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Post-acquisition operating performance of SPACs

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Biographical note

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Abstract

Special Purpose Acquisition Company (SPAC) is a company with no commercial operations that is formed strictly to raise capital through an initial public offering (IPO) for the purpose of acquiring or merging with an existing operating company. The SPAC is an attractive financing tool for management, investors, and target companies, which explains why SPACs are becoming an increasingly popular alternative investment vehicle. Despite the importance and relevance of SPACs, the literature on this topic is relatively scarce. This research fills in a major hole in research on the pre- and post-acquisition operating performance of companies acquired by SPACs. Therefore, this dissertation aims to assess if there are any significant differences in the short- and medium-term operating performance of Good and Bad SPACs (value-creating and value-destroying deals, respectively, in Jenkinson and Sousa (2011) terminology) that confirm (or not) their classification. Our sample comprises 120 U.S. SPACs, that already completed an acquisition, between 2004 and 2019. This study shows that Good SPACs present considerable higher return on assets and market-to-book asset ratios on the decision date compared with Bad SPACs. Moreover, companies of higher quality and stronger growth possibilities are more likely to result in a Good SPAC acquisition. Using the difference-in-difference method, we find evidence that the operating performance, measured with the return on assets and return on sales, of the target firms acquired by SPACs decreases after the transaction is completed. Furthermore, the acquisition has a more significant negative impact on the operating performance of Good SPACs than it does on the performance of Bad SPACs. Considering these conclusions, investors should be wary of participating in SPAC transactions.

Keywords: Blank Check, IPO, Mergers and acquisitions, Operating performance, SPAC

JEL-Codes: G24, G34

Sumário

Special Purpose Acquisition Company (SPAC) é uma empresa sem operações comerciais que é constituída estritamente para obter capitais por meio de uma oferta pública inicial (OPI) com o objetivo de aquisição ou fusão com uma empresa operacional existente. O SPAC é uma ferramenta de financiamento atrativa para gestores, investidores e empresas-alvo, o que explica por que os SPACs se estão a tornar um veículo de investimento alternativo cada vez mais popular. Apesar da importância e relevância dos SPACs, a literatura sobre o tema é relativamente escassa. Este estudo preenche uma lacuna importante na pesquisa sobre o desempenho operacional pré e pós-aquisição de empresas adquiridas por SPACs. Assim, esta dissertação pretende avaliar se existem diferenças significativas no desempenho operacional a curto e médio prazo dos Bons e Maus SPACs (aquisições criadoras e destruidoras de valor, respetivamente, na terminologia de Jenkinson e Sousa (2011)) que confirmem (ou não) esta classificação. A nossa amostra é constituída por 120 SPACs dos EUA, que já concluíram uma aquisição, entre 2004 e 2019. Esta investigação mostra que os Bons SPACs apresentam rentabilidades dos ativos e rácios entre o valor de mercado e o valor contabilístico dos ativos consideravelmente superiores aos dos Maus SPACs. Ainda, empresas de maior qualidade e com mais possibilidades de crescimento têm maior probabilidade de resultar em uma aquisição "Bom SPAC". Usando o método de diferença-em-diferença, encontramos evidências de que o desempenho operacional, medido através da rentabilidade dos ativos e rentabilidade das vendas, das empresas-alvo adquiridas pelos SPACs diminui após a conclusão da transação. Além disso, a aquisição tem um impacto negativo mais significativo no desempenho operacional dos Good SPACs do que no desempenho dos Bad SPACs. Tendo em conta estas conclusões, os investidores devem ser cautelosos ao participar em transações SPAC.

Palavras-chave: *Blank Check*, Fusões e aquisições, OPI, Performance operacional, SPAC

Classificação JEL: G24, G34

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1. Introduction

Going public is a very important step in the life of a company. A public listing essentially gives the firm an opportunity to raise external capital from capital markets that can be used to expand operations or facilitate acquisitions (Meles et al., 2021). It is also a major event for existing shareholders who are provided with liquidity (Kim et al., 2021). Besides the traditional method of initial public offerings (IPOs), companies may access public markets via a non-traditional route. One of the most common alternatives is through a Special Purpose Acquisition Company (SPAC) (Kolb & Tykvová, 2016). SPAC is a company with no commercial operations that is formed strictly to raise capital through an initial public offering for the purpose of acquiring or merging with an existing operating company.

Over the years the investment in SPACs has gained importance. Between 2003 and 2015, 236 SPAC IPOs and 130 SPAC acquisitions were identified in the U.S. capital markets (Kolb & Tykvová, 2016). More recently, 2020 and 2021 have been remarkable years when it comes to SPAC activity. In 2020, $83.4 billion were raised in 248 SPAC IPOs, which represents 55% of all US IPOs. 2021 is already the record year, with 613 SPACs going public. For investors, SPACs are an attractive investment with reduced downside and unlimited upside potential. For target firms, it represents a much easier, cheaper, and faster way to become public.

In fact, some authors (Adjei et al., 2008; Gahng et al., 2021; Jog & Sun, 2007; Klausner et al., 2021; Lewellen, 2009) have studied the market and financial performance of SPACs over their life cycle, with results that appear to be contradictory, depending on the timeframe analyzed. Also, Datar et al. (2012) and Kolb and Tykvová (2016) compared the long-term performance of SPAC firms and IPO firms, both showing that SPAC firms have lower growth opportunities and severely underperform the companies that conduct a typical IPO. Notwithstanding, there exists a major hole in research on the pre- and post-acquisition operating performance of companies acquired by SPACs. Thus, our dissertation addresses this gap, going beyond the market performance of these companies and providing more information for investors and managers when deciding the route through which firms go public.

The main intent of this study is, following the empirical model of Jenkinson and Sousa (2011), which consists of building portfolios of "Good" and "Bad" SPACs, to investigate in what way market, deal and firm-specific variables are able to determine this classification. We also analyze how entities formed via SPAC mergers perform in the short- and medium-term by comparing the operating performance of these two subclasses.

Therefore, our study adds to the literature in two ways. First, we examine the characteristics of the firms that choose to merge with SPACs and contrast Good SPACs with Bad SPACs. Second, we document for the first time how target-firms acquired by SPACs perform operationally in the three-year period following the transaction.

Our sample includes 120 SPACs occurred in the United States, that already completed an acquisition, between 2004 and 2019. The information related to the institutional characteristics of SPACs was retrieved from EDGAR and Zephyr databases. Accounting data of the target firms and market data were obtained from Refinitiv Eikon database.

First, to study the likelihood of a Good SPAC, we run a logistic regression. Our findings suggest that the return on assets is the most relevant factor in differentiating Good and Bad SPACs. Moreover, firms of higher quality and stronger growth possibilities are more likely to result in a Good SPAC acquisition.

Second, we apply the difference-in-difference method to compare the short- and medium-term operating performance of the two subgroups. We report that the operating performance of the target firm decreases after the acquisition, irrespective of the classification of Good and Bad SPACs. For the case of Good SPACs, we can also conclude that the acquisition has a stronger negative impact on their return on assets and return on sales.

The remainder of this dissertation is structured as follows. Section 2 gives a general overview of SPACs and reviews their relevant existing literature. Section 3 describes the data sample and methodology used. Section 4 discusses the empirical results of our analysis. Finally, section 5 presents our main conclusions and limitations, as well as suggestions for future research.

2. Literature review

2.1. General overview of SPACs

SPACs are entities whose only purpose is to raise equity from investors in an IPO to acquire an existing and operating private company. This acquisition must be completed usually within eighteen to twenty-four months and approved by the SPAC's shareholders via a proxy vote (Cumming et al., 2014). Essentially, IPO proceeds are locked up in a trust account up until an acquisition is proposed by the management. If no target company is found or if shareholders reject all proposed transactions, the SPAC is liquidated, and the net proceeds of the offering are returned to the investors. If shareholders approve the transaction and an acquisition is successfully completed, the existing corporation becomes public through a reverse merger (Griffin, 2019).

Nevertheless, it is important to note the difference between reverse mergers and SPACs. A reverse merger occurs when a public shell company[1] is acquired by a private corporation with less timely disclosure and without the traditional IPO road show. In contrast, in a SPAC, the public shell is created using the traditional IPO route, with the intention of merging with a privately held company within a predetermined period (Cumming et al., 2014).

Furthermore, and unlike a private equity fund, public shareholders can trade their securities in the market. The units, usually consisting of common stock and warrants, are all listed and freely tradable on an exchange (Berger, 2008).

2.2. SPAC history and evolution

Historically, SPACs developed in the United States of America in the 1980s. They are the direct descendants of blank check companies that were common instruments of corruption in that period, especially in the penny stock market[2]. These companies were regularly involved in fraudulent activities that include the manipulation of the market price of small capitalization companies' securities (for the benefit of the stock's promoters) and

[1] SEC Rule 144 defines a shell company as a company that has "no or nominal operations, and with no or nominal assets or assets consisting solely of cash and cash equivalents".
[2] Penny stock refers to securities that trade at less than $5.00 per share.

the deception of inexperienced investors by overemphasizing the value creation potential and high liquidity of the potential acquisitions (Heyman, 2007; Riemer, 2007). To protect investors and restore investor trust, the U.S. government imposed stronger disclosure and management requirements on blank check companies in the Securities Enforcement Remedies and Penny Stock Reform Act of 1990. Moreover, the SEC issued the Rule 419 regulation, which introduced numerous forms of protection for investors, such as the obligatory trust account for IPO proceeds, a time limit of eighteen months on the firm's right to keep investor funds without completing an acquisition, after which proceeds would be returned to investors, and the stricter disclosure requirements in the form of prospectuses[3].

With the adoption of this regulation, SPACs became more attractive to investors, as now they are provided with sufficient information of the terms of the investment and the risks involved (Riemer, 2007). Over the period of 2003-2008, 161 SPAC IPOs raised a total of more than $22 billion (Jenkinson & Sousa, 2011), which represents more than 13% of all IPOs in the U.S. This operation peaked in the year 2007, with a total of 66 SPACs reaching a public listing (almost 22% of all IPOs). Over the next two years the activity decreased due to the financial crisis but has started to recover again since 2011. Therefore, between 2003 and 2015, 236 SPAC IPOs and 130 SPAC acquisitions were identified in the U.S. capital markets (Kolb & Tykvová, 2016). More recently, 2020 and 2021 have been remarkable years when it comes to SPAC activity. According to SPAC Analytics, in 2020, $83.4 billion were raised in 248 SPAC IPOs, which represents 55% of all US IPOs. 2021 is already the record year, since 613 SPACs had gone public, with proceeds totaling about $162.5 billion (see Appendix A). This rapid growth in the last two years can be attributed to a higher volatility and instability in financial markets worldwide due to the outbreak of the Covid-19 pandemic. With more difficulties in finding the right "IPO window", private companies turned to SPACs as a way to access public markets (Gigante & Notarnicola, 2021).

[3] For more about regulation of blank check companies see Heyman, D. K. (2007). From blank check to SPAC: the regulator's response to the market, and the market's response to the regulation. *Entrepreneurial Business Law Journal*, *2*(1), 531-552, and Riemer, D. S. (2007). Special purpose acquisition companies: SPAC and SPAN, or blank check redux? *Washington University Law Review*, *85*(4), 931-967.

2.3. SPAC structure

According to Lewellen (2009), there are four phases in a SPAC lifecycle: No Target phase, Target Found phase, Acquisition Completed phase and Acquisition Withdrawn phase (see Appendix B).

2.3.1. No Target phase

This phase corresponds to the period between the SPAC IPO and the announcement of the intention to acquire a target company. SPACs are usually formed by a small group of experienced managers and sponsors[4] that rely mainly on their reputation. The formation of a SPAC starts with a registration with the SEC, by filing the S-1 statement form. This form contains all the relevant information about the SPAC's organization and intentions, including details about sponsors' professional and academic backgrounds, corporate governance and compliance, the financing needs of the new company, the nature of issuing securities and disclosures to potential public investors regarding the conflict of interests between SPAC founders and future investors, and the risks involved in the process from the IPO date until the merger (Lakicevic & Vulanovic, 2013; Shachmurove & Vulanovic, 2018).

Investors fund the SPAC by buying units, which usually consist of one share of common stock and one or more in-the-money warrants. However, warrants can only be exercised after a successful acquisition, and one month after the IPO the common stock and warrants typically begin to trade separately. Moreover, prior to the IPO, the founders are allowed to purchase what is sometimes known as the "sponsors' promote", which represents 20% of the company's equity. These shares are typically locked-up for three years after the IPO. It is also important to note that SPAC sponsors do not receive a salary or management fee on the funds raised (Berger, 2008; Lewellen, 2009).

Immediately after the IPO, about 95% of gross proceeds are held in a trust account, which is administered by one underwriting bank. Normally, the remaining value of raised cash is used to pay the underwriter's discount and other emission fees, working capital and regular administrative and legal expenses. SPAC founders do not have access to the capital raised and the money can be withdrawn only for financing an acquisition, or for reimbursing

[4] In this dissertation, the terms "founder", "manager", and "sponsor" are used interchangeably.

investors in the case of liquidation. Typically, funds are invested in U.S. short-term government securities, earning risk-free interest (Cumming et al., 2014; Lakicevic & Vulanovic, 2013; Lewellen, 2009).

During this phase, the SPAC is still an empty cash shell, with no operating business. Thus, Lewellen (2009) anticipates that the SPAC's return volatility throughout this period would be low, and the price movements should be similar to those of Treasury bills.

2.3.2. Target Found phase

In the second stage, the SPAC has announced, but not completed, a proposed acquisition. After the IPO, founders begin the search for a potential target. Managers have 24 months to successfully complete an acquisition (usually 18 months to announce a target and 6 additional months for the closing of the transaction)[5]. Once an acquisition target has been identified, the SPAC managers are required to inform shareholders via a letter of intent that has extensive disclosure regarding the acquisition target. The fair market value of the target company should also consist of at least 80% of the SPAC's net asset value (Cumming et al., 2014; D'Alvia, 2020).

Shareholders then set a date for a special meeting to vote on whether to approve the transaction. For an acquisition to be approved, two requirements must be fulfilled: (1) a majority (more than 50%) of shareholders must vote to approve the transaction, and (2) the percentage of shareholders who ask for redemption of their shares at the pro-rata price must not exceed a certain maximum – the "threshold". This threshold is defined *ex-ante* in the SPAC prospectus and has historically been between 20% and 40%[6]. Since warrants trade independently, shareholders who choose to redeem their shares for the trust value can keep and/or exercise their warrants regardless of their voting decision (Lewellen, 2009; Shachmurove & Vulanovic, 2018).

During this phase, market volatility is expected to be higher because participants are familiar with the potential target company and can thus form their own value estimates.

[5] This period could be extended for an extra six months by filling proper letter to the SEC.
[6] In the period 2003-2006 the threshold was around 20%, in 2006-2008 it increased to approximately 30%, with several SPACs having threshold of 40%. More recently, in 2008-2010 the threshold ranged from 63% to 88% (Rodrigues & Stegemoller, 2011; Shachmurove & Vulanovic, 2018).

2.3.3. Acquisition Completed phase

If SPAC shareholders approve a business combination and an acquisition is successfully completed, the SPAC becomes a publicly traded company through a reverse merger. This implies that the SPAC will continue to exist as an operating company, whose equity consists of its trust value (Cumming et al., 2014). Those shareholders that do not approve the transaction have the right to receive the funds, interests or dividends of a pro-rata aggregate amount of the securities held on trust (D'Alvia, 2020).

2.3.4. Acquisition Withdrawn phase

In the event no target is found or if it does not receive approval for an acquisition within the deadline, the SPAC will announce its liquidation and terminate its corporate existence. The entire trust account, including interest earned, along with other net assets, is distributed to shareholders based on the number of shares they own. SPAC management however is not entitled to any liquidation distribution with respect to shares acquired before the IPO. Founders also lose their sponsor promote, and their warrants expire worthless (Jenkinson & Sousa, 2011).

Although SPAC structures may differ somewhat from deal to deal, it is possible to identify some advantages of these operations. Sjostrom (2008) notes that private firms acquired by a SPAC are taken public much faster, since they are not obligated to provide detailed financial statements and other disclosures that are required for traditional IPOs. Hence, this route is extremely attractive for target firms that can go public without having to complete the lengthy and costly process of SEC registration (Lewellen, 2009). Berger (2008) also notes that SPAC mergers are an alternative for difficult circumstances that are not suitable for a traditional IPO or when there are no strategic buyers for the target company.

For underwriters and venture capitalists, SPACs offer benefits in terms of fees. During periods when the IPO market is not very active, SPACs can provide revenue to investment banks. In certain cases, investment banks decrease their usual 7% IPO fees to 5%, with the difference being transferred to the trusts. The banks, however, reclaim the funds whenever the SPAC completes an acquisition or the trust is liquidated (Boyer & Baigent, 2008).

For investors, SPACs are an attractive investment with reduced downside and unlimited upside from the IPO until the merger is completed (Berger, 2008). Furthermore, because shareholders can always redeem and receive a pro-rata of the trust fund, investing in a SPAC until the decision date translates into a risk-free investment with an option on a future acquisition if a good deal is found by the SPAC managers (Jenkinson & Sousa, 2011). Additionally, the management team is usually composed of experienced and successful sponsors, whose reputation, knowledge and skills may serve as a guarantee that the SPAC will create value by finding a good target company (Shachmurove & Vulanovic, 2018).

Merging with a SPAC is however associated with some risks. First, highly asymmetric information, risk, uncertainty, and the lack of transparency are some characteristics linked to these vehicles. Second, as shares and warrants purchased by founders are basically worthless if the SPAC is liquidated without having completed an acquisition, the managers are forced to consummate the deal whether or not it is optimal for shareholders, which could lead to agency problems (Jenkinson & Sousa, 2011). Therefore, when the transaction is at risk of being rejected, the sponsors have the possibility to buy out "no" votes in the open market in order to favorably vote for the proposed acquisition, and subsequently sell these shares once the transaction is completed (Lewellen, 2009). Third, the extensive period between announcement and approval exposes the deal to market risk, which could be troublesome in volatile markets and represents an advantage relative to corporate or private equity buyers (Berger, 2008). Finally, the dilution effect is an issue, because after the acquisition the outstanding shares become exercisable and the shares held by the founders will have the same rights as public ones (Jenkinson & Sousa, 2011).

2.4. SPAC performance

Despite the increasing importance and relevance of SPACs, the literature on this topic is relatively scarce, having been largely limited to articles in legal and accounting journals. Jog and Sun (2007) were the first ones to study the performance of SPACs in different stages of their lifecycle. Their results show that while shareholders of blank check IPOs earned a negative -3% annualized abnormal returns, management earned approximately 1,900% annualized return, over a sample of 62 SPACs over the period 2003-2006. Based on a sample of 152 SPACs from 2003 to 2008, Lewellen (2009) also found that

SPACs' return patterns are highly predictable and highly unusual, with a monthly four-factor[7] portfolio alpha of approximately 2% following the announcement of an acquisition and -2% after an acquisition has been completed. Additionally, Lakicevic and Vulanovic (2013) showed that while holders of all three securities (units, common stocks and warrants) realize positive abnormal returns on the merger announcement day, the strongest reaction is observed among the investors holding warrants, whereas common stockholders react very mildly. Klausner et al. (2021) reported as well that SPACs on average had positive unadjusted returns of 19.1% as of twelve-months following a merger, despite the negative median return of -19.3%. Gahng et al. (2021) also analyzed SPAC returns over their life cycle, dividing them down into pre-merger and post-merger periods. They reported investors have earned annualized returns for the pre-merger period of 15.9%, while the average one-year return after the merger was –8.1%. and the average three-year post-merger return was 0.7%.

Regarding long-term performance, Datar et al. (2012) documented that the operational performance of SPACs is inferior to industry peers and that SPAC firms carry more debt, are smaller, invest less, and have lower growth opportunities than the firms that conduct a conventional IPO. These results are in line with those of Kolb and Tykvová (2016), who found that SPAC firms severely underperform the market, industry and firms of similar sizes and book-to-market ratios, as well as IPO firms.

Jenkinson and Sousa (2011) concluded that SPAC investors should listen to the market. They created portfolios of "Good" and "Bad" SPACs according to a simple rule: "Good SPACs" are those when the share price at decision date was higher than the trust value per share, and "Bad SPACs" are those when the price at the decision date was obviously below the trust value per share. Results showed that investors approved 74% of deals, although, according to their rule, more than one half of these deals should have been rejected. Moreover, investors who ignored the market signal lost around 39% of their investments within six months, rising to losses of more than 79% after one year, whereas investors who followed the strategy presented favorable results. The authors link these findings with abnormal trading behavior around the decision date, when the founders purchase large blocks of shares from investors who have indicated that they will vote against the deal.

Concerning underpricing, there is broad consensus in the literature that SPACs reveal a little mispricing. Jog and Sun (2007) found that SPAC issues have very low average

[7] Fama and French (1993) market, size, value, and momentum factors.

underpricing of about 1.9%. Likewise, Boyer and Baigent (2008) reported that SPACs that went public from 2003 to 2006 exhibit much less underpricing than regular IPOs. Rodrigues and Stegemoller (2014) also showed that the valuation process in a SPAC IPO is much less noisy, and thus easier, than that of a traditional IPO, which helps to explain lower underpricing. More recently, Griffin (2019) presented contradictory results when stating that not only do SPACs see underpricing, they see much more underpricing than typical IPOs. Furthermore, larger SPAC IPOs experience a higher degree of underpricing (as represented by double-digit average abnormal first-day trading returns) than smaller SPAC IPOs (which are much more in-line with first-day abnormal returns displayed by traditional IPOs). The author attributes a more powerful and demanding investor base as an explanation for this situation.

Existing literature also discuss some possible factors and determinants that may affect SPAC's approval probability. In a study that covers 139 SPAC from 2003 to 2020, Cumming et al. (2014) concluded that more experienced managers and boards do not enhance the probability of deal approval. Similarly, underwriters with impressive track records and larger underwriter syndicates are less likely to be associated with successful SPACs. Further, they found that the presence of active investors (hedge funds and private equity funds) is negatively correlated with approval probability, and that approval likelihood is significantly higher in an upward-trending market situation prior to the proxy voting.

On the same note, Vulanovic (2017) showed that institutional characteristics of SPACs are determinant in post-merger outcomes of new company. Thus, a greater pre-merger commitment by SPAC stakeholders and initial positive market performance increases post-merger survival likelihood. On the contrary, the probability of SPAC failure is higher for those SPACs that experienced higher transaction costs and that merged with foreign companies. In addition, Dimic et al. (2020) demonstrated that the likelihood of withdrawal is in direct relation with the level of volatility on the day of IPO and that SPACs are less likely to withdraw their IPO if they have a clear focus of acquisition, have a larger number of underwriters in the syndicate, and if their legal counsel is specialized in the SPAC market. They also documented that that the speed of IPO for SPACs is decreasing when the market is doing well, when the size of IPO is increasing, and if the CEO was previously manager of other public companies.

2.5. Operating performance measures

There is considerable variation in the indicators that empirical researchers used to measure operating performance. While early studies focused on changes in earnings per share (Asquith et al., 1989; Healy & Palepu, 1988), subsequent studies started to employ operating income as a performance measure. The major difference between the two performance measures is that operating income excludes interest expense, special items, income taxes, and minority interest. Therefore, Barber and Lyon (1996) argue that the use of operating income should be favored for two reasons: (1) it is a cleaner measure of the productivity of operating assets, because earnings can be can be obscured by special items, tax considerations, or the accounting for minority interests, and (2) corporate events that result in changes in capital structure have a bigger impact on interest expense and, consequently, earnings net of interest expense. Other indicators can be easily manipulated, especially around significant corporate events such as takeovers. Erickson and Wang (1999), for example, provide some evidence which suggests managers of acquiring firms in stock for stock mergers engage in earnings manipulation.

Barber and Lyon (1996) also analyzed five different measures of operating performance that researchers might consider when studying operating performance: return on assets, return on cash-adjusted assets, return on sales, return on market value of assets, and cash-flow return on assets. They concluded that although the choice of performance measure should be critical, test statistics based on a cash-flow measure of operating income (i.e., cash-flow return on assets) are uniformly less powerful than those based on the other performance measures considered.

Loughran and Ritter (1997) in their study of the operating performance of companies conducting seasoned equity offerings used the median operating income (commonly referred to as EBITDA, i.e., earnings before interest, taxes, depreciation, and amortization) to assets ratio, profit margin, return on assets, operating income relative to sales, capital expenditures plus research and development expenses relative to assets, and market value of equity relative to book value of equity as performance measures. More recently, Chen and Liang (2016) examined the performance of venture capital backed initial public offerings using the return on assets.

Moreover, most studies on post-acquisition operating performance use EBITDA, pre-tax operating cash flow, as an indicator of operating performance (Ghosh, 2001; Healy

et al., 1992; Heron & Lie, 2002). Nevertheless, to compare performance across companies and over time, the operating cash flow should be scaled. Common deflators are the book value of assets and sales.

2.6. Importance and aim of this study

The SPAC is an attractive financing tool for management, investors, and target companies. Although for investors SPACs are an investment with reduced downside and unlimited upside potential, and for target firms, it represents a much easier, cheaper, and faster way to become public, some authors defend its highly asymmetric information, uncertainty, and the lack of transparency as inherent risks. Thus, it is important for future research to understand why this investment vehicle is becoming an increasingly popular alternative. Furthermore, there exists a major hole in research on the actual post-acquisition operating performance of companies acquired by SPACs. Our main purpose is to look beyond the market performance and trading activity of SPAC acquired firms and examine the accounting performance of SPAC target companies.

Thus, our work contributes to the literature in two different ways. We compare Good SPACs with Bad SPACs and look at the characteristics of the companies who are acquired by SPACs. Second, we analyze for the first time the operational performance of these firms three years after the acquisition.

This study aims to answer the following: Is it possible to predict "Good" and "Bad" SPACs according to market, deal, and target firm-specific variables? Are there any significant differences in the short- and medium-term operating performance of these two sub-samples that confirm (or not) their classification?

3. Data and methodology

3.1. Sample

Our sample includes all SPACs occurred in the United States, that already completed an acquisition, between 2004 and 2019, issued in the NASQAD, NYSE AMEX and over the counter (OTTCB). The data was obtained from Jenkinson and Sousa (2011) and Anup (2016), extracted from Capital IQ database, and from Gahng et al. (2021).

The information related to the institutional characteristics of SPACs, namely IPO process, and merger and target data was retrieved from the Electronic Data Gathering Analysis and Retrieval (EDGAR) database[8] and from Zephyr database.

The IPO process data, which includes the IPO price and the number of shares, was gathered from 424B2 forms, and then updated considering the exercise of the overallotment option by the underwriters, using the 10-Q or 10-K forms that followed the IPO.

The information gathered about the merger and target was essentially the announcement date, the decision date, the last trust value, and the potential target name. All the data, excluding the trust value, was obtained from Zephyr database and, in some cases, crossed checked with both 425 form and business wire website news[9]. The last trust value was extracted from the last 10-Q or 10-K forms available, as close as possible to the decision date.

Lastly, accounting data of the target firms and market data were obtained from Refinitiv Eikon database.

Between 2004 and 2019, we identify 190 SPAC acquisitions. The first recorded SPAC IPO, which started the new-generation SPAC wave, is that of the Millstream Acquisition Corporation in August 2003, that resulted in the acquisition of Nations Health Inc. in August 2004. Our final sample, which we limit to companies for which firm-specific variables are available, contains 120 SPAC firms. Even though all SPACs are traded in the U.S., they acquired firms incorporated worldwide.

[8] See https://www.sec.gov/edgar/searchedgar/companysearch.html
[9] See https://www.businesswire.com/

3.2. Good versus Bad SPACs

This dissertation is based on the studies by Kolb and Tykvová (2016) and Jenkinson and Sousa (2011). The latter classified SPACs that completed an acquisition in "Good" or "Bad" SPACs.

The Refinitiv Eikon database was used to obtain the historical prices of all SPACs on the day before the decision date, rather than the exact day of the acquisition, to avoid the price already being influenced by the decision itself. This allowed the division of SPACs that successfully completed an acquisition into "Good" and "Bad" SPACs.

The trust value on the decision date was obtained by using the following computation:

$$Daily\ rate\ (\%) = \left(\frac{S_{LTV}}{S_{TVIPO}}\right)^{\frac{1}{LTV\ Date - IPO\ Date}} - 1 \quad (3.1)$$

$$S_{TVD} = S_{LTV} \times (1 + daily\ rate)^{(TVD\ Date - LTV\ Date)} \quad (3.2)$$

where S_{LTV} is the last trust value per share available and $LTV\ Date$ the date the last trust value was available. S_{TVIPO} is the trust value per share at IPO and $IPO\ Date$ the date of the IPO. Finally, S_{TVD} is the trust value per share on the decision date and $TVD\ Date$ the day of the acquisition.

Finally, with all the necessary information, we used the Jenkinson and Sousa (2011) criteria at the decision date, which states that the SPAC is a value-creation deal (Good SPAC) if the share price is higher than the trust value per share; and the SPAC is deemed a value-destroying acquisition (Bad SPAC) if the share price is equal to (or slightly below) the trust value per share. Therefore, we were able to identify 45 Good SPACs (38%) and 75 Bad SPACs (62%). This composition is somehow similar to that of Jenkinson and Sousa (2011) – 47% Good SPACs versus 53% Bad SPACs – which indicates that investors continue to go against the market signal and approve value-destroying deals.

Table 1 shows the composition of our sample of SPAC firms in different regions and industries. Of the 120 SPAC firms, 66.7% are located in North America, 12.5% in Asia and 12.5% in Latin America/Caribbean. Furthermore, based on 2-digit SIC codes, 28.3% of all SPAC companies operate in the services industry, 21.7% in the manufacturing industry and 17.5% in the transportation and utilities industries. Similarly, 57.8% of Good SPACs are

incorporated in North America, 17.8% in Latin America/Caribbean and 13.3% in Asia. Services firms account for 31.1% of Good SPACs, while 22.2% are involved in the manufacturing industry and 20% belong to the transportation and public utilities industries. Regarding Bad SPACs, 72% are in North America, 12% in Asia and 9.3% in Latin America/Caribbean. Moreover, 26.7% of Bad SPACs operate in in the services industry, 21.3% in the manufacturing industry and 16% in the transportation and utilities industries.

Table 1 – Sample overview

This table provides information on the sample composition of SPAC acquisitions executed between January 2004 and December 2019 by region and industry.

Category	Subcategory	Good SPACs		Bad SPACs		Total	
		Frequency	*Percent*	*Frequency*	*Percent*	*Frequency*	*Percent*
Regions	North America	26	57.78%	54	72.00%	80	66.67%
	Europe	5	11.11%	5	6.67%	10	8.33%
	Asia	6	13.33%	9	12.00%	15	12.50%
	Latin America/Caribbean	8	17.78%	7	9.33%	15	12.50%
	Total	45		75		120	
Industries	Manufacturing	10	22.22%	16	21.33%	26	21.67%
	Transportation & Public Utilities	9	20.00%	12	16.00%	21	17.50%
	Retail Trade	5	11.11%	3	4.00%	8	6.67%
	Finance, Insurance, Real Estate	4	8.89%	11	14.67%	15	12.50%
	Services	14	31.11%	20	26.67%	34	28.33%
	Other	3	6.67%	13	17.33%	16	13.33%
	Total	45		75		120	

3.3. Logistic model

To study the likelihood of a "Good SPAC", we applied a logistic regression model with the dependent variable, which is binary and equals 1 for a Good SPAC and 0 for a Bad SPAC[10].

[10] Most existing studies use a maximum likelihood estimator and a simple binary regression model for similar problem settings.

The model specification is:

$$P(Good\ SPAC) = \alpha + \beta_1 Market\ volatility_i + \beta_2 Cost\ of\ debt_i + \beta_3 Time\ to\ resolution_i + \beta_4 Return\ on\ assets_i + \beta_5 Market\ to\ book\ asset\ ratio_i + \beta_6 Debt\ ratio_i + \beta_7 Log(size)_i + \beta_8 Year\ fixed\ effects_i + \sum_{j=9}^{11} \beta_j Industy\ fixed\ effects_{i,j} + u_i \quad (3.3)$$

where individual firms are indexed by i. In addition, we use year fixed effects to control for any unobservable time-specific developments that may be related to some of the regressors, by dividing the sample in two equally weighted groups: the first group corresponds to the years 2004-2010 and the second group refers to the years 2011-2019. Lastly, industry fixed effects reflect potential differences across industries. We include fixed effects for the three largest industries: (i) services, (ii) manufacturing and (iii) transportation and public utilities. The remaining industry classifications represent the reference category. The results are presented in the section 4.1.

Kolb and Tykvová (2016) identified in their study market-, deal- and firm-specific variables that may be important when deciding how to take a company public. In our study, we will use these same variables to examine if they are decisive to determine the classification of Good SPACs and Bad SPACs. Appendix C provides the definitions of the variables used in our regressions.

Market volatility is the first market-specific characteristic we look at. Ritter (1991) found that market timing is essential to the successful execution of an IPO and that the likelihood of success decreases with high volatility. Kolb and Tykvová (2016) concluded that when market conditions are turbulent, it may be more difficult for companies to access the public market through IPOs in comparison with a SPAC purchase, as the latter have a higher liquidity at the time of the acquisition.

Cost of debt is the second market-specific factor that could be connected to the process through which companies go public. Kolb and Tykvová (2016) discovered that more expensive debt is associated with a lower probability of SPAC acquisitions.

The time to resolution, i.e., the period between the announcement of a potential target firm and the conclusion of the transaction, is the only deal-specific variable analyzed. Floros and Sapp (2011) suggest that reverse mergers are executed faster than IPOs. However,

Kolb and Tykvová (2016) indicate that SPAC acquisitions take longer to be executed than IPOs, due to the requirement of proxy voting that slows down the acquisition process.

The first two firm-specific variables, return on assets and market-to-book asset ratio, are used to examine the current profitability and potential for growth, respectively. We follow Chung and Pruitt (1994) metric in our study to measure growth opportunities, as they point out that the market-to-book asset ratio is a good approximation of Tobin's q. Kolb and Tykvová (2016) show that SPAC firms tend to be companies of lower quality and weaker growth prospects.

Debt ratio is the third firm-specific factor we consider. Kolb and Tykvová (2016) suggest that more levered firms are more prone to use the SPAC route than the IPO way. This is in line with Lewellen (2009), who stated that SPACs occasionally borrow money in addition to the cash from the trust account to buy company shares. Indeed, highly leveraged companies could be too risky for IPO investors, hence these companies might have to use the SPAC route.

Finally, the fourth firm-specific variable is size. Kolb and Tykvová (2016) concluded that smaller companies choose to use SPAC acquisitions since it will be challenging for them to find a high-quality underwriter available to handle the process of going public (Fang, 2005). Furthermore, small businesses may be too obscure and fail to pique investors' attention (Adjei et al., 2008).

3.4. Difference-in-difference method

In a second stage, to compare the short and medium-term operating performance of the two subclasses, we will adopt the difference-in-difference (DID) method. The idea is to estimate the effect of "Good SPACs" over "Bad SPACs" on operating performance indicators, such as return on assets and return on sales, by calculating the changes of the performance measures obtained in a three-year period after the acquisition (year +1 to year +3) in relation to the last three fiscal years before the transaction (year -3 to year -1). To note that Meyer (1995) and Heckman et al. (1997) also used this same methodology in similar studies.

If we regress data for the two groups mentioned (Good SPACs and Bad SPACs), we get the following model:

$$Y_{i,t} = \beta_0 + \beta_1 Good\ SPAC_i + \beta_2 After_t + \beta_3 Good\ SPAC_i \times After_t + \beta_4 Log(assets)_{i,t} + \varepsilon_{i,t} \quad (3.4)$$

The operating performance of the target firm $Y_{i,t}$ will be evaluated considering two indicators: return on assets and return on sales. $Good\ SPAC_i$ is a dummy variable taking the value 1 for Good SPACs and 0 for Bad SPACs. It controls for differences in constant performance between the two subgroups. The dummy variable $After_t$ was defined as taking the value 1 in the post-acquisition years and 0 otherwise, for both Good and Bad SPACs. The term $Good\ SPAC_i \times After_t$ is an interaction term between $Good\ SPAC_i$ and $After_t$. Its coefficient represents the DID estimator of the effect of the acquisition on the group of Good SPACs (Table 2).

Table 2 – Difference-in-difference estimator

This table shows the meaning of the difference-in-difference estimator, considering the model presented above (Equation 3.4).

	Before	**After**	**Difference**
Good SPACs	$\beta_0+\beta_1+\beta_4$	$\beta_0+\beta_1+\beta_2+\beta_3+\beta_4$	$\beta_2+\beta_3$
Bad SPACs	$\beta_0+\beta_4$	$\beta_0+\beta_2+\beta_4$	β_2
Difference	β_1	$\beta_1+\beta_3$	$\boldsymbol{\beta_3}$

Lastly, the variable $Log(assets)_{i,t}$ was added to the model to adjust for company size. The inclusion of this variable in the model is justified by the fact that the performance of a firm is also affected by its dimension regardless of whether an acquisition occurs or not. To lessen the scale impact, the log of total assets is utilized instead of total assets. The results are presented in the section 4.2.

3.5. Descriptive statistics

Table 3 presents descriptive statistics for the variables used in our study. We run t-tests and Wilcoxon–Mann–Whitney tests to see if there are any differences between the characteristics of both subsamples. Concerning the market specific variables, we note that the market environment on the announcement date is not relevant to explain the differences between Good SPACs and Bad SPACs. The standard deviation of the S&P 500 total return index during the six months preceding the deal announcement, which is used as a proxy for market volatility, is on average 5.68% for Good SPACs and 5.22% for Bad SPACs. Additionally, cost of debt also does not seem to explain this classification.

When examining deal-specific variables, we observe that Good SPACs take 183 days on average from the announcement of the potential target company to the completion of the SPAC acquisition, whereas the time to resolution for Bad SPACs amounts to 171 days, although this difference is not statistically significant.

The first firm-specific variable is return on assets, where the mean Good SPAC' return on assets is 8.98% and the mean Bad SPAC' return on assets equals -1.38% on average. This difference is significant at the 5% level, which indicates that the market correctly valuates a Good SPAC acquisition, based on positive and higher returns of the target company. In our sample, the mean market to book asset ratio for Good SPACs is 1.69, whereas it is 1.28 for Bad SPACs, suggesting that the growth potential of Bad SPACs is less favorable than those of Good SPACs. The difference has a significance level of 5%, while the Wilcoxon–Mann–Whitney test is significant at 10% level. It is important to note that, because there was not publicly available information, for 22 companies we assumed the market to book asset ratio to be 1. Furthermore, at the end of the quarter before the decision date, the debt ratio for Good SPACs is 37.12%, compared to 34.81% for Bad SPACs. Contrary to expectations, and despite the difference not being statistically significant, Bad SPACs are substantially bigger, as their mean total assets amounts to US$483.39 million, as opposed to a size of US$180.60 million in the case of Good SPACs.

The pairwise correlation coefficients for each pair of variables we employ in our analysis are displayed in Appendix D. The highest correlation of 50% is between the variables time to resolution and cost of debt, so multicollinearity should not invalidate our multivariate tests. In this regard, it might be interesting to notice that the results would not change significantly if we excluded time to resolution from our multivariate regressions.

Table 3 – Summary statistics for SPAC acquisitions

This table presents sample summary statistics and the values of the t-test and Wilcoxon–Mann–Whitney (WMW) test that we run to compare the market-, deal- and firm-specific variables between Good SPACs and Bad SPACs executed between January 2004 and December 2019. All variables are defined in Appendix C. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Full sample				**Good SPACs**				**Bad SPACs**				**t-test**	**WMW test**
Variable	*Mean*	*Median*	*Stdev*	*N*	*Mean*	*Median*	*Stdev*	*N*	*Mean*	*Median*	*Stdev*	*N*	*Value*	*Value*
Market specific variables														
Market volatility (%)	5.39	3.14	6.83	120	5.68	3.67	6.69	45	5.22	3.00	6.96	75	-0.35	0.22
Cost of debt (%)	3.14	2.91	1.08	120	3.11	2.85	1.14	45	3.16	3.00	1.04	75	0.27	0.34
Deal specific variables														
Time to resolution (days)	175.64	143.50	103.96	120	183.00	144.00	118.18	45	171.23	143.00	94.98	75	-0.60	0.16
Firm specific variables														
Return on assets[11] (%)	2.50	-0.47	27.82	120	8.98	1.73	26.12	45	-1.38	-0.52	28.24	75	-2.00**	1.47
Return on assets (Year -1)	3.18	-0.20	11.54	99	4.84	-0.10	13.11	40	2.06	-0.31	10.31	59	-1.18	1.09
Return on assets (Year -2)	-0.25	-0.05	17.41	76	-1.96	-0.05	24.51	28	0.74	-0.06	11.66	48	0.65	0.15
Return on assets (Year -3)	-11.44	0.00	72.61	31	3.82	0.00	10.37	15	-25.75	0.00	99.96	16	-1.14	1.78*
Return on sales (Year -1) (%)	0.43	7.40	45.99	53	-4.09	7.43	49.20	26	4.78	6.18	43.16	27	0.70	0.47
Return on sales (Year -2)	-1.29	8.78	53.37	36	10.30	11.04	18.80	15	-9.58	4.57	67.56	21	-1.11	0.55
Return on sales (Year -3)	5.24	8.40	45.41	16	5.04	8.74	60.69	9	5.51	7.69	15.65	7	0.02	0.95
Market to book asset ratio[10]	1.43	1.24	0.94	120	1.69	1.30	1.37	45	1.28	1.22	0.49	75	-2.34**	1.78*
Debt ratio[10] (%)	35.68	22.70	38.52	120	37.12	33.47	34.59	45	34.81	17.29	40.90	75	-0.32	0.74
Size[10] (million US$)	369.84	89.95	1,202.88	120	180.60	100.20	207.08	45	483.39	88.67	1,505.48	75	1.34	0.44

[11] Closest value prior to decision date.

4. Results

4.1. Logit regressions

As already mentioned in section 3, to analyze the success factors for Good SPACs, we run a logistic regression. We present our main results in Table 4.

The first firm-specific variable, return on assets, which measures current profitability, is positive and statistically significant at the 10% level, suggesting that Good SPACs perform better than Bad SPACs. To note that previous research showed that SPAC firms often have worse quality than other types of firms (Datar et al., 2012). The variable market-to-book asset ratio has a positive sign and is significant at the 10% level, which supports the view that Good SPACs are associated with stronger growth opportunities. The debt ratio variable is positive (albeit not statistically significant), which shows that more levered companies do not necessarily translate into a deal that destroys value. Moreover, Bad SPACs are bigger in size than Good SPACs. Therefore, firm-specific variables are considerably related to the way a SPAC acquisition is classified.

Regarding the only deal-specific variable, the variable time to resolution is positive and not statistically significant, which might indicate that the time a firm takes to complete the deal is not associated to the classification of Good and Bad SPACs.

When examining the market-specific variables, we find that unstable market conditions are not linked to Bad SPACs, since the variable market volatility is insignificant. Furthermore, the finding that cost of debt is not statistically significant supports the idea that SPAC firms do not consider current debt conditions when deciding how to enter the public market.

All Good SPACs and Bad SPACs with available data are used in our primary analysis. Nevertheless, as we can see in Table 2, an average Good SPAC is not entirely comparable to an average Bad SPAC, since some characteristics of one group are very different from those of the other group. This issue is addressed in model 2.

Table 4 – Likelihood of a Good SPAC

This table presents the average marginal effects of logistic regressions. We use a sample of Good SPACs and Bad SPACs that were executed between January 2004 and December 2019. The dependent variable is a binary variable which equals 1 for Good SPACs and 0 for Bad SPACs. Model 1 includes our main specification. In Model 2 we match Bad SPACs to Good SPACs based on size and industry. All variables are defined in Appendix C and standard errors are provided in parenthesis. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Variables	Model 1	Model 2
Market volatility	-0.0071	-0.0058
	(0.0327)	(0.0376)
Cost of debt	-0.3426	0.2019
	(0.3880)	(0.4412)
Time to resolution	0.0024	0.0009
	(0.0023)	(0.0024)
Return on assets	0.0231*	0.0210**
	(0.0121)	(0.0103)
Market to book asset ratio	0.5792*	0.3299
	(0.3587)	(0.4128)
Debt ratio	0.0016	0.0077
	(0.0060)	(0.0068)
Log(size)	-0.1128	
	(0.1545)	
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	No
Constant	-0.6395	-0.0748
N	120	90
N (Good SPACs)	45	45
N (Bad SPACs)	75	45
Pseudo R-squared	9.15%	16.32%
LR statistic	14.5231	20.3628

We select those Bad SPACs that, in terms of size and industry, are most comparable to our Good SPACs. More specifically, we use a propensity score matching model[12] (without replacement) to match the closest Bad SPAC to each of our 45 Good SPACs.

While addressing the concerns regarding the comparability of Good SPACs and Bad SPACs, we are able to evaluate differences in the main variables within the matched sample.

[12] This process compares case records from a single dataset to similar controls. The variable representing the case/control group is initially used as the dependent variable in a logistic regression. Then, depending on the propensity score from the logistic regression, it chooses a match for each case from the control group. The score is an estimate of the likelihood of joining the case group.

Because we are interested in firm-specific factors (such as size and industry) that are connected to the classification of Jenkinson and Sousa (2011), we do not employ the matching strategy in our primary study.

The results from model 2 confirm our previous conclusions: the variable return on assets is still positive, but now significant at the 5% level. All other variables remain statistically insignificant, meaning that the profitability indicator is the most relevant factor in differentiating Good and Bad SPACs.

To sum up, our analysis of both models 1 and 2 supports the conjecture that firms of higher quality and stronger growth possibilities are more likely to result in a Good SPAC acquisition.

4.2. Difference-in-difference method

As explained in the previous chapter, to study the effect of the SPAC acquisition on the target firm' operating performance we perform the Ordinary Least Squares (OLS) method with robust standard errors. The effects were estimated for two performance indicators: return on assets and return on sales.

4.2.1. Return on assets

Table 5 displays the impact of the acquisition on return on assets. Model 1 compares the performance of the three-year period before the acquisition with the subsequent three years. The variable Good SPAC is positive, but not statistically significant, suggesting that there is no difference in the operating performance of Good SPACs in comparison with Bad SPACs, regardless of the period. These results are somewhat conflicting with our univariate analysis, despite the latter only considers the values closest to the decision date. The variable After is negative and significant at the 1% level, which indicates that the profitability of the target company worsens after the acquisition, irrespective of the classification of Good and Bad SPACs. Finally, Good SPAC×After represents the effect of the acquisition on the performance of Good SPACs. According to the model, the impact is negative although not statistically significant. It suggests that there is no substantial effect in terms of return on assets of Good SPACs that successfully completed an acquisition, when comparing with the same effect on Bad SPACs.

Table 5 – The effect of the acquisition on return on assets

This table provides the results for the difference-in-difference model employed on return on assets. Model 1 compares the performance of the three-year period before the acquisition with the three-year period after the acquisition. Model 2 compares the performance of the last year before the acquisition with the first year after the acquisition. In Specification 1 we consider original data. In Specification 2, we winsorize the dependent variable at the 5% level. In Specification 3, we use the sample obtained from the propensity score matching model (winsorized). Standard errors in parenthesis are computed using the Newey and West method, in order to correct for heteroskedasticity and autocorrelation. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Variables	**Model 1**			**Model 2**		
	Specification 1	*Specification 2*	*Specification 3*	*Specification 1*	*Specification 2*	*Specification 3*
Good SPAC	0.0551	0.0263	0.0175	0.0538	0.0363	0.0283
	(0.0439)	(0.0189)	(0.0226)	(0.0408)	(0.0242)	(0.0261)
After	-0.1756***	-0.0969***	-0.0853***	-0.1748***	-0.1014***	-0.0753**
	(0.0496)	(0.0213)	(0.0289)	(0.0540)	(0.0273)	(0.0349)
Good SPAC×After	-0.1391	-0.0708*	-0.0900**	-0.2204	-0.0741	-0.1033*
	(0.0910)	(0.0391)	(0.0430)	(0.1802)	(0.0522)	(0.0545)
Log(assets)	0.1434***	0.0642***	0.0668***	0.2098*	0.0765***	0.0777
	(0.0374)	(0.0095)	(0.0122)	(0.1110)	(0.0177)	(0.0218)
Constant	-0.2637***	-0.1067***	-0.1026***	-0.4259*	-0.1471***	-0.1405***
	(0.0859)	(0.0195)	(0.0237)	(0.2342)	(0.0398)	(0.0464)
No. Observations	464	464	353	196	196	146
Adj. R-squared	11.36%	17.32%	15.81%	11.43%	15.02%	13.21%

In specification 2, we winsorize the dependent variable at the 5% level to get rid of extreme values that could bias our results. For this specification, the conclusions we draw from the variables Good SPAC and After are the same. However, the variable Good SPAC×After is negative and becomes statistically significant at the 10% level, which suggests that the acquisition negatively affects the operating performance of Good SPACs more than affects the operating performance of Bad SPACs.

In specification 3, the sample comprises the companies selected in the propensity score matching model, with the dependent variable also being winsorized at the 5% level. The results obtained confirm our previous conclusions.

Model 2 compares the performance of the last fiscal year before the acquisition with the subsequent year. The results from this model are consistent with those of model 1. The variable After is negative and significant at the 1% level, indicating that the performance of the target company worsens immediately after the acquisition, regardless of if it is a Good or Bad SPAC. Lastly, the variable Good SPAC×After is negative, despite not being statistically significant. It suggests that there is no relevant change in terms of return on assets in the very short-term of Good SPACs that completed an acquisition, when comparing with the same change on Bad SPACs.

4.2.2. Return on sales

Table 6 presents the impact of the acquisition on return on sales. Model 1 once again compares the performance of the three-year period before the acquisition with the following three. Although not statistically significant, the variable Good SPAC is positive, which suggests that there is no difference in the operating performance of both Good and Bad SPACs, regardless of the period. The variable After is negative and significant at the 10% level, indicating that the return on sales of the target firm decreases after the acquisition, irrespective of the classification of Good and Bad SPACs. Lastly, the variable Good SPAC×After, that illustrates how the purchase affected the performance of Good SPACs, is negative, albeit not statistically significant. This might be explained by the fact that there are less observations for return of sales, which weakens the results.

Table 6 – The effect of the acquisition on return on sales

This table provides the results for the difference-in-difference model employed on return on sales. Model 1 compares the performance of the three-year period before the acquisition with the three-year period after the acquisition. Model 2 compares the performance of the last year before the acquisition with the first year after the acquisition. In Specification 1 we consider original data. In Specification 2, we winsorize the dependent variable at the 5% level. In Specification 3, we use the sample obtained from the propensity score matching model (winsorized). Standard errors in parenthesis are computed using the Newey and West method, in order to correct for heteroskedasticity and autocorrelation. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Variables	**Model 1**			**Model 2**		
	Specification 1	*Specification 2*	*Specification 3*	*Specification 1*	*Specification 2*	*Specification 3*
Good SPAC	0.1526	0.0734	0.0985	-0.0251	-0.0149	-0.0199
	(0.1822)	(0.0994)	(0.1386)	(0.1651)	(0.1150)	(0.1590)
After	-0.4399*	-0.1016	-0.0003	-0.2610*	-0.1471	-0.0773
	(0.2450)	(0.0822)	(0.1288)	(0.1607)	(0.0928)	(0.1499)
Good SPAC×After	-0.5882	-0.1721*	-0.2702*	-1.3073	-0.0424	-0.1082
	(0.5550)	(0.1157)	(0.1488)	(1.2716)	(0.1289)	(0.1672)
Log(assets)	0.5211**	0.1378***	0.1287	0.4999	0.1405**	0.1428*
	(0.2141)	(0.0412)	(0.0533)	(0.3153)	(0.0587)	(0.0826)
Constant	-1.1488**	-0.3065**	-0.3133*	-1.0513	-0.2839*	-0.2849
	(0.4908)	(0.1211)	(0.1634)	(0.6739)	(0.1534)	(0.2150)
No. Observations	342	342	265	147	147	112
Adj. R-squared	1.82%	7.37%	6.23%	0.73%	5.47%	2.66%

Nonetheless, in specification 2, where the dependent variable is winsorized, and in specification 3, Good SPAC×After remains negative but is now significant at the 10% level. Therefore, one can conclude that the acquisition of Good SPACs has a negative effect on the return on sales of these companies.

On the other hand, model 2 compares the performance of the last fiscal year before the acquisition with the subsequent year. The findings of this model match those of model 1. The variable After is negative and significant at the 10% level, indicating that the performance of the target company worsens immediately after the acquisition, whether it is a Good or Bad SPAC. Lastly, even though it is not statistically significant, the variable Good SPAC×After is negative. It suggests that Good SPACs that completed an acquisition would not experience any significant change in their return on sales in the very near future.

To sum up, using the difference-in-difference method, we can conclude that the operating performance, measured with the return on assets and return on sales, of the target firms acquired by SPACs decreases following the transaction, irrespective of the classification of Good and Bad SPACs. These results are even more evident for Good SPACs, who witness a worsening in profitability after the acquisition is completed. The decline in operating performance of SPAC firms, however, comes with a caveat. The post-acquisition period shows significant revenue growth for these companies. Thus, a lack of sales growth opportunities cannot be the cause of these firms' poor operating performance.

Existing international studies of IPO companies find that operating performance had declined in the post-IPO period (Jain & Kini, 1994; Kim et al., 2004; Mikkelson et al., 1997), which corroborates our results. The reduction in the operating performance of SPAC companies after the acquisition could be attributed to a variety of factors. One argument has to do with the possibility of higher agency costs when a company switches from private to public ownership. The conflict of interest between founding owners and shareholders could lead, for instance, to the use of IPO proceeds in nonvalue maximizing projects. A second factor could be that managers may try to manipulate their accounting data before going public. As a result, pre-acquisition performance will be exaggerated, while post-acquisition performance will be underestimated. The third reason is that entrepreneurs time their issues to coincide with periods of unusually good performance levels, which cannot be sustained in the future (Jain & Kini, 1994).

As already stated, and to the best of our knowledge, there is no previous research on the impact of the acquisition on the operating performance of target companies acquired by SPACs. Nonetheless, our finds are in line with some literature concerning market performance. For instance, Gahng et al. (2021) reported that investors have earned negative returns in the one-year following the merger, and Kolb and Tykvová (2016) stated that SPAC companies significantly underperform the market, industry and firms of similar sizes. Moreover, Datar et al. (2012) showed that in the year of the merger, the median level of five operating performance measures for SPAC firms was below the industry median.

5. Conclusions, limitations and future research

This dissertation seeks to assess if there are any significant differences in the pre- and post- operating performance of Good and Bad SPACs (value-creating and value-destroying deals, respectively, in Jenkinson and Sousa (2011) terminology) that confirm (or not) this classification. For that, we use a sample of 120 U.S. SPAC acquisitions from January 2004 to December 2019.

Some of the results of our research support the conclusions of previous studies (Datar et al., 2012; Kolb & Tykvová, 2016). In terms of firm-specific characteristics, Good SPACs reveal considerable higher return on assets and market-to-book asset ratios on the decision date compared with Bad SPACs. Our findings also suggest that the return on assets is the most relevant factor in differentiating Good and Bad SPACs. Furthermore, firms of higher quality and stronger growth possibilities are more likely to result in a Good SPAC acquisition.

We find that the operating performance of the target firm decreases after the acquisition, irrespective of the classification of Good and Bad SPACs. This is verified for both one-year and three-year periods after the acquisition is successfully completed. Specifically for Good SPACs, we can also conclude that the acquisition negatively affects their return on assets and return on sales. These are consistent with previous literature, that show that IPO firms show a decline in operating performance after the issue (Jain & Kini, 1994; Kim et al., 2004; Mikkelson et al., 1997).

Our findings corroborate the advice given by Jenkinson and Sousa (2011), but more than that investors should listen to the market, we also suggest that investors should look to the return on assets of the target firm before making a decision on whether to approve a deal or not, since companies with higher profitability on the decision date are more likely to be classified as Good SPACs, allowing investors to reap significant profits at very low levels of risk. However, our findings clearly indicate that this route to become a publicly traded entity has important consequences and should be paid attention to by investors and analysts, as both Good and Bad SPACs experience a decrease in operating performance following the acquisition.

This study suffers from some limitations. The first is related to the fact that the sample used is relatively small. By considering only SPAC acquisitions performed until

December 2019, in order to have at least two years of accounting data after the transaction is completed, we exclude a considerable number of acquisitions from the last two years. Moreover, not all SPACs from 2004 to 2019 are included in this study, as there is a lack of available data.

Secondly, the SPAC's historical stock prices represent another limitation of the study. In many cases, when a SPAC acquires a company, it either disappears from the databases or appears under a different name. As a result, it becomes extremely difficult to obtain stock prices and accounting data from the right companies at the required times, potentially affecting the accuracy of the data.

Thirdly, various assumptions were made throughout this dissertation. More precisely, we extrapolated the most recent trust value disclosed in SEC filings to the vote date, using a daily rate, and used it as a proxy for the trust value on the decision day.

For future research, we suggest including the most recent SPAC acquisitions, which would significantly increase the number of observations and improve the accuracy of the results. Furthermore, we suggest applying this study to different locations, to access the stability of the main conclusions.

6. References

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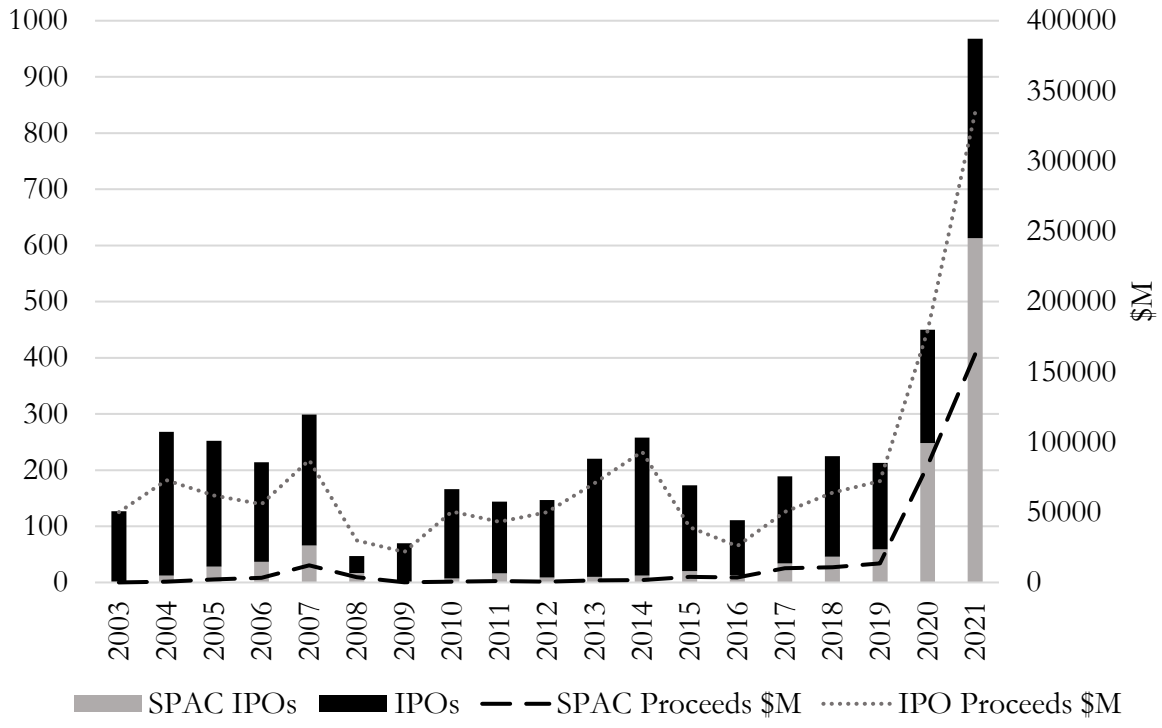
7. Appendices

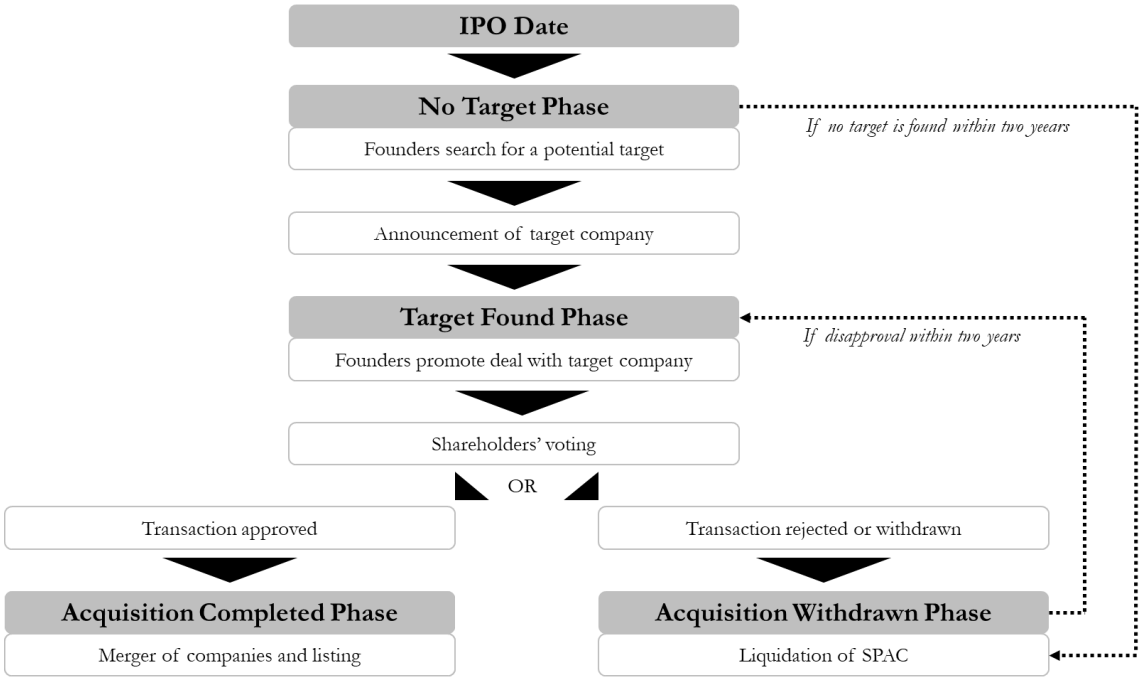
7.1. Appendix A: Number of SPAC IPOs, number of IPOs, SPAC proceeds and IPO proceeds in the United States between 2003 and 2021

Source: https://www.spacanalytics.com/



7.2. Appendix B: SPAC lifecycle

Source: Lewellen (2009)



7.3. Appendix C: Variable definitions

Source: Kolb and Tykvová (2016)

The market-, deal-, and firm-specific variables that we employ in our study are defined in this table, along with the unit in which they are expressed.

Variable name	Unit	Definition
Market specific variables		
Market volatility	%	Average lagged six-month variance on S&P 500 index on the announcement date.
Cost of debt	%	10 year T-bill rate on the announcement date.
Deal specific variables		
Time to resolution	Days	Time period from the announcement date to the completion date.
Firm specific variables		
Return on assets	%	EBIT divided by total assets.
Return on sales	%	EBIT divided by total revenue.
Market to book asset ratio	Ratio	Market value of equity plus book value of total liabilities divided by the book value of equity and book value of total liabilities.
Debt ratio	%	Total liabilities divided by total assets.
Size	Million US$	Total assets.

7.4. Appendix D: Correlation matrix

This table presents a pairwise correlation matrix of the variables that we use in the analysis of the SPAC acquisitions that were executed between January 2004 and December 2019. All variables are defined in Appendix C. *, **, and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

	Market volatility	**Cost of debt**	**Time to resolution**	**Return on assets**	**Market to book asset ratio**	**Debt ratio**	**Log(size)**
Market volatility	1.00						
Cost of debt	-0.23***	1.00					
Time to resolution	-0.15	0.50***	1.00				
Return on assets	0.06	0.12	-0.05	1.00			
Market to book asset ratio	0.20**	0.00	0.01	0.10	1.00		
Debt ratio	0.00	0.04	0.06	-0.29***	0.08	1.00	
Size	0.06	-0.02	-0.03	0.18*	-0.16*	-0.03	1.00