DE-SPACs and Corporate Risk-Taking

An examination of the effect of listing through SPACs rather than traditional IPOs on corporate risk-taking among US firms from 2010 to 2020

Date: 04/08/2021

ERASMUS UNIVERSITY ROTTERDAM – ERASMUS SCHOOL OF ECONOMICS
MSC ACCOUNTING AND FINANCE
OKAN BOKHOVEN (576516)
576516OB@EUR.NL
SUPERVISOR: DR J. PIERK
SECOND ASSESSOR: DR N.L. LEHMANN

Abstract

As the number of DE-SPAC listings increased gigantically in 2020, the SPAC boom prompted various examinations. This paper studies the differences in corporate risk-taking between DE-SPACS versus their IPO peers. Corporate risk-taking is seen as a fundamental of management acting in favor of their companies' shareholders, possibilities for firm growth, and moreover for broader economic growth in the long term. I use data on 123 DE-SPACs and 1,079 IPO firms in the US over the period from 2010 to 2020. The findings in this paper show that DE-SPACs exhibit more risk-taking. This is consistent with the findings that, as part of a cyclical process of underperforming companies, management takes more risks for their own benefit while the company is in downfall. In the long term, these findings are amplified. Additionally, my findings show that DE-SPACs are more sensitive to the relation of performance and risk-taking, meaning that as performance suffers, DE-SPACs' risk-taking amplifies more heavily than their IPO peers. The magnitude of the findings indicates that the difference in corporate risk-taking impacts firm growth, governance and long term economic growth.

Keywords: DE-SPAC, corporate risk-taking, Special Purpose Acquisition Company, Initial Product Offering, IPO, governance [1]

[1] A special thanks to professor Jochen Pierk, my supervisor, for the invaluable feedback and input provided throughout the process of conducting my research. This enabled me to enhance to overall quality and structure of the paper.

1. Introduction

The recent increasing number of listings through Special Purpose Acquisition Companies (SPACs) prompted an examination of their risk-taking[2]. As of 2020, Special Purpose Acquisition Companies have become one of Wall Street's latest most debated trends. In 2020 in the United States, 194 firms went public through an Initial Product Offering (IPO) raising roughly $67 billion altogether, whilst SPACs exceeded the number of IPOs with 200 firms going public through SPAC mergers raising $64 billion (Pisani, 2020). To illustrate, in 2007, a peak-year for SPACs in the first decennium of this century, there were only 26 SPAC listings in comparison to 234 listings through traditional IPO channels in the US. SPACs are publicly listed companies with the sole intent to form business combinations with a privately owned operating target company. SPACs do not have any operating business activities, and only consist of capital acquired during its own Initial Public Offering. The management team of the SPAC, also called the sponsor, aggressively pursues the takeover of a target company. Its capital is then used to form the business combination with the target, which becomes publicly listed afterwards (Berger, 2008). This newly publicly listed operating firm is then called a DE-SPAC. In 2020, the number of DE-SPAC listings exceeded the number of IPO listings for the first time in history (Pisani, 2020). Before SPAC activity surged, the vast majority of companies that aimed for the public status used traditional IPO channels. Bergen (2008) explains that SPACs spark up during unusual times such as crises. Complicated circumstances surrounding companies and markets make it hard for them to become listed through traditional IPOs. Kolb and Tykvova (2016) add that SPAC activity increases during periods with weak IPO activity and volatile markets[3].

As SPAC listings were less common before the COVID pandemic in 2020, still little research is conducted on the topic. Most papers focus on the pre-business combination period of SPACs (e.g. Cumming, Hass and Schweizer, 2014; Chamberlain, 2021) or, regardless the stage, SPAC stock performance (e.g. Kolb and Tykvova, 2014; Dimitrova, 2017; Klausner, Ohlrogge and Ruan, 2020; Gahng, Ritter and Zhang, 2021). However, corporate governance of

[2] SPACs comprise various stages, which I elaborate on in Section 2. This research focuses on post business combination SPACs, better known as DE-SPACs (which is how they are most commonly named in this paper hereafter).

[3] The SPAC boom (i.e. the gigantic increase in SPAC volume as of 2020) can be explained in various ways. First, the COVID pandemic caused the stock markets to become more volatile. Second, stock markets have reached new all-time highs since, resulting in relatively high firm valuations in the market. High valuations heavily incentivize firms (and their investors) to become publicly listed. Lastly, the enhanced structure of SPACs that developed in the past two decades has taken away many doubts of investors on the investment vehicle.

DE-SPACs has been left aside entirely in academic research. Corporate risk-taking is seen as fundamental in corporate governance as it deals with the extent to which managers favor the incentives of shareholders rather than their own. Therefore, in this paper, I study the differences in corporate risk-taking between DE-SPACs and traditional IPO firms with the following research question:

- Do DE-SPACs exhibit deviating corporate risk-taking compared to their traditional IPO peers?

There is clear evidence that DE-SPACs underperform their IPO peers on operating and stock performance according to the few papers on DE-SPACs (e.g. Datar, Emm and Ince, 2012; Kolb and Tykvova, 2016). According to Wiseman and Bromiley (1996)'s evidence, underperforming firms are associated with higher corporate risk-taking. Secondly, Datar, Emm and Ince (2012) provide further evidence on DE-SPACs, showing that they carry more debt than their IPO peers. According to Kim, Patro and Pereira (2017), levered firms are considered to be taking more risks. Lastly, Kim (2009) shows that DE-SPACs have longer tenure of their management, while Berger, Ofek and Yermack (1997) show that entrenchment is associated with risk-avoidance. Concluding, there is no conclusive directional evidence, but what remains clear is that corporate risk-taking among DE-SPACs deviates from their IPO peers. Hence, I formulate the alternative hypothesis as follows:

- H_1: DE-SPACs exhibit deviating corporate risk-taking compared to their traditional IPO peers.

I start by retrieving data on DE-SPACs and IPO firms. I use the ThomsonOne SDC database to obtain data on firms that listed between the period from 2010 to 2020 either by merging with SPACs or using traditional IPO channels. I assign a dummy variable to the dataset to distinguish the two groups. Subsequently, I supplement the sample with accounting data that I retrieve from Compustat. After dealing with observations with no viable identifiers or missing critical values, the final data sample consists of 1,660 firm-quarter and 402 firm-year observations on DE-SPACs, and 30,009 firm-quarter and 7,629 firm-year observations on IPO firms. I measure corporate risk-taking using the volatility of corporate earnings, as riskier operations are associated with more volatile earnings. I use winsorization to the 95th percentile to reduce the effect of outliers .

To observe whether DE-SPACs exhibit deviating corporate risk-taking in comparison to their IPO peers, I conduct regression tests using dummy variable *SPAC* as an independent

variable in my first test. This identifies whether differences in risk-taking are explained by the way the company obtained its public status. A significant coefficient in dummy variable *SPAC* implies that the effect on corporate risk-taking is caused by listing through a SPAC instead of by an IPO. Next, for my main test, I apply natural logarithms to my two independent variables to deal with the skewness of the data and add time and industry fixed effects to enhance the internal validity. I run two regression tests on quarterly and annual data respectively to seek further evidence on the differences among the two groups. Finally, I conduct two robustness tests, first using an alternative measure for the dependent variable, second by adjusting the included observations to three years after listing.

My findings collectively provide evidence to accept the alternative hypothesis: DE-SPACs exhibit deviating corporate risk-taking compared to their IPO peers. More specifically, DE-SPACs exhibit significantly more risk-taking than their IPO peers. These findings are in line with prior evidence showing that 1) DE-SPACs underperform their IPO peers, and underperforming firms exhibit more risk-taking; and 2) DE-SPACs carry more debt, and high-levered firms are associated with more risk-taking. In the long-term, this relation is amplified, meaning that DE-SPACs exhibit more risk-taking in the long-term. Because of the underperforming character of DE-SPACs, I expand my findings on the notion of Wiseman and Bromiley (1996)'s findings: the firm's management takes risks for their own benefit. More specifically, the management tries to pursue better performance during downfall to enhance their future career prospects in the managerial labor markets. Subsequently, this results in unprofitable decision-making, in turn worsening the performance of the firm (Wiseman and Bromiley, 1996). These findings have substantial implications for corporate governance and firm growth among DE-SPACs, in the long-term harming broader economic growth.

First and foremost, this paper contributes to the SPAC literature by expanding on the findings of Datar et al. (2012) and Kolb and Tykvova (2016) of the underperformance among DE-SPACs. My findings help explaining part of why DE-SPACs underperform. Secondly, it adds to the corporate risk-taking literature that already has been studied extensively. From this paper's perspective, shedding light on the SPAC phenomenon adds to the existing literature of corporate risk-taking (e.g. Wiseman and Bromiley, 1996; Zhang, 2009; Li et al., 2013; Lehman et al., 2011) by prompting the existing theory on the most recent booming investment vehicle. The little research that has so far been conducted on DE-SPACs may have to do with the limited availability of data on firms shortly after listing. Although it would be subjected to lots of hand-collecting, future governance studies on DE-SPACs will definitely be interesting topics for

academic research. Studies on this specific topic can provide further substantiation to my findings[4]. The data I use in this paper is limited to a small number of observations in 2020 and leaves out 2021 entirely. SPAC listings occur more frequently during times when IPO activity reduces and when markets are volatile. Therefore, isolating data from the years 2020 and 2021 may provide new insights[5]. Lastly, because of the ever evolving SPAC structure, risk-taking among DE-SPACs may be differently in the future. Therefore, I encourage future research, in addition to governance studies, to prompt the risk-taking of future DE-SPACs.

2. Institutional Background

In the past decade, firms' use of Special Purpose Acquisition Companies to become publicly listed has surged tremendously. In the United States in 2020 the number of firms that listed through SPACs exceeded the number of traditional IPO listings for the first time in the history of finance. As the SPAC phenomenon is still quite new and underdeveloped in academic literature, its evolvements have prompted an examination.

2.1 SPAC's History and Development

SPACs[6] were first known as blank check companies that emerged in the United States during the 1980s[7]. The precursor had a similar form as SPACs, having no operating busines activities, few employees and no assets, with the sole purpose to pursue a business combination with a yet unidentified private operating firm (Cumming, Haß and Schweizer, 2014). Through 'pump and dump schemes', investors were misled and lost an estimated $2 billion per year during this fraudulent period. Hence, blank check companies have since been associated with various cases of fraud and manipulative activities[8], causing a notorious name on the phenomenon (Castelli, 2009). By the end of the 1980s, fraud and abuse surrounding blank check companies reached extensive proportions facilitated by the shortage of reliable information towards investors. In order to overcome these problems, the SEC introduced Rule 419 in 1990

[4] Unfortunately, due to time constraints, hand-collecting this data was not feasible for this research.
[5] This period is marked by the COVID pandemic, in which markets have been heavily volatile.
[6] In early literature, the term SPAC is interchangeably used with the terms "blank check company", "shell company", "blank shell company", or "cash shell". As mentioned before, there are differences among those. Therefore, I do not adopt to these terms as substitutes.
[7] SPACs are a form of blank check companies, but not all blank check companies are SPACs. Under Rule 419, blank check companies are defined as firms issuing penny stocks. Penny stocks are defined as "low-priced", highly speculative stocks that are generally sold over-the-counter (OTC) and generally not listed on an exchange.
[8] One of the most notorious examples of the fraudulent use of blank check companies is the Onnix Financial Group case. The two founders of Onnix indirectly purchased all shares of the IPO themselves by having agents using their funds, which made it seem as if they had a successful listing of the SPAC. Subsequently, they sold all their shares to retail investors and Blinder, Robinson & Co., which was one of the largest penny stock brokerages. Needless to say, the stocks they bought essentially had no underlying value (Riemer, 2007).

in order to improve transparency, investor protection and alignment between the blank check company's management and investors (Riemer, 2007). Under Rule 419, the SEC defines a blank check company as "a company that 1) is a development stage company that has no specific business plan or purpose or has indicated that its business plan is to engage in a merger or acquisition with an unidentified company or companies, or other entity or person; and 2) is issuing 'penny stock,' as defined in Rule 3a51-1 under the Securities Exchange Act of 1934" (Anthony, 2010). The new legislation requires the funds received from penny stock offerings, issued by blank check companies, to be placed in a so-called escrow[9] account until certain conditions are met. This disables the management to commit fraud, as the funds will not be released until the predetermined terms and agreements in the contract are met. Moreover, the taken measures to increase investor rights enabled shareholders to rescind their investment once a target company was announced, leaving the management unknowing upfront how much capital would be available to acquire a target firm, thus making the process of finding the right sized target nearly impossible. Consequently, blank check companies disappeared almost entirely during the 1990s (Castelli, 2009).

As the US economy recovered from its deep recession in the late 1980s, the economy improved, companies experienced growth and thus, the benefits for companies for obtaining the public status increased in turn. Therefore, in the wake of the dot-com bubble[10] in the mid-1990s, blank check companies reemerged, but this time under the name of Special Purpose Acquisition Companies (Castelli, 2009). SPACs, like their blank check company predecessors, have no operating history, assets, revenue or operations, and are solely designed to raise capital in the public equity markets to pursue business combinations with private operating firms. SPACs are exempt from the controls imposed by Rule 419 on blank check companies, because SPACs do not issue penny stocks[11]. Nonetheless, they voluntarily adopted to the Rule 419 regulations to prevent investors from being scared off this former fraudulent phenomenon. In addition to these rules, the funds have since been managed by renowned and well-respected managers. Despite SPAC volume remaining low during the subsequent period, it marks an

[9] An escrow account is held by a third party that collects, holds and disburses the funds depending on the terms and obligations that need to be met between two parties. These contracts are voluntarily agreed on by two parties (Mills, 1994).
[10] The dot-com bubble refers to the period from 1996 to 2000, in which IPO underpricing reached astronomical levels (Ljungqvist and Wilhelm, 2003). One of the most renowned studies (and narratives) of this period shows cumulative abnormal returns, as high as 74% for the 10 days surrounding the announcement day, to the event of changing the firm name to an internet-related dotcom name (Cooper, Dimitrov and Rau, 2001).
[11] Recall that this was how blank check companies were defined under Rule 419.

important milestone for SPACs for the enhanced and less-fraudulent structure it adopted to (Riemer, 2007). This led to the new-generation of SPACs, resulting in increased SPAC activity as of the second half of 2003 (Kolb and Tykvova, 2016). In comparison to other sorts of investment vehicles (e.g. private equity funds), SPACs' prior problems surrounding investor protection have been met, and therefore, the association with the predecessor fraudulent blank check companies is unjustified by current standards (Collins, 2012).

Subsequently, as of 2003, SPACs have kept evolving. In 2009, the so-called Tender Offer structure emerged. Beforehand, target companies were voted on by shareholders and required a certain amount of approval of shareholders[12]. After adopting to this new structure, SPACs started to make tender offers for the shares held by the shareholders prior to completing the acquisition. Therefore, mandatory shareholder votes were replaced. This was tested and accepted by the SEC in 2010, believing that the SPAC structure would become easier to understand and thus more attractive (Magnas, 2011).

Finally, in the current form, SPACs are publicly traded firms that consist of pools of capital. Their only purpose is to form business combinations with private operating companies, rather than having commercial business operations. Their objective is to seek investment opportunities in existing operating companies. SPACs only consist of the capital that it raised during its own IPO. The capital is then used to finance the business combination transaction. SPACs are formed and managed by the sponsor with the intention to generate returns for investors. SPACs have a limited lifespan, commonly 24 months, in which they aggressively pursue target companies to form business combinations with. If the managers do not succeed in finding a target company over the given period, the SPAC liquidates and the money will be distributed pro-rata to its public investors (Berger, 2008). Investors such as hedge funds, private equity funds, mutual funds and institutional investors receive warrants and shares when participating in the IPO of the SPAC. The capital that was raised is then transferred to a so-called escrow account. After the SPAC becomes public, the shares and warrants can be traded publicly (Cumming et al., 2014). For private target companies, SPACs provide access to public markets that traditional IPOs cannot. For instance, complicated circumstances among companies are generally not suitable for traditional IPOs. Besides, firms from new sectors lack comparable companies to benchmark with[13], and therefore are harder to value through traditional IPOs

[12] The certain amount was predetermined in the initial filing to the SEC at the SPAC IPO, and thus publicly available information to investors.
[13] E.g. the Virgin Galactic SPAC listing, which did not have comparable companies to determine firm valuation.

(Berger, 2008). Moreover, traditional IPOs do not include financial projections in their SEC registration statement because of the associated risks of class action litigation. DE-SPAC listings on the other hand are protected under the Private Securities Litigation Reform Act because their way of becoming public concerns a merger rather than an IPO[14]. Therefore, private firms merging with SPACs are enabled to include forward-looking financial statements in their proxy statement and S-4 Form[15] registration filed with the SEC (Chamberlain, 2021). This is seen as one of the major advantages of listing through SPACs, as early-staged companies are enabled to convey information to the public about their forecasts that would not be able through traditional IPOs. Consequently, in 2021, 16 firms either have or are expected to obtain their public status by merging with a SPAC despite having zero revenues, whilst being valued over $1 billion (Daniel, 2021). On the other hand, the associated advantages surrounding SPAC listings come at a cost. The SPAC's sponsor is rewarded with 20% of the equity raised during the IPO of the SPAC after successfully forming a business combination. This is regarded much more than the associated costs for listing through traditional IPOs (Nilsson, 2018). The big difference however, is that during traditional IPOs, firms have to bear the costs (e.g. fees, underwriting costs) themselves. Despite the costs of listing through SPACs are higher (e.g. sponsor's stakes), the private operating firm is not exposed to these costs, but instead the costs are directed to SPAC shareholders (Klausner et al., 2020).

Normally, SPAC sponsors do not receive salaries, but instead receive their compensation as their predetermined share of the targeted firm after successfully forming the business combination. If the search for target firms turns out to be unsuccessful, the SPAC will liquidate and the sponsors' share will become worthless (Cumming et al., 2014). In theory, this incentivizes the sponsors to find the best target company, thereby maximizing shareholder value and thus increasing the likelihood of shareholder approval (Boyer and Baigent, 2008). More logically, Jog and Sun (2007) argue that SPAC sponsors are conflicted by the trade-off of the benefit of receiving very high compensation versus the cost of losing all the time and money they put in. Therefore, they are extremely incentivized to complete an acquisition prior to the expiration date, resulting in SPAC sponsors targeting low-quality firms. In the past years

[14] The Private Securities Litigation Reform Act provides protection from class action litigation for forward-looking statements. This safe harbor does not apply to blank check companies, penny stock issuers or firms listing through traditional IPOs.
[15] The SEC S-4 Form is filed by public companies (the acquiring party) to register, and thus announce, material information relating to merger or acquisition transactions (Schoderbek, 2011).

however, new developments surrounding sponsor compensation have taken place to shift away from this issue by tying sponsor compensation to post-merger performance.

Another recent interesting, and somewhat worrying, development is the involvement of celebrities and athletes by connecting their names to the SPAC[16]. This raises concerns that investors may be misled by the involvement of the celebrity rather than the underlying value of the security. This was recently covered by the SEC, which issued a warning to investors stating that it is never a good idea to invest in a SPAC just because famous people are involved (Securities and Exchange Commission, 2021). A more detailed outline of the SPAC lifecycle is described below.

2.2 SPAC Lifespan

2.2.1 No Target stage

According to Lewellen (2009), a SPAC broadly comprises three distinct stages. The first stage – the "No Target stage" – covers the period until the day prior to the announcement of the targeted firm (Lewellen, 2009). At first, SPACs are formed by a group of managers that typically have backgrounds in private equity, hedge funds or as entrepreneurs (Bai, Ma and Zheng, 2021). In order to obtain the public status for the SPAC, the managers outline the investment focus, the time window and the expertise of the sponsors in a S-1 Form filed to the SEC[17], covering the types of businesses and geographies that the SPAC will try to form a business combination with (Cumming et al., 2014). Subsequently, the SPAC becomes publicly traded after its IPO. The participants of the IPO receive units consisting of one share and one warrant per unit, which can be traded separately afterwards (Chatterjee, Chidambaran, and Goswami, 2016). These units are generally issued at $6, $8 or $10, of which $10 has become the recent standard (Cumming et al., 2014). Of the funds that were raised, at least 85% is invested in low-risk government bonds and placed in an escrow account, which will only be released afterwards to either complete the business combination or liquidate the SPAC pro-rata to its shareholders (Dimitrova, 2017).

[16] Examples are Shaquille O'Neal acting as an advisor to the Forest Road Acquisition Corp SPAC, Serena Williams as a member of the SPAC team at Jaws Spitfire Acquisition Corp, and Steph Curry as a member of the SPAC team at Dune Acquisition Corp.

[17] The S-1 Form is an SEC registration that is required for (US) companies that want to become listed on a US stock exchange. The issuer of the form will be held responsible for any material misrepresentations or omissions (Securities and Exchange Commission, n.d.).

2.2.2 Target Found stage

After that the SPAC's securities have become publicly traded, the sponsors commence the search for appropriate target firms[18] during an 18 to 24 month period (Dimitrova, 2017). Traditional processes of going public through an IPO take approximately twelve months to complete, whereas a SPAC listing is completed in three to six months after having identified the target firm (Chamberlain, 2021). The size of the company must at least have a market value of 80% of the funds raised during the SPAC IPO (Cumming et al., 2014). Finally, if the target firm has been identified, the SPAC communicates the announcement to the public by issuing an 8-K Form[19] filed to the SEC (Kolb and Tykvova, 2016). In the following months, the sponsors conduct due diligence procedures and negotiations with the target firm, and have the SEC review the proposed target (Cumming et al., 2014). Moreover, the valuation of the target firm is determined in this period (Rodrigues and Stegemoller, 2014). Next, through a letter of intent, shareholders are invited to the special shareholder meeting in which a proxy voting will be held whether the target firm is approved upon. In order for a business combination to become successful, it must meet two requirements: 1) the majority of shareholders must vote in favor of the target; and 2) the percentage of shareholders that opts to redeem their shares instead may not exceed a predetermined amount. Historically, this has been between 20-40%. Nonetheless, shareholders that vote against the target can choose to either sell or hold their shares[20] (Cumming et al., 2014). As of 2010, the Tender Offer structure was introduced, by which investors that disapproved to the suggested target were offered a tender to sell their shares back to the SPAC. This resulted in a lower threshold for the SPAC for approving a target, whilst otherwise having an uncertain amount of capital available because of the investors that accepted the tender offer (Rodrigues and Stegemoller, 2014).

2.2.3 Acquisition Completed stage

In case the target firm is approved upon, the SPAC brings in its capital from the escrow account to complete the business combination (Cumming et al., 2014). If the available funds are not sufficient to the pre-arranged amounts to be paid to the target, the SPAC attracts debt or additional equity to finance the remainder to complete the transaction (Dimitrova, 2017).

[18] As outlined in the investment focus in the S-1 Form, filed at the SEC.
[19] An 8-K Form is used to announce major significant events, and is also filed at the SEC (Securities and Exchange Commission, 2020).
[20] Regardless of their choice, they can make the same choice for their warrants (Cumming et al., 2014).

Finally, the former private targeted company obtains its public status and receives a new unique ticker (Gahng et al., 2021). This firm is now called a DE-SPAC[21].

2.2.4 Acquisition Withdrawn stage

In the case that the target was denied upon during the special shareholder meeting, the sponsors can continue the search for another target firm, or they can opt (or be obliged to) liquidate the SPAC. In the prior case, the sponsors would have to undergo the same procedures as of the second stage (Target Found stage). Otherwise, the SPAC is liquidated and the raised funds plus accrued interests are distributed pro-rata to its shareholders (Kolb and Tykvova, 2016). The costs that arose during the unsuccessful period of the SPAC (e.g. administrative expenses, fees, working capital, costs of negotiation) are paid for by the remaining 15% that was raised during the SPAC IPO (Dimitrova, 2017). One of the most recent trends however shows that SPACs shifted to hold 100% of the raised funds in the escrow account, thus protecting the shareholders from downside risks (Gahng et al., 2021). A visualization of the SPAC's lifecycle is provided in Figure 1.

3. Literature Review and Hypotheses Development

3.1 Special Purpose Acquisition Companies

Datar, Emm and Ince (2012) conduct research on DE-SPACs versus traditional IPO firms. Using data on US firms from 2003 to 2008, they retrieve data on 156 DE-SPACs and 794 traditional IPO firms. Their results provide evidence that DE-SPACs are smaller in firm size, are more heavily financed with debt, have fewer opportunities for growth and invest less than their peers. Lastly, the researchers find evidence that DE-SPACs significantly underperform their industry peers and contemporaneous traditional IPO firms on operating performance. Moreover, while the majority of the firms in the sample had negative stock returns during the sample period, DE-SPACs performed even worse, showing stronger negative returns.

Kolb and Tykvova (2016) conduct research on firms that went public either by merging with a SPAC or through a traditional IPO. The researchers opted for the sample period from 2003 to 2015 to shed light on the new generation SPACs that adopted to Rule 419 regulation, which the researchers named the new-generation era for SPACs. In this period, 127 firms went public through SPACs compared to 1,128 firms that used traditional IPO channels. They perceive that firms aiming to achieve a public listing in volatile periods experience difficulties

[21] For this stage, there are multiple terms that are used in literature. Other names that are used interchangeably are "post-business combination SPAC" and "post-merger SPAC".

to go public by traditional IPOs, and thus opt for SPAC mergers. The rest of their findings are consistent with Datar et al. (2012), providing evidence that DE-SPACs are associated with lower growth opportunities, are higher levered and are smaller in size than their traditional IPO peers. Firms that listed through a SPAC are less frequently funded by venture capital and private equity funds. VCs and PEs thus prefer traditional IPOs, indicating that investors perceive SPACs as value-destroying. Lastly, looking at the operating performance of DE-SPACs, the researchers have found that DE-SPACs severely underperform the market, industry, and firms of similar sizes in the long term. From a broader perspective, their findings show that post-business combination SPACs significantly underperform IPO firms during all periods that were included in the test. Proceeding, Dimitrova (2017)'s study across 73 SPACs that formed business combinations between 2003 and 2010 provides further evidence that DE-SPACs deliver poor stock returns in the following years after the combination. Although SPACs are initially received positively by the market, these findings indicate that investors perceive DE-SPACs as less valuable. After studying 87 SPAC listings from June 2003 to December 2006 in the United States, Boyer and Baigent (2008) found evidence that DE-SPACs' stock performance is not consistent and can therefore go either way of being highly profitable or unprofitable to investors, showing that DE-SPACs are highly volatile.

Cumming et al. (2014) study the influencing factors to deal approval on proposed target firms by SPAC management. Their findings show that younger sponsors are associated with a higher deal approval probability. Blockholding structures, which generally are active investors such as hedge funds and private equity funds, have a strongly negative significant influence on the deal probability. In an upward-trending stock market environment, the probability of deal approval tends to be substantially higher. According to Kim (2009), management experience determines the sponsors' quality, signaling the quality of the SPAC. Management that is perceived more experienced attracts more outside investors and top-tier underwriters, eventually leading to higher deal approval. Lastly, SPACs, in their post business combination period, are associated with long tenure in comparison to their IPO peers.

Lakicevic and Vulanovic (2013) conduct research across 161 SPACs to study their characteristics. In their paper, they state that the underwriter's role is manifold, consisting of multiple responsibilities. First, they structure the SPAC's securities, then they serve as market-makers, and finally they act as advisors throughout the whole process. Therefore, underwriters have important roles within equity markets and SPAC listings. As of 2016, the most renowned underwriters such as Morgan Stanley and Goldman Sachs have also become active in this

phenomenon. Beforehand, mostly smaller investment banks were involved. This emphasizes the recent role that SPACs have obtained on Wall Street. Furthermore the underwriter's reputation is an essential factor in attracting institutional investors (Chemmanur and Paeglis, 2005). However, Dimitrova (2017)'s evidence indicates a significantly negative effect between institutional ownership of post-combination SPACs and long-term operating performance.

3.2 Corporate Risk-Taking

As the academic literature on SPACs is still very narrow and mainly focused on the investor's perspective, the firm's perspective has been left aside mostly. Yet, there are clear indications that DE-SPACs possess deviating characteristics in comparison to their IPO peers, affecting the firm's corporate governance. Corporate governance assures suppliers of finances to companies of getting returns on their investments. It comprises the systems by which companies are governed, controlled and directed. These systems help to make directors accountable to various stakeholders, being uttermost essential to making economies function well (Shleifer and Vishny, 1997). Bain and Band (2016) argue that good corporate governance is essential for maximizing a company's effectiveness. An ongoing debate in corporate governance literature highlights agency conflicts among boards of directors and shareholders in various ways. These conflicts arise when managers' incentives are not aligned to their shareholders'. Some of these conflicts are caused by the differences in risk-appetite between both parties. Therefore, corporate risk-taking is seen as fundamental within corporate governance for determining agency conflicts. Li, Griffin, Yue and Zhao (2013) argue that corporate risk-taking is fundamental to firm performance and ultimately to survival. Bromiley (1991) adds that corporate risk-taking has important implications for the growth of the firm. Corporate risk-taking highlights the firms' investment decisions, showing the willingness of managers to take risks while pursuing the most profitable opportunities (Faccio, Marchica and Mura, 2011). Lastly, Miller and Friesen (1978) define corporate risk-taking as the extent to which managers are willing to make large and risky resource allocations having a reasonable chance of failing.

Corporate risk-taking has important implications in the global economy. Acemoglu and Zilibotti (1997) famously argue that the risk-averse behavior of managers slows down capital accumulation, in turn harming long-term economic growth. Thus, risk-taking behavior by management is considered a key metric for economic growth. To illustrate why this issue arises, Jensen and Meckling (1976) conducted research towards agency costs, which became one of the most acknowledged papers within financial accounting literature. The researchers stated

that managers are less willing to take risks because of the concerns that it might negatively impact their careers. From another perspective, shareholders prefer that management opts for all projects with positive net present values, regardless of the risks involved (Faccio, Marchica and Mura, 2011). These agency conflicts surrounding the risk-appetite of managers versus shareholders can be explained in two ways.

The first explanation sounds the career concerns of managers. Holmstrom and Costa (1986) conducted research towards the agency conflicts surrounding corporate risk-taking. Their findings suggest that labor markets do not mitigate agency conflicts as they can be perceived as efficient, but in contrast, are its source. That is, the job market depends its choice on managers based on the results of prior investment choices of the manager. Therefore, remunerations will be adjusted accordingly. Hence, managers will opt for the investment decision that maximizes their individual human capital returns rather than enhancing firm value. In subsequent research, Hirshleifer and Thakor (1992) state that managers usually pursue short-term performance investments. Therefore, they fear investing in uncertain or risky projects such as research and development. More specifically, the researchers state that managers want to enhance short-term performance during their tenure to retain their jobs and maintain a favorable reputation in the external job market. Hence, managers favor projects that pay off in the short term and dislike risky investments.

The second explanation highlights undiversified human capital. Amihud and Lev (1981)'s findings indicate that managers would pursue diversifications of the firm that could potentially harm the benefits of shareholders, to reduce the risk for their own benefits. Managers try to benefit through making decision for suboptimal investments to shareholders. Agrawal and Mandelker (1987) studied the relationship between managerial incentives and their investment and financing behavior. Among a sample of 205 US firms over the period from 1974 to 1982, their results indicate a positive relationship between managers' stock and option holdings and their investment decisions. This induces that incentives between managers and shareholders are well aligned, mitigating concerns surrounding agency conflicts.

Although management performance pay has evolved throughout the past decades to overcome misalignment of incentives, Shen and Zhang (2013) provide evidence among 843 observations over the period from 1995 to 2006 that such incentives affect the efficiency of research and development negatively. Therefore, in the long term, performance suffers. Risk-taking involves managerial decision-making, which can either result in profits or losses.

Generally, it is perceived that higher risks are associated with higher returns, but this is not always the case. For instance, Lehman, Hahn, Ramanujam and Alge (2011) argue that decision-makers focus on attaining and maintaining aspirations in early periods. When deadlines approach, decision-makers in underperforming companies try to ensure the survival of the firm. Thus, underperforming companies exhibit more risk-taking. Wiseman and Bromiley (1996) contribute by reflecting on theories surrounding performance and corporate risk-taking. Their results indicate a cyclical process in which decline, and the loss of resources increases risk-taking, which in turn reduces performance. Ultimately, this leads to organizational shrinkage. As a result, firms that are underperforming may fall into a trap of taking more risks that can turn out to be unprofitable. Lastly, entrenched CEOs attempt to avoid debt, implying that CEOs try to avoid risks (Berger, Ofek and Yermack, 1997).

3.3 Hypothesis Development

Firstly, building on the notion of Lehman et al. (2011) and Wiseman and Bromiley (1996) that underperforming firms take more risks in an attempt to ensure survival of the company, leading to a cyclical process of further decline in performance and risky decision-making. As DE-SPACs underperform their traditional IPO peers in operating performance (Kolb and Tykvova, 2016; Datar et al., 2012), I expect that DE-SPACs exhibit more risk-taking. Secondly, Kolb and Tykvova (2016) and Datar et al. (2012) show that DE-SPACs carry more debt than their IPO peers. Highly leveraged firms are considered to be taking more risks, as accumulating debt is accompanied by the increased likelihood of financial distress (Kim, Patro and Pereira, 2017). Therefore, I expect DE-SPACs to exhibit more risk-taking. Lastly, Kim (2009)'s findings indicate that DE-SPACs are associated with longer tenure periods of their management. Berger, Ofek and Yermack (1997) provide evidence that entrenchment, defined as management's long-period tenure, is positively correlated with risk-avoidance. This leads to another direction of expectation, namely that DE-SPACs are expected to exhibit lower risk-taking than their traditional IPO peers. To conclude, different perspectives from academic literature shed light on different explanations behind the risk-taking of DE-SPACs. Hence, there is no conclusive directional evidence whether DE-SPACs are expected to exhibit more or less risk-taking than their traditional IPO peers. However, what is clear are the indications that DE-SPACs exhibit deviating corporate risk-taking than their traditional IPO peers. Therefore, I compute my main test as a two-tailed test. I formulate my alternative hypothesis as follows:

- H_1: DE-SPACs exhibit deviating corporate risk-taking in comparison to their traditional IPO peers.

4. Sample, Data Sources, and Descriptive Statistics

This research focuses on the differences in risk-taking between DE-SPACs and traditional IPOs. I use quarterly data on US firms that listed effectively between 2010 and 2020. I opt to use quarterly data in favor of annual data because, among the limited amount of available data on DE-SPACs, more data is available on a quarterly basis surprisingly. Nonetheless, it can be argued that some businesses are subjected to seasonal characteristics which may confound the findings while using quarterly data. To overcome this specific problem, I provide robust results by showing the effect using annual data simultaneously in the result tables. As mentioned in Section 2, 2010 was the year in which SPACs conceived the Tender Offer structure for completing business transactions. Beforehand, SPACs required the majority of votes for completing a business transaction. As of 2010, SPACs increasingly started to offer shareholders, that do not agree to the proposed target company, the possibility to redeem their shares upon completion of the business combination. In return, they receive their share of the cash present in the SPAC (Howe and O'Brien, 2012). This indicates that SPACs, as of 2010, have enhanced their voting structures for investors, which can be seen as a second major innovation for the structure of SPACs similar to the 2003 legislation. Not coincidentally, SPAC activity volume increased as of 2011 (Kolb and Tykvova, 2016). This marks a great starting point for my sample period. Subsequently, I opt to include 2020 in order to capture the peak year of SPAC activity, in which the number of listings through SPACs exceeded the traditional IPO listings. The most recent months as of 2021 are excluded due to the unavailability of data. An eleven-year sample period can be considered one of the longest sample periods in the DE-SPAC literature, as most papers focused on five to seven-year periods (e.g. Datar, Emm and Ince, 2012; Dimitrova, 2017; Rodrigues and Stegemoller, 2014) or even shorter periods (e.g. Boyer and Baigent, 2008). To my best knowledge, only Kolb and Tykvova (2016) have exceeded the length of my sample period. However, their sample captures fewer observations as SPAC volume was lower during their sample period. Besides, including 2020 data makes this research topic more relevant than before. Moreover, in comparison to previous study's sample periods, SPACs have significantly improved in institutional terms. Proceeding, I retrieve data on firms that are incorporated in the United States, raising two issues. US SPACs form business combinations with foreign firms, and US operating companies form business combinations with foreign SPACs. This could potentially result in confounding structures and data availability; hence I opt to exclude all foreign SPACs and foreign operating firms.

4.1 Data gathering

I commence by using the ThomsonOne Security Data Companies (SDC) database, containing, among others, data on M&A and IPO transactions. The prior enables me to retrieve data on business combinations that are formed with SPACs. First, through the advanced search on Deals and League Tables, I enter the database for M&A transactions. Following Rodrigues and Stegemoller (2014), I identify DE-SPACs by selecting blank check companies, using one of the filters of the SDC database. This filters the blank check companies, of which SPACs are a subset of. I retrieve data on 222 firms that have effectively formed business combinations from 2010 to 2020. Ideally, this would yield all SPAC business combinations that occurred during the sample period, but unfortunately, this also captures non-SPAC shell companies. For instance, some observations included firms that were created for two operating companies to merge into a new entity. Therefore, I manually check these structures in order to delete the non-SPAC shell companies[22]. For the remainder of the data, I access Compustat, which demands CUSIP 8-digit or 9-digit codes as input for obtaining data. After experiencing issues with the CUSIP 6-digit codes that the SDC database provided, I opted another way around[23]. Therefore, using the Datastream plug-in in Excel, I adjust the Datastream codes that I retrieved from SDC to ISIN codes. By separating the country code and the latter digit, known as the checking number, I obtain the CUSIP 9-digit codes for the observations in my dataset. Using the CUSIP 9-digit code, I retrieve accounting data from Compustat. I apply a dummy variable to the data, assuming the value of 1 for DE-SPACs. Table 1 provides an overview of the sampling procedure of DE-SPACs. The dataset ultimately contains 123 unique DE-SPAC firms over the sample period from 2010 to 2020. This captures a significant amount of the total population of DE-SPACs over the sample period in the United States.

Next, I collect data for the control group on firms that listed using traditional IPO channels during the sample period. Using ThomsonOne SDC, I visit the advanced search on the Deals and League Tables through the equity section. I correspond the IPO date to the sample period and apply IPO as issue type. Subsequently, I exclude blank check companies in order to exclude companies with no operational business activities. These would otherwise not form a proper

[22] I do so by first checking on the name of the acquiror and target firm. Most (if not all) SPACs have "Acquisition Corp" in their name, which makes them easy to recognize. Moreover, shell companies that were created for two firms to merge in are recognizable because two separate transactions were visible in the data. Using this approach, I encountered six cases, thus deleted twelve firms from the data sample.

[23] Thanks to mr Plaatsman of the Erasmus Data Service Center for brainstorming with me on alternative ways to tackle this issue. This, eventually, saved my believe in the feasibility of the data gathering process on this topic.

Table 1: Sample selection procedure of the treatment group sample

Table 1 reports the sampling procedure for my final sample that is used for empirical testing. The number of firms represents the number of DE-SPACs over the period from 2010 to 2020 that are included in my sample. The data was retrieved from ThomsonOne SDC and Compustat. DE-SPACs are used in this paper as the treatment group, thus only representing one of the two groups in my final sample.

Sampling procedure	N
Firm year observations for DE-SPACs in the US from 2010-2020 with from ThomsonOne SDC M&A	222
Less: Non-SPAC shell companies and inviable CUSIP codes	-77
Less: Observations with critical missing values after aggregating with Compustat data	-22
Final sample for testing the hypotheses	123

Table 2: Sample selection procedure of the control group sample

Table 2 reports the sampling procedure for my final sample that is used for empirical testing. The number of firms represents the number of traditional IPO firms over the period from 2010 to 2020 that are included in my sample. The data was retrieved from ThomsonOne SDC and Compustat. IPO firms are used in this paper as the control group, thus only representing one of the two groups in my final sample.

Sampling procedure	N
Firm year observations for IPO firms in the US from 2010-2020 with from ThomsonOne SDC Equity	2,220
Less: SPAC IPOs	-394
Less: Inviable CUSIP codes	-326
Less: Observations with critical missing values after merging with Compustat	-421
Final sample for testing the hypotheses	1,079

control group. Surprisingly, this database does not provide the Datastream code. Therefore, I collect all CUSIP 6-digit codes of the SDC database. Next, I retrieve all CUSIP 9-digit codes over the sample period from Compustat. This enables me to match the CUSIP 6-digits from the SDC data to the right CUSIP 9-digits, which can now be used in Compustat. I aggregate my dataset with accounting data from Compustat. Finally, I apply the value of 0 to the dummy variable for these observations. Table 2 provides an overview of the sampling procedure of traditional IPO firms. Thus, the dataset for the control group consists of 1,079 unique firms that listed through traditional IPO channels from 2010 to 2020 in the US.

In the dataset, containing panel data, the identified firms have multiple periods of data for the quarterly and annual periods. In conclusion, my dataset holds 31,669 firm-quarters consisting of 1,660 DE-SPAC and 30,009 traditional IPO firm-quarters, and 8,031 firm-years consisting of 402 DE-SPAC and 7,629 traditional IPO firm-years. Table 3 provides an overview of the number of firm-quarters and firm-years in my dataset for each sample year. Table 4 shows the descriptive statistics of the total dataset on quarterly and annual data in Panel A and B respectively.

Table 3: Summary Statistics: DE-SPAC and IPO firm-quarters and years

Table 3 reports the summary statistics of my main sample: DE-SPAC and traditional IPO firms from 2010 to 2020. The first two columns show the number of firm-quarters per group, and the third and fourth columns show firm-years for both groups. The number of firm-quarters and years (also called observations) are built upon the number of firms as shown in Table 1 and Table 2. The data was retrieved from ThomsonOne SDC and Compustat.

	Quarterly		Annual	
Year	N DE-SPAC	N IPO	N DE-SPAC	N IPO
2010	12	868	5	331
2011	41	1,726	14	511
2012	64	2,416	24	659
2013	94	2,846	29	728
2014	108	2,999	32	761
2015	139	3,067	37	771
2016	171	3,135	43	778
2017	219	3,197	56	783
2018	276	3,384	64	826
2019	302	3,168	71	767
2020	234	2,953	27	714
Total firm-quarters	1,660	30,009	402	7,629

Table 4: Descriptive Statistics

Table 4 reports the descriptive statistics of my final data sample. Panel A shows the descriptive statistics on quarterly data and Panel B on annual data. *SPAC* is the dummy variable that is assigned to each observation, assuming 1 for DE-SPACs and 0 for IPO firms. Variable *Ln(Mktcap)* is used to measure firm size. Variable *Ln(ROE)* is used to measure profitability. Lastly, *CRT* is the dependent variable used to measure the risk-taking of firm *i* in period *t*. A more detailed description of these variables is provided in Section 5.

Panel A: Quarterly data

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
SPAC	31,669	0.052	0.223	0.000	0.000	0.000	1.000
Ln(Mktcap)	31,669	6.140	1.549	3.286	5.022	7.345	8.809
Ln(ROE)	31,669	-4.302	1.678	-6.990	-5.771	-3.112	-1.014
CRT	31,669	0.217	0.205	0.000	0.049	0.343	0.640

Panel B: Annual data

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
SPAC	8,031	0.050	0.218	0.000	0.000	0.000	1.000
Ln(Mktcap)	8,031	6.125	1.547	3.216	5.052	7.299	8.770
Ln(ROE)	8,031	-3.953	1.664	-7.623	-5.035	-2.698	-1.579
CRT	8,031	0.270	0.228	0.000	0.091	0.410	0.850

5. Empirical Framework

I encounter various empirical challenges to identify the effect of DE-SPACs versus traditional IPO firms on corporate risk-taking. In this section, I explain the tests I conduct and the approaches I use to enhance the internal validity.

5.1 Identification strategy

There are clear indications that corporate risk-taking is affected by listing through SPACs. For establishing causal inference on the effect, it is important that this effect relies upon an exogenous shock. That is, is the perceived effect on corporate risk-taking indeed caused by the differences between the treatment and control group? Therefore, I commence by using an identification strategy using the dummy variable to identify the effect of corporate risk-taking. I use a dummy variable in an ordinary least squares regression. More specifically, I estimate:

$$(1)\ CRT_{it} = \alpha + \beta 1 SPAC_{it} + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

The dependent variable *CRT* captures corporate risk-taking for firm *i* in year *t*. Following Zhang (2009) and John, Litov and Yeung (2008), I measure corporate risk-taking by the volatility of corporate earnings, as riskier corporate operations are associated with more volatile earnings. Therefore, observations must at least have three sequential periods in order to be able to measure the volatility. For each observation, I compute the deviation of the firm's EBITDA/Assets from the sample mean, after which I calculate the standard deviation for each firm[24]. I use the sample mean instead of the national mean, which is used by John et al. (2008), as I am convinced that the average of my sample is more relevant than the national average. The national average would otherwise incorporate data of many unrelated firms to my sample. First, I assemble accounting numbers to compute my own EBITDA measure because the provided EBITDA variable from Compustat is messy[25]. I assemble EBITDA by taking the sum of net income, income tax, interest expenses, depreciations and amortizations[26]. Second, I compute the deviation of the volatility for each firm for each period. Lastly, I calculate the standard deviation of each observation of the variable.

The independent variable of interest for this test is *SPAC*, which is the dummy variable. In order to proceed with my main test, this variable needs to be significantly correlated to the dependent variable, meaning that the differences among the treatment and control group in corporate risk-taking is explained by variable *SPAC*. $\beta 1$ is called the differential intercept

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[24] $CRT_{it} = \sqrt{\frac{1}{T-1}\sum_{T=1}^{T}(Adj.ROA - \frac{1}{T}\sum_{1}^{T} Adj.ROA)^2} \mid T \geq 3$, where:
$Adj.ROA = \frac{EBITDA}{Assets} - \frac{1}{N}\sum_{k=1}^{N}\frac{EBITDA}{Assets} * N$, where *N* indexes the values of the time and firm (John et al., 2008; Zhang, 2009).

[25] Often, values of zero or extreme deviating numbers in relation to other accounting measures (e.g. revenue) were provided.

[26] This approach makes much more sense as the data on the used variables is clearer. After observing the values of the new EBITDA variable in relation to the revenue (EBITDA margins), the new variable's numbers look realistic.

coefficient, which will shed light on the effect of the binary variable (Wooldridge, 2021). That is, a positive coefficient means that there is a positive correlation between DE-SPACs and corporate risk-taking versus traditional IPO firms. Regarding my alternative hypothesis H_1, I expect $\beta 1$ to show significant deviating values from zero.

Finally, I add fixed effects in order to de-mean the dependent and independent variables on the level to which the fixed effect is applied to. I apply fixed effects to industries and time[27]. For the prior, I apply SIC codes to the observations. This helps to control for confounding industry-specific effects, which otherwise may raise endogeneity concerns. For the latter, I apply time fixed effects to control for confounding time-variant effects. To do so, I create a new variable holding the year and quarter of the observation to distinguish between various periods effectively.

5.2 Empirical specifications

Proceeding to my main test, I conduct an ordinary least squares regression. By making use of independent variable *SPAC*, I interact the independent variables to effectively compare the difference between the coefficients. More specifically, I estimate:

$$(2)\ CRT_{it} = \alpha + \beta 1\text{SPAC}_{it} + \beta 2Ln(Mktcap_{it}) + \beta 3Ln(ROE_{it}) + \beta 4\text{SPAC}_{it} * Ln(Mktcap_{it}) + \beta 5\text{SPAC}_{it} * Ln(ROE_{it}) + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

As explained in Section 5.1, *CRT* captures the risk-taking of firm *i* in period *t*. The variable is measured by its earnings volatility, as riskier operations are associated with more volatile earnings. Next, as mentioned in Section 4, *SPAC* assumes 1 for post-business combination SPACs and 0 for traditional IPO firms in the dataset. In line with H_1, I expect $\beta 1$ to deviate from zero as I hypothesized that DE-SPACs exhibit deviating risk-taking. Next, I include *Ln(Mktcap)* and *Ln(ROE)* as explanatory variables, measuring firm size and profitability respectively. I use natural logarithms to deal with the skewness of the data. Moreover, the coefficient estimates on the natural logarithm scale are directly interpretable as the approximate proportional distances in the dependent variable. Next, I interact the independent variables with *SPAC* to observe the differences between the treatment and control group for each independent variable. Variable *Ln(Mktcap)* is the natural logarithm of the market capitalization of firm *i* in period *t*. Following the findings of Datar et al. (2012) and Kolb and Tykvova (2016) firm size

[27] Because I conduct the tests on both quarterly and annual data, I apply time fixed effects to both data sets using quarterly and yearly fixed effects respectively. These are therefore stated together as time fixed effects.

is lower for DE-SPACs. Therefore, I expect that *β2* will be higher than the interacted *β4*. Subsequently, *Ln(ROE)* is the natural logarithm of the return on equity of firm *i* in period *t*. According to the findings of Datar et al. (2012) and Kolb and Tykvova (2016), DE-SPACs underperform their IPO peers in terms of operating performance. Therefore, I expect that *β3* will be higher than the interacted *β5*. Finally, I apply fixed effects on time and industry levels to control for confounding effects.

Of the data retrieved from Compustat, some observations were assigned the value of zero rather than being left empty[28]. This is problematic because this affects the outcomes of the tests due to the sample mean being reduced. Therefore, I delete the zero values and use the MICE algorithm to impute these missing values[29]. Finally, I apply winsorization to the variables *CRT*, *Ln(Mktcap)* and *Ln(ROE)* to reduce the effect of outliers to enhance the robustness of the sample mean. Therefore, I cap all outliers to the 95th percentile of the data[30].

5.3 Robustness tests

Despite believing the opted measure for the dependent variable is appropriate and convincing, I want to provide robust results in my paper. Hence, I follow Bargeron, Leonce, Lehn, Kenneth, Zutter and Chad (2010)'s approach by using R&D investments as the proxy for corporate risk-taking. R&D investments are viewed as risky corporate policies due to the low probability of success, and potential benefits that are distant and somewhat uncertain (Coles, Daniel and Naveen, 2006). I measure R&D investments by computing the R&D expenses over total assets, yielding the firm's risk-taking for long-term investments. However, this approach raises some concerns because, after deleting all zero values, the missing spots amount to approximately two-thirds of the observations. It can be argued that companies do have zero expenses on R&D, however this remains unclear and a common problem in academic research. Hence, I delete all observations that have missing values. Nonetheless, the findings on this

[28] I observe this for the variables 'assets' and 'net income', which I later use to compute variables *CRT* and *ROE* respectively. I am confident that no firms in the sample 1) have no assets; and 2) exactly have a net income of zero. Therefore, I am certain that this approach is appropriate.

[29] "Multiple imputation is the method of choice for complex incomplete data problems […]. In mice, the analysis of imputed data is made completely general, whereas the range of models under which pooling works is substantially extended. mice adds new functionality for imputing multilevel data, automatic predictor selection, data handling, post-processing imputed values, specialized pooling routines, model selection tools, and diagnostic graphs" (Van Buuren and Groothuis-Oudhoorn, 2011).

[30] A common procedure has been to replace any data value above the ninety-fifth percentile of the sample data by the ninety-fifth percentile and any value below the fifth percentile by the fifth percentile. The assumption seems to be that the outlier does not look right and estimates will be improved if the outlier is made to look like other data. This suggests that the outlier value must be incorrect, an exaggeration of the truth […]. The value is replaced by a more plausible value. The new value is a compromise" (Ghosh and Vogt, 2012)

smaller sample may be able to substantiate the prior findings. Similar to the main data sample, I apply winsorization to *RND* to enhance the robustness of the sample mean. Finally, I compose the regression equation similarly to my main test, only changing the dependent variable from *CRT* to *RND*:

$$(3)\ RND_{it} = \alpha + \beta 1\text{SPAC}_{it} + \beta 2Ln(Mktcap_{it}) + \beta 3Ln(ROE_{it}) + \beta 4\text{SPAC}_{it} * Ln(Mktcap_{it}) + \beta 5\text{SPAC}_{it} * Ln(ROE_{it}) + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

As a final robustness test, I limit the data to the first three years after the firm obtained its public status. This isolates the effect on corporate risk-taking to the first three years after listing. This helps to control for confounding effects of the data on companies that have had their public status for over three years, which are arguably different in characteristics to recently listed firms. After filtering my dataset, my sample holds 14,028 firm-quarter observations consisting of 1,173 DE-SPAC firm-quarters and 12,855 traditional IPO firm-quarters, and 3,477 firm-year observations consisting of 266 DE-SPAC firm-years and 3,211 traditional IPO firm-years.

6. Empirical results

In this section, I examine the effect of DE-SPACs versus traditional IPO firms on corporate risk-taking. As mentioned in Section 5, the independent variables *Ln(Mktcap)* and *Ln(ROE)* are transformed using natural logarithms, whereas the dependent variable *CRT* remains in its form. Hence, it must be noted that changes in the explanatory variables reflect a 1% change in the dependent variable of the corresponding coefficient. This remains equal for all tests including those variables.

6.1 Identification strategy

I commence by estimating corporate risk-taking using my dummy variable *SPAC* to measure the average differences between the two groups. Table 5 provides the estimations of the regression test. The table holds two columns of results on quarterly and annual data in the first and second columns respectively. The complete samples are used for both periods, consisting of 31,669 firm-quarter and 8,031 firm-year observations. The results show that variable *SPAC* is positively correlated with the dependent variable at the 1% significance level. For the quarterly and annual data respectively, the regression estimation yields coefficients of 0.073 and 0.109. This positive correlation shows that DE-SPACs exhibit more risk-taking than their traditional IPO peers. This ensures that the effect on *CRT* between the two groups is explained by the condition of listing through a SPAC.

Table 5: Identification Strategy on Corporate Risk-Taking

This table reports the estimates of the identification strategy for my main test on the dependent variable *CRT*. The equation that I use is computed as follows:

$$CRT_{it} = \alpha + \beta 1 SPAC_{it} + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

CRT_{it} is the dependent variable for corporate risk-taking of firm *i* in period *t*. The variable is measured by the volatility of corporate earnings in relation to the sample mean in period *t*. The variable is winsorized to the 95th percentile. A more detailed explanation hereon can be found in Section 5. The test is performed on the aggregate dataset consisting of DE-SPACs (treatment group) and traditional IPO firms (control group). More about the data sample can be found in Section 4. *SPAC* is the dummy variable that assumes 1 for the treatment group, and 0 for the control group. This test will identify whether the effect on corporate risk-taking within the sample is explained by *SPAC*. I add Time (quarterly and yearly) and industry fixed effects to the regression equation to control for systematic differences across time and industries. The first and second columns hold quarterly and annual data respectively.

*Levels of significance are indicated by 10%.
**Levels of significance are indicated by 5%.
***Levels of significance are indicated by 1%.

	Dependent variable:	
	CRT	
Variable	(1)	(2)
SPAC	0.073***	0.109***
	(0.007)	(0.016)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	31,669	8,031
R2	0.368	0.235
Adjusted R2	0.363	0.216
F Statistic	79.632***	12.312***

6.2 Corporate risk-taking among DE-SPACs versus IPO firms

Next, Table 6 provides the results of the regression estimates on my main test. The first column holds quarterly data of 31,669 firm-quarter observations, consisting of 1,660 DE-SPAC observations and 30,009 IPO observations. The second column holds annual data of 8,031 firm-year observations, consisting of 402 DE-SPAC observations and 7,629 IPO observations. First, I investigate the results in the first column. I observe that *SPAC* is highly significant in explaining the dependent variable. This substantiates the findings of the first tests, showing that there is a positive correlation between DE-SPACs and corporate risk-taking. In relation to the other significantly correlated independent variables, the magnitude of the substance is emphasized. That is, the coefficient estimate of *SPAC*, being 0.078, has the largest proportion in explaining the extent of corporate risk-taking in the model. The independent variable *Ln(Mktcap)* shows the relation between the size and risk-taking of the control group, yielding a -0.013 coefficient that is significant at the 1% confidence level, is highly significant. The

interacted independent variable *SPAC*Ln(Mktcap)* also yields a highly significant coefficient of -0.011 on the treatment group. Despite the differences among the two groups being small, this shows that DE-SPACs are less sensitive to take more risks as firm size decreases. Next, the interacted independent variable *SPAC*Ln(ROE)* yields a coefficient of -0.005 that is significant at the 5% confidence interval. Concerning the highly significant coefficient of the control group of 0.005, this shows that DE-SPACs are less profitable while exhibiting more risk-taking. These findings are consistent with the first substantiation behind my hypothesis, stating that while DE-SPACs underperform, they are expected to exhibit more risk-taking. On another note, the R-squared shows a value of 0.368, indicating that the model's input explains a significant share of the variation in the dependent variable. Ideally, a value close to 1 is desired, however with the limited number of independent variables that are included, still a significant portion is covered.

Subsequently, in the second column of Table 6, the annual data does not yield a significant coefficient for independent variable *SPAC*. Looking at the relations between the independent variables and their interactions, I observe similar, but amplified relations in relation to the results in column one. This further substantiates the findings that DE-SPACs are less sensitive to exhibit risk-taking when firm size decreases, and shows that DE-SPACs exhibit more risk-taking while underperforming. These findings are consistent with Lehman et al. (2011) and Wiseman and Bromiley (1996), stating that underperformance is associated with corporate risk-taking.

6.3 Robustness test using RND data

I conduct a similar test using an alternative measure for corporate risk-taking. As mentioned in Section 5.3, I use variable RND in order to substantiate my results using a robustness test. Table 7 shows the resulting estimates of the test. The first and second columns hold results for quarterly and annual data respectively. Due to a large number of missing values of the dependent variable, the sample size significantly reduces. After deleting all observations without viable values, the sample consists of 13,192 firm-quarters and 3,673 firm-years for the treatment and control group respectively. Thus, more than half of the observations were lost while doing so for both periods.

Table 6: Main Test on Corporate Risk-Taking

This table reports the estimates of the main test of this paper. The regression equation that I use is computed as follows:

$$CRT_{it} = \alpha + \beta 1 SPAC_{it} + \beta 2 Ln(Mktcap) + \beta 3 Ln(ROE) + \beta 4 SPAC_{it} * Ln(Mktcap) + \beta 5 SPAC_{it} * Ln(ROE) + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

CRT_{it} is the dependent variable for corporate risk-taking of firm *i* in period *t*. The variable is measured by the volatility of corporate earnings in relation to the sample mean in period *t*. The variable is winsorized to the 95th percentile. The test is performed on the aggregate dataset consisting of DE-SPACs (treatment group) and traditional IPO firms (control group). More about the data sample can be found in Section 4. *SPAC* is the dummy variable that assumes 1 for the treatment group, and 0 for the control group. *Ln(Mktcap)* is used to measure firm size. *Ln(ROE)* is used to measure profitability. A more detailed clarification of the variables can be found in Section 5. In the equation, I interact *SPAC* with the two independent variables to observe the differences in coefficients between the two groups. I add time (quarterly and yearly) and industry fixed effects to the regression equation to control for systematic differences across time and industries. The first and second columns hold quarterly and annual data respectively.

*Levels of significance are indicated by 10%.
**Levels of significance are indicated by 5%.
***Levels of significance are indicated by 1%.

	Dependent variable:	
	CRT	
Variable	(1)	(2)
SPAC	0.078***	0.021
	(0.020)	(0.040)
Ln(Mktcap)	-0.013***	-0.025***
	(0.001)	(0.002)
Ln(ROE)	0.005***	0.038***
	(0.001)	(0.001)
SPAC * Ln(Mktcap)	-0.011***	-0.014*
	(0.003)	(0.008)
SPAC * Ln(ROE)	-0.005**	-0.026***
	(0.002)	(0.006)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	31,669	8,031
R^2	0.368	0.235
Adjusted R^2	0.363	0.216
F Statistic	79.632***	12.312***

Unfortunately, the test results in no significant coefficient estimates for $SPAC$ for both periods. Thus, using RND as the measure for the dependent variable, there is no significant association between corporate risk-taking and DE-SPACs. Beforehand, I was aware that using the RND data was prone to errors due to a large number of missing values. Conducting the main test, implied by equation 3, is thus not meaningful because the differences between the groups on the effect are not explained by $SPAC$.

Table 7: Identification Strategy on Corporate Risk-Taking using RND data

This table reports the estimates of the identification strategy for the robustness test on the dependent variable *RND*. The equation that I use is computed as follows:

$$RND_{it} = \alpha + \beta 1 SPAC_{it} + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

RND_{it} is the alternative measure for corporate risk-taking of firm *i* in period *t*. The variable is measured by dividing R&D expenses through total assets. The variable is winsorized to the 95th percentile. A more detailed clarification hereon can be found in Section 5. The test is performed on the aggregate dataset consisting of DE-SPACs (treatment group) and traditional IPO firms (control group). More about the data sample can be found in Section 4. *SPAC* is the dummy variable that assumes 1 for the treatment group, and 0 for the control group. This test will identify whether the effect on corporate risk-taking within the sample is explained by *SPAC*. I add time (quarterly and yearly) and industry fixed effects to the regression equation to control for systematic differences across time and industries. The first and second columns hold quarterly and annual data respectively.

*Levels of significance are indicated by 10%.
**Levels of significance are indicated by 5%.
***Levels of significance are indicated by 1%.

	Dependent variable:	
	RND	
Variable	(1)	(2)
SPAC	-0.677	-0.123
	(2.817)	(0.892)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	13,192	3,673
R^2	0.004	0.007
Adjusted R^2	-0.005	-0.019
F Statistic	0.441	0.274

6.4 Robustness test using three years post-listing data

Lastly, to substantiate prior findings, I conduct a final robustness test to see whether the findings still hold by only including the first three years after listing. Despite controlling for fixed effects across time and industries, it could still be argued that data on mature firms compared to recently listed firms is confounding. Thus, this approach enhances the comparability of the firms in the data. Following this approach, the dataset is reduced to 14,028 firm-quarter observations consisting of 1,173 DE-SPAC and 12,855 IPO observations, and 3,477 firm-year observations consisting of 266 DE-SPAC and 3,211 IPO observations. In Table 8, I conduct the identification strategy to see whether *SPAC* explains the effect on corporate risk-taking across this adjusted sample. I observe a statistically significant positive coefficient across both periods, meaning that *SPAC* explains the differences in the effect on corporate risk-taking between the two groups.

Table 8: Identification Strategy on Corporate Risk-Taking using Three Years Post-Listing Data

This table reports the estimates of the identification strategy for the robustness test on dependent variable *CRT* using data on firms until three years after listing effectively. The equation that I use is computed as follows:

$$CRT_{it} = \alpha + \beta 1 SPAC_{it} + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

CRT_{it} is the dependent variable for corporate risk-taking of firm *i* in period *t*. The variable is measured by the volatility of corporate earnings in relation to the sample mean in period *t*. The variable is winsorized to the 95th percentile. A more detailed clarification can be found in Section 5. The test is performed on the aggregate dataset consisting of DE-SPACs (treatment group) and traditional IPO firms (control group). More about the data sample can be found in Section 4. *SPAC* is the dummy variable that assumes 1 for the treatment group, and 0 for the control group. This test will identify whether the effect on corporate risk-taking within the sample is explained by *SPAC*. I add time (quarterly and yearly) and industry fixed effects to the regression equation to control for systematic differences across time and industries. The first and second columns hold quarterly and annual data respectively.

*Levels of significance are indicated by 10%.
**Levels of significance are indicated by 5%.
***Levels of significance are indicated by 1%.

	Dependent variable:	
	CRT	
Variable	(1)	(2)
SPAC	0.073***	0.109***
	(0.007)	(0.016)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	14,028	3,477
R2	0.368	0.235
Adjusted R2	0.363	0.216
F Statistic	79.632***	12.312***

Next, Table 9 shows the main test results on the adjusted data, including three years of observations after listing. Surprisingly, most relations to the dependent variable have become insignificant. Independent variable *SPAC* yields a positive 0.052 coefficient, only being significant at the 10% significance level. Nevertheless, this contributes to my findings that DE-SPACs exhibit more risk-taking than their IPO peers. More importantly, this provides new insights to the prior findings. As DE-SPACs have had their public status for a longer period than three years, they tend to exhibit more risk-taking. Again, this evidence is in line with my first substantiation of the alternative hypothesis. Moreover, this adds to the understanding of the evidence provided by Wiseman and Bromiley (1996), that underperforming, as part of a cyclical process, exhibit more risk-taking. Although the researchers do not state a specific time-trend of the cyclical process, it seems logical that this is more elaborate over the long term.

Table 9: Robustness Test on Corporate Risk-Taking using Three Years Post-Listing Data

This table reports the estimates of the robustness test using data on firms until three years after listing effectively. The regression equation that I use is computed as follows:

$$CRT_{it} = \alpha + \beta 1 SPAC_{it} + \beta 2 Ln(Mktcap) + \beta 3 Ln(ROE) + \beta 4 SPAC_{it} * Ln(Mktcap) + \beta 5 SPAC_{it} * Ln(ROE) + time\ fixed\ effects + industry\ fixed\ effects + \varepsilon_i$$

CRT_{it} is the dependent variable for corporate risk-taking of firm *i* in period *t*. The variable is measured by the volatility of corporate earnings in relation to the sample mean in period *t*. The variable is winsorized to the 95th percentile. The test is performed on the aggregate dataset consisting of DE-SPACs (treatment group) and traditional IPO firms (control group). More about the data sample can be found in Section 4. *SPAC* is the dummy variable that assumes 1 for the treatment group, and 0 for the control group. *Ln(Mktcap)* is used to measure firm size. *Ln(ROE)* is used to measure profitability. A more detailed clarification of the variables can be found in Section 5. In the equation, I interact *SPAC* with the two independent variables to observe the differences in coefficients between the two groups. I add time (quarterly and yearly) and industry fixed effects to the regression equation to control for systematic differences across time and industries. The first and second columns hold quarterly and annual data respectively.

*Levels of significance are indicated by 10%.
**Levels of significance are indicated by 5%.
***Levels of significance are indicated by 1%.

	Dependent variable:	
	CRT	
Variable	(1)	(2)
SPAC	0.052*	-0.064
	(0.028)	(0.056)
Ln(Mktcap)	-0.013***	-0.041***
	(0.001)	(0.003)
Ln(ROE)	0.001	0.029***
	(0.001)	(0.002)
SPAC * Ln(Mktcap)	0.001	-0.017**
	(0.003)	(0.009)
SPAC * Ln(ROE)	-0.001	0.017
	(0.004)	(0.011)
Time Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	14,028	3,477
R^2	0.368	0.235
Adjusted R^2	0.363	0.216
F Statistic	79.632***	12.312***

Altogether, my findings suggest that DE-SPACs exhibit significantly higher corporate risk-taking than their traditional IPO peers. As mentioned in Section 3.2, corporate risk-taking is seen as a potential measure to observe the extent that managers favor the shareholders' incentives rather than their own incentives. The extent to which the findings of the treatment group deviate from the control group provides new insights into the literature. Especially in the lights of the structural underperformance of DE-SPACs (Datar, Emm and Ince, 2012; Dimitrova, 2017; Kolb and Tykvova, 2016) and the evidence showing that underperforming

companies, as part of a cyclical process, exhibit more risk-taking leading to unprofitable choices, in turn worsening the performance (Wiseman and Bromiley, 1996). Given these findings, prior theories of risk-averse managers do not hold, but in contrast, managers are expected to exhibit more risk-taking behavior in favor of their own benefits at risk of the shareholders' incentives. This is due to the incentives, among managers and shareholders, that under circumstances of underperforming companies changes. Subsequently, according to my results, DE-SPACs are more sensitive to the operating performance to corporate risk-taking relation. This substantiates the significant negative relationship between performance and corporate risk-taking: while DE-SPACs underperform, they exhibit higher risk-taking. As my findings in Table 9 suggest, after three years after listing, the association of DE-SPACs exhibiting corporate risk-taking amplifies.

Secondly, in line with Datar, Emm and Ince (2012)'s evidence that DE-SPACs carry more debt and Kim et al. (2017)'s evidence that high-leveraged firms exhibit more risk-taking, this seems as a second valid explanation why DE-SPACs exhibit more risk-taking. However, it must be noted that assertions hereon are subjected to endogeneity concerns regarding causality.

The expectation that managers in DE-SPACs have longer tenure and therefore may be risk-averse is not able to hold according to the results. An alternative explanation could be that among firms that become public, many of the CEOs tend to be the founders holding a significant share of the company (Gao and Jain, 2011). In conclusion, my view on the results is that DE-SPACs are less efficiently managed as they underperform whilst exhibiting higher corporate risk-taking in comparison to their traditional IPO peers. Thus, managers in DE-SPACs take decision in their own favor which can result in suboptimal or, even worse, destroying outcomes for the firm value. Relating to the magnitude of the differences among the observed coefficients, the findings are critical in economic sense relating to the increasing number of DE-SPAC listings that are currently occurring in practice. Over long-term periods, this risk-taking behavior could potentially result in staggering numbers of bankruptcy among DE-SPACs which would cause tremendous costs to various stakeholders.

7. Conclusion and Discussion

The volume of companies that obtain their public status by forming business combinations with Special Purpose Acquisition Companies has surged tremendously during the past decade. In 2020, the number of listings using SPACs rather than IPOs occurred for the first time in history. Therefore, the SPAC phenomenon has become an increasingly important part of

nowadays economies. Prior research provides evidence that DE-SPACs underperform their IPO peers in operating performance in the short and long term, and that underperforming firms tend to exhibit more risk-taking. Corporate risk-taking is seen as a way to observe the extent that managers favor the shareholders' incentives rather than their own incentives. DE-SPACs' underperforming character induces that DE-SPACs exhibit more risk-taking in favor of their own benefits at risk of various stakeholders. In this paper, I seek evidence whether DE-SPACs exhibit deviating corporate risk-taking.

I retrieve data from ThomsonOne SDC to obtain DE-SPACs and IPO firms that listed effectively over the period from 2010 to 2020. Then, I aggregate the data with accounting numbers using Compustat. For my tests, I use quarterly and annual data on DE-SPACs, being the treatment group, and IPO firms as the control group. My dataset consists of 1,660 firm-quarter and 402 firm-year observations on DE-SPACs, and 30,009 firm-quarter and 7,629 firm-year observations on IPO firms. Therefore, I create a dummy variable, with which I assign each observation the value of 1 for DE-SPACs and 0 for firms that listed through traditional IPOs. This enables me to distinguish between the two groups.

First, I test whether the dummy variable explains the differences in corporate risk-taking between the two groups. Next, I compare the coefficients of both groups to conclude the differences among the two groups. I apply time and industry fixed effects to control for confounding effects.

My findings first indicate that the difference in the effect on corporate risk-taking is based on the dummy variable *SPAC*. The resulting estimates in the subsequent tests collectively indicate that DE-SPACs exhibit more risk-taking than their IPO peers. Building on the findings that DE-SPACs underperform their IPO peers, my findings suggest that DE-SPACs exhibit more risk-taking as part of a cyclical process, leading to choices for unprofitable risk-taking, again harming the operating performance. This is explained as in circumstances of underperformance, managers exhibit more risk-taking behavior in favor of their own benefits at risk of the shareholders incentives. That is, management tries to take risky decisions in order to enhance the performance while in downfall. Next, my findings indicate that DE-SPACs are more sensitive to the risk-taking and performance relation in comparison to their IPO peers. As performance suffers, DE-SPACs' risk-taking reacts more heavily. These findings are amplified in the long term. Lastly, DE-SPACs are less sensitive to exhibit risk-taking as firm size increases compared to their IPO peers.

The magnitude of the differences among the groups provides evidence of a critical situation as the number of DE-SPAC listings increases. During economic downfall, the risk-taking behavior can turn into bankruptcies among DE-SPACs, causing costs to various stakeholders. Moreover, the findings induce that DE-SPACs have less effective corporate governance in place.

This paper contributes to the existing literature surrounding corporate risk-taking (e.g. Wiseman and Bromiley, 1996; Zhang, 2009; Li et al., 2013; Lehman et al., 2011), but more importantly, to the DE-SPAC literature (e.g. Datar et al., 2012; Kolb and Tykvova, 2016). By using the prior researchers findings, I expand the literature of underperformance of DE-SPACs by partially explaining why DE-SPACs underperform. As mentioned before, still little research is conducted on the phenomenon while the importance increases because of the increasing number of DE-SPAC listings. This paper is limited in various ways. Due to constraints surrounding the availability of data on DE-SPACs and their small IPO peers, I cannot further substantiate the findings with governance data. Moreover, the explanatory power of my models, measured by the R-squared, shows that there are still more features affecting corporate risk-taking for firms that were not yet included. The subjected corporate governance can shed light on how the two groups of companies are managed. I think this is essentially insightful and of added value to the DE-SPAC literature; therefore this would be an interesting avenue for further research.

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Appendices

Figure 1: SPAC Lifecycle