# Are post-merger Special Purpose Acquisition Companies different?

by

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A thesis
submitted to the Victoria University of Wellington
in fulfilment of the requirements for the degree of
Master of Commerce

Victoria University of Wellington
2022

**Abstract**

Special Purpose Acquisition Companies (SPACs) provide their target firms with an alternative route to go public via a reverse merger. Controlling for year, industry and size, post-merger SPAC firms have similar Total Q ratios and generate similar free cash flow. These results suggest that their market value is consistent with their operational performance. Post-merger SPAC firms invest in their physical and total capital at relatively higher rates. These results are inconsistent with the negative tone of many current studies regarding SPACs and advance the idea that post-merger SPAC firms perform similarly to other public companies when appropriately benchmarked. Overall, SPACs represent a positive financial market development.

# 1 Introduction

Special purpose acquisition companies (SPACs) are public "shell" entities that go public for the express purpose of using the proceeds from their initial public offering (IPO) to merge with an unknown target operating company. Once the merger consummates, the target company will trade publicly, and the SPAC dissolves. Deriving from the blank-check companies of the 1980s, the first SPAC went public in 2003. More recently, SPACs have been going public and merging with target companies at an unprecedented rate. A report by the Harvard Business Review[1] documents that in 2020 United States (US) SPAC IPOs accounted for more than 50% of total IPOs, raising a total of $80 billion. Investment in US SPAC IPOs reached $96 billion in the first quarter of 2021 alone. SPACs have become an important part of the financial markets, attracting large amounts of investment and providing firms with an alternate pathway to becoming public.

Of the current literature on SPACs, the most important and ubiquitous finding is that the unique structure of SPACs leads to a misalignment of incentives between the management and investors, which results in poor post-merger financial returns. SPAC managers are given 20% equity in the SPAC as compensation for their work, often for the nominal sum of $25,000. Dimitrova (2017), Kolb and Tykvova (2016), Rodrigues and Stegemoller (2014), Floros and Sapp (2011), Vulanovic (2017), Gahng, Ritter, and Zhang (2021), Klausner and Ohlrogge (2020), Nilsson (2018), Jenkinson and Sousa (2011), Agarwal (2021), Reddy (2021) and Blankespoor, Hendricks, Miller, and Stockbridge (2021) all assert 20% equity compensation is a poor incentive. Specifically, the equity is worth a significant amount post-merger, even if the share price decreases, incentivising SPAC managers to complete deals, regardless if they occur at value-destroying prices.

Blankespoor, Hendricks, Miller, and Stockbridge (2021), Agarwal (2021) and Reddy (2021) find that SPAC managers use overly optimistic projections they rarely meet to justify the value-destroying prices. SPAC transactions take the form of a reverse merger, enabling SPAC managers to provide projections for the target firm going public. Firms can be legally liable in a traditional IPO if they do not meet their projections, leading to the vast majority of these firms not providing any.

[1]Link to report: https://hbr.org/2021/07/spacs-what-you-need-to-know

The value-destroying prices paid and highly ambitious projections lead to poor financial returns (Floros and Sapp (2011), Vulanovic (2017), Lewellen (2009), Bodewes (2021), Chong, Zhong, Li, Li, Agrawal, and Zhang (2021), Chamberlain (2021), Datar, Emm, and Ince (2012) and Kolb and Tykvova (2016)). Overall, this finding is the predominant reason why literature regards SPACs negatively.

The current literature on SPACs tends to cover their post-merger stock price performance and not on their operational performance. Whether the poor financial returns also reflect poor underlying operational performance is what I explore in this paper. I use the operational measures from Peters and Taylor (2017) that capture the importance of intangible capital to modern firms, with the key measures being Total Q and free cash flow. These measures capture a firm's ability to utilise assets and generate cash flow from them. Together these measures provide an overview of a firm's operational performance, which I aim to evaluate in this paper.

Since most of the literature holds a negative sentiment towards SPACs, I expect that post-merger SPACs have worse operational performance than other public companies. Therefore, my first hypothesis is that post-merger SPACs have a lower Total Q. Finding evidence for this hypothesis would add to the negative findings on SPACs. Failing to find a difference in operational performance would imply that post-merger SPAC companies perform similarly to other public companies. While this finding would contrast most of the current literature, it would align with Chatterjee, Chidambaran, and Goswami (2016), who conclude that SPACs are a positive development for the financial markets.

In the intangible capital model that Peters and Taylor (2017) build, the intangible capital is either externally purchased or internally created. The internally created intangible capital comes from either knowledge capital (R&D spending) or organisation capital (SG&A spending). To capture the structure of a firms intangible capital, I calculate the proportion of intangible capital that comes from each of these sources. Importantly, these proportions will show structural similarities or differences between post-merger SPACs and other public firms.

As a reverse merger is intrinsic to a SPAC, my second hypothesis is that post-merger firms will have a higher proportion of externally purchased intangible capital. This result would indicate that going public via a SPAC leads to a different intangible capital structure for the target firm. Failing to find a difference in intangible capital structure implies going public via

a SPAC does not lead to a different structure.

The intangible capital model that Peters and Taylor (2017) build also provides the ability to measure the investment rates of firms into their physical, intangible, and total assets. Both Kolb and Tykvova (2016) and Datar, Emm, and Ince (2012) show that post-merger SPAC firms have lower growth opportunities, with Datar, Emm, and Ince (2012) finding they also invest at lower rates. In contrast to the investment rates from Peters and Taylor (2017), both of these papers fail to recognise the importance of intangible capital to the modern firm.

My third hypothesis is that post-merger SPAC firms have lower physical, intangible and total investment rates, as prior evidence from the literature suggests this may be the case. It is important to note that a lower investment rate is not necessarily bad as firms should only invest in positive net present value (NPV) projects. However, the investment rates do provide operational insight into the future growth of a firm.

The literature finds ample evidence of poor post-merger share price returns. As the share price should reflect the present value of future free cash flows, this implies that the market expects post-merger SPACs to have lower free cash flow in the future relative to other public firms. Therefore, my fourth hypothesis is that post-merger SPACs have lower free cash flow.

Expecting lower free cash flow aligns with expecting a lower Total Q, as both imply that post-merger SPACs have worse operational performance than other public firms. The hypotheses complement as a lower Total Q suggests they do not effectively utilise assets, and a lower free cash flow means they generate less from their assets. Both of these hypotheses derive from the literature having a negative view of SPACs.

For the first hypothesis, I fail to reject the null that $\beta = 0$ and show that the Total Q of post-merger SPAC firms are similar to other public firms. The similar Total Q ratio suggests that the post-merger SPAC firms utilise their assets as effectively as other public firms, and the market values them as such. This critical operational measure shows that post-merger SPAC firms perform comparably to other public firms.

For the second hypothesis, I reject the null that $\beta = 0$ at less than the 1% level and show post-merger SPAC firms have a relatively higher proportion of externally purchased intangible capital and a lower proportion of knowledge capital. The SPAC coefficient accounts for roughly 33% and 18% of the standard deviation of knowledge capital and externally purchased intangible

capital, respectively. This result aligns with my expectation that the reverse merger intrinsic to a SPAC transaction naturally leads to higher externally purchased intangible capital.

For the third hypothesis, I show post-merger SPAC firms have higher physical and total investment rates than other public firms, reject the null that $\beta = 0$ at less than the 5% and 1% level, respectively. The SPAC coefficient is economically significant, accounting for approximately 30% and 22% of the standard deviation in the physical and total investment rates, respectively. This result contrasts the literature findings and my expectations, indicating that post-merger SPAC firms are investing at higher rates for the future growth of their firm.

For the fourth hypothesis, I fail to reject the null that $\beta = 0$ and show that the free cash flow of a post-merger SPAC is similar to other public firms. Finding a similar level of free cash flow means that their business operations generate as much cash as other public firms. This provides more evidence of post-merger SPAC firms performing at a similar level to other public firms in a critical operational measure.

Overall, my findings show that post-merger SPAC firms operational performance is similar to other benchmark public firms. This result contrasts with the literature's negative tone and provides evidence that these firms are of similar quality to other public firms. Since the rise of SPACs, there has been speculation as to whether they are a good or bad development for the financial markets. My findings show that SPACs enable quality firms with good operational performance to go public, which is a positive development. Gahng, Ritter, and Zhang (2021) and Klausner and Ohlrogge (2020) suggest that as more SPACs are going public, the quality of their structure is improving as the market is moving towards an equilibrium. My paper, which includes recent data on SPACs, provides evidence about the quality of the post-merger firms. This evidence contrasts with the prior literature's findings that SPACs cause a misalignment of incentives leading to poor financial returns. Therefore, my findings are important as they indicate the SPAC market is naturally developing towards a market equilibria, and regulatory bodies do not need to step in. My paper finds that SPACs are a positive development for financial markets, providing a pathway for a high quantity of quality firms to go public.

To ensure consistent terminology, I define several terms. The term "SPAC" refers to the SPAC entity from formation until the merger's consummation. Once the SPAC dissolves, and the target company is publicly trading post-consummation, it is the "post-merger SPAC firm".

I label it as a "post-merger" firm rather than a "post-acquisition" firm because the SPAC transaction generally takes the form of a reverse merger. This form of transaction is also why I refer to the transaction as a merger throughout. Within the life of a SPAC company is the "de-SPAC" period, starting when the SPAC company announces the merger until its completion. The management team that form the SPAC are "sponsors", while the "promote" refers to the 20% equity compensation awarded to the SPAC sponsors upon completing a merger.

The organisation of the remainder of this paper is as follows. Section 2 describes how SPAC transactions work in detail, and a related appendix provides a few case studies. Section 3 reviews all the literature on SPACs, while Section 4 develops hypotheses for the paper. Section 5 describes sample data and delineates the operational measures. Section 6 describes testing results. Section 7 tests the robustness of my results to varying assumptions. Section 8 concludes.

# 2 SPAC Transaction Description and Case Studies

## 2.1 SPAC Transaction Description

The SPAC is a blank-check company formed for the sole purpose of raising funds via an IPO so the sponsors can undertake a reverse merger with a private operating business. The private operating business takes on the SPACs legal shell, making it a public company, while the SPAC dissolves. The SPAC sponsors are the people who form the SPAC. They are often a small group of experienced managers with significant expertise in an industry and a successful track record. Many sponsors have a history in private equity (PE), venture capital (VC) or mergers and acquisitions (M&A). The SPAC sponsors cannot have a specified target when they go public. However, the unknown target company is often in a specified industry or sector that aligns with the SPAC sponsors skills, experience or connections. The SPACs offering document will specify their acquisition criteria, although their target is not bound to fit this. SPACs generally have twenty-four months to complete a merger; otherwise, the SPAC dissolves and investors receive the pro-rata value of their shares back.

The SPAC sponsors raise funds through an IPO to fund the merger. The SPAC offers units, often priced at $10. Each unit consists of one common share and a fraction of a warrant. The SPACs prospectus states the fraction size, which varies depending on the SPAC. It is only a fraction of a warrant, instead of a whole warrant, to reduce their dilutive effect at the time of the

merger. To receive a warrant, an investor must purchase enough units to own a whole number of warrants. For example, if a unit includes one common share and one-third of a warrant, an investor buying two units would receive zero warrants. An investor who purchases three units would receive one warrant.

Like a call option, a warrant gives the right to purchase one common share by exercising it when the post-merger firm's share price is above the warrant's strike price (often \$11.50). Their strike price is the purchase price of the warrant (often \$1.50) plus the unit value (often \$10), meaning they generally have a strike price of \$11.50. Warrants are attractive as they offer greater returns for the same movement in share prices. However, the higher return possibilities come with higher risks. If the SPAC fails to merge and liquidates, the warrants have no redemption value, whereas common shares reimburse at the pro-rata trust value.

At the time of IPO, only units are available to purchase. It is typical for a SPAC to undergo either a voluntary or mandatory split after 52 days, at which point the common stock and warrants trade separately. A mandatory split means all units split into separately trading warrants and common shares. If it is a voluntary split, units can still trade until a mandatorily split at the time of the merger. Only units trade until the units split. Not all brokers offer units for trading (e.g. Robinhood), so some retail investors cannot invest in units at the time of IPO. Brokers may charge a unit splitting fee if the investor wishes to split the unit voluntarily. However, brokers generally do not charge for mandatory splits.

A warrant usually becomes exercisable 30 days after the merger and expires five years post-merger. Many SPACs include an early exercise clause. If the post-merger company's closing share price holds above a certain level for 20 of 30 contiguous trading days, investors must exercise their warrant within 30 days. The share price level it must exceed is generally \$18.

Units usually trade at the intrinsic value of their components, making it challenging to purchase units at \$10 except in the IPO. There is an arbitrage opportunity if they do not trade at their intrinsic value. However, this arbitrage opportunity is challenging to execute in practice due to unit splits often having significant broker fees and taking multiple days to execute, in which time market prices may adjust.

A noticeable feature of warrants is that they often trade at a discount to their intrinsic value. The discount occurs as warrants have built-in time risk due to not becoming exercisable

until post-merger. The market is pricing in the risk that the common stock will be trading at a lower level when the warrants become exercisable. It may also be an illiquidity risk premium, as when exercising call options, they can execute nearly instantly. In contrast, warrants may take 3-10 days to execute (depending on brokerage), during which the underlying share price will change.

The majority of the IPO proceeds come from the units offered to investors. SPAC sponsors typically hold 20% equity in the SPAC, referred to as the "promote", as their reward for forming the SPAC. They generally only pay $25,000 for this equity in a private placement prior to the IPO. If a merger consummates, this equity stake represents a lucrative return to the sponsors. To signal their commitment to the long-term value-creation of the SPAC post-merger company, some SPAC sponsors also buy a nominal sum of warrants at their public offering price. This signal is essential to investors, as the returns of these warrants are related to the post-merger share price. The higher the post-merger share price goes, the greater the payoff of these warrants. These warrant purchases align the incentives of the SPAC sponsors to those of investors (long-term value creation) more effectively than the 20% equity stake. SPAC sponsors do not have a salary or other form of cash compensation.

Nearly all the proceeds from the IPO are stored in a trust and invested in government-backed securities. The proportion of proceeds in the trust is nearly always 90% plus, as most exchanges have rules regarding the minimum proportion. These rules protect the investor's money from being misused by the sponsors. SPAC sponsors may use the interest earned on the trust account to pay taxes and search for a target firm.

A critical requirement of SPACs is that they must spend at least 80% of their net assets in the merger to avoid liquidation. Some SPACs will merge with multiple businesses to achieve this, but most find a firm big enough to satisfy this requirement. If the firm they are acquiring is too big to purchase with only the SPAC IPO proceeds, the sponsors can raise further funds via a PIPE (private investment in public equity). Investors in the PIPE are typically sophisticated institutional investors. The SPAC sponsors can also invest via the PIPE raise.

When the SPAC is searching for a target, they rely on the advice of investment bankers. The lead underwriter of the SPAC IPO typically becomes their adviser. They have an existing relationship with SPAC management, and a proportion of the underwriter's fee is typically de-

ferred until merger completion. The deferred fee means the underwriters have a heavy incentive for the SPAC to complete a deal. If the SPAC fails to complete a deal, the underwriters do not receive the deferred proportion of their compensation.

Once a SPAC announces the target firm they will merge with, the shareholders must vote on it. The shareholders get two votes, one on whether to approve the deal and one on whether to redeem the pro-rata value of their shares. If a majority of shareholder's vote to approve the deal and the majority (typically 60%-80%) opt not to redeem the pro-rata value of their shares, the proposed merger is approved. Once approved, shareholders who opted to redeem their shares will receive their pro-rata value back and keep the warrants they own.

Post-merger, the SPAC is dissolved, and the operating company is now publicly traded in the legal shell of the SPAC. The SPAC sponsors, investors, and PIPE investors all have ownership in the post-merger firm. Typically, the SPAC investors will own 5%-20% of the post-merger firm. The SPAC sponsors own 20% of this portion via the promote. Generally, the PIPE investors also own around 5%-20%, while the target firm owners generally own around 60%. The ownership structure varies from deal to deal. Other than owning a significant chunk of the post-merger firm, the only other involvement of SPAC sponsors post-merger is the CEO of the SPAC usually becomes a director of the post-merger SPAC operating company.

When going public via a SPAC, the target firm can avoid the lengthy process and rigorous regulation of a traditional IPO. Since the firm is being taken public via a merger, they do not have to supply detailed financial statements and other disclosures. SPAC target firms can also provide financial projections, which traditional IPO firms rarely do due to the legal ramifications. As SPACs have large cash reserves, going public via a SPAC may be more attractive to a firm whose owners wish to cash out. Private equity firms can also use SPACs to exit their own portfolio companies.

### 2.2 Case Studies

In Appendix A, I provide three case studies. In the first case, the SPAC completes a merger on the first attempt. The SPAC in the second case fails its first merger attempt but completes its second. The third SPAC fails to merge with a company and dissolves. In all three case

studies, the IPO offered units offered for $10 each. One unit consisted of a common share plus one-third, one-half, and one warrant, respectively.

In each case, the SPAC sponsors had significant experience in private equity, investment banking or SPACs. They all pursued target companies in a sector they have significant expertise in or could benefit from their financial knowledge and connections. Covid-19's impact on the markets was why two of the mergers were unsuccessful. The other two mergers were successful. For both of the successful cases, the SPACs CEO currently sits on the board of the post-merger SPAC firm.

# 3 Literature Review

## 3.1 SPAC Structure

The first noticeable feature of SPACs is that they are different from blank-check companies, despite the comparisons. Castelli (2009) finds modern-day SPACs do not display the characteristics that made the blank-check companies of the 1980s damage the credibility of the US markets. He also finds that the recent upsurge in SPACs is in line with an increase in the quality of SPACs. Because of this, he says the SEC should not sceptically view SPACs. Shachmurove and Vulanovic (2017) find that modern SPACs purposefully structure themselves in a way that differentiates them from blank check companies. This differentiation helps avoid additional scrutiny from the SEC. Castelli (2009) concludes that when considering regulatory issues involving SPACs, the SEC should reconsider their apparent pejorative view of SPACs as he believes it is a misguided attempt to protect investors at the expense of allowing this new form of capital structure to naturally innovate and facilitate investing.

The changes in SPACs over time have not only been to differentiate them from blank-check companies, but also to increase the likelihood of their success and make them a more attractive investment. Lakicevic, Shachmurove, and Vulanovic (2014) and D'Alvia (2019) find SPACs have redesigned their structure by adjusting their size, the portion of IPO proceeds deposited in escrow accounts, the inclusion redemption rights, the number of warrants per unit, cash-out voting options, number of warrants purchased upfront by sponsors and percentage of deferred compensation paid to underwriters. These changes, plus the attractive liquid nature of a SPAC

investment, have enabled them to make a resurgence by increasing the likelihood of positive merger outcomes.

Vulanovic (2017) finds that the amount of sponsor's warrant purchases at the time of IPO also increases chances of survival, as a higher sponsor commitment lowers information asymmetry. Their involvement also increases the quality of the initial merger. Greater involvement of underwriters and the size of syndicate also increases survival likelihood as a more extensive network of investment banks means potentially more resources committed to the merger. Dimic, Lawrence, and Vulanovic (2020) also finds that SPACs are less likely to withdraw their IPO if they have more underwriters in the syndicate. They find other factors, including a clear focus on the merger and their legal counsel specialising in the SPAC market, also reduce the likelihood of IPO withdrawal.

Chatterjee, Chidambaran, and Goswami (2016) develop a theoretical framework to explain several of the unique features of the SPAC's design mentioned above, such as the prevalence of unit offerings and the use of equity and warrants in the sponsor's contract. They show that a properly designed SPAC provides an alternative means for relatively riskier firms to go public, enabling greater access to capital markets. A critical aspect of the SPAC structure is ensuring the sponsors makes an upfront risky investment by purchasing warrants. Purchasing warrants more effectively aligns their incentives with those of the shareholders, who are seeking long-term value creation.

Reddy (2021) is more pessimistic, finding the SPAC structure represents a financial instrument used by institutions to make short-term profits at the expense of average retail investors. These short-term profits occur as SPACs are essentially a backdoor allowing highly speculative companies access to public markets at high valuations. He states that if regulators wish to make public markets more accessible to high-quality companies and retail investors, they should review the SPAC structure and implement more regulation.

Blankespoor, Hendricks, Miller, and Stockbridge (2021) echo this concern for retail investors. They find SPACs being able to provide projections at the time of the merger is problematic. The projections are nearly always highly optimistic and are merely merger marketing efforts to draw in investors. Only 35% of firms meet or beat these initial projections. Agarwal (2021) and Reddy (2021) both find evidence that the projections are problematic. The studies conclude

that retail investors are left worse off while institutions make short-term profits.

Agarwal (2021) also notes that the SPAC merger does not require an independent valuation. SPACs sponsors can advertise excessive valuations and overly optimistic projections to retail investors, with no one reining them in. Agarwal says regulators should make getting an independent valuation for the merger mandatory, or retail investors in SPACs will face more losses.

### 3.2 Sponsor Attributes

Berger (2008) advances the improving structural quality of SPACs is driving an increase in the quality of SPAC sponsors. The substantial rewards for success are drawing in more prominent sponsors with impressive track records. He also finds that owners of target companies, including leading private equity firms, are becoming more sophisticated about how to use SPACs to accomplish their goals.

Blomkvist, Nocera, and Vulanovic (2021) explore how the improvement of SPAC sponsors links to capital raising outcomes. They find CEOs of SPACs who are more reputable and have greater financial expertise can credibly convey the value of the share offerings to outsiders. The ability to convey value reduces information asymmetries surrounding a SPAC listing, resulting in larger SPACs and increased demand for the offering. Cumming, Hab, and Schweizer (2014) show that younger SPAC sponsors have a higher deal approval probability.

Lin, Lu, Michaely, and Qin (2021) find that a SPAC sponsor having private equity or venture capital work experience a critical factor for the post-merger firm's performance. They also find SPAC sponsors with a high PE network centrality outperform those with a low network centrality. Because they have superior deal sourcing ability, high PE network centrality sponsors raise more funding from the IPO and PIPE investors, take a shorter time to find a target and explain their merger decisions more carefully. They also have higher announcement and long-term stock returns after business combinations. Rodrigues and Stegemoller (2014) find similar results, with higher quality managing from the SPAC sponsors positively relating to merger announcement returns.

Lin, Lu, Michaely, and Qin (2021) show that SPAC sponsor team size positively correlates to merger success. They find that as team size increases, the decision process becomes longer

and more discreet, contributing to a greater probability of a successful merger. An interesting factor that has a significant negative correlation with the merger's success is the heterogeneity of experience. A potential explanation is that many wide-ranging professional backgrounds and experiences may lead to a wide disparity of opinions, which potentially contributes to miscommunications and is an obstacle to successful mergers.

Maupas and Paugam (2021) find that investors are overly confident in SPAC management completing a good deal. Investors place too much weight on the past successes of individuals, especially in areas unrelated to corporate acquisitions. They suggest that the misalignment of incentives between management and investors means past successes is not a good indicator of a quality SPAC deal.

### 3.3 Advantages

The evolvement of SPACs over time has helped transform their reputation and role within the financial markets. Kolb and Tykvova (2016) find that despite SPACs once being viewed as a means to go public in poor market conditions, they are now seen as an alternate pathway to go public in all conditions via a structured transaction. Berger (2008) also finds SPACs offer benefits over the traditional IPO. Advantages include capital structure solutions, the ability to forego complications in the IPO process, a collaborative transaction structure, the expertise of SPAC sponsors and an alternative pathway if there is a lack of strategic buyers.

Chong, Zhong, Li, Li, Agrawal, and Zhang (2021) also consider SPACs ability to forego complications in the IPO process. They suggests that because the traditional IPO process bar is so high, many small businesses can never seriously entertain taking their companies public to raise capital to fund growth. SPACs represent another pathway with fewer barriers, leading to their surge. Riemer (2007) finds similar benefits, stating SPACs fill a void in the US IPO market. Smaller companies struggle with the regulation of IPOs and finding investment banks to underwrite their IPO. SPACs overcome these barriers, giving them access to public markets and funding. Castelli (2009) finds that in the US, more prominent private companies are replacing largely obscure target companies.

Lakicevic and Vulanovic (2013) find that SPAC IPOs do not experience under-pricing, unlike traditional IPOs. Rodrigues and Stegemoller (2014) find similar results, where mean initial

returns are less than 1%, a lower than usual IPO under-pricing amount. This finding is unsurprising given that the majority of a SPACs cash proceeds reside in a trust account. This structure essentially gives SPACs a trust value per share, limiting their downside exposure by eliminating uncertainty about its prices movements. The SPAC structure mitigates risk and leads to a less noisy IPO. Despite almost no under-pricing, gross spreads in SPAC IPOs are similar to those of traditional IPOs, sitting around 7%.

Gahng, Ritter, and Zhang (2021) find that the financial returns for the private company stakeholders strongly incentivise going public via a SPAC, leading to a surge in SPACs. However, this benefit is beginning to diminish as the SPAC market heads toward an equilibrium. Investors in the SPAC are demanding greater returns post-merger, which means slightly lesser returns for private company stakeholders.

Kim, Ko, Jun, and Song (2020) find post-merger SPAC firms have comparable financial and operating performance to other public firms in Korea. They contribute this finding to SPAC transactions having less ownership dilution than a traditional IPO in Korea, benefiting private companies with greater portions of controlling ownership. The transaction structure protects control rights as the owners maintain more than 50% ownership on average.

Castelli (2009) finds SPACs have increased their quality by independently replacing lower-tier underwriters with reputable international firms such as Goldman Sachs, Citigroup, and Deutsche Bank. Sophisticated hedge funds and institutional investors have also replaced inexperienced private investors.

Shachmurove and Vulanovic (2017) find that modern, innovative SPAC structures can limit the downside for potential investors while promoting efficiency in finding a target. These structures reinforce the confidence to create or invest in SPACs for both investors and sponsors. They also find that their regulatory obligations to the SEC increase investors confidence to invest in SPACs. The transparency via regular reporting to the SEC provides SPACs and its investors a high level of security. Vulanovic (2017) finds practical evidence for this, where survival chances for the post-merger SPAC firm increase with the amount of sponsor's warrant purchases because this sponsor commitment lowers asymmetric information and moral hazard.

Riemer (2007) finds other benefits to the SPAC structure. First, he finds the liquidity of the investment and the investor protections built into the SPAC structure provides investors greater

control. Second, the structure also prevents SPAC sponsors from misusing and overspending invested funds. Third, it creates an opportunity for the average retail investors to invest in a private equity style venture backed by a proven management team, an investment opportunity normally inaccessible to these investors.

Rodrigues (2012) looks at the effect of the Jumpstart Our Business Startups Act (JOBS Act) on SPACs. The JOBS Act intention to make the road to IPO easier, instead it inadvertently makes it easier for the average investor to get a taste of private equity via SPACs. This unexpected interaction shows how difficult it is for regulators to revise the public-private boundary with any degree of certainty. The opposing pulls of investor protection and firms' desire for more capital is tough to balance. The traditional balance saw greater protection on the public markets and left wealthy investors with exclusive access to riskier and potentially more profitable investments. However, the surge in SPACs indicates that public investors desire access to these private equity type of investment opportunities.

Ray and Ray (2017) credits the SPAC structure for creating more successful mergers than traditional M&A. The investor benefits from the liquidity of SPACs and the cash-out voting option at the time of the merger. The SPAC structure also has the advantage in a scenario with multiple target merger firms, as the SPAC sponsors can act as mediators. This circumnavigates such problems of integration of culture and business process, made possible because of the shell nature of the SPAC and the shared SPAC leadership, allowing for more successful mergers.

### 3.4 Disadvantages

Both Kolb and Tykvova (2016) and Datar, Emm, and Ince (2012) find that the target firms SPACs merge with are not as appealing as firms that go public via the traditional IPO. These post-merger firms have lower growth opportunities, are more highly levered, invest less and are smaller than IPO firms. They also have significantly inferior operational performance to their industry peers and contemporaneous IPO firms. The target firms are also less likely to have received investments from venture capital firms and private equity funds. Dimitrova (2017) finds that while the post-merger firms are not more levered, they do still fall short of investors' expectations for returns. Datar, Emm, and Ince (2012) ask why SPAC shareholders continue to approve merger proposals given the low quality of many investments. They advance SPAC

shareholders approve value-destroying deals due to irrational decision-making.

Disadvantages for the target firm are also apparent, with Klausner and Ohlrogge (2020), Kim, Ko, Jun, and Song (2020) and Gahng, Ritter, and Zhang (2021) all finding the cost of going public via a SPAC is significantly higher than for a traditional IPO. The latter paper finds it is almost three times more expensive than the traditional IPO route. The cost of the median company going public via a SPAC merger is 14.1% of the post-issue market cap, while only 4.8% for traditional IPOs. Klausner and Ohlrogge (2020) find these costs are built into the SPAC structure in a subtle and opaque way, meaning they are far higher than previously recognised. They find that although SPACs typically raise funds at \$10 per share at IPO, they hold only \$6.67 in cash per share by the time a merger occurs. They conclude that there is a need for regulatory measures to enhance the transparency of SPACs and eliminate these preferences. Kim, Ko, Jun, and Song (2020) find that as well as being more expensive, SPAC mergers do not even generate the same marketing benefits for the listing firms.

Not only are the costs of going public via a SPAC high, the chances of failure are also high. Vulanovic (2017) finds that the post-merger SPAC firm failure rate over their lifetime is 58.09%. A significant determinant of failure is using bank financing for the merger. Such financing is likely the last resort when they cannot finance the merger in the equity or debt market. Dimic, Lawrence, and Vulanovic (2020) look at other determinants for failure, finding that the volatility level on the first day of trading correlates to failure. If the merger target is in the domain of private equity, they are also more likely to fail and withdraw their IPO.

Berger (2008) finds multiple challenges of merging with SPACs. These include the dilutive effect of warrants, deal closing time, the high hurdle for shareholder approval, paying too high of a valuation, not leaving upside for shareholders, all-cash transactions being complex and the structure-oriented shareholder base.

A key discussion point in multiple papers is the dilutive effect of redemption rights post-merger. Klausner and Ohlrogge (2020) find that post-merger share prices are bound to fall, the degree to which is strongly correlated with the extent of dilution. This result implies that SPAC investors bear the cost of dilution built into the SPAC structure, effectively subsidising the target firm's path to the public markets. They view this as an unsustainable situation and propose regulatory measures to eliminate this cost. Nilsson (2018) also finds the dilution effect

challenging, stating that it is difficult to counteract. He proposes increasing the exercise price of warrants and decreasing the number of shares underlying the warrants.

Klausner and Ohlrogge (2020) find that the latter solution is already occurring. They find share prices to decrease post-merger. In response, SPACs are adjusting their structure by decreasing the fraction of shares each warrant in a unit will buy, meaning less dilution at the time of the merger. This change reduces the wealth transfer from post-merger to pre-merger shareholders, smoothing share price returns. The adjustment towards a sustainable equilibrium leads the authors to believe SPACs will remain a credible alternative to IPOs.

One significant disadvantage of SPACs, consistent throughout the literature, is deals occurring at value-destroying prices. Jenkinson and Sousa (2011) find that SPACs can be very profitable for the sponsors, who typically take 20% of the SPACs portion of the equity in the post-merger firm upon deal completion. Nilsson (2018) notes that this has the advantage of creating a strong incentive for sponsors to find a target and complete a merger.

However, it also means the sponsor's payday is contingent upon deal approval and not upon creating value for public shareholders. Many studies state this as a weakness, including Kolb and Tykvova (2016), Nilsson (2018), Rodrigues and Stegemoller (2014), Floros and Sapp (2011), Vulanovic (2017), Gahng, Ritter, and Zhang (2021), Klausner and Ohlrogge (2020) and Dimitrova (2017). Only Lakicevic and Vulanovic (2013) find SPAC mergers are not occurring at the value-destroying prices that other literature suggests. However, the overwhelming majority of literature finds the prices are value destroying.

Because of the misaligned incentives between SPAC sponsors and investors, the consistent theme in these studies is that shareholders must closely examine the deal to ensure it is not occurring at a value-destroying price. The authors suggest the solution is to link stock performance post-merger into the compensation system. Rewarding SPAC sponsors partly in proportion to post-merger value creation will incentivise the sponsors to care about long-run value creation. This compensation structure is a viable solution, as Dimitrova (2017) finds that the continued involvement of SPAC sponsors as shareholders and board members in the new company positively influences future performance.

Rodrigues and Stegemoller (2014) find that the root issue with the 20% equity compensation is that it derives from private equity. SPACs, however, are only a one time deal. Private equity

is a repeat business where reputation can be a contractual gap filler, but since SPACs are one-off, their lack of reputation constrains them. The solution suggested is for SPACs is to alter their structure to account for this reputational gap. Investors are demanding increasing amounts of "skin in the game" from SPAC sponsors and more conditions on their 20% compensation.

The 20% equity compensation structure has interesting results in practice, with both Vulanovic (2017) and Lakicevic, Shachmurove, and Vulanovic (2014) show that finding the merger target earlier and announcing the merger earlier increases the likelihood of survival and leads to more positive post-merger outcomes. Rodrigues and Stegemoller (2014) find that announcements made closer to the deadline have significantly lower announcement returns than those announced further away from the deadline. This finding suggests sponsors with time pressure to complete a transaction make worse bids at more value-destroying prices, as they want to complete a transaction at any cost to receive their 20% equity compensation.

Maupas and Paugam (2021) summarise the disadvantages of SPACs, as arising from the dilutive effect of the SPAC structure, the excessive confidence investors have in management, and the strong incentives SPACs sponsors have to complete poor quality deals. They also find that many SPACs are competing for a finite pool of private target firms, resulting in underperformance for investors.

### 3.5 Deal Announcement Returns

The returns at the time of deal announcement are a vital signal for the long-run performance of SPACs. Vulanovic (2017) shows that positive returns in the share price around the announcement date increase the firm's likelihood of survival. Chamberlain (2021) finds similar results, where positive returns one-day post-merger announcement is a positive predictor of the post-merger firm's long-run (three-year) share price performance.

Jenkinson and Sousa (2011) also find post-announcement share price reaction critical, and propose a simple rule: if the share price on the merger date is above (below) trust value per share, then investors think the merger is value-creating (destroying) and should go ahead (liquidate). Investors who went against the market signal lost around 39% of their investments within six months and over 79% after one year. Conversely, investors who followed the market signal received handsome, low-risk profits.

Dimitrova (2017) finds the announcement of mergers by SPACs are received positively by the market. Rodrigues and Stegemoller (2014) also find similar results, showing the average announcement returns of SPACs is triple that of size, industry, and time-matched acquirers. Lewellen (2009) finds a post-announcement four-factor alpha of more than 2% per month.

Lakicevic and Vulanovic (2013) also find positive abnormal returns on the merger occur on announcement day. Among the three types of securities, warrants have the strongest reaction. The second strongest reaction is for units, and lastly, common shares. Warrants have larger positive returns relative to common shares. The warrants performance also drives the units abnormal returns, so common shares return relatively less.

Gahng, Ritter, and Zhang (2021) find that risk-adjusted annualised returns are 9.3% from IPO until the merger. They find investing in a SPAC IPO is comparable to investing in default-free under-priced convertible bonds with additional warrants. It is default-free as the trust protects the SPAC proceeds. The interest accruing on the trust proceeds is akin to the coupon payments on a bond. The investor has a vote to either cash out or to remain invested in the post-merger firm, essentially converting their SPAC share (akin to a convertible bond) to a common share in the post-merger firm. It is underpriced as the units at the time of IPO essentially include a portion of a warrant for free as a sweetener for investing early on.

### 3.6 Post-Merger Performance

Dimitrova (2017) finds that post-merger SPAC firms initially trade at higher valuations than their peers. However, multiple papers find evidence for the poor performance of the post-merger firms. For example, Floros and Sapp (2011) find that in the following 31 days post-merger, the mean returns are negative 8.24%. They find a continued drop in returns for the surviving post-merger firms in the long-term, being negative 75.7% over 18 months. Vulanovic (2017) finds similar results, showing post-merger SPAC firms exhibit significant negative post-merger buy and hold performance of negative 40%. Lewellen (2009) finds that the post-merger firms have a post-completion alpha of negative 2% per month. Bodewes (2021) also provide evidence for underperformance, stating that they are value-destroying over longer time horizons.

Chong, Zhong, Li, Li, Agrawal, and Zhang (2021) find that post-merger SPAC firms have negative abnormal returns and Sharpe ratios lower than the S&P 500 index. In both the

CAPM and Three-Factor Model analysis, their average abnormal returns are negative for all time horizons. Chamberlain (2021) shows three-year returns are significantly greater for the NASDAQ (51.50%) relative to the returns of post-merger SPAC firms common shares (negative 32.60%).

Datar, Emm, and Ince (2012) find that excess stock returns are significantly more negative for post-merger firms than other public firms. Kolb and Tykvova (2016) also find similar results. Relative to other public firms, their industry and the market, the long-run abnormal return of post-merger SPAC firms "severely" underperform. Dimitrova (2017) finds post-merger SPAC firms also have worse long-run operational performance relative to various benchmarks.

Vulanovic (2017) finds that market performance characteristics suggest a different impact on post-merger outcomes. While one-month positive post-merger returns negatively impact survival likelihood, one-year post-merger returns strongly suggest that post-merger SPAC firms with higher returns have a higher likelihood of survival. Chamberlain (2021) finds similar results, where positive one-year returns is a positive predictor of long-run (three-year) share price performance. The economic explanation of these findings is that markets are still attempting to understand the value of a company a month after the merger, and overvaluation suggests a higher failure likelihood.

Blankespoor, Hendricks, Miller, and Stockbridge (2021) highlight how SPACs perform relative to the projections they make at the merger. They find that only 35% of firms meet or beat their projections, with the proportion declining over longer time horizons. This evidence supports regulators and market concerns that SPAC merger deals include highly optimistic projections. The projections are approximately three times higher than benchmark firms actual revenue growth. They find the projections suggest merger marketing efforts, as post-merger their projections decline to rates comparable with benchmark firms.

Dambra, Even-Tov, and George (2021) also find that higher revenue growth projections are likelier biased, and firms with these higher projections end up underperforming relative to benchmark firms. They find that the SPACs aggressive projections compel retail investors to invest, but these investors end up worse off in the long run. Reddy (2021) shares the concern for the retail investor, stating they are investing in SPACs "with a wholly laudable long-term perspective" but are left "carrying the can, while all other players make hay".

Agarwal (2021) states that it is critical to remember that most SPAC mergers do not require independent valuation opinions, which contributes to the excessive valuation and financial projections that are not justified. Agarwal states that SPACS can "market numbers that are absolutely rubbish". The lack of requirement for a fairness opinion will lead to more losses for investors in SPACs, particularly retail investors.

Saengchote (2021) investigates why investors approve value-destroying SPAC deals from a behavioural finance perspective. They find it is unclear whether investors overlook the dilution cost or lower quality SPACs tend to offer more warrants and rights. The authors suggest that the approval of value-destroying deals signals that investors may not fully understand SPACs as an investment opportunity. They also find the mispricing starts occurring in line with the Tesla stock price soaring and is more prevalent in SPAC deals with electric vehicle companies.

Hori and Osano (2021) believe that value-destroying SPAC deals gain approval due to SPAC shareholders ability to exercise their voting and redemption rights independently. The two votes enable them to vote in favour of a bad deal and redeem their shares. They find that while this ability may be desirable to some investors, overall, it may not be a positive for the SPAC market.

Lin, Lu, Michaely, and Qin (2021) believe the dilution effect of warrants or the 20% equity compensation is not sufficient reason for post-merger firms underperformance. It may not be sufficient reason as the underperformance occurs not only immediately post-merger but also in the long run. If dilution is the only reason for underperformance, the share price should adjust at the announcement date. The 20% equity compensation for the sponsors is known to the investing public and, therefore, unlikely to result in long-term underperformance.

Therefore, Lin, Lu, Michaely, and Qin (2021) find it more likely that the "safe harbour" rules that entitle SPAC sponsors to legal immunity allow low-quality firms to go public via SPACs. They conclude that this leads to an asymmetric perception of quality, hence the overvaluation by public investors. They suggest requirements be imposed on SPAC sponsors (although they do not put forth any specifical requirements) as a solution to underperformance. By improving the quality of SPAC sponsors and lessening the dilution structure, they see SPACs continuing to be a credible alternate route for firms to go public.

This review covers the current literature on SPACs, highlighting the effect a SPAC structure and the sponsor quality has on outcomes, covering the advantages and disadvantages to SPACs,

and looking at the financial returns of SPACs across their lifetime. The majority of literature holds a negative sentiment towards SPACs. The negative attributes include the misalignment of incentives, overly optimistic projections, and the dilutive effect of warrants. These atrributes lead to poor quality firms accessing public markets, poor financial returns and retail investors losing money while institutions gain short-term profit. Once public, the post-merger firms have lower growth opportunities and invest at lower rates. However, while the literature is rich in information on the SPAC structure and their financial returns, it lacks data on their operational performance post-merger. A few papers gather evidence on revenue growth relative to the projections given but do not go deeper into operational performance. Only Datar, Emm, and Ince (2012) and Dimitrova (2017) present any results on operational performance. I motivate my paper in Section 4.

# 4 Hypothesis Development

I motivate the first hypothesis of this paper from the lack of operational performance research into post-merger SPAC firms. This gap in the literature is likely due to two main reasons: the high level of difficulty in connecting SPAC data to the post-merger firm data and the recent rise in popularity in SPACs.

Firstly, the financial and operational information on SPAC post-merger firms come from different databases. Linking data across databases is troublesome as nearly all firm unique identifiers change at the time of the merger. Secondly, the recent surge in the popularity of SPACs means there is now a lack of research relative to their importance in the financial markets. Dimitrova (2017) sums these issues up, stating "the literature on SPACs is limited compared with the importance of SPAC deals. Researchers have overlooked the richness of empirical data available."

Only two papers focus on the relative operational performance of post-merger firms. Datar, Emm, and Ince (2012) find the median assets, market capitalisation, EBITDA (earnings before interest, tax, depreciation and amortisation) and operating cash flow are significantly smaller for post-merger SPAC firms relative to other public firms. They also find that operating profit margin, return on assets, operating return on assets, operating cash flow to total assets, and sales per employee for post-merger SPAC firms are typically about half for post-merger SPAC

firms. Dimitrova (2017) uses measures such as operating margins and return on sales, finding post-merger SPAC firms significantly underperform relative to these benchmarks and that the poor operating performance of SPACs does not appear to be caused by higher leverage and financial distress costs. Tobin's Q is one measure she does not find to be significantly lower than comparable IPO firms.

This result is surprising given the other operational measures significantly underperforming for post-merger firms. To analyse why this result occurs, I assess the Tobin's Q measure she uses. Tobin's Q is the ratio of capital's market value to its replacement cost, a ratio that summarises how well a firm utilises its assets. Tobin's Q derives from the neoclassical theory of investment that was developed more than 30 years ago. It focuses exclusively on physical capital, as firms back then mainly owned physical assets such as property, plant, and equipment (PP&E). Modern firms now have greater amounts of intangible capital due to the shift in the economy towards technology- and service-based industries. Intangible assets such as human capital, patents, brand, software, customer relationships and databases have become more prevalent and crucial to firms. Despite the importance of intangible assets to firms, the Tobin's Q measure Dimitrova uses fails to include it. Leaving intangible assets off Tobin's Q may lead to biased results. To find an unbiased estimator for Tobin's Q, I need to account for the investment opportunities presented through intangible assets.

Peters and Taylor (2017) innovate on standard measures of operating performance, including Tobin's Q. They develop a theoretical framework for Tobin's Q, capital investment, and free cash flow that includes intangible assets. I refer to the new Tobin's Q measure as Total Q. I break down their framework for the new measures in Section 5. They find their new measures to be more accurate and represent a more useful approximation of reality. In this paper, I utilise their measures to see if there are differences in operational performance between SPAC post-merger companies relative to other public companies. This creates the first hypothesis for this paper:

**Hypothesis 1.** *Relative to other public companies, post-merger SPAC firms have lower Total Q's.*

Finding evidence that SPAC post-merger firms have a lower Total Q means that their operational performance is worse than other public firms. This would follow the negative findings

of the literature covered in Section 3. Many papers view SPACs as a backdoor for lower quality firms to go public that would be otherwise unable to access public markets, so worse operational performance may be expected. Other flaws in the SPAC structure include the misalignment of incentives caused by the promote, overly optimistic projections, no fair value opinions and lack of regulation. These flaws may also lead to post-merger SPACs performing worse operationally. The vast majority of papers finding SPACs post-merger firms have poor financial returns may suggest poor operational performance, as the share price should be indicative of the fair value of a firm in an efficient market.

Alternatively, I could fail to reject the null that $\beta = 0$ in the regressions measuring Total Q. This finding would mean that relative to other public companies, post-merger SPAC firms do not perform significantly different operationally and have similar Total Q's. Failing to reject the null would be an advancement on current literature as it suggests post-merger SPACs operationally perform similarly to other public firms, utilising their assets at a similar effectiveness.

The intangible capital model that Peters and Taylor (2017) build is the sum of three components: externally purchased intangible capital, knowledge capital and organisation capital. Knowledge capital and organisation capital are internally created. My second hypothesis is:

**Hypothesis 2.** *Relative to other public companies, post-merger SPAC firms have a higher proportion of their intangible capital externally purchased.*

A SPAC transaction includes a reverse merger, which I expect will mean post-merger SPAC firms have a higher proportion of their intangible capital externally purchased. This motivates the second hypothesis for this paper. This finding would show that going public via a SPAC changes the structure of the post-merger SPAC firm.

Alternatively, I could fail to reject the null that $\beta = 0$ in the regressions measuring the portions of intangible capital. This result would indicate that the intangible capital structure of post-merger SPAC firms is similar to other public firms.

Third, I can measure the physical, intangible and total investment rates of firms via the intangible capital model Peters and Taylor (2017) provides. A higher investment rate is not necessarily always positive, as firms should only be investing into positive net present value (NPV) projects. However, these investment rates give insight into if there are operational differences between post-merger SPAC firms and other public firms. My third hypothesis is:

**Hypothesis 3.** *Relative to other public companies, post-merger SPAC firms have lower physical, intangible and total investment rates.*

I hypothesis that post-merger firms have lower investment rates because both Kolb and Tykvova (2016) and Datar, Emm, and Ince (2012) find that post-merger SPAC firms have lower growth opportunities. If a firm has lower growth opportunities, it will invest at a lower rate as it has fewer positive NPV projects to invest in. Datar, Emm, and Ince (2012) find that post-merger SPAC firms invest less according to traditional investment measures. The findings suggest that both the investment rates I use (from Peters and Taylor (2017) intangible capital model) are also lower.

Alternatively, I could fail to reject the null that $\beta = 0$ in the regressions measuring the investment rates. This finding would mean that post-merger SPACs and other public firms invest at similar rates. This finding would oppose the findings of the current literature, as it implies that post-merger SPAC firms do not necessarily have lower growth opportunities and invest at similar rates to other public firms.

Lastly, the intangible capital model that Peters and Taylor (2017) develop slightly changes the free cash flow for a firm. It not only adjusts for physical investments but also adds back investment in intangible capital onto the cash flow. This leads to my last hypothesis:

**Hypothesis 4.** *Relative to other public companies, post-merger SPAC firms have lower free cash flow.*

The literature ubiquitously finds post-merger SPAC firms have poor share price returns of SPAC firms post-merger. The share price should reflect the present value of expected future values and as a result I expect the free cash flow of the post-merger SPAC firms to be lower. Finding a lower free cash flow complements finding a lower Total Q (Hypothesis 1) as both imply poor operational performance of post-merger SPAC firms.

Alternatively, I could fail to reject the null that $\beta = 0$ in the regressions measuring free cash flow. This finding would indicate post-merger SPAC firms have similar free cash flow to other public firms.

Failing to reject the null for Hypothesis 1 and 4 would be an advancement on the current literature, which has primarily negative findings. While the literature finds that SPAC post-merger companies are brought public at too high valuations that lead to poor financial returns,

it may be the case that the underlying operational business performance of the firm is not different to that of benchmark firms. This finding may provide more evidence that the rise in the number of SPACs has also led to an increase in the quality firms going public via SPACs, which a few papers mention. Finding evidence for this would also provide credence to the idea that SPACs are a positive development for the financial markets. They are attracting more firms to go public do their relative lack of regulation, valuation certainty, and SPAC sponsor experience with public firms.

# 5 Data

## 5.1 Sample

Because it is the year of the first SPAC IPO, my sample period begins in 2003. The latest date on the Center for Research in Security Prices (CRSP), and hence my sample, is the 2020 year-end at the time of writing. As I am comparing SPAC post-merger operating companies versus other public companies, I gather data on all companies that have gone public in my collection period from the CRSP-Compustat merged database. I use an indicator variable to separate the SPAC post-merger operating companies from other public companies. As is standard in the literature, I exclude firms in the following industries: regulated utilities (Standard Industrial Classification codes 4900-4999), financial firms (6000-6999), and public service, international affairs or non-operating establishments (9000+). I also exclude firms who have missing or non-positive book value of assets or revenue, as well as firms with less than $5 million in capital. I winsorize all regression variables at the 5% level to reduce the effect of outliers.[2]

## 5.2 SPAC Indicator

Within this sample, I define $SPAC(0/1)$ as an indicator variable set to one for SPAC post-merger firms and is set to zero otherwise. To gather information on SPACs, I use the SPAC database *BoardRoomAlpha*. It includes data on SPAC firms at all stages of their life-cycle. It

[2]Because the measures I use do not make economic sense for firms above or below a certain level, I winsorize at the 5% level and not at a lesser level. A negative Tobin's Q implies the firm would pay someone to take their assets, and a Tobin's Q excessively high (e.g. above 10) indicates that a firms replacement value has been inaccurately captured by the measure. Their data would not provide any insight. This is similar to disregarding a P/E ratio for a growth firm with negative or low earnings, as it does not make economic sense or provide insight into the company.

breaks the life-cycle into four main sections: pre-IPO SPACs, IPO SPACs, SPAC announced deals, and SPAC completed deals. As I am interested in post-merger operating performance, I only gather information from the SPAC completed deals section, manually adding any missing firms. I match the firms on this list to those in the CRSP-Compustat sample using their unique firm identifier number *GVKEY*. All firms that match have their $SPAC(0/1)$ set to 1, with all other firms remaining equal to zero.

### 5.3 Tobin's Q

The literature's standard assumption that a firm's total capital equals its physical capital ($K^{tot}$ $=K^{phy}$). This assumption makes the equation for literature's standard Tobin's Q, which I denote as $q^*$ and refer to as Tobin's Q, the following:

$$q^*_{i,t} = \frac{V_{i,t}}{K^{phy}_{i,t}} \tag{1}$$

However, I use the Total Q from Peters and Taylor (2017), which includes intangible capital. The build-up of this formula is taken directly from their paper. Including intangible capital is essential to my testing as the hypothesis outlines. Peters and Taylor (2017) define total Tobin's Q (denoted by $q^{tot}$) as:

$$q^{tot}_{i,t} = \frac{V_{i,t}}{K^{phy}_{i,t} + K^{int}_{i,t}} \tag{2}$$

Eq. (2) comprises three parts: $V$, $K^{phy}$ and $K^{int}$. The only difference between $q^{tot}$ and $q^*$ is the inclusion of $K^{int}$ in the former. The correlation coefficient between them is 0.77.

First, $V$ is the firm's market value, equal to the market value of outstanding equity (CRSP-Compustat items *prcc_f* times *csho*), plus the book value of debt (*dltt* plus *dlc*), minus current assets (*act*), which includes cash, inventory, and marketable securities. Second, the firms physical capital, $K^{phy}$, is set equal to the book value of property, plant and equipment (*ppegt*). Last, I describe intangible capital, $K^{int}$, in Section 5.4 due to its level of complication.

### 5.4 Intangible Capital

Intangible capital, $K^{int}$, is the sum of internally created intangible capital (denoted $K^{intC}$) and externally purchased intangible capital (denoted $K^{extP}$). This is due to the US accounting rules

for intangible capital. These rules depend on whether it was created internally by the firm, or if they purchased it externally. Internally created intangible capital is the sum of knowledge capital ($K^{kno}$) and organisation capital ($K^{org}$). I capture the intangible capital structure of firms by calculating the proportion each component makes up of its total intangible capital. The ratios are $K^{extP}/K^{int}$, $K^{kno}/K^{int}$, and $K^{org}/K^{int}$.

### 5.4.1 Externally Purchased Intangible Capital

When a firm purchases intangible capital externally, it capitalises the asset on the balance sheet as part of intangible assets. The external purchase of intangible capital most commonly occurs via M&A. Intangible assets are equal to the sum of goodwill and other intangible assets. Acquired assets that are separately identifiable (for example, a patent) go under the other intangible assets, while those not separately identifiable (human capital, for example) sit under goodwill. Any impairments to the value of intangible assets require the firm to write down its book value.

Externally purchased intangible capital ($K^{extP}$) equals intangible assets from the balance sheet (CRSP-Compustast item *intan*). If this value is missing, it is set equal to zero. The mean (median) firm in my sample purchases 59% (25%) of its intangible capital externally, meaning a significant amount of firms intangible assets lies on its balance sheet. Including these externally purchased intangible assets is an innovation by Peters and Taylor (2017) relative to what is standard in the literature.

### 5.4.2 Internally Created Intangible Capital

If a firm creates intangible capital internally, it is expensed on its income statement. For example, a firm researching and developing new technology or software would expense this as research and development (R&D). Advertising and marketing expenses for a product or service go on the income statement as a selling, general and administrative (SG&A) expense. Because internally created intangible capital does not appear on the balance sheet, it is much more difficult to measure. Therefore, Peters and Taylor (2017) construct a proxy by "accumulating past intangible investments, as reported on firms' income statements". They define the level of internal intangible capital ($K^{intC}$) as the sum of knowledge capital (denoted $K^{kno}$) and organisation capital ($K^{org}$).

**Knowledge Capital**

A firm develops its knowledge capital through spending on R&D. To estimate a firm's knowledge capital, Peters and Taylor (2017) accumulate past R&D spending using the perpetual inventory method:

$$K_{i,t}^{kno} = (1 - \delta_{R\&D})K_{i,t-1}^{kno} + R\&D_{i,t} \tag{3}$$

where $K^{kno}$ denotes the end-of-period level of knowledge capital, $\delta_{R\&D}$ is the depreciation rate of the knowledge capital and $R\&D_{i,t}$ is a firms annual R&D expenses for the year. Capitalising R&D in this manner has been done in academic literature and by practitioners before. For $\delta_{R\&D}$, I use the United States Bureau of Economic Analysis (BEA) industry-specific R&D depreciation rates.[3] As per the BEA's guidance, I use a depreciation rate of 15% for the industries in which it is not specified. The firms annual R&D expenditure is equal to the CRSP-Compustat variable *xrd*. Following standard practice in literature, R&D expenditure is set equal to zero when it is missing.

A challenge when using the perpetual inventory method in Eq. 3 is selecting a value for $K_{i0}^{kno}$, a firms level of knowledge capital for its first CRSP-Compustat entry. Peters and Taylor (2017) uses a complicated approach to select this value, but I follow their simplified approach and set it equal to zero. Peters and Taylor (2017) show that setting $K_{i0}$=0 produces a stronger Total Q result than their main measure, stating that they consider the "simpler measure a reasonable alternate proxy".

**Organisation Capital**

Peters and Taylor (2017) also use the perpetual inventory method for organisation capital, using an accumulation of SG&A expenditure instead of R&D expenditure. The intuition behind using a part of SG&A expenses is that it represents an investment in organisation capital via advertising, employee training, and distribution systems. Following Peters and Taylor, I assume only 30% of SG&A spending is an investment in intangible capital, while the remaining 70% represents operating costs that support the current periods profit's. $\lambda$ represents this proportion in the formula. This makes the formula for a firms organisation capital:

$$K_{i,t}^{org} = (1 - \delta_{SG\&A})K_{i,t-1}^{org} + \lambda \times SG\&A_{i,t} \tag{4}$$

[3]Link to paper: https://doi.org/10.1111/roiw.12380

I follow Peters and Taylor in setting the depreciation rate of organisation capital, $\delta_{SG\&A}$, equal to 20%. CRSP-Compustat data nearly always add SG&A and R&D together for their variable labelled "Selling, General and Administrative Expense" (*xsga*, despite firms nearly always reporting them separately. Therefore, to isolate SG&A expense, I subtract *xrd* and *rdip* (in-process R&D expense) from *xsga*. As this is not always the case, there is a need to add in an additional screen: when *xrd* is greater than *xsga* but is less than *cogs*, SG&A is set as *xsga* without further adjustments. If *xsga* is missing, it is set equal to zero. As with knowledge capital, I set $K_{i0}^{org} = 0$. This measure of organisation capital has been used and validated in literature.

These are all the measures I require to find intangible capital. I sum knowledge capital with organisation capital to find the internally created intangible capital of a firm. I add this to their externally purchased intangible capital to find their total intangible capital. The total intangible capital is summed with total physical capital to find a firms total capital. Total capital is used in the adjusted Tobin's Q measure, an innovation on the standard literature measure. While the proxy for intangible capital is imperfect, Peters and Taylor (2017) show it is more effective than setting intangible capital equal to zero. This build-up can be seen in the equations below.

$$K^{intC} = K^{kno} + K^{org}$$

$$K^{int} = K^{intC} + K^{extC}$$

$$K^{tot} = K^{int} + K^{phy}$$

$$q^{tot} = \frac{V_{i,t}}{K_{i,t}^{phy} + K_{i,t}^{int}}$$

### 5.5 Investment

The theory for our investment equations also follows Peters and Taylor (2017). A rate of investment is the amount of investment in the current period divided by the last periods stock of capital. They measure the rates of investment according to the following equations:

$$\iota_{i,t}^{phy} = \frac{I_{i,t}^{phy}}{K_{i,t-1}^{tot}} \tag{5}$$

$$\iota_{i,t}^{int} = \frac{I_{i,t}^{int}}{K_{i,t-1}^{tot}} \tag{6}$$

$$\iota_{i,t}^{tot} = \iota_{i,t}^{phy} + \iota_{i,t}^{int} \tag{7}$$

$$\iota_{i,t}^{*} = \frac{I_{i,t}^{phy}}{K_{i,t-1}^{phy}} \tag{8}$$

They measure physical investment (denoted $I^{phy}$) and intangible investment (denoted $I^{int}$) as capital expenditures (Compustat item *capx*) and R&D + ($\lambda\times$ SG&A) respectively. The definition for intangible investment follows the same reasoning and assumptions made in Section 5.4.2. The most notable assumption is that $\lambda$=30%, which is the proportion of SG&A spending that represents an investment in intangible capital. Once again, I estimate literature's standard measure of investment (denoted by $\iota^*$) for comparative purposes. As with $q^*$, this estimate does not adjust for the effect of intangible investment. The correlation between $\iota^{tot}$ and $\iota^*$ is 0.66.

### 5.6 Free Cash Flow

Free cash flow is an important measure for a firm because it measures how cash is available for investment or distribution to shareholders. Peters and Taylor (2017) base their measure for free cash flow (denoted $fcf$) from the literatures standard measure (denoted $fcf^*$), which does not include intangible investment adjustments. The formula for $fcf^*$ is:

$$fcf_{i,t}^{*} = \frac{IB_{i,t} + DP_{i,t}}{K_{i,t-1}^{phy}} \tag{9}$$

$IB$ is income before extraordinary items, and $DP$ is depreciation expense. Once again, this measure treats R&D and SG&A as operating costs, failing to recognise that they represent any sort of investment. Building off the theory and assumptions in Sections 5.5 and 5.3, Peters and Taylor (2017) recognise the investment aspect of them through their adjusted free cash flow measure (denoted $fcf$):

$$fcf_{i,t} = \frac{IB_{i,t} + DP_{i,t} + (1-\kappa)I^{int}_{i,t}}{K^{phy}_{i,t-1} + K^{int}_{i,t-1}} \tag{10}$$

By adding intangible investments back into the cash flow, it measures the cash available for total investment, not just physical investment. Accounting rules allow for firms to expense intangible investments, meaning when they add it back onto the free cash flow, they must adjust for tax. $(1-\kappa)$ represents this adjustment, when $\kappa$ represents the marginal tax rate that applies to a firm. Following literature, I assume a $\kappa$ of 30%. The correlation between $fcf$ and $fcf^*$ is 77%.

### 5.7 Summary Statistics

Table 2 contains summary statistics. The table is split into two columns, one for SPAC post-merger firms, $SPAC(0/1)$ =1, and one for all other firms, $SPAC(0/1)$ =0. The statistics are broken down into five sections: capital stock, intangible capital ratios, Tobin's Q, investment ratios, and free cash flow. Table 1 has definitions and formulas of all the variables.

The inclusion of $K^{int}$ in the denominator of $q^{tot}$ means that it is mechanically smaller than $q^*$. This is evident in the data, with the mean (median) $q^{tot}$ equal to 1.12 (0.77) and 1.35 (0.85) for SPAC(0/1)= 1 and SPAC(0/1)= 0 respectively, and $q^*$ equal to 4.45 (1.38) and 5.13 (1.79) for SPAC(0/1)= 1 and SPAC(0/1)= 0 respectively. The volatility of $q^{tot}$ relative to $q^*$ is significantly smaller. The standard deviation is equal to 1.25 and 1.46 for $q^{tot}$ (SPAC(0/1)= 1 and SPAC(0/1)= 0 respectively), and for $q^*$ equal to 7.26 and 7.58 (for SPAC(0/1)= 1 and = 0 respectively). The coefficient of variation is 1.08 for $q^{tot}$ and is 1.48 for $q^*$, indicating that Total Q is a more reliable measure than Standard Tobin's Q.

The capital stock section includes the level of intangible, physical and total capital. The mean (median) of all these capital levels for SPAC(0/1)= 1 firms are approximately one-quarter (one-half) of SPAC(0/1)= 0 capital levels. This noticeable difference in capital levels suggests that when testing for the effects of the $SPAC(0/1)$ variable, size needs to be controlled. This ensures the results are not due to the size effect.

The other noticeable feature of the capital stock section is that $K^{int}$ makes up a significant proportion of $K^{tot}$, accounting for approximately 36%. Standard Tobin's Q fails to account for this significant proportion of capital, leaving it bias to measurement error.

In the intangible capital ratios section, I observe the proportions of knowledge capital, organisation, and externally purchased intangible capital that make up intangible capital. Because post-merger SPAC firms go public via a reverse merger, this may affect the firms intangible capital ratios, implying higher externally purchased capital. The summary statistics display this difference, with the mean (median) $K^{extP}/K^{int}$ being 46% (42%) for SPAC(0/1)= 1 firms, but only 38% (34%) for SPAC(0/1)= 0 firms. The means for $K^{kno}/K^{int}$ are also different, being smaller for SPAC(0/1)= 1 than SPAC(0/1)= 0 firms, 8% to 16% respectively. However, the median for both is 0%, due to many firms reporting no R&D.

Free cash flow, $fcf$, for SPAC(0/1)= 1 is slightly less than for SPAC(0/1)= 0, having means (medians) of 0.13 (0.10) and 0.16 (0.14) respectively. Standard free cash flow, $fcf^*$, also shows this, with the firms having a mean (median) of 0.11 (0.10) and 0.17 (0.15). The standard deviation of $fcf^*$ is comparatively much greater than for $fcf$, indicating that our new measure is more consistent and reliable.

# 6 Results

In this section, I examine the operating performance of post-merger SPAC firms relative to other public companies. The $SPAC(0/1)$ indicator variable separates the firms in my sample into the post-merger SPAC firms and other firms. I estimate OLS regressions that test whether the $SPAC(0/1)$ variable is related to the operational measures I outline in Section 5. I include a variable list (Table 1) with definitions and formulas for ease. To further isolate the effect of the $SPAC(0/1)$ variable, I estimate the regressions again with controls for year fixed effects, Fama-French 49 Industries, and size. I cluster standard error by firm.

## 6.1 Testing H1: Total Q

I measure how well a firm utilises its assets by calculating their Total Q, $q^{tot}$, each year. I also calculate their Standard Tobin's Q, $q^*$ for comparative purposes. A higher $q^{tot}$ suggests a firm is utilising its assets more effectively, as the market values them at a relatively higher price. Table 3 shows the results of OLS regressions testing whether being a post-merger SPAC company affects $q^{tot}$.

Columns (1) and (2) of Table 3 show the $SPAC(0/1)$ coefficient is statistically significant at less than the 5% and the 1% significance level, respectively. Both $SPAC(0/1)$ coefficients are negative, -0.2336 and -0.2586, respectively. The negative coefficients imply that going public via a SPAC means the firms assets are utilised less effectively. The coefficients are economically important because they account for approximately 18% of the standard deviation, and represent a change in $q^{tot}$ of -0.34 and -0.38, respectively. This takes the average company from having a $q^{tot}$ of 1.35 to 0.97, meaning the market now values the assets less than their cost price.

However, in Columns (3) and (4) $SPAC(0/1)$ coefficient displays no statistical significance in explaining $q^{tot}$. This suggests that relative to appropriate benchmark firms, post-merger SPAC firms are utilising their assets at similar effectiveness levels according to the market, implying a failure to reject the null hypothesis that $\beta = 0$ for $q^{tot}$.

The $q^*$ measure results align very closely to the $q^{tot}$ measure. While the slope is negative for all regressions, there is no statistically significant relationship with the $SPAC(0/1)$ coefficient other than for Column (2). However, for Column (1), (3), and (4) the relationship does not continue to hold. This contrasts my expectations in Hypothesis 1 that post-merger SPAC firms have lower Total Q's. These results show post-merger SPAC firms utilise their assets at a similar level of effectiveness and have similar operational performance as other public firms.

### 6.2 Testing H2: Intangible Capital Ratios

The intangible capital ratios measure the proportion that is from knowledge capital, organisation capital, or externally purchased intangible capital. Knowledge capital and organisation capital are the two forms of internally created intangible capital. A higher proportion of knowledge and organisation capital therefore means a firm is creating more intangible capital internally. A higher proportion of externally purchased capital means a firm obtains more of its intangible capital via M&A. As a merger is intrinsically within a post-merger SPAC firms life-cycle, we expect them to have a higher proportion of externally purchased capital. Table 4 shows the results of OLS regressions testing whether being a post-merger SPAC company affects the intangible capital ratios.

Table 4 shows that in Columns (1), (2) and (4) the $SPAC(0/1)$ coefficient displays statistical significance in explaining Panel A at less than the 1% level. Interestingly, in Column (3) it

displays no statistical significance. In Panel B, the $SPAC(0/1)$ coefficient displays no statistical significance in every column. In Columns (1), (2) of Panel C, the $SPAC(0/1)$ coefficient is statistically significant at less than the 10% level. It has no statistical significance in Column (3), and in Column (4) is significant at less than the 1% level. The $SPAC(0/1)$ coefficients in Column (4) for Panel A and Panel C are in opposite directions, being -0.0443 and 0.1112, respectively. These coefficients are economically important, accounting for roughly 18% and 33% of the standard deviations, respectively.

These results provide evidence to reject the null hypothesis that $\beta = 0$ for Panel C, supporting my prediction in Hypothesis 2 that as mergers are intrinsic to a SPAC, post-merger SPAC firms will have a greater proportion of intangible capital purchased externally. The results show they have a lower proportion of knowledge capital, meaning other public firms produce a greater proportion of intangible capital via R&D.

### 6.3 Testing H3: Investment Ratios

The investment ratios measure how much a firm is investing relative to its current capital stock. Table 5 shows the results of OLS regressions testing whether a post-merger SPAC company invests more or less relative to other public companies.

Panel A of Table 5 shows that the $SPAC(0/1)$ coefficient has no statistical significance. This indicates that post-merger SPAC firms invest in intangible capital at similar levels to other public firms. The exception is in Column (3), as the $SPAC(0/1)$ coefficient becomes statistically significant at less than the 1% level. However, in Column (4), there is no statistical significance. Findings in all columns of Panel B show that the $SPAC(0/1)$ coefficient bears statistical significance at less than the 1% level. The coefficient is 0.0177 in Column (4), accounting for approximately 30% of the sample standard deviation.

The $SPAC(0/1)$ coefficient in Column (4) for Panel C of 0.0289 is also statistically significant at less than the 5% level. This is also economically important as it accounts for 22% of the standard deviation. The results of the Panel D regression align closely with the Panel C results, as the $SPAC(0/1)$ coefficient in Column (4) is also statistically significant at less than the 5% level.

Overall, these results show that post-merger SPAC firms invest more in physical and total capital relative to other public firms, rejecting the null that $\beta = 0$ for $\iota^{phy}$ and $\iota^{tot}$. However, the direction of the coefficient is opposite to my hypothesis and what the negative literature findings suggest.

### 6.4 Testing H4: Free Cash Flow

Free cash flow is one of the most important operational measures for a firm, as it indicates how much actual cash a firm has once it meets its operating and capital expenditure requirements. High free cash flow allows firms to pursue opportunities that will enhance shareholder value.

Table 6 shows the OLS estimation results of $SPAC(0/1)$ on $fcf$ and $fcf^*$. The table shows that the $SPAC(0/1)$ coefficient has no statistical significance for every column. This indicates the $fcf$ for post-merger SPAC firms is similar to other publicly trading companies, failing to reject the null $\beta = 0$ for the $SPAC(0/1)$ coefficient. This is opposite to my prediction in Hypothesis 4.

## 7 Robustness

This section describes the robustness of my results when various assumptions are tested. Overall, the robustness checks are consistent with the results of the main regressions.

### 7.1 Depreciation Rate of Knowledge Capital

I follow Peters and Taylor (2017) in setting the depreciation rate of knowledge capital, $\delta_{R\&D}$, at either the industry-standard rate or 15%, as outlined in Section 5.4.2. This assumption implies that $\delta_{R\&D}$ is constant across time. I also follow the robustness test Peters and Taylor (2017) use for this assumption, setting $\delta_{R\&D}$ to both 10% and 20%. I re-estimate the OLS regressions for the affected variables with the new values for $\delta_{R\&D}$. I include the results of the original regression for comparative purposes. Table 7 shows the results of the OLS regressions.

For the OLS regression on $q^{tot}$, the $SPAC(0/1)$ coefficient has no statistical significance for all values of $\delta_{R\&D}$. The OLS regression on $K^{kno}/K^{int}$ sees the $SPAC(0/1)$ coefficient remaining statistically significant at less than the 1% level for all values of $\delta_{R\&D}$. Overall, both of these results align closely with my main regressions.

## 7.2 Depreciation Rate of Organisation Capital

I follow Peters and Taylor (2017) in setting the depreciation rate of organisation capital, $\delta_{SG\&A}$, at 20%, as outlined in Section 5.4.2. This assumption implies that $\delta_{SG\&A}$ is constant across both time and firm. Once again, I follow the robustness test that Peters and Taylor (2017) uses, setting $\delta_{SG\&A}$ to both 10% and 30%. The OLS regressions for the affected variables are re-estimated with the new values for $\delta_{SG\&A}$. I include the results of the original regression for comparative purposes. Table 7 shows the results of the OLS regressions.

The $SPAC(0/1)$ coefficient on $q^{tot}$ has no statistical significance when $\delta_{SG\&A}$ is 10% and 20%. The coefficient is statistically significant at less than the 10% level when $\delta_{SG\&A}$ is 30%. However, when $\delta_{SG\&A}$ is 30%, both the R-squared and adjusted R-squared are smaller than rows 1 and 2. These lower values indicate that the explanatory level of the $SPAC(0/1)$ variable on $q^{tot}$ lowers when $\delta_{SG\&A}$ is 30%. The $SPAC(0/1)$ coefficient in the regression on $K^{org}/K^{int}$ has no statistical significance for all values of $\delta_{SG\&A}$. Overall, these results match relatively closely with those in my main regressions.

## 7.3 Proportion of SG&A recognised as Organisation Capital

One of the strongest assumptions in the intangible capital model is that $\lambda = 30\%$, where $\lambda$ represents the proportion of SG&A expense recognised as an investment in intangible capital. This assumption is consistent across firms and across time. I following Peters and Taylor (2017), I test this assumption by varying $\lambda$ from 0% to 100% in increments of 10%. Table 9 reports the results of the OLS regressions affected by a change in $\lambda$.

No matter the $\lambda$ level, the $K^{org}/K^{int}$ and $\iota^{int}$ results are not statistically significant. The results for $\iota^{tot}$ have statistical significance at less than the 10% level for all values of $\lambda$ other than 90% and 100%. At these $\lambda$ values, there is no statistical significance. A $\lambda$ of 90% or 100% is an extreme level for lambda. Assuming a proportion above 90% would mean that less than 10% of SG&A on the income statement would represent an operational expense, such as rent, electricity or marketing. A $\lambda$ of 90% cannot be economically justified. $q^{tot}$ has no statistical significance for all $\lambda$ values other than 0% and 10%. The statistical significance is below the 10% level for these lambda levels. A $\lambda$ this low would be assuming a tiny portion of SG&A represents an investment in intangible capital. The R-squared for all the regressions has a tight

spread for the different $\lambda$ values. Overall, my results are similar to my baseline regressions, especially when $\lambda$ is within the vicinity of assumption.

### 7.4 Marginal Tax Rate

I assume a marginal tax rate of 30% in my main regressions. This assumption is constant across firms and time. Table 10 displays the results of the $fcf$ OLS regression when the marginal tax rate is set equal to values ranging from 0% to 50% in increments of 10%. The $SPAC(0/1)$ coefficient has no statistical significance when the marginal tax rate is 30% to 50%. When the tax rate ranges from 0% to 20%, there is a statistical significance of less than 10%. The change in statistical significance may be mechanical, as post-merger SPACs have a slightly higher $\iota^{int}$. When the tax rate decreases as per Equation 10, the $fcf$ will increase more for SPACs as a result. These results align closely with my main regression, showing that the free cash flow of post-merger SPAC firms is similar to other public firms.

### 7.5 Capital Structure

I control for year, industry and size in my main regressions. However, I do not control for the capital structure of a firm. A firm with a much greater debt to equity ratio carries greater risk than a firm with a lower one. In this section, I re-estimate all the OLS regressions in my main analysis, except this time controlling for debt to equity ratio. I include the last column of my main regression, which controls for year, industry and size effects, for comparative purposes.

The $SPAC(0/1)$ coefficients for the OLS regressions on $q^{tot}$, $q^*$, $K^{org}/K^{int}$, and $fcf^*$ remain with no statistical significance in Column (2). The coefficients for the OLS regressions on $K^{kno}/K^{int}$, $K^{extP}/K^{int}$ and $\iota^{phy}$ remain statistically significant at less than 1%. The R-squared and adjusted R-squared rise for $\iota^{phy}$, but they fall for both $K^{kno}/K^{int}$ and $K^{extP}/K^{int}$. The $SPAC(0/1)$ coefficient in the regressions on $\iota^{tot}$ and $\iota^*$ becomes statistically significant at less than the 1% level. This improves the strength of the relationship from my main regression. Overall, these findings are similar to my main regressions.

The two most significant changes come in the $\iota^{int}$ and $fcf$ regressions, going from having coefficients with no statistical significance to significance at less than the 5% and 1% levels, respectively. Both regressions also see increases in their R-squared and adjusted R-squared.

The $SPAC(0/1)$ coefficient for these regressions is positive, indicating that post-merger SPAC firms invest more in their intangible assets and generate greater free cash flow. This finding further supports the conclusion from main regressions that post-merger SPAC firms are not worse than other public companies.

# 8 Conclusion

Special purpose acquisition companies are an attractive alternative pathway for many companies to go public. The majority of the current literature on SPACs covers how their unique structure creates a misalignment of incentives between the SPAC managers and investors, leading to poor financial returns for the investors. Despite their increasingly important role in the financial markets, there is a lack of research into the post-merger SPAC firms operating performance. I fill this gap in the literature by investigating their operational performance relative to other public companies using measures Peters and Taylor (2017) develop.

I find that post-merger SPAC firms have similar Total Q ratios, intangible capital investment rates, and free cash flow relative to appropriate benchmark public companies. They also have higher physical and total investment rates than other public companies. These findings contrast the mostly negative regard with which the literature views SPACs. My results add to the literature as they indicate that when compared to appropriate benchmark firms, post-merger SPAC companies are performing similarly to other public companies.

My findings complement Chatterjee, Chidambaran, and Goswami (2016), who find that a properly designed SPAC represents an alternative path for a firm to go public. They conclude that SPACs are beneficial innovations that allow greater access to capital markets. My findings suggest SPACs are naturally innovating towards an equilibrium with a better structure. SPACs are a positive development for the financial markets as they bring more quality firms public. The similar Total Q also suggests the public markets are valuing the post-merger SPAC firms appropriately once they are public.

# 9 Acknowledgements

Foremost, I would like to thank my supervisor, Dr Michael Keefe, for providing continuous guidance and feedback throughout this project. Thanks also to my family, partner, friends, and classmates who supported me in getting through this thesis.

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# A Appendix – Case Studies

## A.1 Case Study: Social Capital Hedosophia Holdings Corp.

Social Capital Hedosophia Holdings Corp. (SCH) was a SPAC that has now successfully merged with Virgin Galactic. SCH began publicly trading on the NASDAQ on September 14, 2017, offering 60 million units at $10 per unit, raising a total of $600 million. The sole underwriter was Credit Suisse, and including the full exercise of their over-allotment options, the offer increases to 69 million units and $690 million. Each unit consists of one common share and one-third of a warrant. A whole warrant gives the holder an option to purchase a common share at a strike price of $11.50, becoming exercisable on the later of 30 days post-merger of 12 months from the IPO. The warrants expire five years post-merger or upon liquidation. The units were not scheduled to split into shares and warrants until at least 52 days post-IPO but split early on September 29, 2017, at the discretion of Credit Suisse. The tickers for the units, common shares and warrants are "IPOA.U", "IPOA", and "IPOA WS", respectively. SCH has CIK number 0001796946 and CUSIP 92766K106.

SCH takes its name from the two venture capital firms that partnered to found it (the SPAC sponsors) - Social Capital and Hedosophia. Both firms are technology-oriented investors who aim to identify and invest in innovative technology companies. Both firms have extensive experience investing in the technology sector, with Social Capital investments including Box, Yammer, SurveyMonkey and Intercom. Social Capitals founder, Chamath Palihapitiya, was one of the original members of the Facebook management team. Hedosophia investments include N26, Wise, SaltPay, Raisin, and Alma. Prior to founding Hedosophia, Ian Osborne was an adviser to Michael Bloomberg and then ran his own technology-focused consultancy firm. Mr Palihapitiya is the Chairman of the board of directors and CEO of SCH, while Mr Osborne is the President and a director. Naturally, SCH's acquisition strategy was to find a target firm that would benefit from their expertise and experience in the technology sector. They aimed to find a firm at an inflection point with underexploited expansion opportunities that will offer significant equity returns for shareholders through value-creation initiatives. They gave themselves a 24-month window to complete a merger.

The sponsors purchased 17.25 million founders shares for an aggregate amount of $25,000 or $0.001 per share, which gives them a 20% equity stake in the SPAC. They also purchased

8 million warrants via a private placement for an aggregate amount of $12 million, a price of $1.50 per warrant, to signal their commitment to the SPAC. The sponsors have restrictions on their ability to sell both of these securities. They cannot sell the shares until one year after the merger unless the share price rises significantly and meets specific criteria. They cannot exercise or sell the warrants until 30 days after the merger.

Of the $702 million raised between the IPO, underwriters allotment, and private placement, they placed $690 million of the proceeds into a US-based trust account at J.P. Morgan Chase Bank. SPACs pay their taxes using interest earned on the funds. Shareholders will have the option to redeem all or a portion of their shares at their pro-rata aggregate value at merger completion or be fully reimbursed at liquidation.

Almost 22 months post-IPO, on July 9, 2019, SCH announced its intention to merge with Virgin Galactic. Virgin Galactic is the spaceflight company of Virgin Group, founded by Richard Branson. As SCH could not close the merger within their 24-month window, they sought a three-month extension of their deadline. Shareholders had the option to redeem their shares if they disagreed with the extension. Around 3.7 million shares, or 5.5% of total shares, were redeemed at $10.37 as a result.

Merger consummation was on October 25, 2019, for a pro forma enterprise value of $1.5 billion. Once again, they gave shareholders the option to redeem their shares. More shareholders opted to do so, with roughly 12.1 million shares, or 17.5% of total shares, were redeemed at $10.33. The SPAC sponsors did not forfeit any founder shares or warrants. Mr Palihapitiya instead injected extra capital into the merger via a PIPE investment. He provided $100 million of capital via purchasing 10 million common shares at $10 per share. Boeing was also a PIPE investor, providing $20 million of capital by issuing 1,924,402 shares at $10.40 per share.

The original owners of Virgin Galactic ended up owning 58.7% post-merger, with former SCH shareholders owning approximately 27.2%, while the SPAC sponsors (including Mr Palihapitiya) own 13.2%. The post-merger company ticker symbols are "SPCE.U", "SPCE", and "SPCE WS" for units, shares and warrants, respectively. Virgin Galactic's share price peaked at $62.80 on February 4, 2021. As of December 20, 2021, the closing share price was $13.93.

## A.2 Case Study: Leo Holdings Corp.

Leo Holdings Corp. (Leo) was a SPAC that failed to merge with its initial target and then merged successfully with Digital Media Solutions Inc. (DMS). Leo started publicly trading on the NASDAQ on February 12, 2018, offering 20 million units at $10 per unit, raising a total of $200 million. The sole underwriter was Citigroup, and including the full exercise of their over-allotment options, the offer increased to 23 million units and $230 million. Each unit consists of one common share and one-half of a warrant. A whole warrant provides the holder an option to purchase a common share at a strike price of $11.50, becoming exercisable on the later of 30 days post-merger of 12 months from the IPO. The warrants expire five years post-merger or upon liquidation. The units were scheduled to split into shares 52 days post-IPO. The tickers for the units, common shares and warrants are "LHC.U", "LHC", and "LHC WS", respectively. Leo has CIK number 0001725134 and CUSIP G5463L105.

The founders of Leo are senior executives and advisors to Lion Capital. Lion Capital is a consumer-focused private equity firm, with its principals having invested over $8.2 billion of capital invested in 40 firms since 1998. Lion Capital has invested in some of the consumer industry's best-known brands, including Weetabix, Jimmy Choo and AllSaints. Lyndon Lea, the Chairman and CEO of the SPAC, is a founder and Managing Partner of Lion Capital. Leo's acquisition strategy in the IPO prospectus ties closely to Lion Capital expertise, stating they are looking for a firm in the consumer or retail sector in North America or Europe. They also state they want a business underperforming their potential with significant underexploited value creation opportunities. They gave themselves a 24-month window to complete a merger.

The sponsors purchased 5.75 million shares in the SPAC for an aggregate amount of $25,000, or $0.004 per share, giving the sponsors their 20% equity stake in the SPAC. To signal to the investors their commitment to the long-term value creation of the post-merger firm, the sponsors purchased 4.4 million warrants in a private placement for $1.50 each, an aggregate amount of $6.6 million. The sponsors have restrictions on their ability to sell both of these securities. They cannot sell shares until one-year post-merger unless the share price rises significantly and meets specific criteria. They cannot exercise or sell the warrants until 30 days post-merger.

Of the $236.6 million total raised, they deposited $230 million of the proceeds in a trust account at JP Morgan Chase Bank. $2 million of the proceeds raised were used to pay for IPO

expenses and working capital expenses following it. They may use interest earned on the trust to pay income taxes. Shareholders will have the option to redeem all or a portion of their shares at their pro-rata aggregate value at merger completion or be fully reimbursed at liquidation.

On April 8, 2019, a merger with Queso Holdings, the parent company of Chuck E. Cheese (CEC), was announced. CEC is an American family restaurant chain. In the merger agreement, both firms had obligations to meet to ensure the deal's closing, and it stated that termination might occur under certain circumstances. One of Leo's obligations was that it must have $250 million of net available cash available for the merger. Then on July 29, 2019, Leo announced the deal's termination. They stated the number of redemption requests received would have resulted in them having available cash proceeds of less than $250 million. They did not meet their obligations for the deal, leading to its termination. As this was early in the SPACs life-cycle, Leo continued trading publicly.

Then on April 23, 2020, a new merger with Digital Media Solutions Holdings (DMS) was announced. DMS is a technology company that provides digital performance advertising for its customers. It only took until July 15, 2020, for the deal to be approved by shareholders and consummated for an enterprise value of $757 million. To help fund the merger, they raised $100 million via a PIPE. Lion Capital funded approximately 75% of this PIPE raise. The rest came from accredited institutional investors.

Prior to the acquisition, the DMS management team had owned 54% of the company, with private equity firms owning the remaining 46%. Post-acquisition, the private equity firms own 58%, Lion Capital own 24%, and the SPAC owns 15%, with management holding the difference. The post-merger company tickers are "DMS" and "DMS.WS" for common shares and warrants, respectively. On February 8, 2021, the share price peaked at $15.27. As of December 20, 2021, the closing share price was $3.88.

### A.3 Case Study: Allegro Merger Corp.

Allegro Merger Corp. (Allegro) was a SPAC that failed to merge with an operating company and dissolved. Allegro began trading publicly on the NASDAQ on July 3, 2018, offering 13 million units at $10 per unit, raising a total of $130 million. The lead bookrunner was Cantor Fitzgerald, and when including the full exercise of the underwriter's over-allotment options, the

offer increases to 14.95 million units and $149.5 million. Each unit consists of one common share, one right, and one warrant. One right gives the holder the right to receive one-tenth of a share upon consummation of a merger. Each warrant entitles the holder to purchase one share at a strike price of $11.50 per share, becoming exercisable on the later of 30 days post-merger of 12 months from the IPO. The warrants expire five years post-merger or upon liquidation. The ticker for the units, shares, rights and warrants are "ALGRU", "ALGR", "ALGRR", and "ALGRW", respectively. Allegro has CIK number 0001720025 and CUSIP 01749N103.

The CEO of Allegro is Eric Rosenfeld. He had served as Chairman and CEO of five SPACs prior to Allegro, all successfully merging with target companies. Mr Rosenfeld has experience with M&A through his work experience in investment banking. The rest of the SPAC sponsor team has worked on these five SPAC deals. The IPO prospectus does not indicate that the SPAC sponsor team has any significant expertise in one industry, and it does not outline acquisition criteria for Allegro. They gave themselves 18 months to complete a merger.

The sponsors purchased approximately 4.3 million shares for an aggregate amount of $25,000, or $0.0058 per share, giving them a 20% equity stake in the SPAC. The sponsors cannot sell these shares until one year after the merger unless the share price rises significantly and meets specific criteria. The sponsors also purchased 372,500 units for $10 per unit via a private placement.

Between the IPO, underwriters allotment, and private placement, they raised $153.2 million. They placed $149.5 million of the proceeds into a US-based trust account. Each year the SPAC managers may use up to $125,000 of the interest earned from the trust to pay expenses and taxes. Shareholders will have the option to redeem all or a portion of their shares at their pro-rata aggregate value at merger completion or be fully reimbursed at liquidation.

On November 8, 2019, Allegro announced intended to merge with TGI Fridays (TGIF). The merger agreement included specific closing conditions that needed to be met in order for the deal to close. However, the COVID-19 pandemic hit as the deal was closing. Allegro and TGIF mutually agreed to call off the deal in an announcement to the market on March 31, 2020. They cited the extraordinary market conditions brought on by the COVID-19 pandemic meant several closing conditions were unable to be met, leading to the cancellation of the deal. In the same filing, Allegro announced it was liquidating. This announcement was when the US

stock market was falling significantly due to the pandemic, meaning investors in this SPAC still received their investments back with interest despite being in the middle of a market crash.

Table 1: This table lists all the variables used in the paper. It provides the notation, definition and formula of all the variables. The formulas are delineated in Section 5.

| Variable | Definition | Formula *(CRSP-Compustat item)* |
|---|---|---|
| $SPAC(0/1)$ | Indicates SPAC post-merger firm or other | Equal to 1 if SPAC post-merger company, equal to 0 otherwise |
| *Size* | Control variable for firm size | Natural log of revenue *(revt)* |
| $K^{tot}$ | Total capital | $K^{phy} + K^{int}$ |
| $K^{phy}$ | Physical capital | Property, plant, and equipment *(ppegt)* |
| $K^{int}$ | Intangible capital | $K^{int} + K^{extP}$ |
| $K^{extP}$ | Externally purchased intangible capital | Intangible assets *(intan)* |
| $K^{intC}$ | Internally created intangible capital | $K^{kno} + K^{org}$ |
| $K^{kno}$ | Knowledge capital | $(1 - \delta_{R\&D})K^{kno}_{i,t-1} + R\&D_{i,t}$ |
| $K^{org}$ | Organisation capital | $(1 - \delta_{SG\&A})K^{org}_{i,t-1} + \lambda \times SG\&A_{i,t}$ |
| $\delta_{R\&D}$ | Knowledge capital depreciation rate | Set equal to the BEA's industry specific rate, otherwise equal to 15% |
| $\delta_{SG\&A}$ | Organisation capital depreciation rate | Set equal to literature's standard 20% |
| $\lambda$ | Proportion of SG&A recognised as an investment in intangible capital | Set equal to literature's standard 30% |
| $V$ | Firm value | Market value of outstanding equity + book value of debt - current assets *(prcc_f × csho + dltt + dlc - act)* |
| $q^{tot}$ | Total Q | $V_{i,t}/K^{tot}$ |
| $q^*$ | Standard Tobin's Q | $V_{i,t}/K^{phy}$ |
| $I^{phy}$ | Physical investment | Capital expenditure *(capx)* |
| $I^{int}$ | Intangible investment | R&D + (0.3 × SG&A) |
| $I^{tot}$ | Total investment | $I^{phy} + I^{int}$ |
| $\iota^{phy}$ | Physical investment rate | $I^{phy}_{i,t}/K^{tot}_{i,t-1}$ |
| $\iota^{int}$ | Intangible investment rate | $I^{int}_{i,t}/K^{tot}_{i,t-1}$ |
| $\iota^{tot}$ | Total investment rate | $\iota^{phy}_{i,t} + \iota^{int}_{i,t}$ |
| $\iota^*$ | Standard total investment rate | $I^{phy}_{i,t}/K^{phy}_{i,t-1}$ |
| $fcf$ | Free cash flow | $(IB_{i,t} + DP_{i,t} + (1 - \kappa)I^{int}_{i,t})/K^{tot}_{i,t-1}$ |
| $fcf^*$ | Standard free cash flow | $(IB_{i,t} + DP_{i,t})/K^{phy}_{i,t-1}$ |

Table 2: This table shows the summary statistics of US-listed CRSP-Compustat firms from 2003 to 2020. $SPAC(0/1)$ is an indicator variable, denoting SPAC post-merger firms on the left and other public firms on the right. This table is split into five sections: capital stock, intangible capital ratios, Tobin's Q, investment ratios and free cash flow. Capital stocks includes the levels of all forms of capital. Intangible capital ratios includes the proportions of what makes it up. Investment ratios include the rates of investment in the different forms of capital. The Tobin's Q and free cash flow sections include their new measure and the standard measure. Table 1 includes a comprehensive list of all variables, definitions, and formulas.

| | *If* $SPAC(0/1) = 1$ | | | *If* $SPAC(0/1) = 0$ | | |
|---|---|---|---|---|---|---|
| Variable | Mean | Median | Standard Deviation | Mean | Median | Standard Deviation |
| Tobin's Q | | | | | | |
| $q^{tot}$ | 1.12 | 0.77 | 1.25 | 1.35 | 0.85 | 1.46 |
| $q^*$ | 4.45 | 1.38 | 7.26 | 5.13 | 1.79 | 7.59 |
| Capital Stock | | | | | | |
| $K^{int}$ | 308.47 | 104.58 | 654.21 | 1,239.76 | 207.89 | 2,397.01 |
| $K^{phy}$ | 512.74 | 149.03 | 904.99 | 2,169.48 | 260.07 | 4,493.05 |
| $K^{tot}$ | 814.55 | 355.65 | 1,139.39 | 3,422.3 | 648.8 | 6,213.12 |
| Intangible Capital Ratios | | | | | | |
| $K^{kno}/K^{int}$ | 0.08 | 0.00 | 0.18 | 0.16 | 0.00 | 0.25 |
| $K^{org}/K^{int}$ | 0.45 | 0.37 | 0.36 | 0.40 | 0.32 | 0.32 |
| $K^{extP}/K^{int}$ | 0.46 | 0.42 | 0.37 | 0.38 | 0.34 | 0.34 |
| Investment Ratios | | | | | | |
| $\iota^{int}$ | 0.11 | 0.06 | 0.12 | 0.11 | 0.08 | 0.11 |
| $\iota^{phy}$ | 0.07 | 0.05 | 0.07 | 0.06 | 0.04 | 0.06 |
| $\iota^{tot}$ | 0.19 | 0.13 | 0.16 | 0.18 | 0.14 | 0.13 |
| $\iota^*$ | 0.14 | 0.10 | 0.12 | 0.13 | 0.09 | 0.11 |
| Free Cash Flow | | | | | | |
| $fcf$ | 0.13 | 0.10 | 0.20 | 0.16 | 0.14 | 0.18 |
| $fcf^*$ | 0.11 | 0.10 | 0.66 | 0.17 | 0.15 | 0.66 |

Table 3: This table includes four columns and two panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the Tobin's Q measures. In *Panel A* the dependent variable is $q^{tot}$, and in *Panel B* it is $q^*$. Table 1 defines the variables. Column (1) has no controls, Column (2) controls for year fixed effects, Column (3) controls for year fixed effects and Fama-French 49 Industries, and Column (4) controls for these as well as size effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel A* | $q^{tot}$ | $q^{tot}$ | $q^{tot}$ | $q^{tot}$ |
| $SPAC(0/1)$ | -0.2336** | -0.2586*** | -0.1195 | -0.1242 |
| | (0.1000) | (0.0949) | (0.0880) | (0.0881) |
| Size | | | | -0.0043 |
| | | | | (0.0071) |
| Constant | 1.3525*** | 1.6653*** | 1.0207*** | 1.0329*** |
| | (0.0151) | (0.0262) | (0.0343) | (0.0394) |
| Observations | 61,811 | 61,811 | 61,811 | 61,811 |
| R-squared | 0.0002 | 0.0305 | 0.1384 | 0.1385 |
| Adjusted R-squared | 0.000146 | 0.0302 | 0.137 | 0.138 |
| *Panel B* | $q^*$ | $q^*$ | $q^*$ | $q^*$ |
| $SPAC(0/1)$ | -0.6809 | -1.3923** | -0.2418 | -0.2261 |
| | (0.6567) | (0.6191) | (0.6229) | (0.6241) |
| Size | | | | 0.0146 |
| | | | | (0.0323) |
| Constant | 5.1303*** | 4.4409*** | -0.8779*** | -0.9192*** |
| | (0.0852) | (0.1041) | (0.1557) | (0.1783) |
| Observations | 61,907 | 61,907 | 61,907 | 61,907 |
| R-squared | 0.0001 | 0.0234 | 0.2657 | 0.2657 |
| Adjusted R-squared | 3.44e-05 | 0.0231 | 0.265 | 0.265 |
| *Controls* | | | | |
| Year Fixed Effects | No | Yes | Yes | Yes |
| Fama-French 49 Industries | No | No | Yes | Yes |
| Size | No | No | No | Yes |

Table 4: This table includes four columns and three panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the intangible capital ratios. In *Panel A* the dependent variable is $K^{kno}/K^{int}$, in *Panel B* it is $K^{org}/K^{int}$, and in *Panel C* it is $K^{extP}/K^{int}$. Table 1 defines the variables. Column (1) has no controls, Column (2) controls for year fixed effects, Column (3) controls for year fixed effects and Fama-French 49 Industries, and Column (4) controls for these as well as size effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel A* | $K^{kno}/K^{int}$ | $K^{kno}/K^{int}$ | $K^{kno}/K^{int}$ | $K^{kno}/K^{int}$ |
| $SPAC(0/1)$ | -0.0805*** | -0.0870*** | -0.0151 | -0.0443*** |
| | (0.0251) | (0.0253) | (0.0177) | (0.0171) |
| Size | | | | -0.0270*** |
| | | | | (0.0012) |
| Constant | 0.1567*** | 0.1467*** | -0.0083*** | 0.0730*** |
| | (0.0030) | (0.0036) | (0.0024) | (0.0206) |
| Observations | 68,275 | 68,275 | 68,275 | 68,275 |
| R-squared | 0.0006 | 0.0021 | 0.5197 | 0.5665 |
| Adjusted R-squared | 0.000612 | 0.00186 | 0.519 | 0.566 |
| *Panel B* | $K^{org}/K^{int}$ | $K^{org}/K^{int}$ | $K^{org}/K^{int}$ | $K^{org}/K^{int}$ |
| $SPAC(0/1)$ | 0.0569 | 0.0579 | 0.0047 | -0.0297 |
| | (0.0412) | (0.0408) | (0.0351) | (0.0350) |
| Size | | | | -0.0318*** |
| | | | | (0.0015) |
| Constant | 0.3958*** | 0.3294*** | 0.0757 | 0.1715 |
| | (0.0040) | (0.0046) | (0.1265) | (0.1341) |
| Observations | 68,275 | 68,275 | 68,275 | 68,275 |
| R-squared | 0.0002 | 0.0061 | 0.2971 | 0.3362 |
| Adjusted R-squared | 0.000174 | 0.00588 | 0.296 | 0.336 |
| *Panel C* | $K^{extP}/K^{int}$ | $K^{extP}/K^{int}$ | $K^{extP}/K^{int}$ | $K^{extP}/K^{int}$ |
| $SPAC(0/1)$ | 0.0732* | 0.0764* | 0.0527 | 0.1112*** |
| | (0.0402) | (0.0400) | (0.0366) | (0.0360) |
| Size | | | | 0.0540*** |
| | | | | (0.0014) |
| Constant | 0.3844*** | 0.4383*** | 0.1845** | 0.0219 |
| | (0.0040) | (0.0054) | (0.0839) | (0.0828) |
| Observations | 68,275 | 68,275 | 68,275 | 68,275 |
| R-squared | 0.0003 | 0.0030 | 0.1650 | 0.2680 |
| Adjusted R-squared | 0.000271 | 0.00277 | 0.164 | 0.267 |
| *Controls* | | | | |
| Year Fixed Effects | No | Yes | Yes | Yes |
| Fama-French 49 Industries | No | No | Yes | Yes |
| Size | No | No | No | Yes |

Table 5: This table includes four columns and four panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the investment ratios. In *Panel A* the dependent variable is $\iota^{int}$, in *Panel B* it is $\iota^{phy}$, in *Panel C* it is $\iota^{tot}$, and in *Panel D* it is $\iota^{*}$. Table 1 defines the variables. Column (1) has no controls, Column (2) controls for year fixed effects, Column (3) controls for year fixed effects and Fama-French 49 Industries, and Column (4) controls for these as well as size effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively. This table continues overleaf.

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel A* | $\iota^{int}$ | $\iota^{int}$ | $\iota^{int}$ | $\iota^{int}$ |
| $SPAC(0/1)$ | -0.0050 | 0.0037 | 0.0266*** | 0.0152 |
| | (0.0114) | (0.0114) | (0.0098) | (0.0099) |
| Size | | | | -0.0104*** |
| | | | | (0.0005) |
| Constant | 0.1139*** | 0.1647*** | 0.0478*** | 0.0913*** |
| | (0.0013) | (0.0023) | (0.0015) | (0.0024) |
| Observations | 59,049 | 59,049 | 59,049 | 59,049 |
| R-squared | 0.0000 | 0.0321 | 0.4161 | 0.4489 |
| Adjusted R-squared | -5.45e-06 | 0.0318 | 0.415 | 0.448 |
| *Panel B* | $\iota^{phy}$ | $\iota^{phy}$ | $\iota^{phy}$ | $\iota^{phy}$ |
| $SPAC(0/1)$ | 0.0159*** | 0.0231*** | 0.0179*** | 0.0177*** |
| | (0.0060) | (0.0061) | (0.0056) | (0.0056) |
| Size | | | | -0.0002 |
| | | | | (0.0002) |
| Constant | 0.0571*** | 0.0696*** | 0.1045*** | 0.1052*** |
| | (0.0006) | (0.0009) | (0.0008) | (0.0013) |
| Observations | 58,954 | 58,954 | 58,954 | 58,954 |
| R-squared | 0.0005 | 0.0330 | 0.1726 | 0.1726 |
| Adjusted R-squared | 0.000459 | 0.0327 | 0.172 | 0.172 |
| *Panel C* | $\iota^{tot}$ | $\iota^{tot}$ | $\iota^{tot}$ | $\iota^{tot}$ |
| $SPAC(0/1)$ | 0.0088 | 0.0255** | 0.0427*** | 0.0289** |
| | (0.0111) | (0.0111) | (0.0112) | (0.0114) |
| Size | | | | -0.0125*** |
| | | | | (0.0006) |
| Constant | 0.1784*** | 0.2438*** | 0.1594*** | 0.2118*** |
| | (0.0013) | (0.0026) | (0.0020) | (0.0030) |
| Observations | 58,939 | 58,939 | 58,939 | 58,939 |
| R-squared | 0.0000 | 0.0513 | 0.2359 | 0.2702 |
| Adjusted R-squared | 8.09e-06 | 0.0510 | 0.235 | 0.269 |

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel D* | $\iota^*$ | $\iota^*$ | $\iota^*$ | $\iota^*$ |
| $SPAC(0/1)$ | 0.0138 | 0.0214** | 0.0241** | 0.0233** |
| | (0.0095) | (0.0097) | (0.0101) | (0.0101) |
| Size | | | | -0.0007* |
| | | | | (0.0004) |
| Constant | 0.1264*** | 0.1234*** | 0.2051*** | 0.2082*** |
| | (0.0009) | (0.0016) | (0.0016) | (0.0024) |
| Observations | 58,973 | 58,973 | 58,973 | 58,973 |
| R-squared | 0.0001 | 0.0192 | 0.0826 | 0.0828 |
| Adjusted R-squared | 7.47e-05 | 0.0189 | 0.0815 | 0.0817 |
| *Controls* | | | | |
| Year Fixed Effects | No | Yes | Yes | Yes |
| Fama-French 49 Industries | No | No | Yes | Yes |
| Size | No | No | No | Yes |

Table 6: This table includes four columns and two panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the free cash flow measures. In *Panel A* the dependent variable is $fcf$, and in *Panel B* it is $fcf^*$. Table 1 defines the variables. Column (1) has no controls, Column (2) controls for year fixed effects, Column (3) controls for year fixed effects and Fama-French 49 Industries, and Column (4) controls for these as well as size effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| *Panel A* | $fcf$ | $fcf$ | $fcf$ | $fcf$ |
| $SPAC(0/1)$ | -0.0254 | -0.0035 | 0.0020 | 0.0235 |
| | (0.0177) | (0.0179) | (0.0156) | (0.0148) |
| Size | | | | 0.0195*** |
| | | | | (0.0008) |
| Constant | 0.1566*** | 0.2230*** | 0.2918*** | 0.2099*** |
| | (0.0018) | (0.0032) | (0.0028) | (0.0042) |
| Observations | 58,954 | 58,954 | 58,954 | 58,954 |
| R-squared | 0.0001 | 0.0342 | 0.1553 | 0.2041 |
| Adjusted R-squared | 0.000105 | 0.0340 | 0.154 | 0.203 |
| *Panel B* | $fcf^*$ | $fcf^*$ | $fcf^*$ | $fcf^*$ |
| $SPAC(0/1)$ | -0.0635 | -0.0274 | -0.0512 | 0.0569 |
| | (0.0511) | (0.0512) | (0.0514) | (0.0486) |
| Size | | | | 0.1006*** |
| | | | | (0.0030) |
| Constant | 0.1689*** | 0.2082*** | 0.5410*** | 0.1199*** |
| | (0.0067) | (0.0093) | (0.0085) | (0.0147) |
| Observations | 58,990 | 58,990 | 58,990 | 58,990 |
| R-squared | 0.0001 | 0.0082 | 0.1552 | 0.2468 |
| Adjusted R-squared | 3.40e-05 | 0.00791 | 0.154 | 0.246 |
| *Controls* | | | | |
| Year F.E. | No | Yes | Yes | Yes |
| Fama-French 49 Industries | No | No | Yes | Yes |
| Size | No | No | No | Yes |

Table 7: This table includes three rows and two panels of OLS regressions. Rows one through three in each of the panels show the results when a different depreciation rate for knowledge capital ($\delta_{R\&D}$) is used. The rows in bold font indicate the depreciation rate used in my main regression, as outlined in Section 5.4.2. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each row. In *Panel A* the dependent variable is $q^{tot}$, and in *Panel B* it is $K^{kno}/K^{int}$. These are the two variables affected by a change in $\delta_{R\&D}$. Table 1 defines all the variables used. All regressions control for year fixed effects, Fama-French 49 Industries, and size effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Depreciation Rate of Knowledge Capital | | | | | | |
|---|---|---|---|---|---|---|
| *Panel A* | | | | | | |
| $\delta_{R\&D}$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.1 | $q^{tot}$ | -0.1020 | (0.0869) | 61,811 | 0.1341 | 0.133 |
| **0.15** | $q^{tot}$ | **-0.1242** | **(0.0881)** | **61,811** | **0.1385** | **0.138** |
| 0.2 | $q^{tot}$ | -0.1274 | (0.0889) | 61,811 | 0.1408 | 0.140 |
| *Panel B* | | | | | | |
| $\delta_{R\&D}$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.1 | $K^{kno}/K^{int}$ | -0.0525*** | (0.0176) | 68,275 | 0.5716 | 0.571 |
| **0.15** | $K^{kno}/K^{int}$ | **-0.0443*** ** | **(0.0171)** | **68,275** | **0.5665** | **0.566** |
| 0.2 | $K^{kno}/K^{int}$ | -0.0458*** | (0.0170) | 68,275 | 0.5653 | 0.565 |

Table 8: This table includes three rows and two panels of OLS regressions. Rows one through three in each of the panels show the results when a different depreciation rate for organisation capital ($\delta_{SG\&A}$) is used. The rows in bold font indicate the depreciation rate used in my main regression, as outlined in Section 5.4.2. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each row. In *Panel A* the dependent variable is $q^{tot}$, and in *Panel B* it is $K^{org}/K^{int}$. These are the two variables affected by a change in $\delta_{SG\&A}$. Table 1 defines all the variables used. All regressions control for year fixed effects, Fama-French 49 Industries, and size effects.The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Depreciation Rate of Organisation Capital | | | | | | |
|---|---|---|---|---|---|---|
| *Panel A* | | | | | | |
| $\delta_{SG\&A}$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.1 | $q^{tot}$ | -0.0868 | (0.0873) | 61,811 | 0.1405 | 0.140 |
| **0.2** | $q^{tot}$ | **-0.1242** | **(0.0881)** | **61,811** | **0.1385** | **0.138** |
| 0.3 | $q^{tot}$ | -0.1484* | (0.0890) | 61,811 | 0.1373 | 0.136 |
| *Panel B* | | | | | | |
| $\delta_{SG\&A}$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.1 | $K^{org}/K^{int}$ | -0.0477 | (0.0362) | 68,275 | 0.3403 | 0.340 |
| **0.2** | $K^{org}/K^{int}$ | **-0.0297** | **(0.0350)** | **68,275** | **0.3362** | **0.336** |
| 0.3 | $K^{org}/K^{int}$ | -0.0166 | (0.0343) | 68,275 | 0.3334 | 0.333 |

Table 9: This table includes eleven rows and four panels of OLS regressions. Rows one through eleven in each of the panels show the results when a different proportion of SG&A is recognised as an investment into organisation capital is used. The proportion is denoted by $n$. The rows in bold font indicate the proportion used in my main regression, as outlined in Section 5.4.2. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each row. In *Panel A* the dependent variable is $q^{tot}$, in *Panel B* it is $K^{org}/K^{int}$, in *Panel C* it is $\iota^{int}$, and in *Panel D* it is $\iota^{tot}$. These are the four variables affected by the change in $\lambda$. Table 1 defines all the variables used. All regressions control for year fixed effects, Fama-French 49 Industries, and size effects.The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Proportion of SG&A recognised as Organisation Capital | | | | | | |
|---|---|---|---|---|---|---|
| *Panel A* | | | | | | |
| $\lambda$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.0 | $q^{tot}$ | -0.1935* | (0.1143) | 61,811 | 0.1359 | 0.135 |
| 0.1 | $q^{tot}$ | -0.1651* | (0.0997) | 61,811 | 0.1370 | 0.136 |
| 0.2 | $q^{tot}$ | -0.1416 | (0.0927) | 61,811 | 0.1378 | 0.137 |
| **0.3** | $q^{tot}$ | **-0.1242** | **(0.0881)** | **61,811** | **0.1385** | **0.138** |
| 0.4 | $q^{tot}$ | -0.1086 | (0.0849) | 61,811 | 0.1391 | 0.138 |
| 0.5 | $q^{tot}$ | -0.0945 | (0.0822) | 61,811 | 0.1397 | 0.139 |
| 0.6 | $q^{tot}$ | -0.0823 | (0.0802) | 61,811 | 0.1403 | 0.139 |
| 0.7 | $q^{tot}$ | -0.0725 | (0.0780) | 61,811 | 0.1409 | 0.140 |
| 0.8 | $q^{tot}$ | -0.0645 | (0.0762) | 61,811 | 0.1415 | 0.141 |
| 0.9 | $q^{tot}$ | -0.0573 | (0.0745) | 61,811 | 0.1422 | 0.141 |
| 1.0 | $q^{tot}$ | -0.0514 | (0.0730) | 61,811 | 0.1429 | 0.142 |
| *Panel B* | | | | | | |
| $\lambda$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.0 | $K^{org}/K^{int}$ | 0.0000 | (0.0000) | 60,006 | - | - |
| 0.1 | $K^{org}/K^{int}$ | -0.0205 | (0.0341) | 68,275 | 0.3201 | 0.319 |
| 0.2 | $K^{org}/K^{int}$ | -0.0269 | (0.0346) | 68,275 | 0.3297 | 0.329 |
| **0.3** | $K^{org}/K^{int}$ | **-0.0297** | **(0.0350)** | **68,275** | **0.3362** | **0.336** |
| 0.4 | $K^{org}/K^{int}$ | -0.0312 | (0.0354) | 68,275 | 0.3429 | 0.342 |
| 0.5 | $K^{org}/K^{int}$ | -0.0315 | (0.0356) | 68,275 | 0.3487 | 0.348 |
| 0.6 | $K^{org}/K^{int}$ | -0.0315 | (0.0357) | 68,275 | 0.3548 | 0.354 |
| 0.7 | $K^{org}/K^{int}$ | -0.0314 | (0.0358) | 68,275 | 0.3607 | 0.360 |
| 0.8 | $K^{org}/K^{int}$ | -0.0309 | (0.0358) | 68,275 | 0.3661 | 0.365 |
| 0.9 | $K^{org}/K^{int}$ | -0.0303 | (0.0358) | 68,275 | 0.3714 | 0.371 |
| 1.0 | $K^{org}/K^{int}$ | -0.0297 | (0.0357) | 68,275 | 0.3765 | 0.376 |

| Proportion of SG&A recognised as Organisation Capital | | | | | | |
|---|---|---|---|---|---|---|
| *Panel C* | | | | | | |
| $\lambda$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.0 | $\iota^{int}$ | -0.0051 | (0.0038) | 59,049 | 0.4858 | 0.485 |
| 0.1 | $\iota^{int}$ | 0.0089 | (0.0060) | 59,049 | 0.4858 | 0.485 |
| 0.2 | $\iota^{int}$ | 0.0116 | (0.0082) | 59,049 | 0.4736 | 0.473 |
| **0.3** | $\iota^{int}$ | **0.0136** | **(0.0106)** | **59,049** | **0.4629** | **0.462** |
| 0.4 | $\iota^{int}$ | 0.0155 | (0.0130) | 59,049 | 0.4544 | 0.454 |
| 0.5 | $\iota^{int}$ | 0.0177 | (0.0154) | 59,049 | 0.4474 | 0.447 |
| 0.6 | $\iota^{int}$ | 0.0201 | (0.0178) | 59,049 | 0.4415 | 0.441 |
| 0.7 | $\iota^{int}$ | 0.0226 | (0.0203) | 59,049 | 0.4359 | 0.435 |
| 0.8 | $\iota^{int}$ | 0.0252 | (0.0227) | 59,049 | 0.4314 | 0.431 |
| 0.9 | $\iota^{int}$ | 0.0280 | (0.0252) | 59,049 | 0.4273 | 0.427 |
| 1.0 | $\iota^{int}$ | 0.0309 | (0.0276) | 59,049 | 0.4239 | 0.423 |
| *Panel D* | | | | | | |
| $\lambda$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.0 | $\iota^{tot}$ | 0.0190** | (0.0089) | 58,939 | 0.2313 | 0.230 |
| 0.1 | $\iota^{tot}$ | 0.0230** | (0.0092) | 58,939 | 0.2464 | 0.245 |
| 0.2 | $\iota^{tot}$ | 0.0250** | (0.0103) | 58,939 | 0.2676 | 0.267 |
| **0.3** | $\iota^{tot}$ | **0.0267**** | **(0.0119)** | **58,939** | **0.2878** | **0.287** |
| 0.4 | $\iota^{tot}$ | 0.0283** | (0.0137) | 58,939 | 0.3044 | 0.304 |
| 0.5 | $\iota^{tot}$ | 0.0302* | (0.0157) | 58,939 | 0.3173 | 0.317 |
| 0.6 | $\iota^{tot}$ | 0.0323* | (0.0178) | 58,939 | 0.3273 | 0.327 |
| 0.7 | $\iota^{tot}$ | 0.0345* | (0.0200) | 58,939 | 0.3352 | 0.334 |
| 0.8 | $\iota^{tot}$ | 0.0370* | (0.0222) | 58,939 | 0.3416 | 0.341 |
| 0.9 | $\iota^{tot}$ | 0.0397 | (0.0244) | 58,939 | 0.3464 | 0.346 |
| 1.0 | $\iota^{tot}$ | 0.0423 | (0.0267) | 58,939 | 0.3506 | 0.350 |

Table 10: This table includes eleven rows and one panel of OLS regressions. Rows one through eleven in the panel shows the results when a different effective marginal tax rate is used. The rows in bold font indicate the proportion used in my main regression, as outlined in Section 5.6. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each row. In *Panel A* the dependent variable is $fcf$. This is the only variables affected by the change in the marginal tax rate. Table 1 defines all the variables used. All regressions control for year fixed effects, Fama-French 49 Industries, and size effects.The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Marginal Tax Rate | | | | | | |
|---|---|---|---|---|---|---|
| $\kappa$ | Variable | $SPAC(0/1)$ | | Observations | R-squared | Adjusted R-squared |
| 0.0 | $fcf$ | 0.0285* | (0.0152) | 58,954 | 0.2094 | 0.209 |
| 0.1 | $fcf$ | 0.0278* | (0.0149) | 58,954 | 0.2065 | 0.206 |
| 0.2 | $fcf$ | 0.0268* | (0.0148) | 58,954 | 0.2047 | 0.204 |
| **0.3** | $fcf$ | **0.0235** | **(0.0148)** | **58,954** | **0.2041** | **0.203** |
| 0.4 | $fcf$ | 0.0227 | (0.0148) | 58,954 | 0.2049 | 0.204 |
| 0.5 | $fcf$ | 0.0222 | (0.0148) | 58,954 | 0.2071 | 0.206 |

Table 11: This table includes two columns and two panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the Tobin's Q measures. In *Panel A* the dependent variable is $q^{tot}$, and in *Panel B* it is $q^*$. Table 1 defines the variables. Column (1) has controls for year fixed effects, Fama-French 49 Industries, and size, while Column (2) controls for these plus capital structure effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) |
|---|---|---|
| *Panel A* | $q^{tot}$ | $q^{tot}$ |
| $SPAC(0/1)$ | -0.1242 | 0.0998 |
| | (0.0881) | (0.0867) |
| Size | -0.0043 | 0.0302*** |
| | (0.0071) | (0.0063) |
| Capital Structure | | -0.2509*** |
| | | (0.0064) |
| Constant | 1.0329*** | 1.0551*** |
| | (0.0394) | (0.0365) |
| Observations | 61,811 | 49,213 |
| R-squared | 0.1385 | 0.2735 |
| Adjusted R-squared | 0.138 | 0.272 |
| *Panel B* | $q^*$ | $q^*$ |
| $SPAC(0/1)$ | -0.2261 | 0.6319 |
| | (0.6241) | (0.6436) |
| Size | 0.0146 | 0.1060*** |
| | (0.0323) | (0.0313) |
| Capital Structure | | -0.8176*** |
| | | (0.0335) |
| Constant | -0.9192*** | -0.7261*** |
| | (0.1783) | (0.1747) |
| Observations | 61,907 | 49,297 |
| R-squared | 0.2657 | 0.3277 |
| *Controls* | | |
| Year Fixed Effects | Yes | Yes |
| Fama-French 49 Industries | Yes | Yes |
| Size | Yes | Yes |
| Capital Structure | No | Yes |

Table 12: This table includes two columns and three panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the Tobin's Q measures. In *Panel A* the dependent variable is $K^{kno}/K^{int}$, in *Panel B* it is $K^{org}/K^{int}$, and in *Panel C* it is $K^{extP}/K^{int}$. Table 1 defines the variables. Column (1) has controls for year fixed effects, Fama-French 49 Industries, and size, while Column (2) controls for these plus capital structure effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively. This table continues overleaf.

| Variable | (1) | (2) |
|---|---|---|
| *Panel A* | $K^{kno}/K^{int}$ | $K^{kno}/K^{int}$ |
| $SPAC(0/1)$ | -0.0443*** | -0.0378*** |
| | (0.0171) | (0.0140) |
| Size | -0.0270*** | -0.0233*** |
| | (0.0012) | (0.0012) |
| Capital Structure | | -0.0132*** |
| | | (0.0008) |
| Constant | 0.0730*** | 0.0594*** |
| | (0.0206) | (0.0201) |
| Observations | 68,275 | 54,675 |
| R-squared | 0.5665 | 0.5615 |
| Adjusted R-squared | 0.566 | 0.561 |
| *Panel B* | $K^{org}/K^{int}$ | $K^{org}/K^{int}$ |
| $SPAC(0/1)$ | -0.0297 | -0.0248 |
| | (0.0350) | (0.0370) |
| Size | -0.0318*** | -0.0329*** |
| | (0.0015) | (0.0017) |
| Capital Structure | | -0.0068*** |
| | | (0.0014) |
| Constant | 0.1715 | 0.1881 |
| | (0.1341) | (0.1459) |
| Observations | 68,275 | 54,675 |
| R-squared | 0.3362 | 0.3031 |
| Adjusted R-squared | 0.336 | 0.302 |
| *Panel C* | $K^{extP}/K^{int}$ | $K^{extP}/K^{int}$ |
| $SPAC(0/1)$ | 0.1112*** | 0.1055*** |
| | (0.0360) | (0.0374) |
| Size | 0.0540*** | 0.0481*** |
| | (0.0014) | (0.0015) |
| Capital Structure | | 0.0184*** |
| | | (0.0015) |
| Constant | 0.0219 | 0.0645 |
| | (0.0828) | (0.0933) |
| Observations | 68,275 | 54,675 |
| R-squared | 0.2680 | 0.2587 |
| Adjusted R-squared | 0.267 | 0.258 |

| | (1) | (2) |
|---|---|---|
| *Controls* | | |
| Year Fixed Effects | Yes | Yes |
| Fama-French 49 Industries | Yes | Yes |
| Size | Yes | Yes |
| Capital Structure | No | Yes |

Table 13: This table includes two columns and four panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the Tobin's Q measures. In *Panel A* the dependent variable is $\iota^{int}$, in *Panel B* it is $\iota^{phy}$, in *Panel C* it is $\iota^{tot}$, and in *Panel D* it is $\iota^{*}$. Table 1 defines the variables. Column (1) has controls for year fixed effects, Fama-French 49 Industries, and size, while Column (2) controls for these plus capital structure effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) |
|---|---|---|
| *Panel A* | $\iota^{int}$ | $\iota^{int}$ |
| $SPAC(0/1)$ | 0.0152 | 0.0298*** |
| | (0.0099) | (0.0098) |
| Size | -0.0104*** | -0.0085*** |
| | (0.0005) | (0.0004) |
| Capital Structure | | -0.0117*** |
| | | (0.0004) |
| Constant | 0.0913*** | 0.0719*** |
| | (0.0024) | (0.0024) |
| Observations | 59,049 | 47,290 |
| R-squared | 0.4489 | 0.4725 |
| Adjusted R-squared | 0.448 | 0.472 |
| *Panel B* | $\iota^{phy}$ | $\iota^{phy}$ |
| $SPAC(0/1)$ | 0.0177*** | 0.0211*** |
| | (0.0056) | (0.0058) |
| Size | -0.0002 | -0.0001 |
| | (0.0002) | (0.0002) |
| Capital Structure | | -0.0023*** |
| | | (0.0002) |
| Constant | 0.1052*** | 0.1036*** |
| | (0.0013) | (0.0014) |
| Observations | 58,954 | 47,228 |
| R-squared | 0.1726 | 0.1943 |
| Adjusted R-squared | 0.172 | 0.193 |
| *Panel C* | $\iota^{tot}$ | $\iota^{tot}$ |
| $SPAC(0/1)$ | 0.0289** | 0.0468*** |
| | (0.0114) | (0.0109) |
| Size | -0.0125*** | -0.0107*** |
| | (0.0006) | (0.0005) |
| Capital Structure | | -0.0140*** |
| | | (0.0005) |
| Constant | 0.2118*** | 0.1897*** |
| | (0.0030) | (0.0031) |
| Observations | 58,939 | 47,216 |
| R-squared | 0.2702 | 0.2942 |
| Adjusted R-squared | 0.269 | 0.293 |

| Variable | (1) | (2) |
|---|---|---|
| *Panel D* | $\iota^*$ | $\iota^*$ |
| $SPAC(0/1)$ | 0.0233** | 0.0330*** |
| | (0.0101) | (0.0104) |
| Size | -0.0007* | -0.0004 |
| | (0.0004) | (0.0005) |
| Capital Structure | | -0.0074*** |
| | | (0.0005) |
| Constant | 0.2082*** | 0.2040*** |
| | (0.0024) | (0.0026) |
| Observations | 58,973 | 47,241 |
| R-squared | 0.0828 | 0.1017 |
| Adjusted R-squared | 0.0817 | 0.100 |
| *Controls* | | |
| Year Fixed Effects | Yes | Yes |
| Fama-French 49 Industries | Yes | Yes |
| Size | Yes | Yes |
| Capital Structure | No | Yes |

Table 14: This table includes two columns and two panels of OLS regressions. The SPAC indicator variable, $SPAC(0/1)$, is the independent variable in each column. The dependent variables are the Tobin's Q measures. In *Panel A* the dependent variable is $fcf$, and in *Panel B* it is $fcf^*$. Table 1 defines the variables. Column (1) has controls for year fixed effects, Fama-French 49 Industries, and size, while Column (2) controls for these plus capital structure effects. The number of observations, R-squared and adjusted R-squared measures are included. Clustered standard errors by firms are shown in parentheses with 1%, 5%, and 10% significance denoted by ***, **, and *, respectively.

| Variable | (1) | (2) |
|---|---|---|
| *Panel A* | $fcf$ | $fcf$ |
| $SPAC(0/1)$ | 0.0235 | 0.0504*** |
| | (0.0148) | (0.0130) |
| Size | 0.0195*** | 0.0230*** |
| | (0.0008) | (0.0007) |
| Capital Structure | | -0.0260*** |
| | | (0.0007) |
| Constant | 0.2099*** | 0.1789*** |
| | (0.0042) | (0.0042) |
| Observations | 58,954 | 47,213 |
| R-squared | 0.2041 | 0.2985 |
| Adjusted R-squared | 0.203 | 0.297 |
| *Panel B* | $fcf^*$ | $fcf^*$ |
| $SPAC(0/1)$ | 0.0569 | 0.0986** |
| | (0.0486) | (0.0483) |
| Size | 0.1006*** | 0.1048*** |
| | (0.0030) | (0.0031) |
| Capital Structure | | -0.0504*** |
| | | (0.0026) |
| Constant | 0.1199*** | 0.0782*** |
| | (0.0147) | (0.0154) |
| Observations | 58,990 | 47,240 |
| R-squared | 0.2468 | 0.2829 |
| Adjusted R-squared | 0.246 | 0.282 |
| *Controls* | | |
| Year Fixed Effects | Yes | Yes |
| Fama-French 49 Industries | Yes | Yes |
| Size | Yes | Yes |
| Capital Structure | No | Yes |