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The Impact of ESG Scores on the SPAC Post-Merger Performance

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ABSTRACT

In this thesis, I investigate whether the presence of ESG scores mitigates the decline in performance of post-merger SPACs. To assess the impact of sustainable disclosures, I first evaluated the short-term and long-term performance of SPACs from 2019 to 2023 to identify any changes in performance patterns. Subsequently, using panel data, I conducted a multivariate regression analysis to isolate the effect of ESG on the Buy-and-Hold Abnormal Returns (BHAR) performance of blank check deals. The findings indicate that ESG scores are positively associated with the financial outcomes of SPACs. Although the results are not statistically significant, the presence of ESG metrics appears to mitigate the deterioration typically observed in SPAC performance. This study highlights the potential benefits of incorporating ESG practices in SPAC investments and underscores the need for further research to fully understand their impact.

Keywords: SPAC, ESG, post-merger performance

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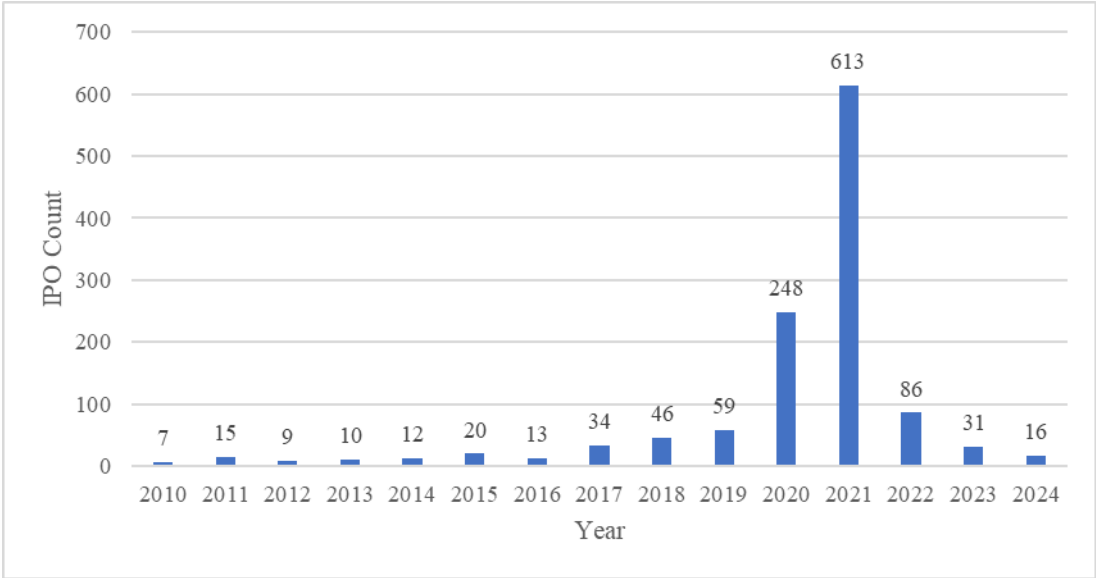
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CHAPTER 1 Introduction

Special Purpose Acquisition Companies (SPACs) have experienced notable growth over the years. Between 2010 and 2019, there was a steady rise in their popularity, with the number of IPOs increasing from 7 in 2010 to 59 in 2019. However, 2020 and 2021 had a remarkable record of 248 and 613 SPAC IPO filings, representing a significant portion of new public listed companies in the United States (Figure 1). SPACs are shell companies designed to raise capital through IPOs solely to acquire existing companies. They offer advantages such as quick access to capital through IPOs, offering advantages like faster access to capital, higher valuations, and fewer regulatory burdens compared to traditional IPOs (Bazerman, 2021).

Despite the advantages and popularity of SPACs, several studies have indicated that SPAC listings tend to underperform in the long run. At the same time, Environmental, Social, and Governance (ESG) factors have garnered increasing significance for investors in their investment decision-making process. According to analysis by Friede et al. (2015), opportunities for outperformance based on ESG factors are evident across various market segments. This suggests that higher ESG scores can lead to better performance, whilst benefiting from the advantages SPACs offer.

Figure 1
Number of SPAC IPOs in the United States from 2010 to 2024



Researchers have extensively studied the performance of SPACs, particularly focusing on their post-merger outcomes compared to traditional IPOs. Kolb and Tykvová (2016) found that SPACs often attract lower quality companies, leading to long-term underperformance for investors relative to market benchmarks, industry peers, and traditional IPO firms. Their study examined a sample of 127 SPAC

firms and 1128 IPO firms operating from 2003 to 2015, predominantly in North America across sectors such as manufacturing, services, transportation, and utilities. Using a five-factor model to analyze monthly equal-weighted portfolio returns, they determined that shell companies significantly underperform compared to companies opting for traditional IPOs. Dimitrova (2017) further supports these findings by investigating SPAC performance, highlighting how it is influenced by contractual features that resemble those in private equity. One of the main conclusions is that post-merged companies exhibit a sharp decline in performance compared to different benchmarks, which is detrimental to shareholders' wealth.

While much of the existing research on SPACs focuses on their long-term performance, empirical analyses incorporating ESG metrics in measuring post-merger SPAC returns are notably lacking. However, there are limited studies examining the performance of ESG-focused SPACs, which target sustainable operating companies. Specifically, Datar et al. (2023) studied SPACs that either intended to acquire or had acquired an ESG-oriented business. The analysis reveals that sustainable acquisition exhibit inferior performance compared to their non-ESG counterparts. This finding is supported by Dimic et al. (2023), who highlight that Green SPACs report initial positive abnormal returns on announcement days, followed by significant declines in the longer term.

In contrast, several studies have shown that ESG screening and factors such as scores or ratings are positively associated with better financial performance (Verheyden et al., 2016; Luo, 2022). Complementary to these findings, regulatory changes in the capital market as of 2019 have contributed to the emergence of a substantial number of ESG-oriented SPACs. Following these regulatory changes, SPAC mergers incorporating ESG practices between 2020 and 2021 have yielded a positive return of 4% year-to-date, contrasting with a 0.2% decline observed among non-ESG SPACs (Trends, 2021). Therefore, the central research question addressed in this thesis is:

How does the ESG score affect the long-term performance of post-merger SPAC IPOs?

To fill this research gap, this study aims to examine if ESG scores affect the long-term performance of post-merger SPACs in the US market, specifically analyzing SPACs listed on the NYSE, Nasdaq, and NY OTC from 2019 to 2023. For short-term performance, an event-study methodology will be used, which involves calculating abnormal returns on the announcement day, one day after, and seven days after the announcement, with the Russell 2000 as the reference index. In terms of long-term performance, the Buy-and-Hold Abnormal Returns (BHARs) methodology will be employed. This involves calculating 6- and 12-months BHARs relative to the Russell 2000 index.

Further, ESG data will be sourced from Thomson Reuters, which assigns scores based on a company's environmental, social, and corporate governance disclosures. These scores will be transformed into a dummy variable, where the presence of an ESG score equals 1. Further, to investigate the relationship between ESG scores and SPAC performance, a panel data regression analysis will be conducted, using SPAC returns as the outcome variable and ESG scores as the predictor.

All data for this study, including stock prices, ESG scores, and market index returns, will be obtained from Eikon Refinitiv Datastream (LSEG). This method allows for a comprehensive examination of the relationship between ESG performance and the financial outcomes of SPACs within the specified timeframe and market context.

Building on the findings of Kolb and Tykvová (2016), I propose a hypothesis suggesting that deSPACs tend to exhibit poor long-term performance relative to the Russell 2000 index. While Datar et al. (2023) observed higher levels of underperformance among ESG-focused SPACs, I anticipate a positive correlation between the presence of an ESG score and the performance of shell companies. This expectation aligns with findings from other studies, such as Luo (2022), which suggest that ESG disclosures lead to better company financial performance. Nonetheless, while expectations of a positive correlation between ESG scores and SPAC performance align with broader findings (Luo, 2022), the nuanced impact of ESG factors on SPACs warrants deeper investigation amid ongoing debates in the investment community.

CHAPTER 2 Theoretical Framework

2.1 SPAC Overview

2.1.1 What are SPACs?

A Special Purpose Acquisition Company (SPAC) is a financial vehicle formed to raise capital through an initial public offering (IPO) with the purpose of acquiring a non-listed operating company (Hale, 2007). SPACs are shell or blank check companies, which the Securities and Exchange Commission (SEC) characterizes as "a development stage company that has no specific business plan or purpose or has indicated that its business plan is to engage in a merger or acquisition with an unidentified company or companies, or other entity or person," which would typically be associated with "penny stock" or "microcap stock". However, Heyman (2007) explains that SPACs have been subjected to regulations over the years, clearly distinguishing them from "penny stocks." As a result, with a new structure designed to protect investors under SEC regulations, SPACs have become an established part of mainstream capital-raising mechanism.

2.1.2 SPAC Stakeholders

In the lifecycle of SPAC, there are three major stakeholders involved, namely the sponsors, investors and targets.

Sponsors. The sponsors or management teams of SPACs consist of experienced business executives with diverse functional backgrounds, primarily focusing on identifying disruptive companies within the tech and biotech sectors. Additionally, shell companies can be established by private equity investors who leverage their professional networks and reputation. The main difference between these types of sponsors lies in their approach and outcome in launching SPACs. Former executives primarily aim to generate returns. They may proceed with mergers or acquisitions, even if it is value-destroying for other investors. In contrast, PE investors mergers are more selective in their choice of target firms, resulting in fewer mergers but generally higher post-merger performance (Del Giudice & Signori, 2024).

The SPAC process begins with the management team initiating capital raising through an IPO. Typically, the management team contributes 20% of the raised capital, a practice known as "skin in the game" (Rodrigues and Stegemoller, 2012). For blank check companies, becoming public is relatively straightforward as they do not engage in operational activities or possess significant assets. However, they must commit to acquiring an operating company within eighteen months; otherwise, the SPAC faces liquidation.

Investors. According to Heyman (2007), SPAC investors can be categorized into several groups. The main group consists of institutional investors, such as hedge funds. A smaller proportion comprises retail investors, who aim to access private equity-style investments at lower share prices with the potential for significant gains. Lastly, private equity firms invest in SPACs as a way to access public capital markets for additional funding.

As previously mentioned, sponsors hold 20% of the common equity, while the remaining 80% comes from investors. Each unit of equity consists of common shares, priced at \$10, and warrants, which expire five years after the SPAC completes the business combination. These units offer investors the right to vote when the target company is identified, leading to two options: proceed with the merger or acquisition, or withdraw their investments with interest. However, there is empirical evidence that deSPAC transactions tend to underperform significantly. Therefore, the rationale behind hedge funds using this strategy lies in the SPACs' structure, which offers a payoff similar to holding a risk-free bond combined with a call option, particularly when they redeem their shares at the merger announcement date (Mitchel and Pulvino, 2012).

Targets. Kolb and Tykvová (2016) note that the most common SPAC targets are typically lower quality companies without venture capitalist (VC) or private equity (PE) involvement, often small businesses. These companies find it easier to raise funding through SPACs rather than traditional IPOs due to several advantages: faster timing of going public, lower investment bank fees, higher valuations, and fewer regulatory demands.

2.1.3 SPAC Mechanism

SPAC formation & IPO. The lifecycle of a Special Purpose Acquisition Company (SPAC) typically spans two years and consists of three main stages: SPAC formation and IPO, searching for a target company, and the business combination, also known as de-SPAC.

Firstly, the process begins with the creation of the SPAC by sponsors or founding shareholders, a phase that usually takes a few weeks to a month. This stage includes filing an SEC Form S-1, indicating the company's intention to go public. The registration statement includes key information such as the types of shares offered, their price, a summary of the company's business and plans for using the money raised, financial statements, risks involved, and market conditions (U.S. Securities and Exchange Commission, n.d.). Once the SEC verifies and approves the registration form, the management team can proceed with the IPO.

Secondly, the IPO event for a SPAC occurs faster than a traditional IPO because the only assets the SPAC holds are the cash from fundraising. Unlike traditional IPOs, SPACs sell units that each include

one common share and a warrant, typically priced at \$10. The management team usually contributes 20% of the equity pre-IPO, with external shareholders investing the remaining 80% during the IPO. If the SPAC founders cannot complete a business combination and must liquidate, they will lose their entire investment, which is why it is called risk capital. In contrast, external shareholders have voting rights for potential acquisitions and can choose to redeem their shares before the merger while keeping their warrants, or they can continue with the deal. This structure offers investors a risk-free opportunity, with a potential payoff higher than Treasury bills (Lewellen, 2009).

Nearly 95% of the raised capital is placed into an escrow account, which are typically invested in short-term U.S. securities such as Treasury bills. This strategy aims to enhance investor security by minimizing the risk of SPAC founders failing to meet their obligations. Further, the primary objective of this account is to utilize the funds for the business combination. In the event that the transaction fails to gain approval and the SPAC undergoes liquidation, all funds are returned to investors.

The differences in unit features can potentially create agency conflicts. Specifically, if investors disapprove of the acquisition and the shell company is compelled to liquidate, sponsors risk losing their invested capital. This situation shifts their focus from aiming for a successful combination with positive post-merger returns to merely closing the deal. Jenkinson and Sousa (2011) examine the performance and risks associated with blank check companies, highlighting a significant issue: after a SPAC IPO, the management team can freely purchase additional public shares. This practice undermines the interests of public investors and leads to the approval of deals that should otherwise be rejected. Consequently, this can result in an underperforming SPAC, but with gains for the management team.

Target Search & Exit. Following the SPAC IPO, sponsors have 18 months to find an operating company for a merger and to draft a letter of intent for public investors. Given the complexity and accelerated pace of these deals, it's crucial that board executives possess prior experience with the process or deep expertise in the relevant sector. This enhances their ability to attract investors and secure approval for the transaction.

Once the merger is announced, external shareholders evaluate the proposed deal and vote on whether to proceed with the transaction or redeem their shares. Typically, a 60-80% majority of positive votes is necessary for the business combination to proceed. In cases where shareholders opt for redemption, sponsors have two options: they can either purchase the shares themselves or seek alternative investors.

Since sponsors' compensation relies on successfully completing the merger, they are highly motivated to influence shareholder votes and expedite the process. However, this focus on completing deals within

the SPAC's timeframe may lead to value destruction for other shareholders and could explain why some SPAC deals underperform.

Subsequently, if the majority of shareholder votes are in favor of the business combination, the SPAC merger process begins and typically lasts between three to five months. This route to going public is advantageous for private companies because it is faster, more cost-effective, and involves less regulatory scrutiny compared to traditional IPOs.

On the other hand, if the acquisition is not approved by shareholders or if sponsors fail to meet the minimum cash requirements agreed upon with the target company, the SPAC is liquidated. In such cases, all funds held in escrow accounts are returned to investors on a pro-rata basis. This means each investor receives a refund proportionate to their ownership stake in the SPAC, ensuring an equitable distribution of remaining funds.

2.2 Literature Review

2.2.1 SPAC Performance

The literature on Special Purpose Acquisition Companies (SPACs) indicates that their performance varies at different stages of their lifecycle. Notably, SPAC IPOs exhibit abnormal returns primarily during the announcement dates of target acquisitions. Study by Howe and O'Brien (2012) highlights a positive market reaction when a business transaction intent is declared, with findings reporting an average return of 1.7 percent. Further, Lakicevic and Vulcanovic (2013) dissect the returns across different SPAC securities: unit holders experience a 2.42 percent positive return, public investors holding common shares see a 1.2 percent return, and warrant holders achieve the highest return at 10.49 percent.

However, this paper focuses on analyzing performance for the post-merger period, also known as the deSPAC phase.

Empirical analysis largely indicates that SPAC acquisitions tend to significantly underperform. Kolb and Tykvová (2016) studied the long-term abnormal returns of SPACs from 2003 to 2015, applying two statistical methods to determine performance: event-time buy and hold abnormal returns (BHARs) and calendar-time five-factor model analysis, incorporating the three Fama-French factors and a momentum factor. The results are compared to the Russell 2000 index, which represents the returns of the small-cap market, firms which followed the traditional IPO, and industry. Post-merger, SPAC performance deteriorates significantly, with an average underperformance of 59 to 96 percent. This trend persists across both methodologies and different time periods.

Several factors may contribute to this underperformance. Time sensitivity, for instance, can pressure sponsors into proposing suboptimal deals to investors if their initial target is not approved, or if sponsors lack sufficient operational expertise in case, they secure an executive role within the operating company. These observations suggest underlying agency issues where sponsors may prioritize protecting their 20% equity stake over ensuring robust target selection and post-merger operational success.

Additionally, Jenkinson and Sousa (2011) highlighted that SPACs often attract lower-quality and smaller-sized businesses seeking alternative paths to public listing. Bai et al. (2021) further support these claims through their analysis of SPACs from 2003 to 2020, which notes that these companies typically have 20.4% lower assets, 48.8% lower revenues, and 45.9% lower market capitalization compared to companies choosing traditional IPO routes. They also emphasize that investing in SPACs represents a speculative opportunity for external stakeholders.

In summary, the poor performance of SPACs post-merger appears to be multifaceted and interconnected, revolving around incentives driven by time pressure, sponsor interests, and the characteristics of companies attracted to the SPAC listing process.

Subsequent literature confirms the poor performance of SPACs over the long term. Vulcanovic (2017), in his study on the survival and characteristics of deSPACs, concluded that operating companies exhibit significant negative returns following the business combination. Specifically, the buy-and-hold returns decline by 19% in the three months post-merger and by 40% one-year post-merger.

A more recent study by Kiesel et al. (2022) focuses on deSPACs from 2012 to 2021, analyzing their short-term performance using event studies and their long-term performance using the buy-and-hold returns method. The study finds that SPACs successfully completing business transactions exhibit significant positive short-term abnormal returns, averaging 7.41%. Notably, during the high-activity period of 2020-2021, these abnormal returns are even higher, reaching 12.68%. However, for longer horizons, there is a sharp decline in returns, ranging from 14.10% to 20.18%, which is lower than the evaluation by Kolb and Tykvová (2016). This discrepancy may be due to different time periods, as post-2008 SPACs faced other regulatory demands, leading to better target selections.

In contrast to the findings of Kiesel et al. (2022), Klausner et al. (2020) conducted a specific comparison analysis of blank check deals, focusing on their performance before and during the SPAC "bubble." They utilized the IPO index, Nasdaq, and Russell 2000 index as primary benchmarks for relative comparison. From 2019-2020, Klausner et al. found that SPACs underperformed significantly: by 50.9% against the IPO index, 17.9% against the Nasdaq, and 4.4% against the Russell 2000. However,

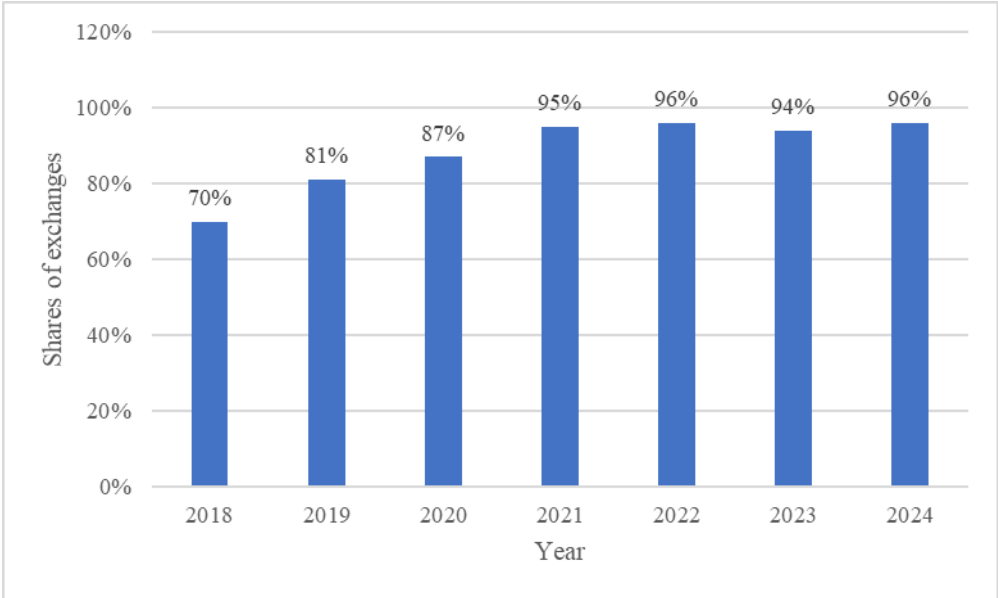
during the heightened popularity of SPACs from 2020 to 2021, post-merger SPAC deals experienced even worse performance: underperforming by 100.4% against the IPO index, 64.1% against the Nasdaq, and 38.0% against the Russell 2000. These results underscore a notable decline in SPAC performance following the surge in popularity during the SPAC "bubble" period of 2020-2021.

2.2.2 Impact of ESG score on the performance

Environmental, Social, and Governance (ESG) factors are increasingly important for businesses and investors. The growing emphasis on ESG disclosures, as illustrated in Figure 2, reflects a clear upward trend. This trend is likely driven by more stringent regulatory requirements and the recognition that robust ESG practices can create significant value for investors. By promoting transparency and accountability, ESG disclosures help build trust, potentially leading to better long-term performance and sustainable growth for companies.

Figure 2

Rise in Investor Demand for ESG Disclosure Across Exchanges: 2018-2024



Based on empirical analysis, there is an ongoing debate about the impact of ESG factors on financial performance, including corporate financial outcomes and market responses to ESG disclosures, such as stock returns. Friede et al. (2015) provide a comprehensive overview of the relationship between ESG and financial performance by analyzing results from 3,700 studies. Their main conclusion is that approximately 90% of these studies find that incorporating ESG factors into business practices generally does not harm financial performance. Moreover, a substantial portion—2,100 out of 3,700 analyses—indicates that ESG performance is positively associated with better financial outcomes.

Verheyden et al. (2016) examined the impact of ESG screening on financial performance, finding that it can positively affect risk-adjusted returns by increasing annual performance by 0.16% and reducing the occurrence of severely negative daily returns. Building on this, Luo (2022) conducted an analysis using Thomson Reuters' Refinitiv data on the performance of UK securities from 2003 to 2020. Luo's study indicates that companies with ESG disclosures generally achieve positive excess returns. Interestingly, firms with lower ESG scores tend to show higher average monthly returns of 1.479%, compared to those with higher ratings, which exhibit average returns of 0.966% per month. This disparity suggests that high-ESG rated companies may face additional financial constraints, such as higher labor costs for employee welfare, and may forgo opportunities that do not align with their sustainability values (Eccles et al., 2011). These companies might avoid investments in industries or practices that offer potentially higher short-term financial returns but have negative environmental or social impacts, contributing to their underperformance relative to lower ESG-rated firms.

Furthermore, while the importance of ESG factors in traditional corporate settings is increasingly recognized, there remains a notable gap in the literature regarding their integration within Special Purpose Acquisition Companies (SPACs). Specifically, Datar et al. (2023) have examined the performance of ESG-focused SPACs. However, their study primarily evaluates SPACs that intend to acquire ESG-focused targets or have acquired an ESG-oriented business, without directly incorporating quantitative ESG metrics such as scores or ratings. The study reports that these ESG-related acquisitions experienced a significant decline of 53.6% in stock returns one year post-merger, compared to their counterparts, which had a negative return of 42%. These findings are supported by Dimic et al. (2023), who focused on Green SPACs, which involve business combinations with sustainable operating companies. Initially, the stocks exhibit positive abnormal returns of around 12% during the first days following the merger announcement. However, post-merger returns turn negative and deteriorate significantly over time.

2.3 Hypotheses Development

Previous studies have indicated that the announcement of SPAC deals can lead to positive abnormal returns in the short term. Specifically, Lakicevic and Vulcanovic (2013) reported abnormal returns of 0.85% and 1.2% for the [-1,0] and [0,1] event windows, respectively. Similarly, Howe and O'Brien (2012) indicated an average return of 1.7% around the announcement period. However, both authors focused on SPACs from 2003 to 2008/2009. Given the significant increase in the number of SPAC IPOs and changes in regulations within their structure, it is essential to re-evaluate the short-term performance of SPACs. Building on research so far, we expect that the announcement of SPAC deals will continue to generate positive abnormal returns. Therefore, our first hypothesis is as follows:

H1: *SPACs experience significant abnormal returns on the announcement day, one day after, and seven days after the merger announcement.*

Various long-term performance analyses indicate that SPAC returns deteriorate significantly over time compared to other benchmarks. Most analyses, focusing on the 2003 to 2020 timeframe, exhibit a negative Buy-and-Hold Abnormal Return (Kolb and Tykvová, 2016; Bai et al., 2021). This underperformance is largely attributed to the speculative nature of SPAC investments, which often attract lower-quality and smaller businesses. Additionally, agency conflicts may also contribute to this trend. Given these observations, the long-term period will be investigated with the expectation that SPACs exhibit a decline in post-merger returns. Thus, the second hypothesis:

H2: *SPACs experience a decline in Buy-and-Hold Abnormal Returns (BHARs) over a six-month, 12-month and 24-month period post-merger.*

As of now, no research examines the effect of ESG scores on SPACs following mergers. While SPACs generally underperform in the long term, studies indicate that companies incorporating ESG practices and disclosures tend to achieve better financial performance (Friede et al., 2015; Verheyden et al., 2016; Luo, 2022). Although Datar et al. (2023) find that ESG-focused SPACs exhibit even lower performance, it is expected that ESG scores could mitigate some adverse effects typically observed in SPAC post-merger performance. Thus, the third hypothesis:

H3: *SPACs with ESG scores experience less decline in buy-and-hold abnormal returns (BHARs) compared to SPACs without ESG scores over a 12-month period post-merger.*

Building on the work of Kolb and Tykvová (2016), who accounted for market-, deal-, and firm-specific variables in their extensive research on SPAC performance, this study will include additional control variables to ensure a robust analysis of the impact of ESG disclosures. These control variables will include firm size (measured by total assets), firm-specific risk (measured by debt ratio), short-term liquidity (measured by cash-to-assets ratio), and the number of trading days until the announcement event. By including these variables, we can better isolate the effect of ESG scores on SPAC performance and provide a more accurate assessment of the relationship. Thus, it is expected a higher positive correlation between ESG factor and BHAR 12-month post-merger. Therefore, the fourth hypothesis is:

H4: *There is a positive correlation between ESG scores and 12-month performance for deSPACs when controlling for firm size, firm-specific risk, short-term liquidity, and trading days until the announcement event.*

CHAPTER 3 Data

3.1 Data Sample

The study centers on SPAC deals with public acquirers listed on the New York Stock Exchange (NYSE), Nasdaq, and Over-the-Counter New York (OTC NY). These exchanges comprise the majority of publicly traded companies and are subject to rigorous regulatory standards, which ensures a higher level of transparency. Moreover, the focus is on public status for acquirers due to the availability of disclosed financial and operational information, which provides a more reliable dataset. The timeframe selected is 2019 to 2023, as most SPAC transactions occurred in this period, with a peak in 2020 and 2021, during which 206 and 181 closed business combinations were recorded (*SPAC Statistics/SPACInsider*, n.d.). Thus, the sample consists of 423 blank check deals primarily collected from Eikon Refinitiv Datastream (LSEG). This source is chosen for its reliability and accuracy, covering extensive historical and current data across different asset classes. Therefore, this comprehensive database represents substantial basis for a robust and comprehensive analysis of the SPAC market during this timeframe.

3.2 Variables Description

In order to analyze the financial performance of blank check deals in both the short and long run, the stock prices and daily returns of the Russell 2000 index are collected from Eikon Refinitiv Datastream. Specifically, for the short period, the main focus is on the announcement return, the following day, and the seven days post-announcement returns. For the long period, the monthly closing prices from 2019 to 2023 for all SPACs are collected to analyze performance over 6 months, and 12 months. Both short and long-term returns are compared against the Russell 2000 index. The Russell 2000 is an appropriate benchmark for SPAC performance analysis due to its similarities with the SPAC market. It comprises small-cap companies from the U.S. equity market, which typically have high volatility and risk profiles. This is similar to SPACs, which usually target small to mid-sized companies (Bai et al., 2021) and have a speculative nature.

By using the Russell 2000 as a benchmark, a more accurate comparison of performance is achieved when performing Abnormal Returns (ARs) and Buy-and-Hold Abnormal Returns (BHARs). This approach will be explained in detail in the following section.

Subsequently, the Thomson Reuters ESG Scores will be used to reflect the extent to which a company incorporates sustainable and ethical practices. The scores range from 0 to 100, with higher values indicating greater commitment to environmental, social, and governance practices. For the purpose of testing our hypothesis, the ESG score will be transformed into a dummy variable, where the value 1 indicates the presence of ESG performance.

Firm-specific variables, including accounting data and the ESG score for operating SPACs, will be retrieved from LSEG Datastream. Yearly data has been retrieved for these variables to ensure temporal accuracy and consistency in the analysis. *Total assets*, representing the total value of everything a company owns, will be used as a control for the company's size. Furthermore, the *debt ratio*, calculated by dividing long-term debt by total assets, will serve as a control variable for firm-specific risk. The *cash-to-assets ratio*, calculated by dividing cash by total assets, will act as an indicator of short-term liquidity. These variables are selected to capture various aspects of SPAC deals that would affect performance, ensuring a robust analysis of the impact of ESG.

For SPAC-specific variable, the number of days from the IPO to the announcement day will be collected. This measure is intended to capture the time sensitivity factor, as the length of time between these events can contribute to the incentives for sponsors to propose suboptimal targets under pressure. This variable will be transformed into a dummy variable, where the value 1 indicates a period exceeding the average of 284 days, suggesting higher pressure for sponsors, as noted by Kiesel et al. (2022).

Table 3.1

Summary of the firm- and SPAC-specific variables.

Variable	Unit	Description	Purpose
Total Assets	US\$	The total value of everything a company owns	Control for company size
Debt Ratio	%	Long-term debt divided by total assets	Control for firm-specific risk
Cash-to-Assets Ratio	%	Cash divided by total assets	Indicator of short-term liquidity
ESG	Dummy	Score reflecting sustainable and ethical practices	Measure of ESG performance
Days	Dummy	Number of days from IPO to announcement.	Sensitivity factor

3.3 Summary statistics

Table 3.2 provides a summary statistic for the continuous variables used in the analysis. Due to high kurtosis and skewness, the total assets and debt ratio have been transformed into their natural logarithms.

This transformation addresses the presence of outliers, which affect the distribution of the data. These outliers have been carefully examined and confirmed to be genuine, providing valuable insights for the study's objectives; therefore, they have not been eliminated.

Table 3.2
Summary statistics of the explanatory variables

Variable	Mean	Median	Min.	Max.	Kurtosis	Skewness
Total Assets	12.07	12.32	5.60	17.22	3.35	(0.32)
Debt ratio	(4.96)	(3.82)	(9.21)	1.72	1.25	(0.04)
Cash-to-assets ratio	0.30	0.20	0	0.99	2.56	0.87

Note: This table presents the descriptive statistics of some explanatory variables for our regression model. Negative values are shown in parentheses.

The log transformation of total assets and debt ratio helps normalize the data while retaining the genuine outliers that can offer valuable insights for the study's objectives. Thus, it ensures that the continuous variables are properly scaled and distributed, which enhances the reliability and interpretability of the regression analysis.

Table 3.3
Correlation matrix

Variable	ESG	Total assets	Debt ratio	Cash-to-assets	Days
ESG	1.00				
Total assets	0.34***	1.00			
Debt ratio	-0.02	0.19***	1.00		
Cash-to-assets ratio	0.13**	-0.03	-0.27***	1.00	
Days	0.06**	-0.11**	-0.08	-0.07	1.0

Note: This table reports the pairwise correlation between the variables. The correlation coefficient and their associated p-values are stated.

*** Significant at 1 percent level

**Significant at 5 percent level

* Significant at 10 percent level

Further, Table 3.3 indicates the correlation analysis between the independent variables. As noted, some variables are highly correlated, such as total assets with ESG scores and debt ratios with other variables. This multicollinearity could distort standard errors and impact the estimated effects of each variable on our BHAR. To address this issue, robust standard errors will be implemented, and a random effects model will be used for the main regression, as indicated by the Hausman test results.

CHAPTER 4 Method

4.1 Short-term analysis

To assess the short-term abnormal returns for SPACs around the announcement day, I applied the event study methodology. The stock performance will be evaluated within the following event windows: [-1,0], [-1,1], and [-1,7], using the value-weighted Russell 2000 index as the benchmark. This method calculates abnormal returns as the difference between SPACs stock return and the return of the reference market on day t , as follows:

$$AR_{it} = R_{it} - R_{mt}$$

where R_{it} is the return of stock i on day t and R_{mt} is the return of the benchmark on day t . These calculations are in line with established studies on SPAC performance (Dimitrova, 2017; Kolb and Tykvova, 2016; Klausner et al., 2020).

Further, cumulative abnormal returns (CARs) were computed by summing the ARs over the specified event windows:

$$CAR_i = \sum_{t=1}^t AR_{it}$$

Last step, involves taking the mean of CARs which provides the cumulative average abnormal returns (CAARs) of the sample:

$$CAAR = \frac{1}{N} \sum_{i=1}^N CAR_i$$

To assess whether CAARs significantly differ from zero, we utilize a parametric cross-sectional t-test with clustering by event date. Clustering adjusts standard errors, addressing potential heteroscedasticity and ensuring robustness and accuracy. Additionally, we employ a sign test to evaluate whether abnormal returns lean towards being positive or negative. The sign test is preferred for its robustness against outliers and skewness, as it does not assume a symmetrical distribution.

4.2 Long-term analysis

To evaluate the long-term performance of SPACs, I will implement the Buy-and-Hold Abnormal Returns (BHAR) method for 6- and 12-month periods following the announcement day, drawing on the methodologies of Kolb and Tykvová (2016), Vulcanovic (2017), and Kiesel et al. (2022). The samples for the long-run analysis are derived from the primary sample used in the short-term event study. This analysis will use monthly stock prices of SPAC deals and compare them against the Russell 2000 benchmark index. The BHAR is calculated as follows:

$$BHAR_{i(t_1,t_2)} = \prod_{t=t_1}^{t_2} (1 + R_{it}) - \prod_{t=t_1}^{t_2} (1 + R_{mt})$$

where R_{it} and R_{mt} are the monthly returns of firm i for month t and the monthly return of the benchmark index for month.

4.3 Regression analysis

The main focus of this study is to test whether the presence of ESG scores contributes to a less sharp decline in the performance of SPACs. To achieve this, a multivariate regression analysis is performed using panel data. The dependent variable is the benchmark-adjusted BHAR for 12 months post-merger, which is considered a valid measure of long-term performance. Although longer periods were considered, there is a lack of a significant number of observations for these durations.

The primary independent variable is the ESG dummy. The regression also includes several firm-specific control variables such as size (log of total assets), risk due to debt (log of debt ratio), and liquidity (cash-to-assets ratio). Additionally, a SPAC-specific variable, trading days till announcement, is included as a sensitivity factor. The regression model is as follows:

$$BHAR_{it} = \alpha_i + \beta_1 ESG_{it} + \beta_2 Total\ Assets_{it} + \beta_3 Debt\ Ratio_{it} + \beta_4 Cash-to-assets\ ratio_{it} + \beta_5 Days_{it} + \epsilon_{it}$$

where $BHAR_{it}$ is the benchmark-adjusted BHAR for SPAC i at time t , α_i is the SPAC-specific intercept, ESG_{it} is the dummy variable for the presence of ESG scores for SPAC i at time t , $Total\ Assets_{it}$ is the natural log of total assets for SPAC i at time t , $Debt\ Ratio_{it}$ is the natural log of the debt ratio for SPAC i at time t , $Cash-to-Assets\ ratio_{it}$ for SPAC i at time t , and $Days_{it}$ which is a dummy for the trading days from IPO to the announcement date for SPAC i at time t . The error term is denoted as ϵ_{it} .

CHAPTER 5 Results & Discussion

5.1 Short-term results

In line with previous research, we find that SPACs show significant positive short-term returns post-event announcement. Table 5.1 indicates average cumulative abnormal returns (CAAR) of 5.01% for the [0, 1] window and 11.01% for the [-1, 1] window, both significant at the 5% level. There is a slight decrease in the number of observations as the event window lengthens, likely due to incomplete data or SPACs exiting the market. However, as the event window extends to [-1, 7], the statistical significance of the t-test decreases, although the z statistic remains significant across all periods, indicating a predominance of positive returns.

Compared to earlier studies, Howe and O’Brien (2012) reported an average return of 1.7%, and Lakicevic and Vulcanovic (2013) reported 1.2%. These results indicate a lower immediate market response, likely reflecting the different market conditions from 2003 to 2008/2009 when these studies were conducted. In contrast, Kiesel et al. (2022) found significant short-term returns of 6.67% for the [-1, 1] event window, which aligns more closely with our findings. This suggests that the short-term performance of SPACs may have improved in recent years.

Table 5.1

Short-term event study

Event Window	No. Obs.	CAAR (%)	Median CAR (%)	t-test	Sign z
[0, 1]	382	5.01	0.01	5.34***	6.44***
[-1, 1]	380	11.01	0.02	5.34***	6.97***
[-1, 7]	370	72.25	0.02	1.34	5.80***

Note: This table reports the short-term post-merger performance of SPACs between 2019 to 2023. The CAAR (Cumulative Average Abnormal Returns) column shows the average cumulative abnormal returns as a percentage for each event window. The Median CAR (Cumulative Abnormal Return) column presents the median cumulative abnormal return for the respective event window. The t-test column provides the t-statistic values testing the null hypothesis that the CAAR is equal to zero. The Sign z column presents the z-statistic values from the sign test, which tests the null hypothesis that the number of positive abnormal returns equals the number of negative abnormal returns. Statistical significance denoted as:

- *** Significant at 1 percent level
- **Significant at 5 percent level
- * Significant at 10 percent level

5.2 Long-term results

As we expand the event window, the average performance of SPACs diminishes significantly. Namely, Table 5.2 indicates an average Buy-and-Hold Abnormal Return (BHAR) for the 6-month period of 12%, significant at the 5% level, although with substantial variability. It is notable that some SPACs perform extremely poorly, with returns as low as -88.4%. Further, over the 12-month period, the average abnormal return is nearly zero (-0.08%) and significant at the 10% level, indicating that SPACs tend to lose their short-term gains over a longer period.

This trend highlights that while SPACs may offer significant short-term returns, they often fail to sustain this performance in the longer term. These patterns are consistent with previous findings reinforcing the notion of declining returns over extended periods. Specifically, Kolb and Tykvořá (2016) note a sharp decline in returns ranging from 59% to 96%, and Vulcanovic (2017) finds that SPACs exhibit a BHAR of -40% over one year. Thus, even though this study focuses on more recent SPAC deals, it is evident that SPACs underperform significantly in the long term.

Table 5.2

Buy-and-Hold Abnormal Returns (BHARs)

Event Window	No. Obs.	Mean	Median	Min.	Max.	t-test
[0, 6]	405	0.120	0.002	-0.884	30.341	3.39***
[0, 12]	405	-0.001	0.000	-0.319	0.007	-1.05*

Note: This table reports the Buy-and-Hold Abnormal Returns (BHARs) for SPACs over 6- and 12-months post-merger between 2019 and 2023. The t-test column displays the t-statistic values testing the null hypothesis that the mean BHAR is equal to zero. Statistical significance denoted as:

*** Significant at 1 percent level

**Significant at 5 percent level

* Significant at 10 percent level

5.3 Regression results

The Hausman test is conducted to determine whether a fixed effects or random effects model is more appropriate for panel data analysis. With a p-value of 0.18 (higher than 0.05), we do not reject the null hypothesis that the random effects model is appropriate. However, the correlation matrix indicates significant correlations between ESG and other variables, such as total assets and cash-to-assets ratio, suggesting potential endogeneity concerns (Table 3.3). Therefore, we proceed with the random effects model to analyze the relationship between ESG scores and 12-month market-adjusted BHAR, while

acknowledging the potential limitations and the need for careful interpretation due to the observed correlations.

Table 5.3

Hausman-test

Component	Value
Fixed Effects Coefficient (ESG)	-8.35
Random Effects Coefficient (ESG)	-2.35
Std. Error of Difference	4.51
χ^2 - statistic	1.77
p-value for χ^2	0.18

Note: This table reports the results of the Hausman test conducted to determine the appropriate model for analyzing the relationship between ESG scores and the dependent variable in the study. The test compares the fixed effects and random effects models.

Subsequently, the regression analysis in Table 5.4 denotes the relationship between the presence of ESG scores and Russell-adjusted BHAR over a 12-month period, along with other explanatory variables such as total assets, debt ratio, cash-to-assets ratio, and days. Across all regression models, the R-squared values are very low, indicating that the variables do not sufficiently explain the variation in the dependent variable.

Initially, the ESG coefficient indicates a negative correlation of -2.347 with performance. However, after adding other firm-specific variables, the ESG coefficient changes to 0.036, indicating a positive correlation. This suggests that the presence of ESG disclosure is associated with better financial performance when taking into account other control variables. However, the other variables are not statistically significant, underscoring the need for further investigation into other potential factors that might explain the declining performance of SPACs.

These results align with the findings of Friede et al. (2015), who extensively investigated this subject and found that 90% of the studies reported a positive association between the incorporation of ESG factors and financial outcomes. Conversely, literature specifically focused on SPACs with sustainable intentions indicates that these SPACs tend to perform worse compared to non-ESG-focused blank checks by 10% (Datar et al.,2023). However, these analyses did not incorporate specific ESG metrics, only the stated sustainable intentions.

Table 5.4*Regression analysis*

Dependent variable	Russell-adj. BHAR				
Explanatory variable	(1)	(2)	(3)	(4)	(5)
ESG	-2.347	0.028	0.026	0.035	0.036
Total assets		-0.163	-0.163	-0.164	0.163
Debt ratio			0.016	0.016	0.015
Cash-to-assets ratio				0.007	0.005
Days					-0.502
Constant	2.692	2.913	2.995	3.012	3.181
<i>N</i>	394	100	100	98	98
R²	0.001	0.011	0.014	0.013	0.016

Note: This table presents the results of the regression analysis examining the relationship between various explanatory variables and the Russell-adjusted Buy-and-Hold Abnormal Returns (BHAR) for SPACs. Five different regression models (1 through 5) are reported, each including different combinations of explanatory variables. Statistical significance denoted as:

*** Significant at 1 percent level

**Significant at 5 percent level

* Significant at 10 percent level

CHAPTER 6 Conclusion

In this thesis, I have analyzed the impact of Environmental, Social, and Governance (ESG) practices on the long-term performance of SPACs. Previous literature on the performance of ESG-focused SPACs, often referred to as Green SPACs, concludes that these deals tend to exhibit sharper negative returns compared to their non-ESG counterparts. However, until now, no study has explicitly incorporated ESG metrics in their research. To fill this gap, I conducted a comprehensive analysis to address the central question of my dissertation:

How does the ESG score affect the long-term performance of post-merger SPAC IPOs?

To address this research question, I investigated 423 SPAC closed deals from 2019 to 2023. The analysis was carried out in three stages. Firstly, I used the event-study methodology to examine changes in short-term performance patterns for more recent data. Secondly, I assessed the long-term performance of SPACs using Buy-and-Hold Abnormal Returns (BHAR) as the event windows expanded. Lastly, I conducted a panel regression analysis, incorporating firm- and SPAC-specific variables to isolate the effect of ESG factors. This comprehensive approach allowed me to thoroughly evaluate the impact of ESG scores on the long-term performance of post-merger SPAC IPOs. Based on this approach, I found that ESG disclosures are positively associated with the long-term performance of blank check deals, indicating that ESG factors contribute to a less sharp deterioration in performance.

This study reveals that ESG factors can mitigate the deterioration typically observed in SPAC performance over time. Contrary to previous studies suggesting that ESG-intended SPACs underperform, this thesis demonstrates that explicit ESG metrics are associated with improved long-term financial outcomes. This highlights the importance of using specific metrics rather than general intentions in assessing ESG impact. Therefore, this methodology can serve as a model for future research in examining why SPACs underperform significantly compared to various benchmarks.

CHAPTER 7 Limitations

While this study provides valuable insights into the impact of ESG scores on SPAC performance, addressing its limitations and expanding the scope of future research could offer a more comprehensive understanding. A potential limitation is the incomplete data for various financial metrics, which may have affected the robustness of the results. Additionally, analyzing the impact of ESG scores over a longer period could reveal insights and patterns not apparent within a 12-month window. As well, incorporating additional variables, such as market conditions, could also better explain the variance in performance.

Future studies should aim to gather more complete datasets and consider longer-term performance measures. Moreover, including a broader range of explanatory variables could enhance the explanatory power of the models used and provide a deeper understanding of the factors influencing SPAC performance.

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