

STOCKHOLM SCHOOL OF ECONOMICS

Department of Finance

Master's thesis in finance

Academic year 2020 – 2021

DEVELOPMENT OF SPAC 3.0: EMPIRICAL EVIDENCE ON SPAC PERFORMANCE  
AND MORAL HAZARD

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**Abstract.** Special purpose acquisition companies (SPACs) are shell companies equipped with money raised in an initial public offering (IPO) to identify and acquire a private target within a specified timeframe. For private targets that acquire public status after a merger with a SPAC, SPACs are a reliable and fast alternative route to access public markets. For public investors, SPACs constitute a single-shot private equity like investment in which they may benefit from the skills and expertise of the usually reputable SPAC management. Nonetheless, existing literature finds that SPACs as an asset class underperform any reasonable benchmark in the long-term. Contributing to the literature about SPAC structure and performance, this thesis sheds light on SPAC mergers as an alternative to IPOs, long-term stock performance of the latest generation of SPACs (SPAC 3.0), and moral hazard in SPACs. Using a proprietary database of SPACs, the thesis finds that SPAC mergers are less subject to common frictions prevalent in traditional IPOs. This indicates that SPAC mergers are an attractive alternative to IPOs, in particular in cold markets. Second, the thesis explores the development of SPACs and hypothesizes that due to the positive evolution of the asset class, SPAC 3.0 perform better than previous SPACs. However, the analysis shows that the long-term underperformance is still present in a similar magnitude. Lastly, the findings indicate that moral hazard caused by extreme incentive structures is a main driver of SPAC underperformance.

Keywords: Special Purpose Acquisition Company, Regulation, Initial Public Offering, Frictions, Stock Performance, Incentive Structure, Moral Hazard

Supervisor: Assistant Prof. Alvin Chen

Date submitted: December 07, 2020

## **Acknowledgements**

We would especially like to express our gratitude to our supervisor, Assistant Prof. Alvin Chen, for his insightful comments and clear advice throughout the past months. Additionally, we wish to thank our closest surroundings for the constant encouragement.

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## Acronyms

|               |                                                              |
|---------------|--------------------------------------------------------------|
| <b>AMEX</b>   | American Stock Exchange                                      |
| <b>BHAR</b>   | Buy and Hold Abnormal Return                                 |
| <b>CAR</b>    | Cumulative Abnormal Return                                   |
| <b>CRSP</b>   | Center for Research in Securities Prices                     |
| <b>EDGAR</b>  | Electronic Data Gathering and Retrieval                      |
| <b>IPO</b>    | Initial Public Offering                                      |
| <b>JOBS</b>   | Jumpstart Our Business Startups Act                          |
| <b>NASAA</b>  | North American Securities Administrators Association         |
| <b>NASDAQ</b> | National Association of Securities Dealers Automated Network |
| <b>NYSE</b>   | New York Stock Exchange                                      |
| <b>PIPE</b>   | Private Investment in Public Equity                          |
| <b>PERMNO</b> | Permanent Number                                             |
| <b>SEC</b>    | (United States) Securities and Exchange Commission           |
| <b>SIC</b>    | Standard Industrial Classification                           |
| <b>SOX</b>    | Sarbanes-Oxley Act of 2002                                   |
| <b>SPAC</b>   | Special Purpose Acquisition Company                          |
| <b>WRDS</b>   | Wharton Research Data Services                               |

## 1. Introduction

In recent years, special purpose acquisition companies (SPACs) have evolved from a niche asset class to a tremendously popular financial vehicle. The massive surge in number and volume of funds raised has been accompanied by the market entry of seasoned, high profile businesspeople such as former Facebook top executive Chamath Palihapitiya and hedge fund billionaire William Ackman who raised their own SPACs. In 2020 alone, SPACs raised more than \$70.5 billion in over 200 initial public offerings (IPOs).

SPACs are shell corporations that acquire public status by raising funds from public investors in so-called unit IPOs (public offering consisting of shares and warrants). Other than the cash raised in the SPAC IPO, which is largely placed in an escrow account (around 90%), the financial vehicles possess neither business operations nor assets. SPAC's exclusive purpose is to complete a business combination with a private company within a pre-defined time frame (usually two years). In the process of merging with a SPAC, a formerly private target fills the hollow SPAC shell with an operational business and thereby effectively becomes publicly listed (SPAC merger). SPACs that do not fulfil their merger objective are forced to liquidate at the end of the pre-set lifecycle and must return the pro-rata trust fund value to their shareholders. Broadly speaking, SPACs fulfil two main economic purposes. First, SPACs provide companies that aim to access public equity financing a viable alternative to the traditional IPO route (Berger, 2008). Second, SPACs enable all public investors participation in an investment hypothesis similar to that of private equity funds (Hale, 2007). Although SPACs can thus be characterized as "single-shot private equity funds" from an economic perspective, they have three distinct features. First, shares and warrants acquired by SPAC shareholders in the SPAC IPO trade publicly during the SPAC's lifecycle. Second, SPAC shareholders have the opportunity to approve a proposed acquisition or reject it and redeem their shares (i.e., receive the pro-rata share value of the trust account). Third, SPAC founders receive no compensation but are incentivised to search for a target through so called "founder shares". Prior to the IPO, SPAC founders acquire founder shares for a greatly reduced nominal price, usually \$25,000. These founder shares equal 20% of the SPAC's equity but they are only released in case of successful merger completion. When no merger is consummated, the shares expire worthless.

Although the main SPAC features remained largely unchanged since the financial vehicle's infancy, SPACs have undergone a significant development process. The emergence

of the first generation (SPAC 1.0) in the 1990s is closely linked to the 1980s blank check penny stock companies. Until 1990, penny stock offerings effectively operated in a regulatory blind spot, which gave rise to massive and widespread investor fraud in the U.S. penny-stock market (Heyman, 2007; Riemer, 2007). However, at the turn of the decade U.S. legislators acted against the fraudulent practices and mandated the Securities and Exchange Commission (SEC) to oversee penny stocks, which led to the introduction of Rule 419, which is explained in *Section 3*. While Rule 419 successfully curbed investor fraud, the regulation also made it virtually impossible for legitimate penny stock blank check companies to complete an acquisition (Riemer, 2007). David Nussbaum, Chairman of GKN Securities at the time and later founder of EarlyBirdCapital Inc., recognized that and invented the SPAC as known today. The blank check company he created issued equity in large excess of the statutory penny stock threshold (i.e., five million U.S. dollars) and thus circumvented Rule 419 regulation. However, Nussbaum's SPAC voluntarily complied with most of the Rule 419 requirements, which ensured extensive investor protection and satisfied U.S. regulators. Although GKN Securities launched 13 SPACs between 1993 and 1994, the vehicle suddenly disappeared towards the end of the 1990s. During the dot-com boom private companies could easily raise capital in traditional IPOs, which thus rendered SPACs obsolete (Riemer, 2007).

As the tech IPO frenzy faded after the turn of the millennium and the Sarbanes-Oxley-Act of 2002 (SOX) substantially increased the regulatory burden and associated costs for IPOs, SPACs experienced their renaissance (Lakicevic et al., 2014). The financial vehicle reappeared in 2003 with the IPO of Millstream Acquisition Corporation, which was underwritten by EarlyBirdCapital Inc. Thus, the second generation of SPACs (SPAC 2.0) was born. Since then, SPACs became more and more established. Within the first decade of the 21. century, the number and size of SPAC offerings increased dramatically and in 2007 SPAC IPOs represented 25% of the total IPO market. Besides size, SPACs became progressively more reputable as the most respected investment banks entered the SPAC market as underwriters and well-known managers launched their own vehicles. After SPACs were first only traded Over-The-Counter (OTC) markets, the main U.S. stock exchanges AMEX, NYSE, and NASDAQ began to list SPACs with AMEX as the first mover in 2005 (Castelli, 2009; Cumming et al., 2014).

Without a single SPAC IPO in 2009, the financial crisis induced another significant break for SPACs. In view of the reoccurrence of SPACs from 2010 onwards, which were subject to institutional changes as well as further influx of high-caliber stakeholders who attracted more investors, this thesis introduces the notion of the third SPAC generation (SPAC 3.0). Two developments in the institutional environment of SPAC 3.0 crucially impacted the

financial vehicle: (1) the introduction of the tender regulation in lieu of a shareholder vote in 2010 and (2) the introduction of the Jumpstart Our Business Startups Act (JOBS) in 2012. These changes made SPAC mergers more feasible, which, in turn, led to an increase in SPAC market activity.

Taking the evolution of SPACs and the respective institutional environment as well as the resulting implications for stakeholder dynamics into account, this thesis focuses primarily on three aspects. First, the thesis investigates whether SPAC mergers are an attractive alternative to traditional IPOs for private companies. Second, the thesis sheds light on the question whether the improved characteristics of SPAC 3.0 enhance the performance of the asset class due to potential mitigation of adverse selection problems. Third, the implications of improved SPAC 3.0 features for moral hazard are investigated.

Although the analyses indicate that SPACs developed substantially, the results show that SPAC 3.0 do not perform better than previous generation's SPACs. Over a two-year period, the long-term buy and hold abnormal return (BHAR) amounts to -57% when compared to similar sized companies that went public via traditional IPOs during the same period. Based on these results and consistent with previous research, the thesis proposes two main causes for poor stock performance: first, SPAC managers may be unskilled in identifying valuable targets and second, SPAC managers may be subject to moral hazard. Furthermore, the analysis hypothesizes that misaligned incentive structures of SPAC stakeholders are the major factor for value destroying acquisitions. The notion that SPAC managers are subject to moral hazard and pursue ex-ante negative value acquisitions is supported by the finding that late mergers underperform within the SPAC asset class by -27%. However, this finding is not significant. Even though the results show that SPACs perform poorly on average, they also indicate that SPAC mergers do not exhibit frictions that are present in traditional IPOs such as IPO underpricing. Including the lower fees for private companies along the SPAC route and other advantages such as reduced time effort, a higher cash-out ratio, and smoothened market cyclicity, private firms have incentives to go public via SPACs.

The study contributes to the existing literature on SPACs in multiple ways. First, the thesis complements existing studies on SPAC performance of earlier generation SPACs by assessing the performance of SPAC 3.0. Second, the thesis provides a comprehensive and up-to-date analysis on how SPACs evolved structurally, given changes in the institutional environment. Further, the implications of that development for SPACs as an asset class and an alternative to traditional IPOs are evaluated in-depth. Lastly, the thesis explores potential implications of the financial vehicle's evolution on existing moral hazard issues.

This thesis proceeds as follows. *Section 2* provides a more detailed overview over the structure and lifecycle of modern-day SPACs. Subsequently, *Section 3* elaborates on the changes in the regulatory environment that led to the emergence of SPACs as well as following regulatory developments that further shaped SPAC characteristics. *Section 4* summarizes the existing literature on SPACs and IPO frictions. Thereafter, *Section 5* describes the sample construction and summary statistics. *Section 6* derives the tested hypotheses and *Section 7* presents the analysis and results. Afterwards, *Section 8* elaborates on the limitations of the thesis. The findings are discussed, and future research avenues are explored in *Section 9*. Lastly, *Section 10* concludes.

## **2. SPACs: Key aspects and process**

### *2.1 SPAC founding and IPO*

A SPAC is a publicly listed company with the purpose of effecting a merger with an operating business in a pre-defined time period, mostly around 24 months. Since the business that a SPAC intends to acquire must not yet be identified at SPAC formation, SPACs are often referred to as blank check companies. SPACs are founded by so-called SPAC sponsors who can be persons or firms. Since SPAC sponsors initiate the vehicle and manage it during its lifecycle, the terms SPAC sponsors, SPAC founders, and SPAC managers are used interchangeably. Usually, SPAC founders are seasoned, high-profile businesspeople from the financial or other industries. Their reputational capital is paramount to induce investor confidence and facilitate an IPO. During the SPAC's IPO, units consisting of common shares, redeemable warrants, and sometimes also rights are offered to the general public. Virtually all SPACs offer one share and one or more warrants. Warrants are either in- or out-of-the-money at SPAC IPO depending on the year of observation and can be converted to equity of the merged entity if the SPAC succeeds in consummating a business combination. Similarly, rights can be converted to a fraction of a share of the businesses' equity in the aforementioned scenario. However, right conversion is free of charge in that rights do not include an exercise price. All three SPAC securities (i.e., shares, warrants, and rights) begin to trade separately on the secondary market after a period of around 50 days after SPAC IPO. Around 90% to 100% of the gross IPO proceeds raised through the issuance of SPAC units are placed on a trust account of a large and reputable financial organization where they earn an interest similar to that of treasury bills. The interest earned is either accumulated on the escrow account or utilized

by SPAC management to cover operational expenses. Further, in cases in which less than 100% of IPO proceeds are placed on the trust account, the differential is similarly at disposal for operational SPAC expenses and taxes. Two additional features are distinct to SPAC IPOs. First, SPAC founders can also acquire the issued units for the general issuance price in so-called “private placements”. The monetary amount contributed due to private placement is placed on the trust account. While units acquired in private placements are equal to those acquired by SPAC shareholder, SPAC founders commit to refrain from trading their securities and surrender the share based pro-rata distribution right. Hence, private placement units only constitute additional SPAC equity for the SPAC sponsors if the SPAC completes a merger. Second, SPAC IPO underwriters often agree to defer around 50% of their underwriter fee. The deferred underwriter fee portion is placed on the trust account and its release to the underwriter is contingent on a successful business combination. Due to the private placement and the deferred underwriter fee, it can be sometimes observed that the trust account value represents more than 100% of the IPO gross proceeds.

## *2.2 Acquisition and merger*

For a SPAC to complete a merger, certain criteria must be met. First of all, the SPAC must announce and usually complete the merger within the timeframe defined in the prospectus filed with the SEC. If the pre-set SPAC lifecycle is about to expire and the SPAC and the target have already entered merger negotiations (e.g., signed a letter of intent) or even announced a merger, shareholders can usually grant an extension to the SPAC management. In many other cases, the deadline extends automatically by six months if a letter of intent to merge is signed. Second, prior to merger completion, SPAC shareholders have the option to (indirectly) approve or reject the proposed merger. Depending on the specific terms of a SPAC that are laid out in the SPAC’s IPO prospectus, this mechanism can vary in form. First, many SPACs include a shareholder vote (proxy vote) on proposed acquisitions. Proxy votes usually require a simple majority for the merger to be approved. Proxy votes are usually combined with a subsequent share redemption process. The share redemption process includes a threshold number of redeemed shares that must not be exceeded for the merger to go through. The observed average threshold number differs from time period to time period though the overall trend shows that redemption thresholds have increased over time (i.e., mergers can be completed with more redeeming shareholders). Shareholders that redeem their shares are offered the pro-rata share based amount of the aggregate trust account. For instance, if a public investor buys one unit,

including one share, at IPO for \$10 and 95% of the total IPO proceeds is placed on the trust account, redeeming shareholders are entitled to \$9.5 per share. Hence, SPACs can theoretically pursue a proposed merger if more than 50% of the shareholders approve the acquisition in the shareholder vote and/ or fewer shareholders opt to redeem their shares than the redemption threshold defines. The second alternative some SPACs employ prior to merger consummation involves a tender offer process. The tender offer alternative has been introduced in 2010 and is thus a feature exclusively observed in SPAC 3.0. Tender offer mechanisms are employed in lieu of the shareholder vote and the redemption process. SPACs that opt for this alternative file a proxy statement with the SEC, which states that the SPAC offers to “buy back” shareholder’s units by redistributing the pro-rata trust account value. Hence, tender offers are not subject to a formal threshold like the ones observed in redemption processes and therefore SPACs that employ a tender offer may theoretically “always” pursue a proposed acquisition. However, and regardless of the respective mechanism in place, there are practical limitations. First, if too many shareholders redeem respectively tender their shares, the SPAC may run out of sufficient liquidity to acquire the target. Second, SPACs must at all times have more than \$5 million in the trust account. This is due to SEC Rule 419 regulation, which applies to all blank check companies with less than \$5 million in assets. Successful SPACs acquire targets with an enterprise value that is oftentimes in far excess of the SPAC’s IPO proceeds. This is due to the fact that besides the cash raised in the IPO, private investments in public equity (PIPE) or debt financing are often utilized. After a successful acquisition, the target’s shareholders are issued shares in the merged entity, which are the same shares that initial shareholders of the SPAC receive. In a final step, the entities reverse merge and the operational business is effectively listed.

In summary, SPACs are forced to liquidate in three scenarios (1) the SPAC does not merge with a target within the pre-defined time period; (2) a majority of SPAC shareholders votes against a proposed merger; (3) a large number of shareholders tender respectively redeem their shares or the shares redeemed exceed the redemption threshold. If the SPAC liquidates, the funds held in the trust account are released to the shareholder on a pro-rata value of the per share basis of the aggregate value on the trust account. Overall, the SPAC structure enables shareholders to always retract (almost) all their investment at the end of the SPAC’s lifecycle.

### *2.3 Compensation structure*

The compensation structure in SPACs is remarkable in that SPAC managers receive no formal compensation for their efforts, i.e., are not paid a salary. SPAC managers are however incentivized to pursue and complete a business combination through the mechanism of so-called “founder shares”. Prior to the SPAC’s IPO, SPAC sponsors acquire founder shares for a greatly reduced nominal price of around \$25,000. Founder shares are non-tradeable during the operational phase of a SPAC, however, in the scenario of a successfully completed merger the founder shares convert to a substantial equity stake of around 20% of the SPAC’s equity. In the case of no merger consummation (i.e., SPAC liquidation) founder shares expire worthless. As explained in *Section 2.1*, SPAC sponsors can further acquire SPAC units during the SPAC’s IPO for the normal issuance price. This is referred to as private placement. From the SPAC founders’ perspective, the \$25,000 paid for founder shares as well as the amount paid in the private placement constitute the at-risk capital. This is due to the fact that the money contributed by SPAC sponsors is placed on the trust account and only public investors (i.e., SPAC shareholders) have a claim to share based, pro-rata trust account redistribution in the case of SPAC liquidation or if they choose to redeem respectively tender their shares in the event of a proposed SPAC merger. Hence, SPAC sponsors are greatly compensated in scenarios in which the SPAC completes a merger and receive no pay-out at all as well as lose their at-risk capital otherwise. The benefits of this compensation scheme are that SPAC managers are incentivized to fulfill their objective and money contributed by SPAC shareholders is not transferred to SPAC founders during the SPAC’s operational phase in the form of a formal salary. The disadvantages are however, that SPAC compensation is purely event-based and not linked to post-merger SPAC performance, which gives rise to potential moral hazard issues.

## **3. Development of the regulatory framework for SPACs (1990 – 2012)**

In the late 1980s, the North American Securities Administrators Association (NASAA) noted that penny stock frauds were the biggest threat for retail investors. More specifically, the claims of fraud had increased by more than 260% in one decade (Riemer, 2007). These frauds were especially facilitated through blank check companies, the predecessor of SPACs. Around that time the SEC defined blank check companies as a company that (1) is trying to establish a new business without any or any significant revenues so far, (2) is issuing “penny stocks” (i.e., share

price less than five dollars), and (3) has indicated that its purpose is to engage in a merger.<sup>1</sup> Blank check companies were prevalent: by 1990, 20% of all new registration filings were done by blank check companies, which were characterized by a low degree of available information. This in combination with the fact that penny stock offerings were neither traded on large, reputable stock exchanges nor had to be registered or approved for registration by an authority enabled the fraudulent practices of the time (Heyman, 2007). A common technique in this regard was the “pump and dump” scheme: first, shares of blank check companies were issued to collaborating brokers who artificially inflated the share price. Then the shares were marketed and re-sold to deceived investors – often by employing “high-pressure boiler room type tactics” (Riemer, 2007; Castelli, 2009). Finally, the U.S. Congress reacted and passed the Penny Stock Reform Act of 1990, which led to the introduction of Rule 419 by the SEC. Rule 419’s main regulations can be summarized as follows. First, 90% of the funds raised and all securities issued by a blank check company are to be held in an escrow account and not to be released until the company acquires a target or liquidates its fund. Second, the blank check company has an 18-months limit from the time of its IPO to acquire a target or otherwise has to redistribute the funds held in the escrow account. Third, the issued securities are not eligible for trading until an acquisition is completed. Fourth, investors have the opportunity to have their investment returned in the case they disapprove a proposed acquisition. Fifth, the acquired target’s fair market value must equal at least 80% of the proceeds held in the trust account and the blank check company must disclose extensive information about the target. Lastly, the acquisition needs shareholder approval in that at least 80% of the shares must vote in favor of the proposal. In sum, Rule 419 halted the frauds conducted through blank check companies but also made it almost impossible for blank check companies to complete an acquisition (Riemer, 2007; Heyman, 2007). Castelli (2009) reports that especially the compulsory super-majority vote and the fact that investors could retract their investment increased merger uncertainty. This, in turn, put off many private targets.

The large majority of SPACs did not fall under the jurisdiction of Rule 419 since stocks from issuers with total net tangible assets of more than \$5 million were excluded.<sup>2</sup> Nevertheless, Castelli (2009) points out that the managers of the first SPACs, founded in 1993, complied with most of the conditions of Rule 419 voluntarily as they tried to reestablish investor confidence in blank check type offerings. Therefore, the first SPAC offerings were designed

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<sup>1</sup> Section 616. Rule 419 – Offerings by Blank Check Companies

<sup>2</sup> Rule 3a51-1 under the Exchange Act

to attract a broader investor base and additionally to keep the regulators satisfied (Riemer, 2007). The voluntarily adopted restrictions included that SPACs hold a substantial amount, on average between 85% and 95% of the proceeds, in an escrow account and targets must account for at least 80% of net assets. Other factors that made a business combination hardly feasible were low redemption thresholds (20%) in combination with an obligatory super-majority approval. Similar to Rule 419 regulation, public shareholders had the right to have their shares returned if they disapproved a proposed acquisition. A redemptions threshold of 20% means that in order to pursue an acquisition, a maximum of 20% of shares were allowed to be redeemed (Castelli, 2009). Apart from the safeguards that were designed to attract investors, the SPAC designers differentiated their vehicles from blank check companies along other aspects as well. Most strikingly, SPACs allowed trading of their issued securities upon IPO consummation, which offered investors a higher degree of liquidity and made an investment especially interesting for institutional investors such as hedge funds (Hale, 2007).

Despite the self-imposed regulations, the SEC kept SPACs under close observation and after the emergence of “modern” SPACs in 2003 the regulatory environment changed. Most significant milestones occurred between 2005 and 2012. In August 2005, the SEC introduced new disclosure requirements for public shell companies. That included that private companies were from now on obligated to disclose the same amount of information required in a traditional IPO, when merging with a public shell company.<sup>3</sup> According to Castelli (2009), this change rendered one main benefit of going public via SPACs obsolete, namely the reduced disclosure obligations. On the other hand, SPACs became gradually more accepted. First, they were traded on OTC markets only. However, in 2005 AMEX allowed SPACs to be listed on its exchange. More importantly however, NYSE and NASDAQ followed suite in May and July 2008. In order to get the SEC’s approval, all exchanges adopted stringent rules for SPACs. For instance, NYSE requires SPACs to place at least 90% of the IPO proceeds in an escrow account and to complete a business combination within a maximum of 36 months. Furthermore, the SPAC’s initial shareholders must waive their rights to redeem their shares in the event of a liquidation. Redemption thresholds were also adopted by the exchanges. On the NYSE, business combinations could not be consummated if more than 40% of public shareholders exercised their redemption right, which increased the number of non-approved mergers. Following that increase, NASDAQ and NYSE AMEX (which are now merged, but still operate as two separate exchanges) both adopted rule changes in order to mitigate the low merger

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<sup>3</sup> Section 5.06 of Form 8-K became effective on November 7<sup>th</sup>, 2005

probability. From 2010 on, SPACs were not obligated to hold a shareholder vote in order to conduct a business combination. Instead, companies could pursue a business combination while public shareholders could tender their shares for the pro-rata share of the amount in the trust account.

Besides the regulatory development for SPACs, two main regulations impacted the IPO market. First, in July 2002, the U.S. congress passed SOX. More specifically, SOX Section 404 requires the implementation and subsequent external audit of effective internal control over financial reporting (ICFR), which greatly increased the costs of going public. However, the legislators noticed that the regulatory burden depressed IPO activity. Hence, U.S. congress acted by passing measures that – at least for a transitional period – eased SOX requirements. The SEC deferred Section 404 compliance for small companies, Form S-3 short form was allowed, and Audit Standard No. 5 was approved. Second and more importantly, congress passed JOBS in April 2012, which also aimed at enhancing IPO activity. JOBS was specifically designed to ease regulatory burdens for small corporations – most notably by creating a new category of public company i.e., the “emerging growth company” (EGC). Firms with annual revenue of less than \$1 billion in their last financial year can qualify for EGC status, which can be held for a maximum of five years after the IPO. Conditional to retaining EGC status is that within those five years the company’s revenues do not exceed \$1 billion and its market capitalization does not exceed \$700 million. Further, the EGC must issue no more than \$1 billion in non-convertible debt within the first three years after its IPO. EGC firms are only partly subject to SOX Section 404 in that they must assess and disclose ICFR mechanisms in their financial filings but do not need to subject their ICFR to an external audit. Besides reducing regulatory burdens for companies and decreasing related cost and time issues, Section 5(d) of the JOBS Act also “de-risks” IPOs by allowing companies to “test the waters” (i.e., disclose information to potential investors prior to their IPO). The impact of these regulations on SPACs will be discussed in detail in the hypothesis development and analysis section of this paper.

## **4. Literature review**

### *4.1 Governance and organizational design*

As mentioned, the governance structure of SPACs is designed to comply with the features of Rule 419 while not being subject to it (Murray, 2017). According to the existing literature, the

designers follow two main goals: first, keeping public shareholders' investments safe and second, aligning the insider's and investor's interests. All that, while making an acquisition feasible. Most research focuses on key organizational designs such as size, securities issued, compensation for insiders and underwriters, and mechanisms for shareholder protection (Boyer and Baigent, 2008; Hale, 2007; Jog and Sun, 2007; Lakicevic et al., 2014). Although SPAC structures are largely standardized, they differ between groups and evolved over time (Murray, 2017). One approach many researchers employ is to analyze SPACs over time and to categorize them into different periods, namely the pre-financial crisis period of between 2003 and 2008 and the post-financial crisis period.

In general, pre-financial crisis SPACs were getting successively larger towards the end of the period i.e., SPACs raised more money in IPOs and conducted larger mergers (Jenkinson and Sousa, 2011). Vulcanovic (2017) reports that between 2003 and 2013, approximately 30% of all SPAC merger volume appeared in 2007 shortly before the crisis began. In an extensive study, Lewellen (2009) remarks that the amount held in the trust accounts usually exceeds 95% of gross IPO proceeds. Typically, the unit offerings consisted of one share and one or more warrants with an average exercise price of around \$6 and an average unit price of \$8 - \$9. Both, unit price and exercise price for the warrants increased over time to an average of \$10 and \$11.5 respectively. Furthermore, pre-crisis SPACs granted public shareholders voting rights. Shareholders were allowed to vote on proposed acquisitions and if they voted against a proposal, they could redeem their shares. Another aspect noted by Nilsson (2018) is the restrictive redemption thresholds that typically were around 20% before the financial crisis, which posed a high barrier to mergers. On the other hand, insiders consisting of the SPAC management and sponsors have strong incentives to conduct an acquisition through the compensation structure. SPAC managers received 20% of the shares in the SPAC if a target was acquired and nothing otherwise (Rodrigues and Stegemoller, 2014). Lastly, underwriter fees were also subject to structural changes over time. In the beginning, underwriters were paid at the time of the IPO, but a deferred underwriter fee structure was adopted from 2005 on, causing that half of the fee is placed on the trust account and paid out only if a business combination is successfully conducted (Lewellen, 2009).

After the financial crisis, the SPAC structure changed. The amount held in an escrow account increased as uncertain market conditions demanded safety. Two additional aspects drove the higher share placed on the trust account that often exceeded the gross IPO proceeds. First, private placements by sponsors and managers increased substantially over time which are placed completely on the escrow account. Second, deferred underwriter fees are also placed

on the trust account (Lewellen, 2009; Rodrigues and Stegemoller, 2014). Lakicevic et al. (2014) further notice that post-crisis SPACs were initially smaller in size while they had a higher initial investment by sponsors and managers. Murray (2017) notices that in recent SPACs shareholders can still convert their shares if they want to, but the right has been separated from the voting, which was not the case for SPAC shareholders before the financial crisis. The most important structural changes came into place with regulatory innovations implemented by NYSE AMEX and NASDAQ in 2010. The introduction of tender offers in lieu of shareholder votes was an innovative attempt to increase the probability of merger approval (Rodrigues and Stegemoller, 2014). Regarding the compensation for management and sponsors, however, research finds no significant changes in the general structure. Most insiders of post-crisis SPACs still receive 20% of the SPAC shares contingent only on conducting a merger (Dimitrova, 2017; Kolb and Tykvova, 2016). Most recently, SPACs introduced novel features. Among these are units including rights that entitle shareholders to receive an additional fraction of a share after a business combination. This feature was introduced to incentivize public investors to acquire larger amounts of shares (Nilsson, 2018).

Lastly, Murray (2017) adds another view on SPACs in his study. He finds that before 2015, two groups of SPAC structures emerged rather than one universal structure. The first cluster of structures is suitable for smaller issues. It is characterized by insiders holding units, a shorter time limit to find an acquisition target, and trust account holdings of more than 100% of gross IPO proceeds. The second cluster features larger SPACs, insiders holding warrants rather than whole units, deferred underwriter fees and the use of tender offers rather than shareholder voting.

#### *4.2 SPAC incentive structure*

Besides the private target company, the two major stakeholder groups involved in a SPAC transaction are the sponsors and the public investors of the respective SPAC. Subordinated to these two groups, underwriters act as stakeholders in the SPAC transaction due to their reputational capital and (deferred) underwriting fees. SPACs employ a set of ex-ante and ex-post contractual features that results in an interdependent incentive structure and dynamic among the three parties (Lakicevic and Vulcanovic, 2013).

Boyer and Baigent (2008) point out that the SPAC structure should in theory motivate SPAC sponsors to locate the ideal target company and negotiate an attractive acquisition since this would minimize the risk of a failed merger due to lack of shareholder support. This, in turn,

would maximize shareholder value and therefore support an assessment of aligned incentives among SPAC sponsors and shareholders. However, the pay-out obtained by SPAC sponsors is conditional to a completed merger but does not essentially depend on whether the merger creates economic value for the SPAC shareholders. The incentive “to pursue any acquisition over no acquisition” may lead to ex-ante value destructive transactions and may create a moral hazard problem for SPAC shareholders (Dimitrova, 2017). That is, SPAC managers try to exploit the unobservability of the true value of the target firm. Jenkinson and Sousa (2011) point out that this issue may be exacerbated by the opportunity for SPAC sponsors to acquire shares from shareholders who are likely to vote “No” in the proxy vote. Rodrigues and Stegemoller (2014) argue that the detrimental motives and mechanisms to complete value-destructive acquisitions may be moderated by the fact that SPAC sponsors are often repeat players in the SPAC market. Therefore, they have an incentive to maintain and foster their reputational capital by pursuing value-adding deals.

Hedge funds generally constitute the largest group of institutional investors in SPACs (Lewellen, 2009). In the IPO, initial investors acquire SPAC units that typically consist of one share in the SPAC and one warrant. The warrants may be converted to a share in the target company if the SPAC succeeds in completing a business combination. Furthermore, shares and warrants held by SPAC investors start to trade separately once the IPO underwriter grants permission and the respective 8-K is filed with the SEC (Lakicevic and Vulcanovic, 2013). While SPAC investors have “little to rely on other than the reputation and experience of the SPAC founders” as to whether the SPAC succeeds in completing a value-adding transaction, the motives to acquire SPAC shares may be manifold (Nilsson, 2018). Naturally, investors who buy and hold SPAC shares until either a merger is conducted, or the SPAC is liquidated, bet on the capabilities of the sponsors to generate returns by sourcing and executing a positive value merger. However, due to the separate trading of shares and warrants, initial SPAC investors may sell the shares at an amount close or identical to the initial investment on the secondary market and hold the warrants. Thereby, effectively creating a riskless option with a potential future upside (Nilsson, 2018). Furthermore, shareholders may obtain returns by a practice known as “greenmailing” or “SPAC mailing”. By threatening to vote against a proposed merger, large stake investors can “force” SPAC sponsors to acquire their shares at a premium if sponsors want to ensure that the merger is followed through with (Lewellen, 2009). Lastly, SPAC shares sometimes trade below their respective per share cash amount in the trust fund. This is the case when SPAC shareholders face liquidity issues or increased opportunity costs and are willing to sell their shares at a discount. Secondary market investors who are

liquid and not deterred by the temporary capital commitment may exploit these situations (Nilsson, 2018).

SPAC IPO underwriters often agree to defer a significant amount of their fee (i.e., 50%) until and conditional to the completion of a business combination (Dimitrova, 2017). Furthermore, investment banks rely heavily on their reputational capital since they must repeatedly market IPOs to the potential investor-base they have access to (Beatty and Ritter, 1986; Carter and Manaster, 1990). Both may on the one hand incentivize underwriters to be more selective with regard to the SPAC IPOs they underwrite. Ideally assigning the underwriting banks a gate-keeper role strong enough to ensure that only SPACs of those sponsors who are competent in executing value-adding transactions make it past the IPO stage (Sjostrom Jr, 2007). The deferred portion of the underwriter fee however may on the other hand also encourage underwriters to pitch value-destructive deals to the SPAC sponsors – especially if the underwriting bank is concerned that the SPAC will not carry out a merger within the time frame (Dimitrova, 2017).

#### *4.3 SPAC performance*

SPAC performance has been a keystone of research since the academic literature on the topic started to emerge. Researchers focus on different performance measures.

The largest part of research focuses on the stock performance of SPACs in the different stages of the SPAC lifecycle. Jog and Sun (2007) are the first to examine the performance of SPACs. As the first modern SPAC occurred in 2003, the researchers faced a limited time period and sample size. Nevertheless, they find that public shareholders experience a negative annualized return between IPO date and announcement date and announcement date and merger date. Within 60 days in the post-merger period, the public shareholders realize around -18.0% annualized abnormal return. More importantly, Jog and Sun (2007) postulate three propositions that should be fulfilled for SPAC stocks. One, at any point in time before a shareholder vote, the stock price should exceed or be equal to the pro-rata trust value discounted from the SPACs last possible liquidation date. Two, the stock price at the shareholder vote date should exceed or be equal to the discounted pro-rata value if the acquisition is approved. Three, after completing an acquisition the stock should earn returns according to its market beta. However, most researchers fail to confirm the propositions in practice. Multiple papers notice, however, that returns tend to be significantly positive around and after announcement date until the closing date (Dimitrova, 2017; Lewellen, 2009;

Rodrigues and Stegemoller, 2014). The abnormal announcement date returns in a three-day window surrounding the date range from 1.5% to 2.4% when using the Russell 2000 Index returns as a benchmark. Using a four-factor model benchmark, Tran (2010) remarks that the monthly excess return of SPACs between announcement and closing date is 1.5%. Raw cumulative returns equal 3.7% on average. Every analyzed paper finds, however, that SPACs perform poorly when post-merger returns are examined. Using the Russell 2000 index benchmark, Dimitrova (2017) and Kolb and Tykvova (2016) calculate standard buy and hold abnormal returns (BHAR) over different time periods. Both studies conclude that the stocks significantly underperform the market, namely by 39.7% and 46.0%, respectively. Compared to other IPOs, which some researchers argue to be a more accurate method of benchmarking SPACs, the stocks still earn negative abnormal returns of -23.8% (Dimitrova, 2017). Another aspect the existing literature focuses on are cross-sectional differences between SPACs. These studies divide SPACs along characteristics such as the size of institutional shareholdings (Howe and O'Brien, 2012) and time needed to conduct an acquisition (Dimitrova, 2017). Interestingly, Dimitrova (2017) finds that late mergers on average generate even higher negative abnormal returns for shareholders and he concludes that the moral hazard problem of striking a destructive deal rather than no deal exists and is substantial. Lastly, Jenkinson and Sousa (2011) investigate the market reaction to announcements. Creating a method to divide SPACs into “good” and “bad” SPACs according to the market reaction, they find that the overall stock performances is driven by “bad” deals that destroy 79% of shareholder value after one year.<sup>4</sup>

Secondly, the literature evaluates other performance dimensions as well. That is, researchers also examine indicators of success such as merger probability or post-merger survival. Cumming et al. (2014) show in an extensive paper which characteristics predict a merger success. Interestingly, the authors find that more experienced managers and boards are not increasing the chances of getting a deal approved. Similarly, neither a high share of institutional investors as shareholders nor prestigious underwriters enhance the merger probability. On the other hand, a higher share of gross IPO proceeds placed on the trust account might signal higher operational efficiency and has a positive effect on the merger approval probability. Lastly, the authors remark that also SPACs are subject to market sentiments as approval probability is significantly higher in a bull market. Vulcanovic (2017) considers

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<sup>4</sup> According to the rule investors should listen to the market at announcement date. SPACs are “good” if their share prices trade above the actual pro-rata trust value. If the share price is equal or slightly below the pro-rata value, SPACs are categorized as “bad”

another aspect of success especially relevant to companies seeking access to public markets, namely the “survival” rate. In his main analysis, companies are considered to survive if they are not delisted. First of all, the study finds that SPAC merger firms tend to fail more often than non-SPAC companies with a failure rate of approximately 58%. The author concludes that despite the bad overall performance certain institutional characteristics help companies to survive in the public markets. The most significant characteristics with predictive power are increased pre-merger commitments of the founders and less time needed to complete a merger. According to the author, both characteristics are associated with lowering moral hazard behavior of SPAC founders. A last category of alternative performance measures is operating performance and valuation multiples of companies. Using two profitability measures: (1) operating profits and (2) net income (both as percent of sales), Dimitrova (2017) shows that SPAC companies underperform their industry, the market and other IPO companies by around 30%. However, the same study finds that companies that merge with SPACs are not more levered than benchmark firms and have even higher valuations than their peers, which according to the author might indicate that investors expected higher returns.

A third literature strand deals with the differences in performance among the securities offered in a SPAC IPO. Lakicevic and Vulcanovic (2014) note that most studies on performance evolve around common shares of SPACs. Using a market benchmark and concentrating on announcement returns, the authors find that warrant holders gain the most while holders of common shares experience only a weak positive return.

In sum, SPAC performance has been under scrutiny with researchers covering a broad range of measures. However, the findings show that SPACs are not particularly attractive as an independent asset class. One important note in this regard is that research so far is exclusively focused on earlier generations of SPACs.<sup>5</sup>

#### *4.4 SPAC merger as an IPO alternative*

The existing literature on the advantages and disadvantages of going public via reverse mergers or SPAC merger compared to a traditional IPO is extensive. But as Sjostrom Jr (2007) points out, SPAC mergers and ordinary reverse mergers have different quality standards. In a traditional reverse merger, listed firms that have gone bankrupt and are typically without assets

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<sup>5</sup> Only Kolb and Tykvova (2016) use a data sample ranging from 2003 – 2015 but cannot observe long-term stock performance

are used as natural shell companies. These firms then look for private companies they can “marry” and after a merger the private company becomes part of a public company and is thus listed. The target companies lack an underwriter’s approval, which serves as a gatekeeper for public markets. Hence, low quality firms go public through reverse mergers (Sjostrom Jr, 2007). SPACs on the other hand, have a high-caliber management, which serves as a quality gatekeeper due to its reputational capital and only use the reverse merger process to combine with a private company.

Advantages of SPACs include but are not limited to the following aspects. First, SPACs are not as dependent on market conditions as IPOs, which occur in waves (Pástor and Veronesi, 2005). Shell companies have the cash readily available, which enables them to conduct a business combination in cold market phases as well. These business combinations take on average around six months from the announcement of a target to the completion whereupon an IPO takes around one to two years (Kolb and Tykvova, 2016). Second, private targets benefit from reduced time and monetary commitment as reverse mergers are not subject to extensive SEC reviews. Therefore, reverse mergers incur less legal costs and managers of the private companies are not required to prepare an IPO on multiple road shows (Carpentier et al., 2012; Cumming et al., 2014; Floros and Sapp, 2011; Rodrigues and Stegemoller, 2014). Riemer (2007) remarks that especially smaller firms have difficulties to find a way to the public markets due to the regulatory burden created by SOX. Here, SPACs are well-situated to help these firms access the public equity markets (Castelli, 2009). Dambra et al. (2015) remarks that the JOBS Act lowered the costs of IPOs, which might render SPACs obsolete. However, Rodrigues (2012) mentions that SPACs are similarly benefitting from lower costs and regulatory burdens.

Another aspect that might be attractive to target shareholders is the possibility to obtain liquidity faster than in an IPO. Kolb and Tykvova (2016) find that target shareholders can achieve a higher cash-out ratio than in ordinary IPOs as they can convert a larger portion of their shares into cash without a lockup period. Lastly, Gleason et al. (2005) indicate that reverse merger fees are substantially lower than IPO fees (i.e., 2.7% of transaction value vs. 7.2% of gross IPO proceeds) and that underpricing is also less severe in reverse mergers, which result in less costs compared to a traditional IPO for targets.

Reverse mergers and SPACs come with disadvantages, too. First, targets might not be willing to negotiate with SPACs due to the uncertainty regarding deal approval (Riemer, 2007). Next, Lakicevic et al. (2014) point out that shareholders of a private firm might fear high levels of dilution due to the exercise of in-the-money warrants and rights. Fear of reputational damage

is also a motive not to opt for reverse mergers and SPACs mergers as the regulatory screening process is less thorough (Floros and Shastri, 2009). In line with that argumentation, firms with lower growth opportunities and less prestigious investors are more likely to go public via SPACs (Kolb and Tykvova, 2016). Lastly, multiple studies find that firms that choose the alternative way of going public via SPACs have underperformed the broad market and as well as IPOs (Dimitrova, 2017; Kolb and Tykvova, 2016).

#### *4.5 IPO underpricing*

IPO underpricing (overpricing) is usually defined as the positive (negative) differential of an IPO listing price and its first day closing price. While overpriced IPOs are rarely observed, an extensive amount of research has documented that shares tend to close above their listing price on the first day of trading. Logue (1973) and Ibbotson (1975) were among the first scholars that substantiated this phenomenon. Ljungqvist (2007) observes that IPO underpricing averaged 19% in the U.S. between 1960 and 2004 with stark fluctuations between different time periods (e.g., 12% between 1970 and 1980 and 40% between 2000 and 2004). Over that time period, four main academic approaches to explain the underpricing phenomenon have emerged: asymmetric information theories, institutional explanations, theories centered on control, and behavioral approaches.

Rock (1986) assumes an information asymmetry dynamic in which some investors are better informed than other investors, the underwriter, and the issuer. In accordance with Akerlof's (1970) "lemons problem", he proposes a "winner's curse" situation for the uninformed investors. Subject to the condition that the ongoing participation of the informed as well as the uninformed investors is crucial for the IPO market, the scholar concludes that IPOs must be underpriced on average. By testing the implications and extending the approach to different time periods and geographic regions, several studies lend support to Rock's hypotheses (Koh and Walter, 1989; Levis, 1990; Keloharju, 1993; Michaely and Shaw, 1994; Amihud et al., 2003; Aggarwal et al., 2002). Following Rock's (1986) "winner's curse", Beatty and Ritter (1986) find that underpricing increases in the ex-ante uncertainty of the true value of the issuing company. Welch (1989), Grinblatt and Hwang (1989), and Allen and Faulhaber (1989) propose a reciprocal view to Rock (1986). They hypothesize that issuers are more informed than investors. Hence, these researchers argue that underpricing serves as an instrument to credibly signal high firm quality to investors. The researchers conclude that in equilibrium, high quality companies employ this signaling tool and low-quality issuers have

an incentive to mimic high quality counterparts. By testing the implications of signaling models in the context of seasoned equity offerings, Jegadeesh et al. (1993) support the assessment that IPO underpricing signals high company quality. Other studies critically assess both perspectives by pointing out that different and potentially less costly means exist to decrease valuation uncertainty and signal high firm quality e.g., hiring a reputable underwriter (Booth and Smith, 1986; Carter and Manaster, 1990; Michaely and Shaw, 1994) or auditor (Titman and Trueman, 1986). However, the empirical evidence in this regard is controversial and appears to be dependent on the time period examined (Beatty and Welch, 1996). A third body of information asymmetry IPO underpricing literature focuses on information revelation theories. These theories argue that underwriting banks rely on information held by investors to establish an IPO price. Thus, underwriters must develop a mechanism that incentivizes investors to truthfully disclose their information. Following this hypothesis, several scholars argue that bookbuilding serves as such a mechanism. More stock is allocated to investors who aggressively bid for the offering, which in turn induces increases in the issue price. Hence, IPOs must be underpriced on average to ensure that truthful bidding is incentivized (Benveniste and Spindt, 1989; Benveniste and Wilhelm, 1990). Hanley (1993) supports this theory with his observation of the “partial adjustment phenomenon”, which shows that price revisions in the pre-IPO process are correlated to underpricing. Principal-agent models are the fourth body of IPO underpricing literature within the “information asymmetry” heading. One theory in this context assumes agency conflicts between the issuing company and the underwriting investment bank. In return to offering underpriced shares to an investor, investment banks potentially receive some form of side payment or increase their probability for joint future business (a practice known as “spinning”) (Loughran and Ritter, 2004). Baron and Holmström (1980) and Baron (1982) assume that the underwriter has an information advantage over the issuer regarding investors’ demand. Hence, they argue that in equilibrium, IPOs are underpriced since this induces optimal selling and it allows the underwriting investment bank to capture positive rents. Biais et al. (2002) combine this theory with the assessment that investors hold information relevant for IPO pricing. Furthermore, underwriters could collaborate with informed investors to the disadvantage of the issuing firm. Studies that in this context assess monitoring efforts and underwriter compensation lend support to such principal-agent problems (Ljungqvist and Wilhelm, 2003; Ljungqvist, 2003). Furthermore, Reuter (2006) suggests that underwriting banks were awarded \$0.85 per \$1.00 of underpricing return they allocated to mutual funds between 1996 and 1998.

Institutional explanations for IPO underpricing center on legal liability, price stabilization, tax arguments, and ownership and control. Lowry and Shu (2002) show that between 1988 and 1995 almost 6% of U.S. IPO companies were sued for reasons related to the IPO. Furthermore, the financial penalties for litigated issuers were economically significant (i.e., 13.3% of IPO proceeds). On this basis, Tinic (1988), Hughes and Thakor (1992) and Hensler (1995) propose the theory that deliberate underpricing serves as an insurance against litigation. This explanatory approach however remains contested for two main reasons. First, the observed degrees of underpricing between different time periods do not correlate with changes in litigation risk levels (Drake and Vetsuypens, 1993). Second, the risk of being sued differs greatly across jurisdictions and in many is not economically significant, while IPO underpricing is a global phenomenon. (Jenkinson, 1990; Beller et al., 1992; Keloharju, 1993; Rydqvist 1997; Kunz and Aggarwal, 1994; Ljungqvist, 1997). Ruud (1993) argues that IPOs are priced at expected value and are in fact not intentionally underpriced. However, the practice of price support by the underwriter eliminates the overpriced tail of the first day return distribution. Hanley et al. (1993) and Schultz and Zaman (1994) provide support to this notion by showing that price support is especially widespread among weak offerings. Furthermore, some scholars hypothesize that the incentives to underprice fall in relation to price support offered by the underwriter. However, Asquith et al. (1998) prove that while the degree of observed average underpricing may be influenced by price support, the practice is not the causal factor for underpricing in general. Rydqvist (1997) studied underpricing in Sweden throughout a time period during which legislature regarding the taxation of different income streams changed. He points out that underpricing fell after the advantageous tax treatment of capital gains was abolished in 1990. Tax incentives have not been as substantial in the U.S. Nevertheless, Taranto (2003) shows that the two-step taxation of employee stock options (i.e., first, taxation of value differential between strike price and market value, second, taxation of capital gains at sale of underlying stock) leads to management incentives to underprice their issuing.

Explanatory approaches based on ownership and control provide two reciprocal theories for the phenomenon. According to Brennan and Franks (1997) managers who enjoy private benefits may aim to protect these benefits from increased scrutiny from a major external shareholder. By showing that large bids are treated discriminatory compared to smaller ones, the scholars conclude that management resorts to underpricing to enable a strategic allocation of shares. This assessment is supported by evidence that companies implement more takeover defense mechanisms when internal monitoring is weak and management compensation is

extraordinarily high (Field and Karpoff, 2002). Stoughton and Zechner (1998) on the other hand provide a contrary theory. Their study points out that stock allocation to a large external shareholder who is capable of effective monitoring is value-enhancing. Further, they argue that since managers are usually minority owners, they equally suffer from underpricing and benefit from the value increasing external monitoring. Ljungqvist (2007) contextualizes both perspectives and concludes that the reason for the reciprocal theories stems from different institutional environments of the two studies.

In the subcategory of behavioral explanations to IPO underpricing, Welch (1992) points out that “informational cascades” can develop in IPOs due to investment decisions being made sequentially. He argues that investors monitor others who have already placed an order and incorporate the information implicit in earlier bids. According to the scholar’s theory, this in turn causes investors to “rationally disregard” their own analysis. Hence, IPO demand either builds up substantially or fades out. This setting attributes market power to initial bidders who can “demand” higher degrees of underpricing in return. Further, the scholar argues that from the perspective of the IPO company, the cascade setting is preferential to one with open communication since this would lead to a maximum information advantage of investors compared to the company. Amihud et al. (2003) provide evidence consistent with Welch’s (1992) prediction as they show that IPOs are either substantially under- or oversubscribed with demand being seldomly in between those two extremes. However, the cascade theory cannot explain IPO underpricing for IPOs that employ a bookbuilding process since in bookbuilding, bids are not made public and thus investors cannot observe the previous actions of their peers. Ljungqvist et al. (2006) assume the existence of “irrationally exuberant investors”. They argue that this assumption, coupled with Miller’s (1997) short-sale constraints results, in an optimal issuer behavior that includes offering underpriced shares. Lastly, a strain of behavioral IPO underpricing research builds on Thaler’s (1985) “mental accounting”. Evidence shows that positive adjustments from the pre-defined “reference price” throughout the IPO process are associated with large first day returns (Hanley, 1993). Loughran and Ritter (2004) pair Thaler’s implications with the prospect theory’s reference-point notion and conclude that issuers mentally offset the wealth loss implicit in underpricing with the (often larger) wealth gain on retained shares.

#### *4.6 IPO cyclicalities*

Since many years, scholars observe distinct cyclicalities regarding the number of monthly IPOs in equity markets (Ibbotson and Jaffe, 1975; Ritter, 1984; Ibbotson et al., 1994). The classification of time periods in so-called hot and cold IPO markets is not limited to the absolute number of new issues but is also well documented for the sum of raised capital (Lowry, 2003; Schill, 2004; Doidge et al., 2011). The aforementioned scholars further observe that hot IPO periods are followed by a decline of average first-day returns. Additionally, Lowry (2003) and Benninga et al. (2005) observe that the fluctuation in IPO volume and aggregate capital raised is not fully driven by variations in the need of total capital. In light of this IPO wave “puzzle”, theories centered on mispricing and the market timing theory of funding decisions, adverse selection issues and information spillover effects, and “rational” factors have emerged.

Multiple scholars argue that market conditions are an important factor for the IPO decision and issuing equity is especially popular in periods of relatively high share prices (Taggart, 1977; Marsh, 1982; Loughran et al., 1994; Ritter and Welch, 2002). Further, Ritter (1991) points out that investor over-optimism exists in certain time periods and other studies show that investor sentiment is positively related to IPO volume (Lee et al., 1991; Helwege and Liang, 1996; Pagano et al., 1998). In this context, one theory for IPO waves assumes that company managers and owners realize before public investors that shares of their company are overpriced. Thus, advocates of this theory argue that time variations of information asymmetry between company insiders and public investors are the reason for the observed IPO cyclicalities (Lucas and McDonald, 1990; Bayless and Chaplinsky, 1996; Hoffmann-Burchardi, 2001; Rajan and Servaes, 1997). Consistent with this view, Subrahmanyam and Titman (1999) show that price inefficiencies in public equity markets influence the choice of financing channels. Schultz’s (2003) “pseudo market theory”, on the other hand, suggests that company insiders do not detect ex-ante market mispricing but are rather subject to sentiment decision making themselves. He shows that specific “trigger-prices” induce IPO decisions although the respective decision makers fail to predict future equity prices. This is supported by Batnini and Hammami (2015) who suggest that managers depend on observations of past stock market performance prior to deciding whether to do an IPO or not. He (2007) connects the argument that investors rely on performance of previous IPOs to form pricing expectations with the role of underwriters. His study predicts reinforcing IPO dynamics in that changes in IPO volume influence the incentives for investment banks to produce information, which in turn amplifies IPO activity. Another model that predicts IPO cyclicalities in absence of mispricing is presented by Pástor and Veronesi (2005). Their analysis of optimal IPO timing argues that IPO waves are caused by

changes in ex-ante expected market return, profitability, and uncertainty. In the context of Spiegel and Tookes' (2007) model on the interrelation of innovation, competition and choice of financing, Chemmanur and He (2011) show that companies decide to go public when they fear that their competition may do an IPO. Given certain circumstances (e.g., technological advancement in an industry) a reinforcing dynamic may cause IPO waves. Other studies suggest that the technological advancements themselves cluster in time and hence naturally initiate the observed IPO patterns (Loughran and Ritter 1995; Baker and Wurgler, 2000; Lowry, 2003). Helwege and Liang (2004) however show that IPO waves occur more frequently than waves of breakthrough technological advancement. Further, they argue that periods of numerous IPOs are not exclusive to periods of innovation waves. Related to this, some scholars hypothesize that technological innovations indirectly induce the clustering of IPOs due to information externalities. Investors need to dedicate resources to get informed about the fair value of a novel technology and the cost-benefit ratio of getting informed increases with the number of IPOs of companies that are affected by the innovation (Maksimovic and Pichler, 2001; Stoughton et al., 2001). Many other scholars similarly emphasize the role of information spillover effects in IPOs and their IPO volume amplifying influence on adverse selection issues in other contexts (Choe et al., 1993; Booth and Chua, 1996; Benveniste et al. 2002). For instance, Alti (2005) argues that the outcome of "pioneer" IPOs reveals information on general valuation factors that was previously private. In his study, the information spillover effects of these "pioneer" IPOs result in IPO waves. Boeh and Dunbar (2014), on the other hand, examine information spillovers due to pre-IPO actions (e.g., IPO registration, withdrawal, or an adjustment of terms) and reach a similar conclusion.

#### *4.7 IPO lock-up period*

In traditional IPOs, initial shareholders usually agree to abstain from trading their retained shares for a specified period of 90 to 180 days (Field and Hanka, 2001). Academia provides two main motives as well as a hybrid explanation for the implementation of these so-called lock-up periods. Brav and Gompers (2003) argue that lock-up agreements aim to control a moral hazard problem between the issuers and potential public investors. Brau et al. (2005), on the other hand, advocate the theory that lock-ups are utilized to control for adverse selection. Yung and Zender (2010) provide evidence that both explanatory approaches are not mutually exclusive but that their influence rather depends on firm characteristics and the reputation of the IPO underwriter. While the IPO lock-up period serves a role in mitigating investor concerns,

it comes at a cost in terms of deferred liquidity for the private company shareholders. This is noted by the observation of substantial surges in trading volume and negative abnormal return around the expiration date of the lock-up period (Field and Hanka, 2001; Bradley et al., 2001; Arthurs et al., 2009; Cao et al., 2004).

## **5. Sample construction and summary statistics**

### *5.1 Sample construction*

The proprietary data sample consists of U.S. SPACs that went public between 2003 and 2019 whereby extensive characteristics are gathered for SPACs founded between 2003 and 2016. The reason for the latter is that the performance analysis of this study focuses on the long-term stock performance of SPACs that consummated their IPO between 2010 and 2016. The sample is limited to U.S. SPACs in order to guarantee comparability among them and since the U.S. market is by far the largest in terms of frequency and volume of SPAC IPOs and mergers. Additionally, the SEC's Electronic Data Gathering and Retrieval (EDGAR) database provides an exhaustive database that can be utilized to gather required information. It is also important to note that there is no publicly available database that offers information on SPAC IPOs and SPAC characteristics.

In a first step, the EDGAR database is searched for companies with a standard industrial classification (SIC) code "6770" (blank check companies), which have the text "special purpose acquisition company" in any of their SEC filings. Since not every blank check company is a SPAC, the companies are screened and filtered manually in order to make sure to capture SPACs only. To verify the result, multiple analytics platforms such as "spacresearch", "spacinsider", and "spacalpha" are utilized.<sup>6</sup> These platforms are used to check whether the total number of gathered SPAC IPOs lies in a range similar to the total number of SPAC IPOs reported by these websites. Furthermore, news articles of well-published papers are used to cross-check the SPACs.<sup>7</sup> One main advantage of this method is that the gathered database does not suffer from a survivorship bias. That is, all SPACs have to report by law and the database does not depend on companies reporting voluntarily (Cumming et al., 2014). From 2003 to 2016, 180 SPACs consummated an IPO and completed the entire SPAC lifecycle. All 180 SPACs are included in the general summary statistics.

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<sup>6</sup> <https://spacinsider.com/>, <https://www.spacresearch.com/>, <https://spacalpha.com/> report 86 SPACs that consummated their IPO between 2010 – 2016

<sup>7</sup> For example, see <https://www.ft.com/content/6eb655a2-21f5-4313-b287-964a63dd88b3>

Four different clusters of data are gathered for the analysis: (1) SPAC structure data, (2) SPAC performance data, (3) underwriter data, and (4) merger process data. Table 1 lists the descriptive statistics for the entire data set. A detailed description of all variables can be found in table A1 (*Appendix*).

#### *SPAC structure data*

The structural data contains the lion's share of information and is gathered by screening Forms 424 and 8-K (6-K for foreign entities) filings on the EDGAR database. This data describes the design of the offering, the initial investment of the founders, the redemption thresholds, amount put in the trust account, and other contractual details such as whether a focus area of acquisition (e.g., industry) is pre-defined. Furthermore, information on the SPAC management is gathered whereby management – as defined by this thesis – comprises officers of the SPAC and the president, and vice president of the board. Ordinary board members are not taken into account as they usually serve a passive role. Management is categorized as experienced if one team member has served a role in a SPAC previously. Furthermore, the gross IPO proceeds do not include the over-allotment option granted to underwriters that was exercised in some cases.

#### *SPAC performance data*

Stock data is gathered for third generation SPACs only. Of the 74 third-generation SPACs, ten SPACs had no available stock data and are thus only included in the general statistics but not considered in the stock performance analysis. All daily stock data available from Jan 01, 2010 to Dec 31, 2019 is collected in order to evaluate the stock performance. SPACs founded before 2010 are not analyzed in detail as the long-term stock performances of SPAC 2.0 have been extensively assessed in previous studies (Dimitrova, 2017; Kolb and Tykvova, 2016). Therefore, this paper primarily focuses on SPAC 3.0 and intends to evaluate the performance relative to present benchmarks and the performance of older SPACs. Following Cumming et al. (2014), other performance data such as the time needed to announce a target or complete a merger is calculated using information in 8-Ks and press releases.

In a first step, daily stock data is collected using the Center for Research in Security Prices (CRSP) on Wharton Research Data Services (WRDS). Using the permanent number (PERMNO) the analysis ensures to capture SPACs as well as the post-merger entities. Following Dimitrova (2017), Jog and Sun (2007), Kolb and Tykvova (2016), and Lewellen (2009), the Russell 2000 index is used as a benchmark since SPAC targets are comparable in size to the firms listed in the index. The study retrieves daily index information on the Russell

2000 from “Yahoo Finance” and calculates the returns. In order to account for the larger SPAC sizes of the third-generation SPACs, CRSP’s value-weighted index is also used as a control benchmark as the index reflects the value-weighted return on all NYSE, AMEX, and NASDAQ stocks.

#### *Underwriter data*

For the IPO process, this study uses information on the lead SPAC IPO underwriters. In order to analyze the development of SPAC IPOs the reputation of underwriters has to be taken into account. Therefore, underwriters are ranked using the widely acknowledged Carter-Manaster Ranking (CM-rank) extended by Loughran and Ritter (2004), which is available on Jay Ritter’s website. As developed by Carter and Manaster (1990), the CM-rank has a scale of 0 – 9 (a CM-rank of -9 represents inactive underwriters) and the ranks are available until 2015 only. Assuming that the ranking was stable for one year, the ranks from 2015 are used for 2016 as well. This appears reasonable as the ranks for the individual banks do not fluctuate much throughout the sample period. In order to create a distinctive variable for underwriter reputation, the thesis first assigns each bank a CM-rank. Banks with a CM-rank of 8.0 – 9.0 are considered the most prestigious on a national level. Second, underwriters with a score between 5.0 – 7.9 are regional underwriters with high quality. Lastly, the underwriters with the lowest level of prestige have CM-ranks ranging from 0.0 – 4.9 (Carter and Manaster, 1990). If there is more than one lead underwriter, the equally weighted average of all lead underwriters is taken. The reasoning is that the expertise and accessible potential investor bases are presumably shared among lead underwriters.

#### *Merger process data*

This cluster includes all data regarding the merger i.e., the closing date, the outcome of proxy votes, and the number of shares tendered or redeemed, respectively. “Abstentions” and “Broker Non-Votes” are not considered as they appear in negligible numbers.

### *5.2 Summary statistics: Entire data sample*

Table 1 shows that the vast majority of SPAC IPOs are structured in a very similar way. On average SPACs raise \$118.25 million (excluding the over-allotment option that might have been exercised) with units priced between \$5 and \$10. The units include one share and 1.2 warrants on average. The low standard deviation and small range show that the dispersion is rather small.

Interestingly, the exercise price is on average smaller than the unit price, which might be interpreted as an additional measure to incentivize investors to buy units at the IPO. However, Lakicevic and Vulcanovic (2013) show that the issuance of in-the-money warrants is partly responsible for diluting equity by approximately 35% in case of a merger. From 2003 to 2016, SPACs deposited on average 96.7% of the gross IPO proceeds in a trust account. However, one can observe greater variation here as the values range from 83% to 114% and the standard deviation equals 5%. As mentioned, the amount on the trust account consists of the amount raised in the IPO minus the part of the underwriter fee paid at consummation plus the deferred part of the underwriter fee, and the capital contributed by sponsor's private placements and founder shares. On average, around \$3.35 million are committed by insiders in a private placement.

With regards to the SPAC characteristics, three features are important to note. First, around half of the SPACs had a focus on a specific region and/ or industry, which, according to Lakicevic et al. (2014), correlates with a successful merger completion. Second, the statistics highlight that the vast majority of SPAC founders pay only \$25,000 for the founder shares, which nevertheless amount to 19% of the SPAC's equity in a successful merger scenario.<sup>8</sup> The founder shares constitute the compensation for the SPAC founders, which means that they pay a negligible amount to get hold of around 20% of the SPAC's equity if they fulfill their objective. In case of a liquidation, the founders are paid nothing, and they additionally lose their private placements as those are not redeemable for insiders but get distributed to public shareholders. These observations highlight why closing a merger is likely to be so profitable for SPAC insiders. Lastly, the redemption threshold varies strongly. On average, 51% of shares can be redeemed without forcing the SPAC to liquidate.

The last part of table 1 shows that the actual time needed to announce or complete a merger exceeds the time limit that is set in the contract on average. On average, SPACs need 16 months to announce and 22 months to complete a merger. That is possible if a majority of shareholders vote in favor of an extension of the deadline. In multiple cases the deadline extends automatically by six months if a letter of intent to merger is signed within the time frame. However, this shows that average SPACs exhaust the time they are given.

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<sup>8</sup> The average of \$38,500 is due to one Grubb & Ellis Realty Advisors, founded in 2005/09/07.

**Table 1: Summary statistics (entire data sample)**

| Variable                        | All SPACs |        |                   |       |          |     |
|---------------------------------|-----------|--------|-------------------|-------|----------|-----|
|                                 | Mean      | Median | Std.<br>Deviation | Min.  | Max.     | N   |
| <i>At IPO:</i>                  |           |        |                   |       |          |     |
| Gross Proceeds (\$ mio)         | 118.25    | 60.00  | 132.50            | 7.88  | 900.00   | 180 |
| Unit price (\$)                 | 8.34      | 8.00   | 1.75              | 5.00  | 10.00    | 173 |
| Number of shares                | 1.00      | 1.00   | 0.00              | 1.00  | 1.00     | 174 |
| Number of warrants              | 1.20      | 1.00   | 0.55              | 0.00  | 2.00     | 173 |
| Warrant exercise price (\$)     | 7.33      | 6.00   | 3.16              | 4.50  | 12.50    | 179 |
| Warrant conversion ratio (%)    | 0.91      | 1.00   | 0.24              | 0.50  | 1.00     | 177 |
| Private placement (\$ mio)      | 3.35      | 2.10   | 4.99              | 0.00  | 54.50    | 178 |
| Trust account value (%)         | 96.73     | 98.66  | 5.48              | 82.79 | 114.23   | 180 |
| Underwriter rank                | 4.64      | 4.00   | 2.96              | 1.00  | 9.00     | 178 |
| Over-allotment exercised (%)    | 54.96     | 64.00  | 44.51             | 0.00  | 100.00   | 178 |
| <i>SPAC characteristics:</i>    |           |        |                   |       |          |     |
| SPAC expertise (%)              | 23.03     | -      | -                 | -     | -        | 177 |
| Founder shares (%)              | 19.64     | 20.00  | 6.18              | 10.00 | 78.00    | 176 |
| Founder share (\$ tsd)          | 38.45     | 25.00  | 186.98.           | 1.00  | 2,500.00 | 176 |
| Focus (%)                       | 47.75     | -      | -                 | -     | -        | 177 |
| Redemption threshold (%)        | 51.39     | 30.00  | 37.19             | 0.00  | 100.00   | 177 |
| <i>Operating time (months):</i> |           |        |                   |       |          |     |
| Time limit                      | 19.94     | 18.00  | 3.48              | 12.00 | 36.00    | 178 |
| Time to announcement            | 16.38     | 17.28  | 6.00              | 2.43  | 37.33    | 160 |
| Time to completion              | 21.80     | 23.10  | 6.19              | 7.55  | 39.34    | 142 |

This table shows the summary statistics for the entire data sample. Thus, the time period covered by this summary statistics ranges from 2003 to 2016. *N* differs since not every variable is available for all SPACs. First, *number of shares* and *number of warrants* are the respective securities included in IPO units. *Trust account value (%)* is the amount (\$ million) deposited into the trust account at IPO as share of (*IPO*) gross proceeds (\$ million). Second, *underwriter rank* is the equally weighted Carter-Manaster rank (CM-rank) of the lead underwriters, which ranges from 0 to 9 and a higher value means more prestige. *Founder shares (%)* and *founder shares (\$ tsd)* describe the share and price paid for the founder shares, which constitute the equity compensation for SPAC sponsors. *SPAC expertise (%)* and *focus (%)* are dummy variables. Lastly, *time limit* is the available amount of time defined in the IPO prospectus to announce a merger while *time to announcement* and *time to completion* constitute the actual time needed in month by the SPAC.

### 5.3 Summary statistics: SPAC 2.0 vs SPAC 3.0

As mentioned, all SPACs founded before 2010 are part of SPAC 2.0 and all SPACs that consummated their IPO thereafter are SPAC 3.0. There are 105 SPAC 2.0 and 75 SPAC 3.0. Table 2 offers a cross-generational comparison between SPAC 2.0 and SPAC 3.0. Comparing the two clusters with regards to the IPO offering, one can observe that third-generation SPACs were able to raise on average \$27 million more than SPAC 2.0. Another interesting feature is

the development of the exercise price and conversion rate of warrants. For SPAC 2.0 the exercise price tends to be substantially lower than the unit price and virtually every warrant guaranteed one share per warrant. For SPAC 3.0, on the other hand, the warrants are on average out-of-the-money at IPO and investors receive less than one share per warrant. Both features lead to lower overall dilution for SPAC 3.0 and the target companies. Third, SPAC 3.0 founders commit almost double the amount in private placements compared to the previous generation's founders. In turn, this leads to higher amounts placed in the trust account. In total, 101% of the gross IPO proceeds are placed into the trust while in SPAC 2.0 only around 94% are placed on the escrow account. Lastly, underwriters in SPAC 3.0 are significantly more reputable than the previous generation's underwriters. The CM-rank is on average 1.48 points higher and the difference is significant at the 1% level.

With regards to the SPAC characteristics, table 2 shows that most founders of both generations are awarded with around 20% of the shares in successful merger scenarios for which most of the founders pay \$25,000. The higher mean is driven by one extreme outlier in the second generation. Unsurprisingly, SPAC founders of the later generation are more experienced as many raise follow-up vehicles after successfully launching SPACs previously. Lastly, one can see the impact of the rule changes introduced by NASDAQ, NYSE, and AMEX in 2010. The redemption threshold increases significantly for third-generation SPACs. On average, 90% of the shares can be redeemed without forcing the SPAC to dissolve, which increases the probability of conducting a merger. Operationally, SPAC 3.0 are granted around one month more time and also use more time to announce and complete a merger. To announce a merger, SPAC 3.0 take additional three months, and the difference is significant at the 5% level. It might indicate that SPAC managements screen the market more thoroughly, which may help to identify high-quality targets. In the last part, table 2 shows the voting behavior of shareholders of SPAC 3.0. On average, 36% of shares are redeemed or tendered depending on the SPAC management's decision to hold a proxy vote or to offer the tender alternative before a merger is completed. If a proxy vote is held, a large majority of shareholders opt to vote in favor of the proposed business combination. One explanation might be that the SPAC management conducts a proxy vote only if it is relatively certain that the outcome will be positive.

In conclusion, SPACs evolved significantly between the two generations. SPACs of the third generation are larger in size, have higher personal commitments from the founders, and their IPOs are underwritten by more prestigious investment banks. Additionally, the substantially higher redemption thresholds, the possibility to circumvent a proxy vote via a

tender offer, and an extended time limit should make conducting a business combination more feasible. On the other hand, the substantial incentives for SPAC founders to close a deal are still present and might even get exacerbated by the larger private placements because these increase the at-risk capital.

**Table 2: Cross-generational differences**

| Variable                        | SPAC 2.0 |       |           |     | SPAC 3.0 |        |           |    | Diff.     |
|---------------------------------|----------|-------|-----------|-----|----------|--------|-----------|----|-----------|
|                                 | Mean     | Med.  | Std. dev. | N   | Mean     | Med.   | Std. dev. | N  | Mean      |
| <i>At IPO:</i>                  |          |       |           |     |          |        |           |    |           |
| Gross Proceeds (\$ mio)         | 106.82   | 54.50 | 132.16    | 105 | 134.24   | 75.00  | 132.18    | 75 | 27.42     |
| Unit price (\$)                 | 7.37     | 8.00  | 1.47      | 99  | 9.62     | 10.00  | 1.17      | 74 | 2.25***   |
| Number of shares                | 1.00     | 1.00  | 0.00      | 99  | 1.00     | 1.00   | 0.00      | 75 | -         |
| Number of warrants              | 1.47     | 1.00  | 0.51      | 99  | 0.83     | 1.00   | 0.35      | 74 | -0.64***  |
| Warrant exercise price (\$)     | 5.58     | 5.00  | 0.89      | 105 | 9.81     | 11.50  | 3.55      | 74 | 4.23***   |
| Warrant conversion ratio (%)    | 1.00     | 1.00  | 0.00      | 104 | 0.78     | 1.00   | 0.32      | 74 | -0.22***  |
| Private placement (\$ mio)      | 2.18     | 1.00  | 5.69      | 104 | 4.94     | 4.25   | 3.18      | 75 | 2.76***   |
| Trust account (%)               | 93.82    | 95.33 | 5.36      | 105 | 100.08   | 100.00 | 1.00      | 75 | 6.26***   |
| Underwriter rank                | 4.01     | 3.50  | 2.81      | 104 | 5.49     | 6.00   | 2.98      | 75 | 1.48***   |
| Over-allotment exercised (%)    | 59.31    | 76.00 | 44.15     | 105 | 48.97    | 47.00  | 44.61     | 73 | -10.34    |
| <i>SPAC characteristics:</i>    |          |       |           |     |          |        |           |    |           |
| SPAC expertise (%)              | 18.10    | -     | -         | 105 | 30.14    | -      | -         | 73 | 12.04**   |
| Founder shares (%)              | 19.10    | 20.00 | 4.61      | 102 | 20.39    | 20.00  | 7.81      | 75 | 1.29      |
| Founder shares (\$ tsd)         | 46.99    | 25.00 | 245.42    | 102 | 26.84    | 25.00  | 26.60     | 75 | -20.15    |
| Focus (%)                       | 56.00    | -     | -         | 105 | 34.25    | -      | -         | 73 | -21.75*** |
| Redemption threshold (%)        | 23.80    | 20.0  | 6.05      | 103 | 89.29    | 100.0  | 26.87     | 75 | 65.49***  |
| <i>Operating time (months):</i> |          |       |           |     |          |        |           |    |           |
| Time limit                      | 19.57    | 18.00 | 3.77      | 105 | 20.56    | 21.00  | 2.77      | 74 | 0.99**    |
| Time to announcement            | 15.12    | 16.16 | 5.65      | 95  | 18.14    | 18.02  | 6.09      | 66 | 3.02***   |
| Time to completion              | 21.60    | 23.80 | 5.95      | 83  | 22.07    | 21.19  | 6.56      | 59 | 0.47      |
| <i>Voting:</i>                  |          |       |           |     |          |        |           |    |           |
| Redeemed shares (%)             | -        | -     | -         | -   | 36.45    | 30.26  | 35.18     | 64 | -         |
| Proxy vote (%)                  | -        | -     | -         | -   | 96.21    | 97.28  | 3.70      | 46 | -         |

This table shows the summary statistics per generation. Furthermore, it shows the differences in means between the two clusters. The variables included are the same as in table 1. As *voting* data is only available for SPAC 3.0, the section is left blank otherwise. *Redeemed shares* is the number of shares redeemed prior to the merger and *proxy vote (%)* indicates the share of “For” votes in a merger proxy vote.

\*Significant at 10% level, \*\*Significant at 5% level, \*\*\*Significant at 1% level

## 6. Hypothesis development

### 6.1 SPAC mergers as an IPO alternative in the context of IPO frictions and detriments

To date, the traditional IPO remains the dominant route of accessing U.S. public equity markets. However, going public through a merger with a SPAC has become increasingly popular since the financial vehicle's infancy. In the decision process of going public via an ordinary IPO or via a SPAC merger, private companies must evaluate and weigh up the frictions and detriments inherent in the two alternatives.

Arguably the most economically significant friction of the traditional IPO route is the wealth-loss initial shareholders experience due to IPO underpricing. The underpricing phenomenon occurs in every decade, although its magnitude varies across different time periods. Data from Jay Ritter implies an average underpricing of traditional IPOs of 16.50% during the SPAC 3.0 period (2010-2019).<sup>9</sup> Academic literature has proposed several theories for IPO underpricing (see *Section 4.5*). Among those headings, information asymmetry theories for IPO underpricing can be considered the most established and well-tested. In this context, the thesis argues that the transaction process as well as the dynamic between the involved stakeholders differs greatly between SPAC mergers and traditional IPOs. Most importantly, due to the incentives of SPAC insiders and the negotiation and due diligence, the main information asymmetry explanations do not at all or only marginally apply to SPAC mergers.

Another friction in public equity markets is the substantial cyclicity in the number and volume of IPOs that far exceeds fluctuations in capital demand. Proposed academic theories for the IPO wave “puzzle” centre on mispricing, market timing, information dynamics, and (macroeconomic) external factors (see *Section 4.6*). Naturally, SPACs that are set for a merger with a private company have already consummated their IPO (possibly prior to the beginning of a cold IPO wave or despite of it). Hence, SPACs have capital readily available regardless of the external market circumstances. Further, given the pre-set time period and the incentives of SPAC insiders to consummate a merger, SPACs managers have no reason to abort their *raison d'être* as a response to external market conditions. External market conditions however have two noteworthy potential implications. First, SPAC shareholders may be more inclined to a SPAC liquidation and pro-rata redistribution of funds if market conditions are unfavourable, uncertainty is high, and liquidity is scarce. Second, however, during these times SPAC mergers might be an especially attractive alternative to traditional IPOs from the private

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<sup>9</sup> See figure A2 (*Appendix*)

company perspective. Hence, during cold IPO waves, SPACs potentially draw on a larger and possibly more qualitative pool of potential targets and further enjoy an improved negotiating power. This indicates that SPAC mergers might be able to smooth IPO waves and offer private companies a viable access to public markets in times of depressed IPO activity. Overall, this section develops the following hypothesis:

*H1: SPAC mergers are viable IPO alternatives for private companies as they on average imply less direct and indirect costs and a shorter required time. These effects are especially attractive during cold IPO waves*

## *6.2 SPAC development and implications for SPAC 3.0 performance*

This thesis argues that three parameters that have changed between SPAC 2.0 and SPAC 3.0 are likely to have a noteworthy impact on potential adverse selection issues in SPAC 3.0. First, SPAC 3.0 underwriters are more reputable than those of SPAC 2.0: on average, the CM-rank is 1.48 points higher for underwriters of the third generation. Due to the common practice of a deferred underwriter fee portion, underwriters have a continuous connection to the SPAC and often pitch potential private targets to the SPAC management. Furthermore, underwriters often serve an advisory role in the event of a SPAC merger. If one implies that more reputable underwriters are more competent and have more valuable reputational capital at risk, more prestigious underwriters should mitigate an adverse selection problem. Second, a significantly higher number of SPAC 3.0 management teams have previous SPAC experience compared to those of SPAC 2.0 (30% in SPAC 3.0 vs. 18% in SPAC 2.0). Assuming an upward-trending learning curve among SPAC founders and a market mechanism that efficiently weeds out bad performing SPAC managers and awards good performing ones this observation should affect performance positively. If one, further, assumes reputational capital of repeat players in the SPAC market, this should imply that SPAC 3.0 managers are on average more thorough and capable in identifying value-adding targets. Third, SPAC 3.0 take additional three months to announce a merger when compared to SPAC 2.0. Assuming more time allows for a more thorough assessment of the market and it takes time to sort out potential lemons, this should again imply less adverse selection issues in SPAC 3.0 compared to earlier SPAC generations. Overall, this section advocates the hypothesis that SPACs of generation SPAC 3.0 are less prone to adverse selection problems and hence should on average show improved post-merger performance than their predecessors.

*H2: On average, SPAC 3.0 perform better post-merger than SPAC 2.0 due to mitigated adverse selection issues*

### *6.3 SPAC structure and moral hazard*

SPAC managers are presumably skilled in identifying and acquiring a target, but they rely on the capital provided by public investors. Additionally, the SPAC managers expect very high compensation in case of a merger completion and, therefore, have an incentive to oversell any potential business combination to uninformed public shareholders. Consistent with Myers and Majluf (1984), this implies a classic moral hazard situation. Three features of the SPAC structure and the regulatory environment might have a significant impact on the persistence of moral hazard problems.

The amount committed by SPAC sponsors at IPO i.e., the private placement, is a crucial instrument designed to align interests between in- and outsiders i.e., SPAC sponsors and public investors. As Margiotta and Miller (2000) show, tying the private wealth of managers to performance mitigates the moral hazard problem and organizations in which this is the case perform better. On the other hand, higher private placements increase the at-risk capital, which might further exacerbate moral hazard. Comparing SPAC 2.0 and SPAC 3.0 in the data sample, third-generation SPAC founders commit on average \$2.8 million more than their peers in the previous generation, which is an increase of more than 100%. It is ambiguous, though, how this development affects moral hazard issues. Next, the regulatory environment might have an effect on the moral hazard problem of SPACs whereby two rulings are crucial. First, in 2010 all three major U.S. exchanges adopted the rule that allowed tender offers in lieu of proxy votes and share redemption mechanisms. That is, before a merger is closed, the SPAC management offers every public shareholder the possibility to tender their shares to the SPAC management for a per share price, which equals the pro-rata value of the amount held in the trust account. This rule rendered a proxy vote obsolete, enabling the SPAC management to proceed with the merger without explicit shareholder approval. Second, if redemption mechanisms are in place, the redemption thresholds were substantially increased. That means that a higher percentage of shares could be redeemed without forcing the SPAC to cancel the merger. The rules increased the merger probability for SPACs due to less supervision and higher redemption thresholds. In sum, these rules might worsen the moral hazard problem as they reduce the control mechanisms available to the public shareholders. Lastly, the unchanged compensation structure of SPAC insiders should also contribute to the persistence of moral hazard. Contract theory literature

shows that a performance-based payment scheme mitigates principal agent problems (Sun, 2014). However, the compensation through founder shares in SPACs constitutes an event-based payment. If the SPAC completes a merger, the founders are issued 20% of the SPAC's equity. In case of no merger, the founders forgo the compensation. Evidently, Dimitrova (2017) finds that the compensation structure leads to the closing of value-destroying deals in the second generation of SPACs. In the sample, SPAC 2.0 founders are rewarded with an average of 19.1% of all outstanding shares, while SPAC 3.0 founders receive 20.4% of the shares on average in cases of a consummated merger. The difference is negligible and also statistically insignificant, and no indication is found that the structure changed over time. Taken all three aspects together, this thesis hypothesizes that third-generation SPACs still suffer from moral hazard problems.

*H3: Moral hazard is still prevalent in SPACs*

## 7. Analysis and results

### 7.1 Methodology

The thesis tests the stock performance of SPACs by calculating the long-term buy and hold abnormal returns (BHAR) using the following formula (Kolb and Tykvova, 2016):

$$BHAR(t_1, t_2) = \prod_{t=t_1}^{t_2} [(1 + R_{i,t})] - \prod_{t=t_1}^{t_2} [(1 + R_{b,t})],$$

where  $R_{i,t}$  is SPAC i's return on day t and  $R_{b,t}$  is the return of a benchmark portfolio on day t. The benchmark portfolio is either the Russell 2000 index, CRSP's value-weighted index of all stocks listed on the NYSE, AMEX, and NASDAQ, or a basket of IPO firms that went public at the same time as the SPAC mergers occurred. Although the existing literature commonly chooses the Russell 2000 index as benchmark portfolio, CRSP's value weighted index might be more accurate for benchmarking SPAC 3.0. That is, looking at the summary statistics, SPACs are larger in size and most of the vehicles now list on one of the major stock exchanges. The IPO benchmark is particularly valuable as the thesis mainly focuses on SPAC mergers as an alternative to ordinary IPOs. If there is no quality difference between firms that choose the IPO or SPAC merger route, it should translate into similar returns. A significant difference, on the other hand, in the respective stock performance might indicate the existence of adverse

selection. BHARs are calculated for the 6-, 12-, 24-, and 36-months period whereby  $t_1$  equals the closing or announcement date depending on the model.  $t_2$  is the earlier of the observation period or the delisting date. The BHARs are compared to results calculated by Dimitrova (2017), Howe and O'Brien (2012), and Kolb and Tykvova (2016) who analyze SPACs from 2003 to 2008, 2003 to 2008, and 2003 to 2015, respectively. In particular, Dimitrova (2017) and Howe and O'Brien (2012) are interesting studies as they cover SPAC 2.0 only and thus can be used to compare how SPAC 3.0 developed in terms of long-term performance. It is important to note that Howe and O'Brien (2012) use pure buy and hold returns instead of buy and hold abnormal returns and therefore one has to be cautious in comparing the results. Similar to this study, Dimitrova (2017) and Kolb and Tykvova (2016) on the other hand, use abnormal returns and deploy 12- and 24-months periods. The analysis should give a clear picture of the effect of the structural, operational, and regulatory changes on the performance of SPACs.

#### *Methodology: Short-term stock performance*

In order to assess the short-term stock performance in *Section 7.3 SPAC 3.0 performance*, the study calculates cumulative abnormal returns. Following Dimitrova (2017), CARs are measured over a three-day event window  $[-3,3]$  around the acquisition announcement date and are adjusted for the market and IPO benchmarks' returns. CARs indicate whether the market assesses the intended acquisition positively. The formula used to calculate CARs is:

$$CAR(t_1, t_2) = \frac{1}{N} \sum_{t=t_1}^{t_2} R_{i,t} - R_{b,t},$$

where N is the number of SPACs.

#### *7.2 IPO frictions in the context of SPACs*

In order to test for the hypothesis that no systemic underpricing occurs in SPAC mergers, the thesis tests the first day return of SPACs whereby two dates are tested: (1) the announcement date return and (2) the closing date return. In doing so, the thesis calculates the raw return of the first day of trading, which is a standard measure for underpricing (Ibbotson, 1975). The thesis tests two first day returns, since in case of SPAC mergers it is not absolutely clear how much information is incorporated in the stock price at a point in time. Both methods have pros and cons. At announcement date, the SPAC has to file an 8-K, which incorporates the exact purchase price. Therefore, any significant increase in the stock price of the SPAC, which

eventually might become the stock of the target, should be an indicator for underpricing. However, taking the announcement date might be flawed since the merger completion is not certain. It might be the case that the uncertainty distorts the results i.e., that less reaction is observed. On the other hand, evaluating underpricing at closing date, makes sure that market participants know about the completion of the merger, which eliminates uncertainty. But information “leakage” before the closing date might lead to the fact that information is already incorporated in the stock price. In order to capture both dynamics, this paper conducts its analyses using both dates. Confirming the thesis’ hypothesis, underpricing is found in SPAC mergers to an extremely low degree. The first day return on announcement date in the sample is on average 0.6% and significant at the 10% level. At closing date, the return averages 2.7%, however, the result is statistically not significant. Compared to the decade-based average underpricing of 16.5% in ordinary IPOs between 2010 to 2019, the results clearly indicate that private firms do not leave as much money on the table in SPAC mergers. The reasons might be manifold. First, low information asymmetry between the SPAC’s management and the private target might open up opportunities for the private target to signal the true quality of the firm and to curb the implications of Rock’s (1986) “winner’s curse” through other means than underpricing. Second, due to the merger negotiation and due diligence process in the SPAC merger, the main institutional theories for underpricing do not apply. There is no mechanism equal or similar to underwriter price support and the negotiated merger agreement provides for an extensive opportunity to curb litigation risks. Third, ownership and control theories for IPO underpricing are not fully transferable to the SPAC context. Given the pre-defined SPAC lifespan and the strong incentives of SPAC insiders to complete an acquisition, this thesis assumes that private companies that intend to go public via a SPAC merger should face no issues in strategically selecting a preferred SPAC.

Regarding IPO cyclicity and the role of SPAC mergers, the thesis hypothesizes that due to the fact that SPACs have readily available liquidity in the trust account, they should be able to offer private companies an access to the public markets in a cold phase. Since 2003, only the years 2008 and 2009 are characterized by significantly low IPO activity (figure A4, *Appendix*). In these years, the number of ordinary IPOs decreased substantially, while the number of SPAC mergers remained stable. This indicates that SPACs are able to transfer money that is raised in hot markets into cold markets to a certain degree. However, it is important to note that SPACs are highly likely to be able to smooth cyclicity only for around two years as SPAC IPOs might also be subject to IPO cyclicity. Additionally, the thesis tests whether SPACs conduct better acquisitions during cold phases as it is hypothesized that during

these periods adverse selection is less prevalent. The reason is that SPAC mergers become very valuable for private targets if the public markets are hard to access via ordinary IPOs. Therefore, the long-term BHARs of SPAC mergers in 2008 and 2009, in which IPOs were seldom due to the outbreak of the financial crisis, are assessed. Using the IPO benchmarked BHAR over 24 months, the analysis finds that SPAC mergers between 2008 and 2009 underperform on average by 24%, which is better than the underperformance of SPAC mergers that occurred between 2003 and 2008 (-30%) and 2010 and 2016 (-67%). The difference between the SPAC 3.0 performance and the performance of SPAC mergers from the cold market is significant at the 5% level. The result indicates that SPAC performances may be cyclical due to reduced adverse selection in times in which SPAC mergers are vital to bring private companies to the public markets.

In addition to IPO market frictions, direct costs and time to completion might influence the decision to access public equity markets via a traditional IPO or a SPAC merger. Accessing public U.S. equity markets via an ordinary IPO is associated with substantial regulatory requirements and costs. Riemer (2007) argues that the enactment of SOX has further increased the regulatory burden and associated costs of going public. Consistent with this assessment, a 2006 survey of the consultancy CRA International Inc. shows that SOX-related costs amounted to an average of \$8.5 million for Fortune 1000 companies and \$1.2 million for companies with a market capitalization below \$700 million. Relative to the average revenues, SOX has disproportionately affected smaller firms i.e., firms that constitute the large majority of potential SPAC targets (0.11% for Fortune 1000 and 0.38% for the smaller companies). Although JOBS was specifically designed to ease regulatory hurdles and costs for small companies, Chaplinsky et al. (2017) show that the overall costs of going public via a traditional IPO remain significant. Consistent with these arguments, a recent study by the consultancy PwC that examined over seven hundred IPOs (excluding SPACs) between 2015 and 2020 found that the direct costs of going public add up to a substantial amount in relation to the gross proceeds of issued equity. The relative costs appear to be especially high for smaller IPOs (see figure A5, *Appendix*). Consistent with the increased costs since the enactment of SOX, data from Jay Ritter shows that in comparison to earlier periods, IPO activity has been very low since 2000 and that this decline has been particularly pronounced for small companies. In contrast to these substantial IPO costs, Gleason et al. (2005) find fees of 2.7% of the transaction value in average reverse mergers, the process, which is utilized in a SPAC merger. Furthermore, another study published by PwC shows that a traditional IPO takes approximately one to two years due to substantial time required for planning and assessing whether the private company is fit for an

IPO. On the other hand, completing a SPAC merger takes approximately five to six months with most of this time spent on process execution (S-4 filing, investor briefing and proxy vote, and closing). Lastly, IPOs come with extensive lock-up agreements, which might create liquidity problems for initial shareholders of the private firm. Brau et al. (2003) and Kolb and Tykvova (2016) provide evidence that initial shareholders can convert a larger share of their stock into cash without a lock-up period and achieve a higher cash-out ratio in general in SPAC mergers compared to a traditional IPO.

In sum, the analysis shows that SPAC mergers do not exhibit important frictions prevalent in the IPO market and offer advantages to private firms and thus are legitimate reasons to choose a SPAC merger over an IPO.

### *7.3 SPAC 3.0 performance*

#### *Results: Short-term performance (CAR)*

Looking at the cumulative abnormal returns around the announcement date, the findings show that on average SPACs tend to outperform the market during the three days surrounding the announcement date. This result might indicate that the market evaluates a possible merger in a positive way although the degree to which it does so is unknown. As Dimitrova (2017) remarks, the market might have evaluated SPACs in a very negative way before the announcement, for example, not expecting it to announce a merger at all. Positive CARs show that SPACs perform well relative to the market's prior beliefs. On average, the CARs accumulate to approximately 4.8% for all three benchmarks and the results are significant at the 5% level. Interestingly, companies that announce a merger and are able to complete a merger in the end, experience a significantly positive CAR while firms that fail to merge, do not. Firms that acquire a target earn a CAR between 5.3% and 5.5%. For SPACs that are not able to close the acquisition after announcing it, the study cannot find results, which differ from zero significantly. The results suggest that the market anticipates successful merger completions, which provides valuable information for investors and SPAC insiders alike. Comparing the findings with previous results shows that SPAC 3.0 CARs are not different to second-generation SPACs CARs (Dimitrova, 2017).

**Table 3: Cumulative abnormal returns**

| <i>CAR [-3,3]</i> | SPAC 3.0  |        |                 |        |           |        |
|-------------------|-----------|--------|-----------------|--------|-----------|--------|
|                   | All SPACs |        | Target acquired |        | Liquidate |        |
|                   | Mean      | Median | Mean            | Median | Mean      | Median |
| Benchmarks:       |           |        |                 |        |           |        |
| IPO benchmark     | 0.048***  | 0.002  | 0.055**         | 0.002  | 0.005     | 0.002  |
| CRSP Index        | 0.047***  | 0.002  | 0.053*          | 0.002  | 0.009**   | 0.005  |
| Russell 2000      | 0.048***  | 0.002  | 0.054*          | 0.002  | 0.005     | 0.001  |

This table shows the CARs of SPACs. It summarizes all SPACs of the third generation and, furthermore, it divides the sample into SPACs that acquired a target and SPACs that announced a merger but have not acquired a target in the end and thus had to liquidate. In the data sample are 15 liquidated SPACs and 50 merged SPACs.

\*Significant at 10% level, \*\*Significant at 5% level, \*\*\*Significant at 1% level

### *Results: Long-term performance (BHAR)*

Table 4 shows the results of the BHAR analyses and it becomes clear that SPACs still underperform any of their benchmarks substantially. Post-merger returns tend to be negative. Considering the shortest observation period, six months, BHARs range from -23% to -25% and the SPACs lose more ground against the market and IPO benchmarks with time. The results are similar to those found by Dimitrova (2017) who finds that SPACs underperform the market by approximately 20% six months after closing date. 24 months after the merger the difference between CRSP's value-weighted index and SPACs is -56% on average. Within 36 months after merger completion, SPACs underperform by around 56% and 68% depending on the benchmark. Although the paper hypothesized that SPACs might have overcome the problems prevalent during the vehicle's infancy, SPACs still seem to draw and choose low quality firms. Provided the former is the main cause for poor stock performance this indicates an adverse selection issue. The large differential between the IPO benchmark and SPAC 3.0 points to the conclusion that high-quality firms opt for the IPO route, while lemons choose the SPAC merger alternative. Surprisingly, the IPO benchmark performs as well as the market and, thus, outperform SPACs by a large margin. Although multiple papers find that IPO firms tend to underperform the market, this study cannot confirm it (Ritter, 1991). However, it might be a phenomenon specific to the sample period. For instance, between 2010 and 2016 Renaissance Capital's IPO firm index, which tracks a basket of U.S. IPO firms, performed as solid as the S&P 500 index. Except for the six-month period, the results are very similar if  $t_1$  is defined as the announcement date. After six months, SPAC stocks do not move substantially while the IPO benchmark rises by approximately. 10%. The difference between the returns is significant

at the 1% level throughout all periods. 36 months after the announcement date, SPACs earn an average BHAR of -69% when compared with the IPO benchmark.

**Table 4: Long-term stock performance (BHAR)**

|                               | SPAC 3.0 |      | Benchmark |      | Difference |       |    |
|-------------------------------|----------|------|-----------|------|------------|-------|----|
| Period                        | Mean     | Med. | Mean      | Med. | Mean       | Med.  | N  |
| <i>Panel A: IPO benchmark</i> |          |      |           |      |            |       |    |
| Post-merger:                  |          |      |           |      |            |       |    |
| 6 months                      | 0.83     | 0.82 | 1.08      | 1.10 | -0.25***   | -0.23 | 51 |
| 12 months                     | 0.76     | 0.65 | 1.16      | 1.16 | -0.41***   | -0.41 | 51 |
| 24 months                     | 0.67     | 0.51 | 1.25      | 1.21 | -0.57***   | -0.62 | 52 |
| 36 months                     | 0.62     | 0.51 | 1.29      | 1.29 | -0.67***   | -0.79 | 52 |
| Post-announcement:            |          |      |           |      |            |       |    |
| 6 months                      | 0.96     | 0.99 | 1.10      | 1.11 | -0.14***   | -0.13 | 51 |
| 12 months                     | 0.91     | 0.85 | 1.18      | 1.18 | -0.25***   | -0.31 | 53 |
| 24 months                     | 0.69     | 0.55 | 1.27      | 1.20 | -0.57***   | -0.63 | 54 |
| 36 months                     | 0.66     | 0.52 | 1.37      | 1.34 | -0.69***   | -0.75 | 54 |
| <i>Panel B: CRSP Index</i>    |          |      |           |      |            |       |    |
| Post-merger                   |          |      |           |      |            |       |    |
| 6 months                      | 0.83     | 0.82 | 1.08      | 1.08 | -0.24***   | -0.26 | 51 |
| 12 months                     | 0.76     | 0.65 | 1.14      | 1.15 | -0.38***   | -0.41 | 51 |
| 24 months                     | 0.67     | 0.51 | 1.24      | 1.23 | -0.56***   | -0.62 | 52 |
| 36 months                     | 0.62     | 0.51 | 1.30      | 1.34 | -0.68***   | -0.86 | 52 |
| Post-announcement:            |          |      |           |      |            |       |    |
| 6 months                      | 0.96     | 0.99 | 1.08      | 1.08 | -0.12***   | -0.11 | 51 |
| 12 months                     | 0.91     | 0.85 | 1.14      | 1.15 | -0.23***   | -0.32 | 53 |
| 24 months                     | 0.69     | 0.55 | 1.24      | 1.21 | -0.54***   | -0.63 | 54 |
| 36 months                     | 0.66     | 0.52 | 1.35      | 1.38 | -0.66***   | -0.82 | 54 |
| <i>Panel C: Russell 2000</i>  |          |      |           |      |            |       |    |
| Post-merger:                  |          |      |           |      |            |       |    |
| 6 months                      | 0.83     | 0.82 | 1.06      | 1.06 | -0.23***   | -0.22 | 51 |
| 12 months                     | 0.76     | 0.65 | 1.11      | 1.10 | -0.35***   | -0.35 | 51 |
| 24 months                     | 0.67     | 0.51 | 1.15      | 1.11 | -0.48***   | -0.57 | 52 |
| 36 months                     | 0.62     | 0.51 | 1.18      | 1.17 | -0.56***   | -0.66 | 52 |
| Post-announcement:            |          |      |           |      |            |       |    |
| 6 months                      | 0.96     | 0.99 | 1.08      | 1.10 | -0.12***   | -0.11 | 51 |
| 12 months                     | 0.91     | 0.99 | 1.12      | 1.13 | -0.21***   | -0.29 | 53 |
| 24 months                     | 0.69     | 0.55 | 1.17      | 1.12 | -0.46***   | -0.58 | 54 |
| 36 months                     | 0.66     | 0.52 | 1.23      | 1.21 | -0.55***   | -0.64 | 54 |

This table depicts the long-term performance of SPAC 3.0 and the respective benchmarks. *Difference* shows the difference in means and medians between SPAC 3.0 and the benchmarks. *Post-merger* indicates that the first day of the measurement period is the closing date, while *post-announcement* indicates that announcement date is used.

\*Significant at 10% level, \*\*Significant at 5% level, \*\*\*Significant at 1% level

#### *7.4 Persistence of moral hazard in SPAC 3.0*

In the last part, the study conducts a regression analysis in order to test the third hypothesis. If the updated terms, under which SPACs are set up in the third generation, lead to a better alignment between SPAC insiders and public investors, the moral hazard problem should be reduced significantly. Therefore, the main variable that is put to test is “late merger”. That is, any SPAC that announces a deal shortly before its deadline is more likely to be caught in an agency conflict because the SPAC management faces the imminent pressure to conduct any deal before forgoing the compensation (founder shares) and losing the private placement. Late merger is a dummy variable indicating whether the deal is announced within a month before the SPAC reaches its deadline in which case it would be forced to liquidate.

In all models, the dependent variable is the IPO benchmarked BHAR 24 months after the announcement date. Besides late merger, model (1) includes SPAC characteristics as control variables such as the size of the SPAC’s initial offering. In model (2), the SPAC experience of the management and the underwriter’s status are added. Underwriters are defined as prestigious if the CM-rank is greater or equal to a score of eight. Model (3) furthermore includes the market participants’ reactions. In order to do so, “share redemption”, which is the amount of redeemed or tendered shares in \$ million divided by the IPO gross proceeds, is introduced. Moreover, the model takes the exercised share of over-allotment options, which are exercised by the underwriter as a stabilization mechanism in case of excess demand at IPO, into account.

As shown in table 5, model (1) cannot conclude that the time needed to close a deal has an influence on the performance as the coefficient is not significant. The direction, however, points towards the hypothesis that later mergers might suffer from moral hazard problems of the founders. Model (2) shows that more reputable underwriters might indicate better performance. The result is, however, statistically insignificant. The negative sign for late mergers still prevails, when the other factors enter the model. However, the result is also still insignificant. Lastly, also model (3) finds no significant results. Including variables that are proxies for the market’s assessment of the SPAC’s IPO (share of over-allotment exercised) and the approval of a SPAC merger (ratio of shares redeemed) lead to an even greater negative loading on the later merger coefficient. Again, one has to be very cautious in interpreting the results as they cannot be statistically distinguished from zero.

Although the regression analysis finds no significant results, the results point to the prevalence of moral hazard problems inherent in the SPAC structure. Despite the updated terms and continued development of SPACs, it is not surprising to find these results due to the

incentive structure, which has not substantially changed since the emergence of SPACs. SPAC insiders still face the all or nothing situation and this is likely to create moral hazard, which is especially accentuated at the end of the SPAC's lifecycle.

**Table 5: Regression analysis**

| Independent variable     | Dependent variable             |                 |                 |
|--------------------------|--------------------------------|-----------------|-----------------|
|                          | 24 months BHAR (IPO benchmark) |                 |                 |
|                          | Model (1)                      | Model (2)       | Model (3)       |
| Late merger              | -0.13<br>(0.38)                | -0.13<br>(0.41) | -0.27<br>(0.11) |
| Private placement        | -0.01<br>(0.84)                | -0.01<br>(0.77) | 0.02<br>(0.55)  |
| Redemption threshold     | -0.07<br>(0.84)                | -0.05<br>(0.88) | 0.12<br>(0.76)  |
| Gross proceeds           | 0.00<br>(0.22)                 | 0.00<br>(0.40)  | 0.00<br>(0.76)  |
| Focus                    | -0.02<br>(0.92)                | -0.02<br>(0.93) | -0.02<br>(0.91) |
| Prestigious underwriter  | -                              | 0.07<br>(0.70)  | -0.00<br>(0.99) |
| SPAC expertise           | -                              | -0.10<br>(0.52) | -0.18<br>(0.32) |
| Over-allotment exercised | -                              | -               | -0.01<br>(0.96) |
| Redeemed shares          | -                              | -               | -0.31<br>(0.23) |
| Intercept                | -0.67<br>(0.08)                | -0.67<br>(0.08) | -0.62<br>(0.14) |
| N                        | 54                             | 54              | 49              |
| R-squared                | 0.15                           | 0.16            | 0.25            |
| Adj. R-squared           | 0.06                           | 0.03            | 0.08            |

This table shows the regression coefficients of the long-term stock performance of SPACs. The dependent variable is the BHAR of SPACs against the IPO Benchmark over two years. P-values are shown in parentheses. *Late merger* is the main coefficient that is analyzed and a dummy variable indicating whether SPACs announced a merger within a month prior to the deadline. Moreover, *prestigious underwriter* equals one if the equally weighted CM-rank of underwriters is greater than or equal to 8 (on a scale from 0 to 9). The models control for different SPAC characteristics.

\*Significant at 10% level, \*\*Significant at 5% level, \*\*\*Significant at 1% level

## 8. Limitations

While this study sheds light on the main economic purposes and structural characteristics of SPACs, the analysis faces some limitations.

First, a hand-collected and small data sample limit the research possibilities. This is caused by the unavailability of an extensive database of SPAC IPOs, mergers, and

characteristics. Related to that, SPACs in general and SPAC 3.0 especially, are a fairly new phenomenon and therefore the data sample period is limited by nature. Although the study is confident that its search method described in *Section 5.1* is thorough and comprehensive, it cannot be ruled out that some SPACs have been overlooked. Second, the granularity of the variables can be enhanced. For instance, when analyzing the expertise of SPAC managers, it might be value-adding to take the performance of the SPAC founders' previous vehicles into account and not only the fact whether they gathered experience or not. Similarly, taking not only the CM-rank into account but also specific SPAC expertise of the underwriters, for example by incorporating the stock performance of previously underwritten SPACs, might lead to more insightful analyses. Third, this study calculates the first day return on (1) announcement date and (2) closing date and finds that underpricing is virtually non-existing. However, it might be the case that information is gradually incorporated and that a longer event date window must be examined to reach a final conclusion on SPAC merger underpricing. Fourth, the thesis assumes that adverse selection and moral hazard are the two main issues inherent in SPACs. The analysis tests the hypotheses only by evaluating stock performance. However, other performance metrics might draw a clearer picture on these questions. Regarding adverse selection, for instance, one could compare operational performances of SPAC targets relative to their peers. For moral hazard, on the other hand, one could assess whether SPAC management overstates the target's outlook in the proxy statement presented to the SPAC shareholders. Although the stock performance of SPACs indicates that shareholder value is destroyed, it would be premature to claim that SPACs do not fulfill other legitimate purposes. Due to the fact that the reasons to invest in SPAC IPOs can be manifold, a BHAR analysis might not be an accurate benchmark for all investors. For instance, hedge funds may seek to invest in "options" with capped downside risk and a potential upside. Furthermore, SPACs might be a viable alternative to IPOs for companies seeking access to public markets in times of high uncertainty or if equity funding for a project is needed timely. Therefore, this paper must be viewed in combination with studies that analyze other aspects in order to grasp a holistic picture of SPACs. Last, the evidence on the lower direct costs and other IPO detriments that are not present in SPAC mergers come from examining existing literature and studies. Given more time, one could conduct a study specifically aiming at quantifying direct costs of SPAC mergers. This might be insightful in further answering the question as to why private firms decide to merge with SPACs.

## 9. Discussion and future research

In this section the study attempts to explain why SPAC 3.0 have apparently not overcome structural problems related to moral hazard. Further, theoretical and practical avenues for potential future research are explored.

As seen in the *Section 7.3*, long-term performances of SPACs are still alarmingly poor although some important features changed in the transition from the second to the third SPAC generation. The thesis argues that moral hazard of the SPAC insiders is one main cause for poor performance. The problem is rooted in the much-discussed incentive structure of SPACs. Expecting high rewards most of the time when any target is acquired, SPAC managers might decide to overpay rather than not acquire. Interestingly, the incentive structures have not changed as seen in the summary statistics. SPAC insiders are still rewarded with 20% of the SPAC's equity contingent only on the completion of the merger. Facing a lockup-period of one year only, this can be viewed as a mostly event- and not performance-based payment. The introduction of higher redemption thresholds and the possibility for SPAC management to circumvent a proxy vote completely via offering public shareholders to tender their shares might exacerbate moral hazard. The abolition of proxy votes decreased monitoring and controlling of the SPAC management through public shareholders, which might induce SPAC sponsors to act in their own best interest only. In line with the thesis' hypothesis, Li et al. (2018) show that companies with high agency costs are more likely to avoid shareholder votes and perform worse as an acquirer.

Nevertheless, investors and SPAC founders might innovate SPACs once more and change the incentive structure in future SPACs. One prominent case in point is the largest SPAC raised so far: "Pershing Square Tontine Holdings" (Tontine) founded by hedge fund manager William A. Ackman in July 2020. From its prospectus it becomes clear that this is a new type of SPAC.<sup>10</sup> Three differences are significant. First, Tontine's sponsors buy \$65 million of warrants with an exercise price of \$24 and promise not to exercise the warrants for three years after a business combination. The unit price is \$20, which implies that Tontine's sponsors exercise their warrants only after public shareholders realized a 20% return. In order to cap the dilution, the SPAC managers are awarded a maximum of 5.95% of the shares in the newly merged company, which still represents a lucrative incentive for Tontine. Second, the

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<sup>10</sup> For legal purposes, the sponsor owns 100 shares, which is less than 0.1%. 424B4 filing: <https://www.sec.gov/Archives/edgar/data/0001811882/000119312520197776/d930055d424b4.htm#toc9300556>, accessed on 2020/11/27

unit structure is unique. Besides one ninth of one redeemable warrant, which is traded alongside the shares, shareholders who chose not to redeem their shares are rewarded with an additional two-ninths of a warrant after the merger. Consequently, two-thirds of the warrant is only rewarded to long-term investors, discouraging investors that seek short-term returns by buying and redeeming shares before the merger. Third and most importantly, the sponsors own virtually no shares prior to the IPO, forgoing all founder shares. Combining the founders' warrant structure and the lack of founder shares, the SPAC's founders are discouraged to buy a company that might be value-destroying. Hence, the compensation structure is largely performance based. Thus, this structure theoretically solves the moral hazard issue of the sponsors' compensation. By increasing the stake of the SPAC sponsor through a significantly higher private placement, more capital is at risk, which is shown to be performance-enhancing in the contract theory literature (Gayle and Miller, 2009). It remains to be seen whether this structure will become an industry standard replacing the event-based payment by a performance-based compensation.

In the future, possible research avenues are manifold. First, future research could expand the limited data and explore whether SPAC performance is cyclical as it is indicated in this study. Moreover, researchers could focus on differences in operating metrics between companies that seek a SPAC merger in cold and hot markets. Second, it might be interesting to investigate macroeconomic trends that drive SPAC IPOs and mergers. In 2020 alone, there have been over 200 SPAC IPOs so far, which is more than in this study's entire data set for SPAC 3.0 from 2010 to 2016. Showing which drivers are responsible for this trend is an enlightening future research avenue. For instance, Kolb and Tykvova (2016) conclude in their study that SPAC mergers are very valuable options for private companies in times of high volatility. Other market characteristics such as the abundance of capital might also contribute to this surge.

## **10. Conclusion**

Special purpose acquisition companies offer public shareholders the opportunity to participate in private equity like investment hypotheses. Additionally, SPACs provide private companies with a fast and reliable alternative to access public markets. This paper assesses these notions with a recent sample of SPACs (SPAC 3.0). It first investigates SPACs' role as an alternative for private companies to access public equity markets. Furthermore, the thesis examines the

stock performance of SPACs as an asset class, and structural features, that potentially impact moral hazard and adverse selection in SPACs.

The study finds that SPAC mergers overcome frictions prevalent in the IPO market and thus should theoretically be an attractive alternative for private companies. In particular, the two economically most significant IPO frictions, cyclicity and underpricing, are not found in SPAC mergers. The findings indicate that cyclical IPO markets also lead to relatively good private companies seeking a SPAC merger in times of low IPO activity. Therefore, SPAC mergers might be crucial for providing firms with needed capital. SPACs developed substantially in the transition from SPAC 2.0 to SPAC 3.0: in recent SPACs, managers are more experienced and more prestigious investment banks act as underwriters and advisors. However, SPACs still underperform the market and ordinary IPO firms by a large margin. Over a three-year period, the BHAR amounts to -69%. The magnitude is very similar to the long-term performances found by Dimitrova (2017) for SPAC 2.0. Clearly, SPACs pick lemons and the SPAC literature indicates that moral hazard caused by the extreme incentive structure of SPACs is a main driver for the bad performance. This study confirms the hypothesis by comparing mergers that occur at the end of a SPAC's lifecycle (high moral hazard) to earlier mergers (low moral hazard). Late mergers suffer more from the issue as SPAC founders face the imminent threat of forgoing their compensation and losing committed capital. The late mergers perform 27% worse than earlier mergers, although the result is statistically not significant. SPAC founders seem to be willing to undertake bad acquisition in order to get their equity reward. As Lewellen (2009) concludes, SPACs are comparable with private equity funds. Thus, the compensation structures (i.e., to date mostly event-based vs. performance-based) should also resemble each other to mitigate moral hazard prevalent in SPACs.

Surprisingly, despite the poor performance, SPAC IPOs and mergers reached unprecedented levels in recent years. The thesis names legitimate reasons for SPACs as a financial vehicle. However, to serve a value-adding shareholder purpose, SPACs must align the interests between public investors and SPAC insiders by adjusting their compensation structures.

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## **Appendix**

**Table A1: Variable description**

| Variable                      | Description                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>At IPO:</i>                |                                                                                                                                                                                                                                                                                                                                      |
| Gross proceeds (\$ mio)       | IPO gross proceeds is the amount in \$ million, without any over-allotment options, that was raised from public shareholders in a SPAC's IPO                                                                                                                                                                                         |
| Unit price (\$)               | The price per unit paid by public shareholders in \$                                                                                                                                                                                                                                                                                 |
| Number of shares              | The number of shares included in an IPO unit                                                                                                                                                                                                                                                                                         |
| Number of warrants            | The number of warrants included in an IPO unit                                                                                                                                                                                                                                                                                       |
| Warrant exercise price (\$)   | The price, which is paid if the warrants is exercised                                                                                                                                                                                                                                                                                |
| Warrant conversion ratio (%)  | Number of shares (part of share) that one warrant converts to                                                                                                                                                                                                                                                                        |
| Private placement (\$ mio)    | Amount in \$ million that is paid by SPAC founders to purchase either units and/ or warrants at IPO                                                                                                                                                                                                                                  |
| Trust account (%)             | The amount that is placed into the trust account upon IPO completion relative to IPO gross proceeds. It also includes any private placements and deferred underwriter fees                                                                                                                                                           |
| Underwriter rank              | Carter-Manaster rank for underwriters. The rank ranges from 0 to 9 with 9 being the highest (most prestigious). It is publicized on Jay Ritter's website                                                                                                                                                                             |
| Over-allotment exercised (%)  | The share of over-allotment options exercised relative to the amount granted                                                                                                                                                                                                                                                         |
| <i>SPAC characteristics:</i>  |                                                                                                                                                                                                                                                                                                                                      |
| SPAC expertise (%)            | Indicates whether a SPAC management board member has experience at a management board of any SPAC (dummy = 1 if yes). The mean is the share of SPACs with one or more experienced members.                                                                                                                                           |
| Founder shares (%)            | The percentage of total shares that founders acquire before an IPO                                                                                                                                                                                                                                                                   |
| Founder shares (\$ tsd)       | The amount in \$ thousand paid by SPAC founders for the founder shares                                                                                                                                                                                                                                                               |
| Focus (%)                     | Indicates whether the SPAC defines a specific industry and / or country that it wants to purchase a company in (dummy = 1 if yes). The mean is the share of SPACs with a focus.                                                                                                                                                      |
| Redemption threshold (%)      | Percentage of shares that can be redeemed before merger without forcing the SPAC to liquidate                                                                                                                                                                                                                                        |
| <i>Operating time (month)</i> |                                                                                                                                                                                                                                                                                                                                      |
| Time limit                    | Time (in month) that SPACs are allowed to look for a target before returning the amount held in a trust account. It is the minimum amount that SPACs have as this deadline can be extended if shareholders approve. It also extends automatically in many cases by six months if a letter of intent is signed within the time period |
| Time to announcement          | Time (in month) until SPAC announced a merger                                                                                                                                                                                                                                                                                        |
| Time to completion            | Time (in month) until SPAC completes a merger ("consummation date" or "closing date")                                                                                                                                                                                                                                                |
| <i>Voting:</i>                |                                                                                                                                                                                                                                                                                                                                      |
| Redeemed shares (%)           | Percentage of shares relative to all shares that is redeemed before merger                                                                                                                                                                                                                                                           |
| Proxy vote (%)                | Percentage of shares relative to all shares with voting rights that is voted in favor of a merger                                                                                                                                                                                                                                    |

**Table A2: Listing rules on major stock exchanges for SPAC 3.0**

| Regulation                                         | NASDAQ                                                                | NYSE                                                                                                                                                                                 | AMEX                                    |
|----------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Trust account value                                | 90%                                                                   | 90%                                                                                                                                                                                  | 90%                                     |
| Max. time limit                                    | 36 months                                                             | 36 months                                                                                                                                                                            | 36 months                               |
| (Net) value of target                              | At least 80% of the trust account value                               | At least 80% of the trust account value                                                                                                                                              | At least 80% of the trust account value |
| Business combination approval (before rule change) | Must be approved by a majority of shareholders and board of directors | Majority vote of shareholders                                                                                                                                                        | Majority vote of shareholders           |
| Redemption threshold (before rule change)          | 40%                                                                   | 40%                                                                                                                                                                                  | 40%                                     |
| Other                                              |                                                                       | SPAC founders must waive their right to receive distribution upon liquidation. IPO underwriter must waive their right to receive the deferred underwriter fee in case of liquidation |                                         |

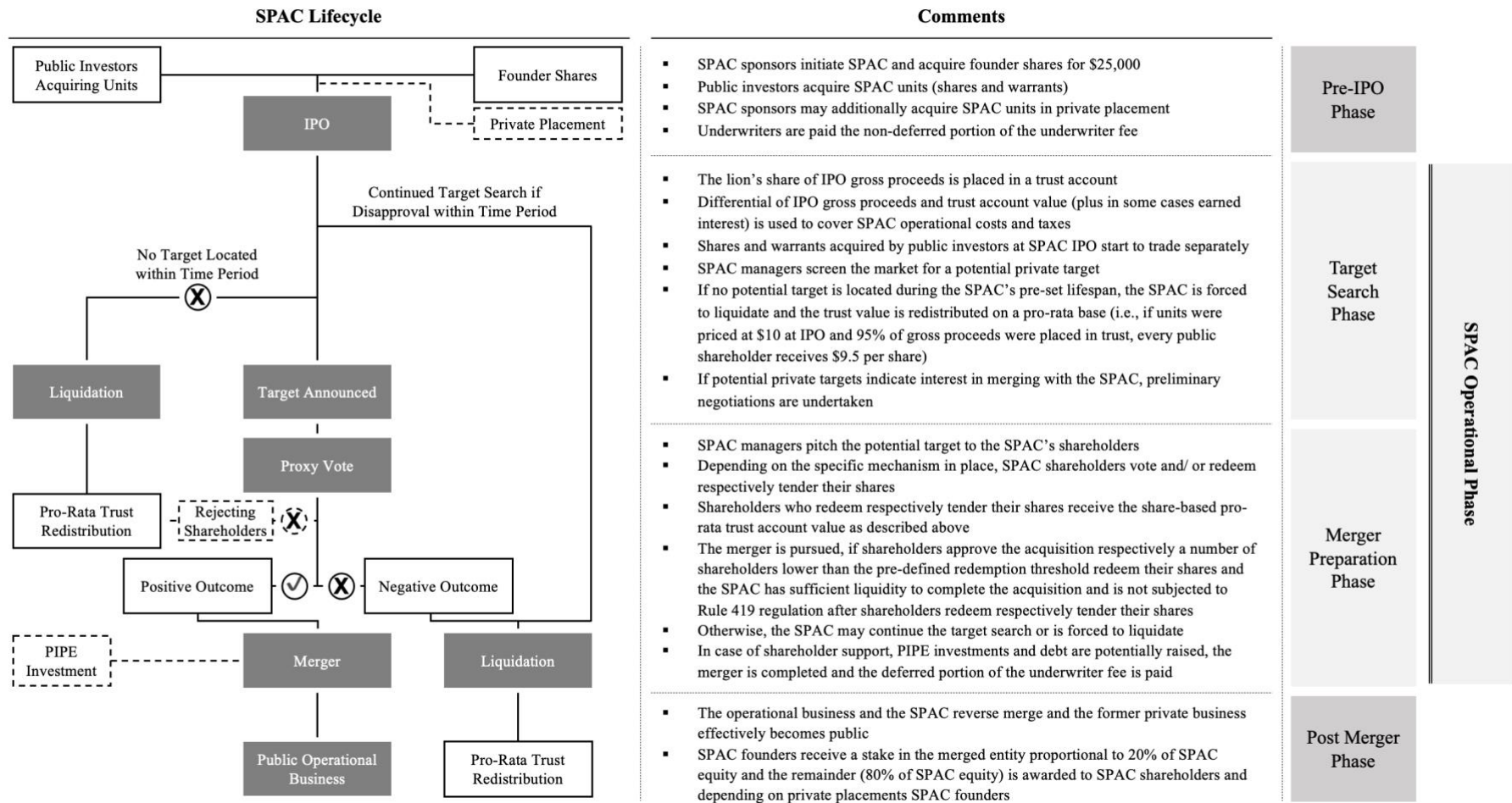
The table depicts listing rules for SPACs on the three major U.S. exchanges. It includes listing rules that disappeared with the rule changes in 2010/ 2011. Especially, *business combination approval* and *redemption threshold* changed through the rule. Business combinations do not need approval anymore.

**Table A3: Rule 419 vs. SPAC rules (illustrative example of SPAC 3.0)**

|                                                           | Terms of the offering                                                                                                                                                                                                                                                                                                                                                                                                   | Rule 419                                                                                                                                                                                                     |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Escrow account                                            | \$51,000,000 of the net IPO gross proceed, private placement, and deferred underwriter are placed into the trust account, which amount to 101% relative to the gross IPO proceeds.                                                                                                                                                                                                                                      | \$46,082,813 would be required to be deposited into an escrow account.                                                                                                                                       |
| Limitation of fair value or net assets of target business | The business combination must be with one or more target businesses, which have an aggregate fair market value of at least 80% of the value of the trust account at the time the merger is consummated.                                                                                                                                                                                                                 | Fair value of a business to be acquired represents at least 80% of the maximum offering proceeds.                                                                                                            |
| Trading of securities issued                              | The units will begin trading on the IPO consummation date. Each of the common stock and warrants shall trade separately on the tenth business day following the earlier to occur of: (i) the expiration of the underwriters' over-allotment option (ii) the full exercise of the over-allotment options or (iii) the announcement by the underwriters of their intention not to exercise all the over-allotment option. | No trading of the units or the underlying common stock and warrants would be permitted until the completion of a business transaction.                                                                       |
| Exercise of warrants                                      | The warrants cannot be exercised until either 30 days after completion of the initial business transaction and one year from the date of this prospectus. The warrants expire worthless in case of no merger completion.                                                                                                                                                                                                | The warrants could be exercised prior to the completion of a business transaction, but securities received, and cash paid in connection with the exercise would be deposited in the escrow or trust account. |
| Time limit<br>Election to remain an investor              | 24 months<br>The company will not provide the shareholders the chance to vote on a business combination. Instead, shareholders will be offered to redeem their shares according to the tender rules of the SEC. If shareholders decide to redeem, each share entitles to the pro-rata value per share to be returned to the investor.                                                                                   | 18 months<br>Investors must notify the company regarding her decision to be an investor or not. If no notice reaches the company, the investment will be returned to the investor.                           |
| Release of funds                                          | Funds will be released, and every shareholder will be returned her pro-rata value of shares in case of (i) a failure to consummate a business transaction within the specified time frame or (ii) a successful business combination.                                                                                                                                                                                    | Funds will be released in case of the earlier of the closing of a business combination or the failure to consummate a business combination.                                                                  |

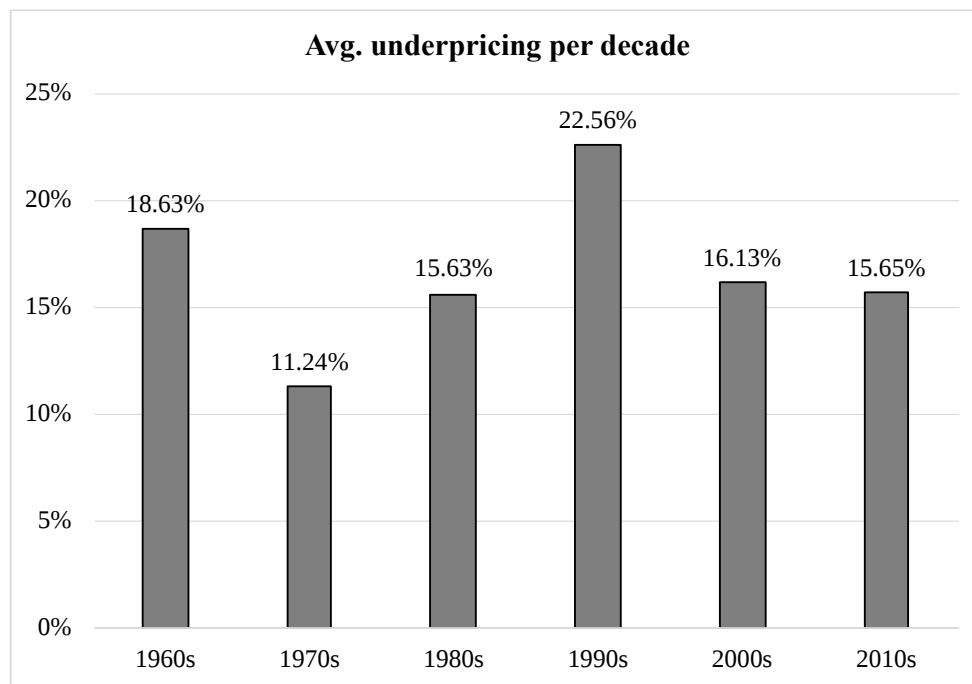
This table depicts illustratively how of SPAC 3.0 offerings differed to Rule 419 rules. Such a table is included in every prospectus of SPACs (Forms 424).

**Figure A1: SPAC lifecycle**



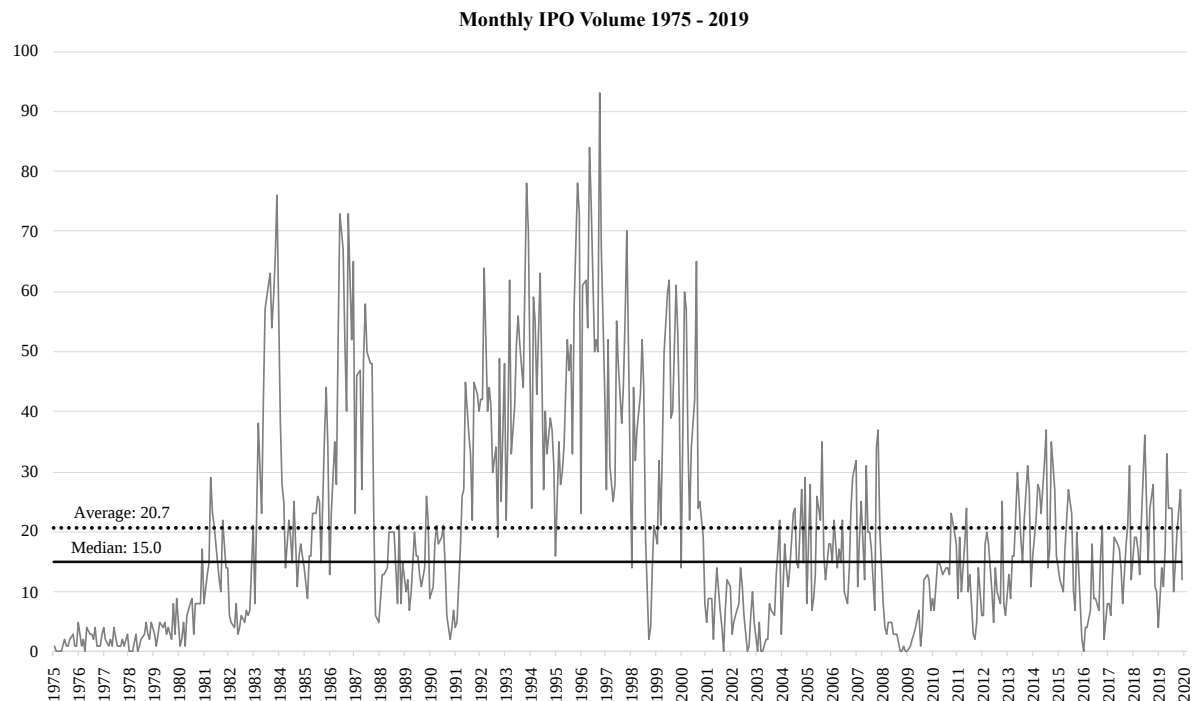
The figure illustrates the different stages in a SPAC's lifecycle. On the left-hand side, it illustrates the lifecycle from the purchase of founder shares by the SPAC sponsors to either (1) the liquidation and pro-rata trust redistribution or (2) a successful merger completion. The right-hand side divides the SPAC lifecycle into different categories and describes the most important aspects of each phase.

**Figure A2: IPO underpricing**



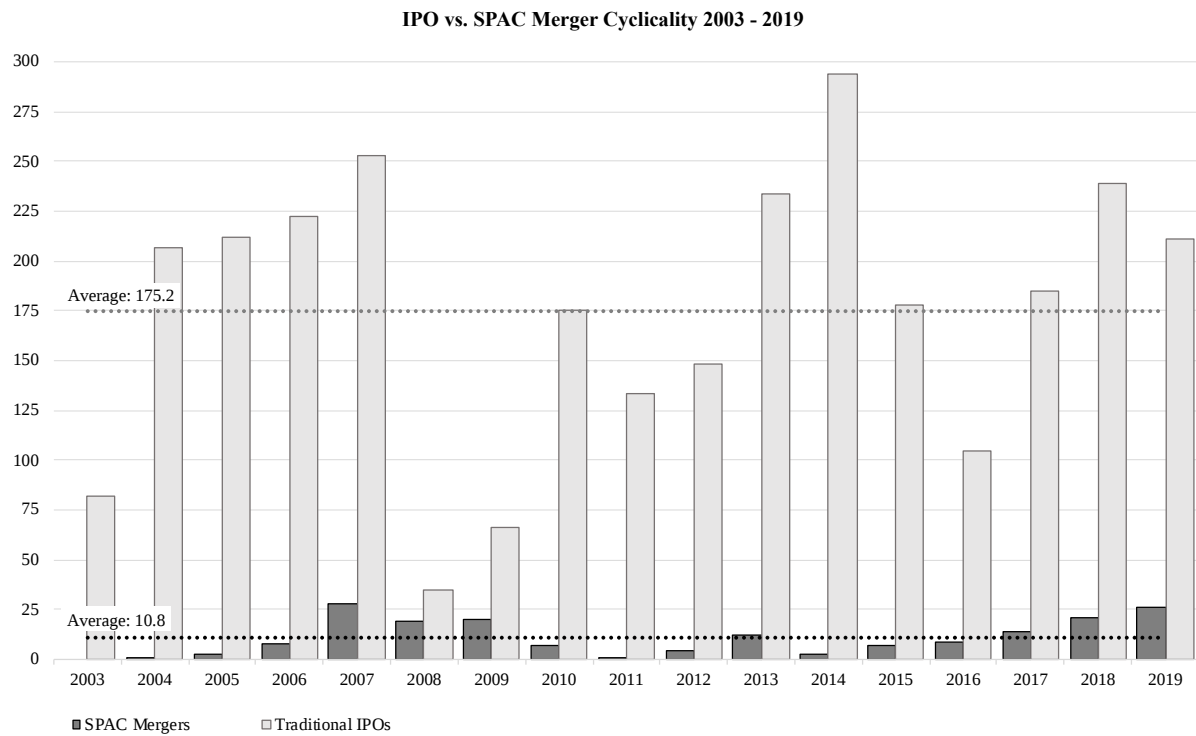
This figure depicts the degree of underpricing in the U.S. per decade. It is defined as the average raw first day of return of a stocks that consummated their initial public offering.

**Figure A3: IPO cyclicalty (1975 – 2019)**



This figure shows the monthly number of IPOs in the U.S. The continuous line shows the median number per month while the dotted line depicts the average.

**Figure A4: IPO vs. SPAC mergers (2003 – 2019)**



The table shows the number of ordinary IPOs in comparison with the number of SPAC mergers from 2003 to 2009 on a yearly basis. The light columns depict the IPOs per year while the dark columns depict the SPAC mergers. Similarly, the light, dotted line indicates the average number of IPOs per year and the dark, dotted one shows the average number of SPAC mergers per year.

**Figure A5: IPO direct costs**

| Deal Value             | Underwriter Fees  |                   | Legal Fees        |                   | Accounting Fees   |                   | Printing Fees     |                   | SEC Registration  |                   | FINRA             |                   | Exchange Listing  |                   | Total Miscellaneous |                   |
|------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---------------------|-------------------|
| <i>mio.</i>            | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i> | <i>Max (tsd.)</i> | <i>Min (tsd.)</i>   | <i>Max (tsd.)</i> |
| <b>\$25 - \$99</b>     | \$1,620           | \$7,470           | \$175             | \$2,800           | \$20              | \$1,400           | \$10              | \$150             | \$3               | \$12              | \$2               | \$11              | \$5               | \$50              | \$10                | \$881             |
| <b>\$100 - \$249</b>   | \$6,216           | \$17,609          | \$140             | \$9,000           | \$50              | \$5,300           | \$36              | \$1,600           | \$10              | \$98              | \$10              | \$226             | \$20              | \$358             | \$3                 | \$5,687           |
| <b>\$250 - \$499</b>   | \$10,709          | \$33,810          | \$412             | \$6,373           | \$150             | \$625             | \$35              | \$2,000           | \$29              | \$94              | \$16              | \$151             | \$0               | \$345             | \$7                 | \$6,100           |
| <b>\$500 - \$1,000</b> | \$24,106          | \$51,750          | \$1,431           | \$6,285           | \$300             | \$5,000           | \$180             | \$2,000           | \$64              | \$196             | \$64              | \$226             | \$25              | \$367             | \$22                | \$7,616           |
| <b>&gt; \$1,000</b>    | \$40,064          | \$106,110         | \$1,400           | \$15,000          | \$170             | \$50,000          | \$214             | \$2,000           | \$122             | \$1,254           | \$145             | \$226             | \$25              | \$500             | \$61                | \$7,740           |

| Deal Value             | Underwriter Fees  |                 | Legal Fees        |                 | Accounting Fees   |                 | Printing Fees     |                 | SEC Registration  |                 | FINRA             |                 | Exchange Listing  |                 | Total Miscellaneous |                 |
|------------------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|---------------------|-----------------|
| <i>mio.</i>            | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i> | <i>% of IPO</i> | <i>Avg (tsd.)</i>   | <i>% of IPO</i> |
| <b>\$25 - \$99</b>     | \$4,545           | 7.33%           | \$1,488           | 2.40%           | \$710             | 1.15%           | \$80              | 0.13%           | \$7               | 0.01%           | \$6               | 0.01%           | \$28              | 0.04%           | \$446               | 0.72%           |
| <b>\$100 - \$249</b>   | \$11,912          | 6.83%           | \$4,570           | 2.62%           | \$2,675           | 1.53%           | \$818             | 0.47%           | \$54              | 0.03%           | \$118             | 0.07%           | \$189             | 0.11%           | \$2,845             | 1.63%           |
| <b>\$250 - \$499</b>   | \$22,260          | 5.94%           | \$3,393           | 0.91%           | \$388             | 0.10%           | \$1,018           | 0.27%           | \$62              | 0.02%           | \$83              | 0.02%           | \$173             | 0.05%           | \$3,054             | 0.82%           |
| <b>\$500 - \$1,000</b> | \$37,928          | 5.06%           | \$3,858           | 0.51%           | \$2,650           | 0.35%           | \$1,090           | 0.15%           | \$130             | 0.02%           | \$145             | 0.02%           | \$196             | 0.03%           | \$3,819             | 0.51%           |
| <b>&gt; \$1,000</b>    | \$73,087          |                 | \$8,200           |                 | \$25,085          |                 | \$1,107           |                 | \$688             |                 | \$185             |                 | \$263             |                 | \$3,900             |                 |

| Deal Value             | Total Fees        |                 |
|------------------------|-------------------|-----------------|
| <i>mio.</i>            | <i>Avg (tsd.)</i> | <i>% of IPO</i> |
| <b>\$25 - \$99</b>     | \$7,309           | 11.79%          |
| <b>\$100 - \$249</b>   | \$23,181          | 13.28%          |
| <b>\$250 - \$499</b>   | \$30,428          | 8.12%           |
| <b>\$500 - \$1,000</b> | \$49,816          | 6.64%           |
| <b>&gt; \$1,000</b>    | \$112,515         |                 |

This figure depicts direct costs that arise on average divided into the amount raised (*Deal Value*) in \$ mio and separate categories e.g., underwriter fees. The average, minimum, and maximum costs are shown. Furthermore, the costs are shown as a share of proceeds raised in the IPO. The third row depicts the sum of all fees (*Total Fees*) for an average IPO in the *Deal Value* range in \$ tsd and as a percentage share of IPO proceeds.