An R^2 value of 0.094 implies that our model explains approximately 9% of the total variance of SPAC period returns. The significance value also indicates that the variables we have chosen for trying to explain differences contribute to the regression in a certain way. Next, we look at the individual variables in the regression and their contribution to the overall regression model.

Table 5. Individual explanatory variables and their significance

		Coefficients		
Explanatory variable	Unstandardized B	Std. Error	t	p-value
Weighted underwriter score	-0.118	0.077	-1.521	0.129
Size of IPO	0.001	0.001	1.854	0.065*
Dummy: Market place	-0.186	0.225	-0.828	0.408
Dummy: Right included	1.406	0.673	2.091	0.037**
Warrant structure	1.584	0.641	2.473	0.014**

Table 5 presents our explanatory variables and their unstandardized b-values i.e., how they affect the dependent variable. Further the table show each variables significance level. * Indicates p-values below 10%, ** indicates p-values below 5% and *** indicates p-values below 1%.

Table 5 illustrates the effect of our independent variables on our measurement for SPAC performance, i.e., R_{SPAC} which is our dependent variable.

The first predictor is our weighted underwriter score of the underlying bookrunners which results in a p-value of 0.129. However, most interestingly, it finds that this correlation is in fact negative, the opposite of what one at first would expect. This means that SPACs assigned with a higher quality underwriter does not increase SPAC period returns, rather a higher quality underwriter results in lower returns. But since our p-value is rather large we cannot draw any statistically significant conclusions regarding underwriter score's impact on SPAC period returns.

Further, one must also note the question about causality in this case. Gahng et al. (2021) notice that there is correlation between low quality SPACs and how many derivative securities that they tend to include in their SPAC units. This is also something that we notice in our data set, where SPACs with lower underwriter score generally include both a higher fraction of warrants as well as being the only SPAC units that have rights included, see Table 6.

Table 6. Average share of warrants in a SPAC Unit and the number of SPACs with rights included segmented after underwriter score

Underwriter Score	≥ 6.001	< 6.001
Avg. Warrant in unit	0.312	0.558
Number of SPACs with rights included	0	10

Table 6 shows the average fraction of warrants in units segmented after underwriter score. SPACs with underwriters who scored ≥ 6.001 included on average 0.312 warrants per unit. SPACs with underwriters who scored < 6.001 included on average 0.558 warrants per unit. The table also illustrates that only SPACs with an underwriter score in the lower bracket contain rights.

The regression model shows that the dummy variable that determines if the SPAC contains a right and the fraction of a warrant that a SPAC includes is positively correlated with the return. This result is of no surprise since the IPO price in our data set is constant at 10.00 US Dollars and both warrants and right bear an intrinsic value. Hence, the more securities that is included in the SPAC unit, the more value you get for the $10.00 that you spend at the time of IPO. This could thus be an explanation for why underwriter score is negatively correlated with SPAC period returns. One could also speculate that to attract investors if you are a rather unknown sponsor who uses low-reputation underwriters, you need to offer higher fractions of warrants and other securities. This is also contingent with the conclusion made by Gahng et al. (2021), saying that sponsors have started to realize the underpricing of SPACs by offering lower fractions of derivative securities, thus leading to lower overall returns for investors.

Further, Gahng et al. (2021) finds a strong correlation between SPAC period returns post business combination and underwriter ranking, as well as De-SPAC period returns and underwriter ranking. This might imply that a higher underwriter ranking has an impact on how successful the eventual business combination of the SPAC will be, but that it has no positive impact on the return prior to announcing a business combination.

Additionally, we also notice that the initial size of the IPO does not have any significant effect on SPAC period returns. A larger IPO size implies that a larger amount of cash will be placed in the trust account. A larger amount of invested capital usually facilitates the opportunity to receive higher interest rates and other beneficial conditions, and one could believe that this would result in an overall higher return. However, since the redemption value only accounts for a minimal share of the total return where its value instead rather derives from it enabling a money-back guarantee for its investors, this is not a surprising result. Another notable feature is that if the SPAC is traded on the Nasdaq or the New York Stock Exchange has minimal explanatory value for how large the SPAC period returns are.

4.3 T-test for mean differences in return between SPACs and 2-year US Treasury Notes

Table 7 illustrates the average SPAC period return compared to the average 2-year US Treasury Note yield. According to the observations for the time-period we can see that there is a clear difference in the mean annualized return between the two groups in both tests. This is an interesting finding considering the default-free characteristic of SPAC period returns mentioned above. However, one need to keep in mind that not all of the return is possible to realize at time t, more specifically it is not possible to realize if one would need to redeem their shares, hence in multiple cases the majority of the return is still locked and will continue to be until a business combination or liquidation is proposed.

In the table below we have divided our data into two groups. The first section consists of the full sample. We can see that there is a clear difference between the mean of both groups, the SPAC mean return during the SPAC period is 1.43% while the corresponding number for the 2-year US Treasury Note is 0.16%. In our adjusted sample we choose to exclude the top 5% SPACs with the highest returns. As mentioned above we saw in our data that a few SPACs had abnormally large returns during the SPAC period (see for example figure 6 above for distribution of SPAC period returns), considering the default-free nature. Therefore, we choose to exclude the top 5% and retest our hypothesis. Here, we find that the mean return is still substantially higher for the SPACs compared to the matching 2-year US Treasury Note yield, 1.12% and 0.14% respectively on an annual basis.

Table 7. SPAC period return versus 2-year US Treasury Notes

	Full sample		**Adjusted sample**	
	Mean	Std. Deviation	Mean	Std. Deviation
SPAC return	1.428%	1.967%	1.118%	0.729%
Treasury Notes	0.156%	0.178%	0.142%	0.083%

Table 7 presents the mean and standard deviation of the annualized SPAC period returns and of the 2-year US Treasury Notes. We have divided it up to illustrate the difference between the full sample and adjusted sample. In the adjusted sample we removed the top 5% of the highest returning SPACs and their assigned 2-year US Treasury Note yields.

Table 8 presents the result of the test of differences in mean values. Here we can conclude that there is a statistically significant difference in the mean value between SPAC period returns and the 2-year US Treasury Note yields.

Table 8. Summary of independent samples t-test results

	t	One-sided p	Two-sided p	Mean Difference	Std. Error Difference
Full sample	11.96	< 0.001***	< 0.001***	1.272%	0.106%
Adjusted sample	24.09	< 0.001***	< 0.001***	0.976%	0.041%

Table 8 presents the results of our t-test. Both the full sample and the adjusted sample gave a statistically significant difference in mean between SPAC period returns and the 2-year treasury note at 99.9% statistical confidence. * Indicates p-values below 10%, ** indicates p-values below 5% and *** indicates p-values below 1%.

4.4 Mann-Whitney U test for mean differences in return between SPACs and 2-year US Treasury Notes

As mentioned above, we supplement our regular t-test with a non-parametric test to make our results more rigorous and statistically reliable. As a result, performing the Mann-Whitney U test with the unedited data gives us the following statistics:

Table 9. Summary of Mann-Whitney U test results

	N	Mean Rank	Sum of Ranks	Z-value	p-value
SPAC Return	345	497.94	171,791		
2-year Yield	345	193.06	66,604		
				-20.14	< 0.001***

Table 9 presents the Mann-Whitney U-test. The Z-value is -20.14, which according to appendix in Newbold, Carlson and Thorne (2019) generates a p-value lower than 0.001. * Indicates p-values below 10%, ** indicates p-values below 5% and *** indicates p-values below 1%.

The mean rank for the 2-year US Treasury Note yield amounts to 193.06 while the corresponding statistic for the SPAC returns amounts to 497.94. Further, the total rank sum for the 2-year US Treasury Note yield amounts to 66,604 while the total rank sum for the SPAC returns amounts to 171,791. Moreover, the test results in a p-value of less than 1%. We can thus – according to the Mann-Whitney U test – conclude that the pool of SPAC period returns is higher than their corresponding 2-year US Treasury Note yield with statistical significance.

4.5 Analysis of differences in return between SPACs and 2-year US Treasury Notes

All three tests performed; the two t-tests with the full sample and the adjusted sample as well as the non-parametric test conclude with p-values lower than 1% that the mean of SPAC period returns is higher than the corresponding 2-year US Treasury Note Yields.

We argue above that the fact that not a single SPAC showed a negative return during the SPAC period illustrates its default-free characteristic. Considering that we prove that SPAC period returns on average outperform comparable 2-year US Treasury Notes, there might be an opportunity related to risk-adjusted returns, which might be of great interest to industry practitioners. As we mentioned earlier in section 1.1, there are hedge funds who have already implemented similar strategies given the attractive risk-adjusted returns, the so called the “SPAC-mafia”.

Our tests statistically prove that the SPACs in our study - i.e., all currently listed SPACs on the NYSE and the NASDAQ that have been traded for longer than one year – has on average outperformed the corresponding 2-year US Treasury Yield. Although this is not an exhaustive explanation for why the SPAC popularity rose so sharply in 2020 and 2021, we are confident in concluding that the default-free nature of investing in SPAC during the SPAC period and its associated performance is a key contribution factor to why the number of SPACs has increased rapidly in recent years.

As noted earlier, derivative securities constitute the majority of SPAC period return. Hence, this discrepancy between different default-free investments is started to get noticed by sponsors. As a result, they have started to comprehend the "free-lunch"-concept when including derivative securities in their SPACs and have responded with including fewer amounts in their units, meaning that the market is starting to become more efficient. Table 10 illustrates the development of the average warrant fractions in a unit from 2019-2021.

Table 10. Average warrant fraction in unit per year

Year	2019	2020	2021
Avg. Warrant in unit	0.67	0.45	0.33

Table 10 shows the average fraction of warrants included in our collected SPAC data per year. $n_{2019} = 3$, $n_{2020} = 98$, $n_{2021} = 244$

This in conjunction with increasing yields in 2-year US Treasury Notes in the beginning of 2022 should - according to our hypothesis – imply that SPAC popularity will decrease, both due to lower expected returns because of fewer derivative securities being included in the SPAC units as well as a higher opportunity cost caused by increased US Treasury yields. By April, 58 SPAC IPOs had taken place in the US so far under 2022. This implies a total run rate of 174 for 2022, a number significantly lower than the 613 SPACs that went public in 2021.

It is important to notice that this is only an estimation, and it will be affected by multiple other economic and non-economic factors such as macro events, development of the overall world situation and similar, and only time will tell if the trend of decreasing number of SPACs will continue.

4.6 Robustness testing

To evaluate the validity of our regression model we perform different robustness tests. These tests are mostly related to the assumptions of the OLS regression model as well as assumptions related to the t-test. As a result, we test for multicollinearity, autocorrelation, omitted variable bias and heteroskedasticity to make sure our regression model follows the assumptions and yields appropriate conclusions.

4.6.1 Multicollinearity

To estimate the strength of our model we turn to multicollinearity, which is important since our research centers around how the independent variables affect the dependent variable i.e., the return of SPACs. Therefore, if there is multicollinearity between our independent variables their coefficients can't be interpreted meaningfully. To test this, we create a new regression equation for each independent variable and then test the tolerance and the variance inflation factor (VIF). For equations and formulas see Exhibit B in appendix.

The result of the tests is presented in table 11 below. There we can see that for all independent variables the VIF values are below 10, which according to Hair, Anderson, Tatham and Black (1995) is the maximum acceptable level. Higher levels than that indicates that multicollinearity and correlation between independent variables is a present issue. Other books and research papers find that this level might be lower, and the cutoff point can be 5 (Menard, 2001) or below. Since all our independent variables have VIF values < 5 there is no issue with the variance inflation factor. Tolerance levels exhibit the characteristics that higher T values indicate lower degrees of multicollinearity. The cut-off point for tolerance is 0.4 (Allison, 1999), others argue that this number might be lower. Our findings conclude that the tolerance levels are all above 0.4, indicating absence of multicollinearity in the model.

Table 11. Test results for multicollinearity

Explanatory variables	Tolerance (T)	Variance inflation factor (VIF)
Weighted underwriter score	0.564*	1.774**
Dummy: Market place	0.889*	1.125**
Dummy: Right included	0.739*	1.354**
Size of IPO	0.763*	1.310**
Warrant structure	0.586*	1.706**

Table 11 shows all our independent variables tested for tolerance and variance Inflation factor. * Indicates T > 0.4 and ** indicates VIF < 10.

4.6.2 Autocorrelation

Ordinary least squares (OLS) regression assumes that there is independence between the random errors in our model. Therefore, we need to test if there is correlation between the error terms from one observation to another adjoining observation. Since we use time-series data, the error term in the data series represents the effect of all factors in the model, excluding the independent variables effect on the dependent variable. As a result, the characteristics of these factors might be similar over several time periods and correlation between the error terms might be present between observations closer together in time.

For our study, it is therefore important to test for autocorrelated errors in our time-series data. To test for this, we use the Durbin-Watson test:

$$d = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2}$$

Which approximately can be written as:

$$d = 2(1 - r) \tag{3}$$

Our result for this test is that d approaches a value of 1.904. It is important to mention that if d is approximately 2 and r is approximately 0 (derived from equation 3) we can conclude that the errors are not autocorrelated (Newbold, 2019). This conclusion is illustrated in Figure 7 below.

Figure 7. Illustration over autocorrelation decisions

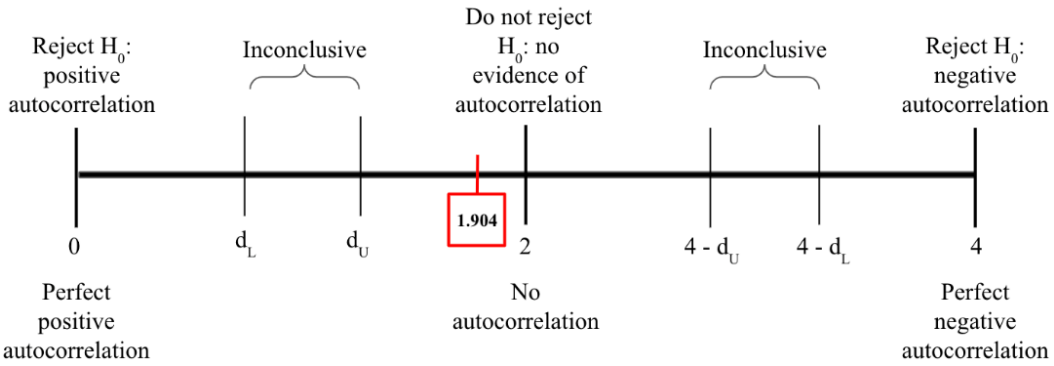

Figure 7 presents the results of the Durbin-Watson test. Since our value is close to 2 there is no evidence of autocorrelation. According to Newbold (2019) cutoff points for the Durbin-Watson test statistic is d_L = 1.57 and d_U = 1.78 with $\alpha = 0.01$, n = 100 and k = 5. N=100 was used since that was the maximum value of the table.

4.6.3 Omitted variable bias

In our regression we have focused on five explanatory variables. Since our regression model only explains around 9.5% of total variance according to table 3 above, it is important to examine whether our model exhibits any omitted variable bias i.e., leaving out relevant variables in the model which leads to bias in the form of greater explanatory strength of the variables that were included. Since there is no general test in examining omitted variable bias, we will have a discussion regarding this possibility. At first, our model included four explanatory variables:

$$R_{SPAC} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_2 \times Right\_included_{it} + \beta_3 \times Underwriter\_Score_{it} + \beta_4 \times IPO\_Size_{it} + \varepsilon_i$$

When we ran this regression, underwriter score had a p-value of < 0.005. This indicated to us then that the variable had statistically significant explanatory value for SPAC period returns. When we included a fifth explanatory variable, warrant structure, in our regression model our results became different. According to table 5 above, underwriter score then only became significant at the 12% level. As a result, it is no longer statistically certain that underwriter score has any significant explanatory value for SPAC period returns. We can also note that our previous model exhibited omitted variable bias i.e., that underwriter score looked to explain more than it did when we included one omitted variable that had great explanatory strength.

4.6.4 Heteroscedasticity

To check whether our model is coherent with the assumption of homoscedasticity we perform the Breusch-Pagan Test. We do this to further evaluate the robustness of our regression model and be more confident regarding possible heteroscedasticity. Since our regression model is based on the least square's method, if our sample does not exhibit the same variance in the error terms, this method might not be the best option for our regression. Therefore, performing the tests below is essential in validating our model.

As mentioned above the Breusch-Pagan test examines the assumption of homoscedasticity with the aim of evaluating whether heteroscedasticity is present in our regression model. The test about heteroscedasticity could also tell us about whether our model is built good enough or if we should continue to examine the relationship between the dependent and independent variables. Therefore, the test is also important for the overall model and its validity.

Running the test results in the following outputs:

Table 12. Summary of Breusch-Pagan test results

Sum of squares	Breusch-Pagan value	df	p-value
3.085	1.5425	1	> 0.1

Table 12 illustrates the outputs for the Breusch-Pagan test for homoscedasticity. The Breusch-Pagan value is received by dividing the sum of squares by 2. The BP-value of 1.5425 is then compared against table 7a in Newbold (2019) since it follows a chi-square distribution with υ (degrees of freedom) of 1. In table 7a $\alpha = 0.1$ and $\upsilon = 1$ gives a chi-square value of 2.706. Our BP-value of 1.54 is closer to $\alpha = 0.25$ and $\upsilon = 1$ which have a cutoff at 1.32.

The sum of squares in the regression model is 3.085. To interpret this number meaningfully we convert it to the Breusch-Pagan value according to the method above. The Breusch-Pagan value is then interpreted further by studying the chi-square distribution for cutoff points with one degree of freedom. According to the table above our value of 1.54 is significant for heteroscedasticity at a p-value higher than 0.1. Therefore, we can conclude that it is likely that our model does not suffer from heteroscedasticity, but rather follow the assumptions of the OLS regression model of homoscedasticity.

5. Conclusion

5.1 Conclusion

The purpose of this study has been to analyze the unique nature of SPACs and why the popularity of SPACs has risen in recent years. More specifically we have examined the default-free returns of SPACs during the SPAC period and which factors that influence it. Our sample consisted of 345 SPACs listed on either NYSE or NASDAQ that went public between 2019-05-14 and 2021-03-30. We also made use of an existing underwriter ranking that was applied to the bookrunners of the collected SPACs.

We then proceeded to calculate the annualized returns of the SPACs using our tailored model inspired by the model used by Gahng et al. (2021). We developed a regression model that aims to determine what factors that explain the return of SPACs, looking at marketplace, right and warrant structure, underwriter score and IPO Size. Further, we also compared the SPACs annualized return with 2-year US Treasury Note yields to see if there is any discrepancy present between the two. To avoid drawing misleading conclusions we performed multiple tests. Two parametric tests, one using all samples and one where the top 5% highest returning SPACs were removed. Moreover, we used a non-parametric Mann-Whitney U test to further strengthen the analysis. We also tested our regression model for robustness to make our results more reliable.

We found that the two parametric tests as well as the non-parametric test conclude with statistical significance that default-free SPAC period returns on average outperform 2-year US Treasury Note Yields under the studied period. We argue that this evidence with support by observed investor behavior by for example the so-called SPAC mafia indicates that attractive default-free returns partially explain the rise in SPAC popularity in recent years. We then drew implication about how trends in changed SPAC structure with on average lower amounts of derivative securities in conjunction with higher US Treasury Note yields will affect SPAC popularity, speculating that these two factors will lead to a decrease in the number of SPACs in the nearest future. Data available by April 2022 underpin this hypothesis, although only time will tell if this continues.

Our constructed regression model then yielded limited insights in which factors that influence and explain default-free SPAC period return. We observe that underwriter score has a negative correlation with SPAC, although with no statistical significance, as well as noting that this may be due to a lower underwriter score being correlated with the inclusion of more derivative securities. A higher inclusion of derivative securities is found to be positively correlated with SPAC period returns with statistical significance, this conclusion is coherent with Gahng et al. (2021) naming the derivative securities included in SPAC units as “free-lunch”. Further, our model concludes with statistical significance that the size of IPO is found to be almost completely uncorrelated with SPAC period returns, however no significant conclusions could be drawn regarding how marketplace affect returns.

5.2 Further research

As mentioned earlier the SPAC universe is still unexplored with a sparse portfolio of quality academic research, thus it is obvious that there is ample room for further research to supplement the area. We below aim to touch upon some possible extensions.

First off, our thesis takes its stance in exploring the SPAC period returns prior to the announcement of a business combination as we argue for in section 3.4.1. After the majority of the SPACs during this examined perioded have either performed a business combination or been liquidated it would be interesting to both look at the SPAC period return after the business combination has been announced, and the corresponding De-SPAC period returns. This would also include looking at the proposed parameters to attempt explaining the returns, such as quality of underwriter and size of IPO. We believe this would yield interesting insights and further supplement the research field, and we encourage practitioners to proceed with these questions when they become possible to pursue.

Furthermore, one parameter that is left out of our analysis is the sponsor behind the SPAC. Thus, the effect that the sponsor has on SPAC performance is unknown in our study. The reason we left this out in our analysis is that we did not find an adequate way of swiftly analyzing them. However, we are certain that there are ways of doing this through for example looking at the history of sponsors, if they have sponsored SPACs before, if they consist of private investors or corporations, if they have any connections to celebrities, etc. to either rank them or give them different labels. We thus willingly invite more skilled and time affluent researchers to include sponsors in their analyzes to further strengthen the research field and produce additional interesting insights. Another possible parameter to look at is for example sector belonging if the SPAC has a distinct investment niche.

Earlier in this thesis we noted the fact that, although investing in a SPAC during its SPAC periods with its money-back guarantee is to be considered default-free, it is not completely risk-free. You are still exposed to for example illiquidity risk and fire-sale risk. In our return model with associated tests to compare with the 2-year US Treasury Note yield we do not take this risk into account and hence it is excluded from our analysis. We thus believe that there is a need for a more developed and sophisticated model, which in some way incorporates the risk-premium associated with investing in SPACs during the SPAC period.

To conclude, our regression model only explains a limited part of the SPAC period return and the reminding explanatory value is puzzling. We thus welcome all additional research that tries to explain SPAC return both during the SPAC period and the De-SPAC period through extended analyzes, perhaps using our proposition as a starting point.

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Appendix

Exhibit A. List of all underwriters appearing in our study, their assigned score, and the number of IPOs they act as book runner in

Underwriter	Score	Number of IPOs
Citigroup	9.001	77
Credit Suisse	8.501	53
Goldman Sachs	9.001	35
Cantor Fitzgerald & Co	6.001	32
Morgan Stanley	9.001	30
Bank of America	8.501	30
Jefferies	8.001	30
Deutsche Bank	8.501	28
Barclays	8.001	26
J.P. Morgan	9.001	25
UBS Investment Bank	8.501	24
Early Bird Capital	5.001	20
BTIG	6.501	14
RBC Capital Markets	8.001	10
Stifel Nicolaus	7.001	9
Cowen	7.001	9
Cantor Fitzgerald	6.001	9
Wells Fargo Securities	8.001	8
Chardan	4.001	7
I-Bankers Securities	2.001	6
Maxim	3.001	6
Mizuho Securities	7.501	6
BMO Capital Markets	7.001	5
B. Riley FBR	5.001	5
Evercore ISI	7.001	5
Raymond James	7.501	4
Oppenheimer & Co.	7.501	4
Moelis & Company	6.001	4
Ladenburg Thalmann	6.001	3
EF Hutton	1.001	3
Piper Sandler	7.501	3
Nomura	1.001	2
Imperial Capital	4.001	2
Guggenheim Securities	7.001	2
Allen & Company LLC	8.001	2
CODE Advisors	1.001	2
PJT Partners	1.001	2
William Blair	7.001	2

	ThinkEquity	1.001	1
	H.C. Wainwright & Co.	1.001	1
	Intrepid Partners	1.001	1
	JMP Securities	1.001	1
	Kempen & Co	1.001	1
	Siebert Williams Shank	1.001	1
	SMBC Nikko	1.001	1
	Canaccord Genuity	6.001	1
	TD Securities	7.001	1
Total	**47**		**553**

Exhibit B: Multicollinearity Equations

$$Market\_Place_{it} = \beta_0 + \beta_2 \times Right\_included_{it} + \beta_3 \times Warrant\_Structure_{it} + \beta_4 \times Underwriter\_Score_{it} + \beta_5 \times IPO\_size_{it} + \varepsilon_i$$

$$Right\_included_{it} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_3 \times Warrant\_Structure_{it} + \beta_4 \times Underwriter\_Score_{it} + \beta_5 \times IPO\_size_{it} + \varepsilon_i$$

$$Warrant\_Structure_{it} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_2 \times Right\_included_{it} + \beta_4 \times Underwriter\_Score_{it} + \beta_5 \times IPO\_size_{it} + \varepsilon_i$$

$$Underwriter\_Score_{it} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_2 \times Right\_included_{it} + \beta_3 \times Warrant\_Structure_{it} + \beta_5 \times IPO\_Size_{it} + \varepsilon_i$$

$$IPO\_size_{it} = \beta_0 + \beta_1 \times Market\_Place_{it} + \beta_2 \times Right\_included_{it} + \beta_3 \times Warrant\_Structure_{it} + \beta_4 \times Underwriter\_Score_{it} + \varepsilon_i$$

$$T = 1 - R^2$$

$$VIF = \frac{1}{1 - R^2}$$