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IPO OR SPAC: A QUANTITATIVE ANALYSIS OF VENTURE CAPITAL PREFERENCES IN PUBLIC EXITS

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Abstract:

2020 marked the beginning of a boom of special purpose acquisition companies (SPACs). As all these SPACs look for acquisition targets, this study raises the question if exiting using SPAC acquisitions is a viable exit strategy for venture capital backed firms or if the VC industry still prefers traditional IPOs. The results from the analysis of 1303 public exits between 2010 and 2020 indicate that venture capital backed firms tend to prefer traditional IPOs and avoid merging with a SPAC as a public exit strategy. Moreover, for firms controlled by venture capital, the preference for an IPO is even stronger.

Keywords: Finance, Entrepreneurial Finance, Venture Capital, Special Purpose Acquisition Company, SPAC, IPO, Exit Strategy, Public Exit, Going Public, Venture Capital Decision-Making

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1 Introduction

Special purpose acquisition companies (SPACs) are cash shell firms founded with the intent of going public and to merge with an operating, private business. Despite strong IPO activity, SPACs boomed in 2020. This boom led to an overall increase in active SPACs looking for operating firms as acquisition targets. For operating firms, going public is a major event in the lifecycle of the business. On the one hand, it enables the firm to raise money to grow the business further. On the other hand, it allows existing shareholders to liquidate some of their holdings. One of the most important shareholders of young companies are venture capital (VC) firms, which rely on public exits of their portfolio companies (Bayar and Chemmanur 2011, 1756). VC firms have a significant influence and interest in the public exit of their portfolio companies. For all these new SPACs to successfully acquire a target, they must convince the VC industry that a SPAC acquisition is an attractive public exit strategy.

This study raises the question of whether VC firms consider an exit of their portfolio company via a SPAC acquisition as a viable public exit strategy and if they prefer it over the traditional IPO by empirically examining the impact of venture capital backing on the public exit strategy of firms. The current literature provides inconsistent results with arguments going both ways. Only the study of Kolb and Tykova (2016) finds empirical evidence that venture capital might prefer one strategy over the other. However, as the study includes VC involvement as one of many variables in the analysis, the statistical evidence is very limited. Thus, this study contributes to this limited and still emerging research on public exit strategies for venture capital firms by improving on the analysis of Kolb and Tykova (2016). Focusing on the venture capital perspective by looking within a VC-backed sample and increasing the sample size closes an important gap in the research on public exits of VC firms.

2 Literature Review

2.1. Public Exit Strategies

A company can use different public exit strategies to become publicly listed, namely, an initial public offering, a merger with a SPAC and a direct listing. The following paragraphs present these strategies in more detail.

Initial Public Offering (IPO):

The most established public exit strategy is an initial public offering (Chemmanur and Fulghieri 1999). In the process of an IPO, the company issues shares to a large number of diversified, institutional investors (Ibbotson and Ritter 1995, 993). The primary motivation to go public via an IPO is to raise additional capital and create a public market where founders and other shareholders can trade their shares (Ritter and Welch 2002, 1796; Kim and Weisbach 2008). The first step of this process is to choose an underwriter. The underwriter prepares the company for the IPO, commits to the liability of buying the stock inventory, and sell to the public at the determined IPO price. After identifying an underwriter, the company and the underwriter prepare the legal documentation to comply with SEC rulings (Brau and Fawcett, 2006). Other documents include marketing material, which the firm uses in roadshows to convince institutional investors to sign shares. After knowing institutional investors' demand regarding the issue, the company and the underwriter decide on the offer price and the number of shares sold at the IPO. The last step of the process is the final public offering at the stock exchange. At the IPO date, the underwriter releases the issued shares to the market and officially lists the stock. From that point onwards, public investors can trade it.

Special Purpose Acquisition Companies (SPACs):

A SPAC is a company founded with the sole purpose of acquiring a company (target) in the future of the lifecycle of the SPAC. SPACs are often considered as "blank-check" or "cash-shell" companies (Jenkinson and Sousa 2011, 3) as they do not have an operating business, but only cash proceeds raised during the IPO of the SPAC. Operating companies can make use of SPACs to become publicly listed by merging with a SPAC. Merging with a SPAC to become publicly listed presents an alternative to the traditional IPO (Lewellen 2009). This new way has gained traction in public as a merger with a SPAC is often regarded as having relative advantages to a traditional IPO when it comes to the legal requirements, costs, and completion time.

It is important to review the lifecycle of a SPAC to understand how SPACs work. Shortly after its incorporation, the management team takes the SPAC public to raise the necessary funds to acquire a company (Jenkinson and Sousa 2011, 19). At the IPO, the SPAC has neither a functioning operating business nor a clear intention, which target to acquire to avoid extensive regulatory disclosure in the IPO prospectus required by the SEC. After the IPO, the SPAC only consists of the founder team and the raised cash proceeds. However, the company cannot access the cash until it acquires the company, and thus the proceeds are placed in a trust until that point (Jenkinson and Sousa 2011, 20). The managers of a SPAC have 18 months to identify a potential target. Before the management of the SPAC can acquire the identified target, the shareholders of the SPAC have the opportunity to vote on whether the target should be acquired or not. An acquisition is approved if the majority of the shareholders vote in favour of the deal. The managers of the SPAC must conclude the acquisition of the target within 24 months after the IPO (Jenkinson and Sousa 2011). If the founders of the SPAC do not manage to acquire a company within this time, public market investors receive back their cash. In such a scenario, the founders of the SPAC lose their invested capital. This mechanism serves as an incentive

for the founders of the SPAC to acquire a target. However, due to this heavy incentive, the management of a SPAC might choose targets, which are not an optimal choice for an acquisition (Jenkinson and Sousa 2011, 19).

Direct Listings:

Direct Listings are a relatively new public exit strategy. This new form of public exit is a response of founders and VC firms to the increase in underpricing over the last years in traditional IPOs, especially for venture capital backed companies (Loughran and Ritter 2002, 416). Direct listings eliminate the problem of underpricing for the firms as no underwriter is involved. The motivation for a firm to go public via a direct listing is not to raise capital but instead to provide a liquid, open market for company shareholders (Nickerson 2019, 987). A direct listing refers to a privately held company's stock, listed for trading on a national stock exchange without an underwritten offering (Gibson Dunn 2021). The process of direct listings is the same process as the one used for opening the stock every morning (NYSE 2021). In the process, a direct market maker uses past, private transactions reference prices and gauges supply and demand to derive an opening price for the stock. According to Crabb (2019, 3), direct listings might have the opportunity to represent a viable alternative to the IPO process. Still, more companies need to demonstrate that the process works to make it happen. Thus, most companies prefer the traditional IPO process or a SPAC acquisition to go public (Lowry, Michaely and Volkova 2017).

As only a few firms consider this strategy to go public, this public exit strategy is not included in this paper.

2.2. The role of venture capital firms in public exit strategies

VC firms are a well-established player in the going public field and are involved in many going-public decisions of firms (Bayar and Chemmanur 2011, 1757). Suppose venture capital firms are involved in the going-public process of a portfolio company. In that case, they have clear objectives and try to identify the most attractive public exit channel to achieve these objectives and maximise their results. A review of the literature on venture capital exit strategies and decision-making (e.g. Lerner 1994, 19-24; Schwert 2002, 11-26; Giot and Schwienbacher 2007, 693-702; Gompers 1996, 138-155; Subrahmanyam and Titman 1999) finds that venture capital firms mainly consider the following criteria and objectives when going public: market volatility and public valuations (market conditions), cost of the process, reputational implications for the venture capital firm, time for completion and cash-out potential. The next part will compare the public exit strategies along the assessment criteria used by VC firms.

Valuation:

One of the most critical factors a VC firm considers when exiting a portfolio company is the return of the overall investment. Thus, VC firms aim for a high exit valuation (Derrien 2003). Lerner (1994, 294) finds proof for this argument, showing that VC firms try to time the market, hence taking more portfolio companies public when valuations are high. Likewise, Lerner (1994) finds that IPO activity drops significantly in times of low valuations, which is in line with the findings of Ljungqvist, Nanda and Singh (2006).

Comparing both exit strategies, Greene (2015) finds that for companies with similar pre-exit characteristics, the wealth post public exit for the shareholders is similar regardless of the chosen exit strategy. However, Gahng, Ritter and Zhang (2021) argue that SPACs potentially allow operating firms to negotiate higher valuations than IPOs do. Two reasons enable

operating firms to negotiate higher valuations. The first reason is that other than firms going public through an IPO, firms merging with SPACs can publish forward-looking statements. These statements allow to exaggerate future operating performance (Klausner, Ohlrogge and Ruan 2020), leading to the opportunity to negotiate higher pre-money valuations (Gahng, Ritter and Zhang 2021, 14). The second reason for the increased negotiation power of operating firms lies in the recent SPAC boom. This boom might result in an increasing number of SPACs chasing a relatively stable number of potential operating firms, enabling those firms to negotiate higher valuations for the merger in the future (Gahng, Ritter and Zhang 2021). To conclude, the academic literature does not offer clear evidence that one exit strategy delivered significantly higher valuation for the shareholders in the past but suggests that SPACs should theoretically have a small advantage.

Risk of Failure:

A failure of the public exit process might result in significant difficulties for the portfolio companies in the form of liquidity issues or even insolvency. Therefore, choosing an exit strategy with a high certainty that the public exit succeeds is essential.

Comparing both public exit strategies, SPAC mergers seem to offer a higher degree of certainty than IPOs because traditional IPOs rely on positive sentiment and low market volatility of the IPO market (Ritter 1991). A sudden change in sentiment and high market volatility might decrease the chance of success of an IPO or even result in a failure of the process (Ritter 1991). The reverse merger with a SPAC is sentiment agnostic, meaning that the merger can be executed even in markets with higher volatility because the firm entering the public market does not have to convince a large number of external, institutional investors (Kolb and Tykova 2016, 81). In line with this, Gahng, Ritter and Zhang (2021) argue that going public via a SPAC

provides a higher relative certainty that the deal goes through. Hence, merging with a SPAC should have a small, relative advantage regarding the risk of failure. However, if a firm has venture capital backing, the firm can signal quality, significantly reducing the risk of failure (Megginson and Weiss 1991).

Costs of the Process:

VC firms are return driven, and thus costs are also part of the consideration of a VC firm when choosing an appropriate exit strategy (Nahata 2008, 128). Costs of a public exit process consist of direct and indirect costs.

In terms of direct costs, Aydogdu, Shekhar and Torbey (2007) conclude that going public via a reverse merger reduces direct costs significantly compared to a traditional IPO. Gleason, Rosenthal and Wiggins (2005) confirm this. Their study shows that fees for reverse mergers are only 2.7% of the total transaction volume and the fees of a traditional IPO correspond to 7.2%. The main reason for this difference is that firms that decide to take the traditional IPO route for entering the public market must fulfil strict legal requirements and intense due diligence to list at an exchange (Gleason, Rosenthal and Wiggins 2005). As SPACs are already public, companies entering the public market using this vehicle do not need to fulfil the requirements of the IPO process and get listed without an extensive SEC registration process. This reduces the costs of going public significantly (Gleason, Rosenthal and Wiggins (2005).

Comparing the indirect costs of the process, firms must consider three cost-drivers. The first driver is underpricing (Beatty and Ritter 1986), the second driver is the dilution of the original shares, and the third is internal resources allocated to the process. Ritter and Welch (2002) and Ghao, Ritter and Zhu (2013) show that shares in a traditional IPO are often significantly

underpriced, resulting in a wealth transfer to the institutional investors. Lee and Wahal (2004) and Ljungqvist (1999) indicate that VC-backed firms encounter even higher underpricing from 1980 to 2000. Gleason, Rosenthal and Wiggins (2005) show that underpricing for SPACs is significantly lower. The main reason why SPAC mergers are less underpriced than IPOs is that all parties involved agree on the market value in advance (Gleason, Rosenthal and Wiggins 2005). Comparing the dilution as the second cost-driver, Gahng, Ritter and Zhang (2021) show that SPAC mergers are subject to a higher degree of dilution. The dilution stems from warrants and options (Gahng, Ritter and Zhang 2021, 28). IPOs, on the other hand, involve less dilution for the original shareholders (Gahng, Ritter and Zhang 2021, 32). Internal resources represent the last cost-driver of indirect costs associated with the public exit process. In a traditional IPO, the firm's managers going public need to convince outside investors to invest in the IPO of the firm, leading to indirect costs (Aydogdu, Shekhar and Torbey 2007, 3). Companies choosing the SPAC reverse merger strategy as an exit strategy do not need to allocate as many resources as they do not have to convince outside investors.

Overall, recent evidence of Gahng, Ritter and Zhang (2021), comparing the total costs of the different public exit strategies, suggests that SPACs are significantly more expensive compared to IPOs. Gahng, Ritter and Zhang (2021) find that the median cost of going public via SPAC is 15.1% of the market cap, whereas an IPO only cost 3.3% of the firm's market cap. Therefore, although mergers with a SPAC are cheaper on paper due to lower direct costs (Boyer and Baigent 2008, 12; Gleason, Rosenthal and Wiggins 2005), SPACs are less cost-effective than traditional IPOs (Gahng, Ritter and Zhang 2021, 5).

Reputation:

Reputation is the most important criteria VCs use to evaluate exit opportunities as venture capital firms use their reputation to attract high-quality deal flow (Nahata 2008, 128). The attraction of this deal flow is a key success factor for delivering superior returns compared to their peer group (Nahata 2008, 129) and raising new funds (Gompers 1996, 146). Liu and Ritter (2011) argue that VCs even allow higher levels of underpricing to establish their reputation because they are concerned about analysts' reports, negatively influencing the fund's reputation. Therefore, reputational considerations are a key driver of the exit strategy of a VC firm.

Having a successful IPO enhances a VC's reputation significantly because the better a VC's access to the IPO market, the more attractive the fund becomes in the eyes of limited partners and potential portfolio companies (Megginson and Weiss 1991, 883). In contrast to IPOs, mergers with a SPAC do not offer the same reputational benefits. Therefore, VC firms might intentionally use an IPO as an exit route to bolster their reputation (Nahata 2008, 129). Another element, which might have reputational effects on the VC firm is the performance of the portfolio companies after the public exit as a bad performance after exit might reduce the reputation in front of limited partners, potential future portfolio companies and the general public. Therefore, a VC firm might consider the effect of the performance for their decision-making as well. Research suggests that both public exit strategies, IPOs and SPAC mergers, underperform the market (Ignatyeva, Rauch and Wahrenburg 2013; Boyer and Baigent 2005; Gahng, Ritter and Zhang 2021). In a direct comparison, most studies find that firms that merged with SPACs perform worse than firms after an IPO (Howe and O'Brien 2012; Gahng, Ritter and Zhang 2021, 10). However, Greene (2015) argues that this result is not driven by the decision of the firm to use the SPAC merger as an exit but by the differences in the pre-exit characteristics of firms that choose a reverse merger compared to an IPO. He finds that SPACs

are used more often by low-quality firms to obtain access to the public market. When pre-exit characteristics between firms going public via a traditional IPO and a firm going public via a reverse merger are similar, the post-wealth of the shareholders is similar (Greene 2015, 67-68). Therefore, there should not be a significant difference between the two exit strategies in terms of performance for the individual portfolio company. Overall, this suggests that an IPO should be superior to a reverse merger via SPAC in reputation management as venture capital firms still regard an IPO as the most reputable public exit available.

Cash-Out Potential:

VC firms have a limited fund lifetime, usually seven years. Therefore, VC firms are often under pressure to realise their gains and convert their stake into cash (Giot and Schwienbacher 2007, 700). Public exits are a possibility for VC firms to convert some ownership stake into cash and realise their gains (Brav and Gompers 2000, 7). Therefore, the cash-out potential of a public exit strategy is an important consideration for venture capital firms (Black and Gilson 1998).

Venture capitalists typically do not sell any of their holdings in the event of an IPO (Gompers and Lerner 2001, 161). Analysing the selling activity of principal shareholders at the IPO, Brav and Gombers (2003) find proof for this argument as they confirm that principal shareholders often do not sell large parts of their stake. One of the main reasons existing shareholders do not sell a large part of their holdings is that they are subject to lockup agreements. These lockup periods help avoid negative signalling to the public market, which would occur if insiders sell a large part of their shares (Bradley et al. 2001). In SPAC exits, shareholders are sometimes also subject to lockup periods. However, SPACs still allow venture capitalists to cash out larger parts of their holdings immediately as SPAC shareholders want to gain control of the firm (Kolb and Tykova, 2016, 84). Therefore, the SPAC exit strategy should be superior in cash-

out possibility due to its possibility to cash out larger proportions of the holding at the time of the public exit.

Time for Completion:

Lerner (1994) suggests that firms try to time the market and go public when valuations are high. Following this line of thought, the public exit strategy providing a speed advantage should be preferred by VC firms as it allows more control and, ultimately, better market timing. VC firms might also prefer a fast time of completion due to their pressure to realise returns.

Several studies suggest that an IPO process takes longer to complete than a merger with a SPAC, as an IPO exit requires extensive documentation, roadshows, and book-building (Ritter and Welch 2002, 1805). Reverse mergers can theoretically be faster, as most of the steps required in an IPO process are unnecessary (Aydogdu, Shekhar and Torbey 2007, 3). Kolb and Tykova (2016) find evidence in their analysis that the reform of SPACs in 2010 increased this advantage even further. However, Gahng, Ritter and Zhang (2021) find close to no speed advantage for a company choosing a reverse merger via SPAC. The reason for that is that the speed advantage is subject to the premise that there is no delay in the reverse merger process. This means that there cannot be a delay in the vote on the reverse merger by the shareholders and that the deal must go through in a timely manner. For most of the SPAC mergers, this premise does not hold. Despite these findings, Gahng, Ritter and Zhang (2021) still acknowledge that the speed advantage of SPACs on paper influences the decision-making of firms, thus favouring SPACs when assessing the time for completion of the public exit.

To conclude, prior research on the exit choice of a venture capital firm suggests that multiple considerations have different effects on the exit choice of the venture capital firm. Despite the controversial view amongst researchers of the field, the following inferences can be made. SPACs offer a small, relative advantage in terms of risk of failure of the process as well as time for completion and cash out potential. Considering the valuation, research finds that none of the strategies seems to have a clear advantage over the other strategy. For the two most important considerations of venture capital firms, namely the cost of the process and the reputational benefits of the public exit, IPOs seem to be the superior exit strategy. Overall, it can be inferred that prior studies in this field have produced inconsistent results. Thus, the question of what exit choice venture capital firms prefer cannot be answered with a literature review as there is a clear gap in the literature. This paper aims to fill this gap by empirically examining which public exit strategy venture capital firms prefer, testing two hypotheses:

Hypothesis 1: VC involvement decreases the likelihood of a firm to exit via a SPAC merger.

Hypothesis 2: Firms controlled by VC firms are less likely to exit via a SPAC merger than firms, where venture capital firms only have minority ownership.

It is necessary to introduce hypothesis 2 in this study. The first regression might be biased due to omitted factors as VC-backed firms might be more suited for IPOs than SPACs due to unobservable other factors. To reduce the bias of those factors, the second hypothesis looks within a sample of VC-backed firms in which firms are more comparable. The descriptive statistics of each sample presented later in this study confirm that this approach is effective. However, it is important to note that the second hypothesis, to some extent, might still be biased by omitted factors.

3 Methodology

3.1. Dataset

The study focuses on SPAC acquisitions and IPOs in the US market. The main reason for this focus is data availability, which is limited in other countries. The timeframe of the study covers 12 years, starting in 2010 and ending in Q4 2020. Following prior research, 2010 marks the beginning of the period of the study to account for two changes in the structure of SPACs, which occurred in 2010 (Gahng, Ritter and Zhang 2021, 11). The dataset, therefore, only includes the new generation SPAC version and allows to compare the findings of the study to SPACs of prior generations. As only two direct listings occurred in the study's timeframe, direct listings as an exit strategy are beyond the scope of the research. Firms with a negative age and negative sales are removed from this dataset. Furthermore, noticeably small firms (less than 10 million USD of total assets) are excluded as well. Observations with missing data are also removed to create a complete dataset. The final dataset of the study contains 1303 firms.

Deal-specific data:

Deal-specific data is defined as data directly linked to the public exit of the firm. In this study, the following deal-specific data is used: Completion date of the exit, type of exit and ticker symbol. I obtain deal-specific data using several databases. I gather the data for the SPAC acquisitions from three databases, focusing on SPAC research. SPACTRACK serves as the primary database, providing the most extensive research on SPAC business combinations. Two other databases, SpacResearch and Spacinsider, complement and verify the data. The databases provide the completion date of the business combination and the ticker symbol of the respective firm. For data on IPOs within the study's timeframe, I use the extensive data of Ritter (2021). The data includes the relevant deal-specific characteristics for the IPO data. I supplement all missing deal-specific data using the EDGAR database of the SEC.

Firm-specific data:

Firm-specific data is defined as information directly associated with the firm. In this study, the following firm-specific data is used: VC involvement, VC ownership, Age, Sales, Total assets, Return on assets. I obtain most firm-specific data using the Compustat North America Database as the primary source. The Wharton Research Data Services provides access to this source. In cases where Compustat does not provide the information required, 10k filings of the specific firm supplement the data. Compustat does not provide information on VC involvement and VC ownership. For information on VC involvement for SPAC acquisitions, I use two databases. The first is the database of Ritter (2021), providing information on VC involvement in IPOs. For VC involvement in SPAC business combinations, I use the Crunchbase database. To obtain information about VC ownership, I use the S1, S4 and 424 filings of the firm. I match all characteristics from the different databases using the ticker symbol as an identifier.

3.2. Variables Definitions

Dependent variable:

This study examines the influence of venture capital backing on the strategic exit choice of the firm. Therefore, the choice of exit strategy serves as the dependent variable for the analysis. The exit can be either an IPO or a SPAC business combination. Thus, the dependent variable is a binary dummy variable and can be either zero (IPO) or one (SPAC). This definition follows the standard methodological approach of the field (see Kolb and Tykova 2016, 87; Adjei, Cyree and Walker 2007; Paulson and Stegemoller 2008) and is commonly used in other fields of research as well.

Explanatory variables:

As the main objective of the research is to analyse the influence of VC-backing on the exit decision, variables indicating VC-backing serve as the explanatory, independent variables for the analysis. To test the first hypothesis, VC involvement is the explanatory, dummy variable, either one if a VC is involved or zero if no VC is involved. VC involvement indicates that the firm is backed by at least one venture capital firm at the time of public exit. To test the second hypothesis of the study, I introduce the explanatory variable VC ownership. This variable is dummy coded and shows one for firms, where venture capital is the majority owner and zero for firms, where venture capital firms are not in possession of a majority control.

Control Variables:

As Gahng, Ritter and Zhang (2021) find that firms that merge with a SPAC tend to be older, age will serve as the first control variable. Gahng, Ritter and Zhang (2021) also show that the size of a firm influences the choice of an exit strategy. Therefore, firm size serves as another independent control variable. To measure the size of the firms, Gahng, Ritter and Zhang (2021) use sales of the firm. On the other hand, Kolb and Tykova (2016) use total assets. I include both variables in the analysis, but the variable total assets serves as the control variable in the main specification. To reduce the skewness of the data of total assets and Sales, I use a log transformation. Several studies show that profitability and growth prospects also influence the choice of a firm's exit strategy (e.g. Gahng, Ritter and Zhang 2021). While Gahng, Ritter and Zhang (2021) use net income to assess the firm profitability, Kolb and Tykova (2016) adopt the return on assets as a measure of profitability. In my analysis, I use return on assets to measure profitability and winsorize it at a 2% level to reduce the skewness. To control for growth prospects, I use Tobin's Q, in line with Kolb and Tykova (2016). Fixed industry effects, using 3-digit and 2-digit SIC codes, control for exit preferences across different industries.

3.3. Model Specification

To examine the exit strategy of VC firms, I use two linear probability models (LPM). Model 1 tests the first hypothesis that VC involvement decreases the likelihood of a SPAC exit. Model 2 tests the second hypothesis that firms majority-owned by venture capital firms are less likely to exit using a SPAC merger than minority-owned firms. In both models, the variable $P(Exit)_i$ serves as the binary dependent variable. The main difference between both models is that model 1 uses the explanatory variable VC involvement, and in model 2, VC ownership serves as the explanatory variable.

Main specification linear probability model 1: (1)

$$P(SPAC)_i = \beta_0 + \beta_1 VC\ involvement + \beta_2 Age + \beta_3 \text{Log(total assets)} + \beta_4 Return\ on\ assets + \beta_5 Tobin's\ Q + \sum_{j=6}^{153} \beta_j\ Industry\ fixed\ effects$$

Main specification linear probability model 2: (2)

$$P(SPAC)_i = \beta_0 + \beta_1 VC\ ownership + \beta_2\ Age + \beta_3\ \text{Log}\ (total\ assets) + \beta_4\ Return\ on\ assets + \beta_5\ Tobin's\ Q + \sum_{j=6}^{20} \beta_j\ Industry\ fixed\ effects$$

Limitations to the Linear Probability Model:

The linear probability model is subject to some limitations. First, it is easy to see that predictions of either less than zero or greater than one are possible (Woolridge 2013, 251). Since these are probabilities, this is an explicit limitation of the approach. The second limitation of the approach is that the LPM assumes a linear probability relationship between a dependent variable and an independent variable for all their possible values (Wooldrige 2013, 251).

4 Linear Probability Model 1

4.1. Descriptive Statistics

Table 1 presents the descriptive statistics of the first sample used to test hypothesis 1. The number of IPO exits in the sample is higher than the SPAC exits. At first glance, VC involvement tends to be higher in IPO exits. Additionally, VC backed firms seem to have better growth prospects and tend to be younger and less profitable. The correlations of the first sample are presented in Table 2. The highest correlation of 72% is between Log(sales) and Log(total assets). As both variables control for size, multicollinearity should not be an issue.

Table 1 Descriptive Statistics Sample 1

	IPO Exit			SPAC Exit			Full Sample		
Variable	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
VC involvement	0.55	0.50	1243	0.32	0.47	60	0.54	0.50	1303
Age	14.8	14.3	1242	12.9	14.9	60	14.7	14.3	1302
Log(sales)	4.88	1.94	1243	5.24	1.71	60	4.89	1.93	1303
Log(total assets)	5.94	1.54	1243	6.32	1.37	60	5.96	1.54	1303
Return on assets	-0.098	0.23	1243	-0.12	0.22	60	-0.099	0.23	1303
Tobin's Q	3.41	3.57	1243	3.69	4.82	60	3.42	3.64	1303

	No VC involvement			VC involvement			Full Sample		
	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
Age	19.6	18.6	603	10.5	6.87	699	14.7	14.3	1302
Log(sales)	5.46	1.89	603	4.41	1.83	700	4.89	1.93	1303
Log(total assets)	6.42	1.68	603	5.56	1.28	700	5.96	1.54	1303
Return on assets	-0.020	0.19	603	-0.17	0.25	700	-0.099	0.23	1303
Tobin's Q	2.40	2.36	603	4.29	4.27	700	3.42	3.64	1303

Table 2 Correlation matrix Sample 1

	VC involvement	Age	Log(sales)	Log(total assets)	Return on assets	Tobin's Q
VC involvement	1					
Age	-0.318***	1				
Log(sales)	-0.272***	0.350***	1			
Log(total assets)	-0.280***	0.247***	0.720***	1		
Return on assets	-0.315***	0.171***	0.474***	0.354***	1	
Tobin's Q	0.260***	-0.135***	-0.147***	-0.254***	-0.168***	1

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.2. Results

The results of the first linear probability model are presented in Table 3. The main specification (1) of model 1 includes all control variables available as well as industry-fixed effects. The analysis shows that the explanatory variable VC involvement is statistically significant at the 10%, 5% and 1% level, respectively. The results confirm hypothesis 1 that VC involvement decreases the likelihood of firms exiting via a SPAC merger by 4.04%. Thus, there is evidence that venture capital firms seem to prefer an IPO exit over a SPAC merger.

Besides the significance of the focus variable VC involvement, the variables Age, Return on assets and Tobin's Q also suggest statistical significance. From these control variables, the variable Return on assets seems to have a substantial effect as it suggests statistical evidence at the 1% level. A firm with 100% Return on assets is 7.59% less likely to exit using a SPAC merger than a firm with a Return on assets of 0%. This result indicates that higher-quality firms prefer an IPO exit over a SPAC exit. The other variables, Age and Tobin's Q, are statistically significant at 1% and 10%, respectively. However, the magnitude of the effect on the likelihood is negligible. An increase in Age of one year only increases the likelihood of a SPAC by 0.13%, and an increase of Tobin's Q by one increases the likelihood of a SPAC exit by 0.3%.

To test the robustness of the model, I run further specifications. Specifications (2) and (3) vary the industry fixed effects. It is worth pointing out that controlling for broader industry fixed effects in specification (2) decreases the likelihood of firms exiting via a SPAC merger even further (-5.17%). Excluding industry fixed effects in specification (3) amplifies this effect, decreasing the likelihood of a SPAC exit by 5.61%, respectively.

Moreover, using Log(sales) as an alternative size variable in specification (4) leads to a similar effect of VC involvement on the dependent variable. These specifications also indicate statistical evidence for the variable VC involvement at the 10%, 5% and 1% level. The results of these specifications confirm the robustness of the model.

Table 3 Likelihood of a SPAC acquisition model 1

	(1)	(2)	(3)	(4)
	Main Specification	Industry-Effects (2-Digit)	Without Industry-Effects	Different Size Control Variable
VC involvement	-0.0404***	-0.0517***	-0.0561***	-0.0407***
	(-2.89)	(-3.80)	(-4.31)	(-2.91)
Age	-0.0014***	-0.0012**	-0.0010**	-0.0012**
	(-3.05)	(-2.56)	(-2.38)	(-2.48)
Log(total assets)	0.0048	0.0080*	0.0091**	
	(1.03)	(1.80)	(2.18)	
Return on assets	-0.0759***	-0.0702**	-0.0586**	-0.0609**
	(-2.75)	(-2.51)	(-2.14)	(-2.14)
Tobin's Q	0.0030*	0.0023	0.0028	0.0026
	(1.82)	(1.39)	(1.65)	(1.62)
Log(sales)				-0.0047
				(-1.08)
Constant	-0.0208	-0.0228	0.0217	0.0124
	(-0.21)	(-0.22)	(0.74)	(0.13)
Industry fixed effects (2-Digit)	No	Yes	No	No
Industry fixed effects (3-Digits)	Yes	No	No	Yes
Observations	1302	1302	1302	1302
Adjusted R^2	0.176	0.110	0.017	0.176

t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5 Linear Probability Model 2

5.1. Descriptive Statistics

To test the second hypothesis, I create a random sample of 60 VC-backed firms out of the original dataset as collecting data on the variable VC ownership is very labour-intensive and thus not feasible for the whole dataset. The descriptive statistics for the second sample are presented in Table 4. Overall, the number of IPO exits clearly outnumber the SPAC exits in this sample, and VC ownership is significantly higher for IPO exits. As expected, using VC ownership instead of VC involvement decreases the bias of omitted factors as the firms in this sample are more comparable. The correlations in Table 5 do not seem to be an issue.

Table 4 Descriptive Statistics Sample 2

	IPO Exit			SPAC Exit			Full Sample		
Variable	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
VC ownership	0.75	0.43	57	0.33	0.58	3	0.73	0.45	60
Age	10.5	5.43	57	7.67	2.08	3	10.4	5.34	60
Log(sales)	4.71	1.83	57	6.13	1.81	3	4.78	1.84	60
Log(total assets)	5.67	1.45	57	6.47	1.14	3	5.71	1.44	60
Return on assets	-0.16	0.23	57	-0.10	0.067	3	-0.16	0.23	60
Tobin's Q	4.32	3.92	57	3.62	2.08	3	4.29	3.85	60

	VC Minority Ownership			VC Majority Ownership			Full Sample		
	Mean	Stdev	N	Mean	Stdev	N	Mean	Stdev	N
Age	8.25	4.37	16	11.2	5.49	44	10.4	5.34	60
Log(sales)	4.87	1.65	16	4.75	1.93	44	4.78	1.84	60
Log(total assets)	6.06	1.53	16	5.58	1.40	44	5.71	1.44	60
Return on assets	-0.094	0.25	16	-0.18	0.22	44	-0.16	0.23	60
Tobin's Q	2.68	1.55	16	4.87	4.26	44	4.29	3.85	60

Table 5 Correlation Matrix Sample 2

	VC ownership	Age	Log(sales)	Log(total assets)	Return on assets	Tobin's Q
VC ownership	1					
Age	0.243*	1				
Log(sales)	-0.0290	0.108	1			
Log(total assets)	-0.147	0.0709	0.793***	1		
Return on assets	-0.178	0.0986	0.527***	0.346***	1	
Tobin's Q	0.254*	0.300**	0.0169	-0.0718	0.00175	1

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.2. Results

The results of the second probability model are presented in Table 6. The main specification (1) includes all control variables as well as the 3-Digit industry fixed effects. The results of the linear probability model also indicate statistical evidence for the explanatory variable VC ownership at a 10% level. This result confirms the second hypothesis as it suggests that VC majority ownership decreases the likelihood of a firm to exit using a SPAC merger by 9.6%. Thus, the hypothesis for the second linear probability model that firms, which are majority-owned by venture capital firms, prefer IPO exits over SPAC exits can be confirmed as well.

In the second model, none of the control variables suggests statistical evidence. One reason might be that firms, not majority controlled by VCs, are usually controlled by founders. As they have different incentives than institutional investors, this might bias the results. Another reason might be that VC firms pre-select firms based on specific underlying characteristics. This pre-selection might reduce the statistical information of the original control variables used in the linear probability model 2. Hence, venture capital specific control variables like cash-out potential or time for completion might be better suited to control the model.

In Specification (2), industry-fixed effects are removed from the linear probability model. The results show that the explanatory variable VC ownership is statistically insignificant without controlling for industry effects. Introducing Log(sales) as a different control variable for size in specification (3) yields similar results as the main specifications in terms of significance and effects, thus increasing the model's robustness. However, due to the small sample size of only 60 observations, the model is not as robust as model 1 and should only be seen as a supplementary analysis, extending the results of model 1 and delivering additional statistical evidence for the study.

Table 6 Likelihood of a SPAC acquisition model 2

	(1)	(2)	(3)
	Main Specification	Without Industry-Effects	Different Size Control Variable
VC ownership	-0.0966*	-0.0886	-0.0960*
	(-1.78)	(-1.26)	(-1.79)
Age	0.0028	-0.0039	0.0026
	(0.58)	(-0.66)	(0.56)
Log(total assets)	-0.0051	0.0163	
	(-0.22)	(0.75)	
Return on assets	-0.0227	-0.0014	0.0296
	(-0.21)	(-0.01)	(0.24)
Tobin's Q	-0.0033	0.0023	-0.0030
	(-0.56)	(0.29)	(-0.51)
Log(sales)			-0.0198
			(-0.89)
Constant	0.0862	0.0515	0.1709
	(0.39)	(0.34)	(0.96)
Industry fixed effects	Yes	No	Yes
Observations	60	60	60
Adjusted R^2	0.546	-0.027	0.555

t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

To conclude the presentation of the results, I find clear statistical evidence that VC involvement decreases the likelihood of a SPAC exit and thus, both hypotheses can be confirmed. Analysing the effect of overall VC involvement on the exit choice, the likelihood of a SPAC exit decreases by 4.04% when VC firms are involved. The results in model 2 show that if venture capital firms control the operating firm, the likelihood of a SPAC exit decreases to more than twice as much (-9.6%). That result suggests that VC firms have a clear preference for IPO exits over SPAC exits. If the VC has the majority stake in the company, the VC uses the voting power to strive for an exit via an IPO. The results support the arguments of the line of research arguing that VC firms see IPOs as a superior exit strategy as it increases the firm's reputation and is more cost-effective.

6 Conclusion and Implications for Future Research

In the face of the increasing popularity of SPACs, this study shed light on the public exit choice of venture capital firms. Prior studies on the public exit strategy decision making of venture capital firms, specifically those looking at the relationship between venture capital backing and exit choice, have produced inconsistent results. On the one hand, researchers argue that venture capital firms should prefer an exit via SPAC as it reduces the risk of failure of the process and increases the cash-out prospects as well as the speed of the overall process. On the other hand, researchers indicate that venture capital firms still prefer an exit via an IPO. These researchers argue that IPOs have relative advantages in terms of reputation and overall costs for the operating firm. Comparing all dimensions, the literature review concludes that overall, none of the public exit strategies available seems to be strictly superior to the other strategy. As so far statistical evidence in this field is very limited, the literature review reveals a clear gap in the literature, which this study tried to close.

Two hypotheses using a sample of 1,303 firms from 2010 to 2020 were tested to analyse which public exit strategy venture capital firms prefer. The first hypothesis tested the general exit behaviour of firms, trying to prove that firms backed by venture capital prefer an IPO over a SPAC exit. The second hypothesis zoomed in further to reduce the omitted factor bias of linear probability model 1. Examining a random sample of 60 venture capital backed firms, hypothesis 2 tried to show that firms controlled by venture capital firms have a higher probability of using an IPO as an exit strategy than firms minority-owned by venture capital firms.

The LPM used for testing the first hypothesis provided the following results: Across all model specifications, empirical evidence supported the first hypothesis that venture capital backed firms prefer an exit via an IPO over an exit via SPAC merger. The LPM used for testing the second hypothesis also provided statistical evidence to support the second hypothesis. In this model, the likelihood to exit via a SPAC exit decreased even further if a company is majority-owned by a VC firm. This finding underlines that venture capital firms have a clear preference for IPOs and suggests that VC firms make use of their voting power to align the final exit choice of the firm with their own objectives and preferences. Thus, this study finds support for the argument of the stream of research arguing that the traditional IPO is the superior exit choice of VC firms due to the significant positive effect on the reputation. The results also seem to support the signalling theory of prior research, suggesting that VC involvement helps to signal quality and therefore reduce the risk of failure of the process IPO process. Overall, the results indicate that SPACs might face problems acquiring VC-backed firms, which could lead to higher premiums for SPAC acquisition and a decrease in quality of the target firms.

Although the study offers important insights concerning the exit behaviour of venture capital backed firms, it is subject to some limitations. One of the study's main limitations is that only two exit choices were included in the study. To account for this problem, future research could introduce an extended dataset, including data on other exit strategies. Moreover, the study only looks at publicly listed firms in the U.S. The results may not apply in other geographic regions. Other papers could try to reproduce the findings of this study in other countries or to compare findings of other regions to the results of this study. Future research might also expand the conclusions drawn from hypothesis 2. Introducing new, venture capital related control variables and increasing the sample size might also further reduce the bias of omitted factors and make the analysis more robust.

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