



The Impact of SPAC Mergers on Financial Performance and Growth: Evidence from the Italian Market

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Abstract

This study examines the impact of SPAC mergers on the financial performance of Italian firms, focusing on profitability (ROE, ROI), revenue growth, and workforce expansion. A Propensity Score Matching (PSM) combined with a Difference-in-Differences (DiD) approach is employed, analyzing Business Combinations completed between 2015 and 2019, with data spanning from 2013 to 2022 (two years pre- and three years post-merger). Results indicate a decline in profitability post-merger, consistent with challenges like overvaluation and integration difficulties, while sales growth improved significantly. The findings highlight the importance of strategic planning and regulatory oversight in optimizing SPAC mergers, addressing a critical gap in the Italian market where research is limited. This analysis provides valuable insights for managers and policymakers navigating the evolving SPAC landscape in Italy.

Keywords: Spac Mergers, Financial Performance, Italian Market, Difference-in-Difference analysis, Propensity Score Matching

Introduction

In recent years, Special Purpose Acquisition Companies (SPACs) have emerged as a popular alternative to traditional initial public offerings (IPOs), offering unique opportunities for both investors and firms. SPACs, often referred to as “blank check companies,” raise capital through an IPO with the intent of acquiring or merging with an unidentified private company

within a set period, typically two years. These companies have no operations or assets and their share price tends to decline over time (Floros & Sapp, 2011). Moreover, they provide greater flexibility and certainty for companies seeking public market access while offering investors a distinctive investment avenue (Chatterjee et al., 2016).

SPACs attract investors due to their risk-mitigating structure. Funds raised are held in trust until a merger is completed, minimizing downside risk for investors, who can redeem their shares if they disapprove of the merger. Investors often receive warrants, allowing them to purchase additional shares at a set price post-merger, enhancing the upside potential (Hale, 2007; Berger, 2008). The reputation of the sponsor is critical, as SPACs led by experienced sponsors with successful M&A track records (Klausner & Ohlrogge, 2022) tend to secure higher investor confidence and are more likely to select high-quality targets (Jenkinson & Sousa, 2011; Lakicevic & Vulanovic, 2013).

The U.S. remains the most active SPAC market, supported by a regulatory environment conducive to innovation. In contrast, Europe's SPAC market has developed more slowly due to stricter regulatory frameworks and less familiarity with the SPAC model. Additionally, in spite of being listed on European stock exchanges, many SPACs do not have a European focus, neither in terms of investors, nor in their choice of target companies (Cumming et al., 2014).

The evolution of SPACs in Italy began in 2010 when Borsa Italiana and Consob introduced the SPAC structure, offering a new route for companies to access public markets. Initial growth was slow, with limited listings and lower investor familiarity compared to the U.S. market. However, between 2015 and 2019, SPAC activity in Italy increased significantly, targeting medium-sized, often family-owned businesses in technology, industrial, and consumer sectors. This period marked the height of SPAC popularity in Italy, as they became a favored option for firms seeking faster access to public markets with fewer regulatory hurdles compared to traditional IPOs.

Since 2020, despite the challenges posed by the COVID-19 pandemic, Italian SPACs have continued to grow, particularly focusing on innovative sectors such as fintech and renewable energy. However, these SPACs still face unique challenges, including regulatory scrutiny, market skepticism, and a need for robust due diligence processes (Ignatyeva et al., 2013). The mixed performance outcomes observed in recent years highlight the need for careful evaluation and strategic alignment to maximize the benefits of SPAC mergers.

Current literature on SPACs predominantly focuses on the U.S. market and often examines market-based performance indicators such as

stock price and market reaction (Barth et al., 2023). Studies exploring profitability and growth metrics before and after SPAC mergers are limited, particularly outside the U.S. (Kim, 2010). For Italy, research has primarily addressed descriptive and legal and financial aspects of SPACs due to the smaller sample size (Fumagalli, 2014; Riva & Provasi, 2019; Gigante et al. 2020;) and to our knowledge, no studies have specifically analyzed the evolution of profitability and growth performance metrics pre- and post-SPAC mergers.

This study aims to fill this gap by evaluating the financial and operational impact of SPAC mergers on Italian firms, focusing on key accounting measures of performance, including profitability (ROE, ROI), revenue growth, and employee growth. These metrics provide a comprehensive view of the impact of SPAC mergers beyond market reactions, contributing to the sparse literature on SPAC performance in Italy. Examining the Italian market is valuable not only due to the lack of specific studies but also because of its distinctive characteristics, such as the predominance of SMEs and unique governance structures. This research will provide insights into whether SPACs can effectively serve as a strategic tool for Italian companies looking to scale in global markets.

The rest of the paper is organized as follows. Section 2 provides an overview of the existing literature and the development of study hypotheses. Section 3 presents the data sample and methodology. Section 4 reports the empirical results. Section 5 presents the main conclusions.

1. Literature review and hypotheses development

Special Purpose Acquisition Companies (SPACs) have gained significant traction, particularly in the United States, where they have been the subject of extensive academic research from various perspectives including structural, legal, accounting, and financial analyses. Early studies examined SPACs as unique financial vehicles, highlighting their structural and legal nuances (Riemer, 2007; Lakicevic et al., 2014; Rodriguez & Stegemoller, 2014; Okutan Nilsson, 2018; D'Alvia, 2020; Boreico & Lombardo, 2024). Accounting-focused analyses have also emerged, examining SPACs' financial reporting and valuation methods (Hale, 2007; Min & Cha, 2017). Financial studies have primarily focused on SPAC performance and market behavior, revealing mixed outcomes compared to traditional IPOs (Kolb & Tykvová, 2016; Vulcanovic, 2017; Banerjee & Sxydlawski, 2024). A limit in academic contributions is often due to challenges in obtaining comprehensive pre-merger data on target firms (Huang et al., 2023). Moreover, the evolving structures of SPACs, frequently modified to adapt to market conditions and regulatory changes, complicate consistent cross-study comparisons (Sjostrom, 2007).

Research highlights that the success of SPACs is influenced by multiple factors, including company size, the composition of the Board of Directors, and the quality of the management team (Cumming et al., 2014; Cao & Lerner, 2009; Lin William et al., 2021). Agency conflicts have been particularly noted as critical, where sponsor incentives can misalign with those of investors, leading to rushed or suboptimal deals (Del Giudice & Signori, 2021). These conflicts stem from the typical SPAC structure, where sponsors retain a 20% promote, creating potential for conflicts of interest that can compromise the quality of acquisitions (Dimitrova, 2017).

SPACs differ fundamentally from traditional IPOs. Traditional IPOs involve lengthy roadshows, extensive regulatory scrutiny, and market-driven valuations (AlShiab, 2018), whereas SPACs facilitate a faster path to the public market through private negotiations, often resulting in greater valuation control (Ritter, 2012; Jenkinson & Sousa, 2011). SPACs secure funding at inception, providing targets with greater certainty and mitigating the risks associated with market fluctuations during listing (Dimitrova, 2017; Blomkvist & Vulcanovic, 2020). However, these advantages are counterbalanced by the potential for conflicts and rushed decisions, as sponsors prioritize deal completion due to their significant promotes (Jenkinson & Sousa, 2011; Ignatyeva et al., 2013).

Most existing literature on SPAC performance focuses on market-based indicators such as stock prices, investor reactions, and market perceptions. Studies generally reveal that SPACs tend to experience lower first-day underpricing compared to traditional IPOs, attributed to their unique trust structures that reduce initial investor risk (Boyer & Baigent, 2008; Datar et al., 2012). Sector-specific factors, such as lower perceived risk in technology and healthcare, further moderate initial returns (Ignatyeva et al., 2013). Nevertheless, stock price reactions post-business combination are crucial indicators, with positive responses signaling investor confidence and negative reactions highlighting concerns about valuation and integration challenges (Berger, 2008; Barker & Rueda, 2008; Ridgway & Rueda, 2008; Kiesel et al., 2023).

Studies analyzing SPACs' post-merger performance show mixed results, often highlighting underperformance compared to traditional IPOs. Factors contributing to these outcomes include overvaluation pressures, integration difficulties, agency conflicts and target selection (Jog & Sun, 2007; Jenkinson & Sousa, 2011; Cumming et al., 2012). SPAC targets, particularly in capital-intensive sectors like energy, often face operational challenges that hinder their ability to meet projected growth (Renneboog & Vansteenkiste, 2017). Conversely, better outcomes are observed in high-growth industries such as technology and healthcare, where robust

fundamentals and experienced management teams drive long-term success (Hale, 2007; Datar et al., 2012).

Although most studies emphasize market-based performance, limited research explores accounting metrics like Return on Equity (ROE), Return on Investment (ROI), and revenue or employee growth rates. Dimitrova (2017) discusses the performance implications of SPACs but remains primarily focused on market metrics. Blankespoor et al. (2022) critique the often overly optimistic financial projections of SPACs compared to their actual post-merger performance, highlighting a gap between projected and realized accounting outcomes. This suggests the need for more rigorous evaluations of SPACs using detailed financial statements rather than market perceptions alone. PwC (2021) underscores the importance of comprehensive financial reporting in SPAC transactions, emphasizing the need for closer scrutiny of financial data during and after the merger process.

In Italy, SPACs primarily target SMEs with distinct governance structures, often characterized by family ownership and limited experience with public market operations. These unique market characteristics present both opportunities and challenges (Riva & Provasi, 2019). The smaller size and less diversified nature of Italian SPAC targets can lead to higher volatility and integration challenges post-merger (Boyer & Baigent, 2008). Cultural and operational differences amplify the difficulty of achieving expected synergies, often resulting in underperformance compared to more mature public companies.

Based on the observed underperformance of SPACs and the distinct challenges faced by Italian firms, this study hypothesizes that SPAC mergers in Italy will yield mixed results. The hypothesis is grounded in the particular characteristics of the Italian market, where SPACs often engage with smaller, less diversified firms that may struggle with public market demands and integration complexities. These factors, combined with entrenched management practices and limited public market experience, are likely to hinder the realization of expected financial improvements and synergies post-merger.

2. Sample and methodology

2.1. Methodology

In this study, Propensity Score Matching (PSM) combined with a Difference-in-Differences (DiD) approach was employed to estimate the causal effect of SPAC mergers on firm performance. This methodological approach allows for a robust comparison between treated firms (those that underwent a SPAC merger) and control firms (non-SPAC firms), addressing selection bias and isolating the treatment effect over time. PSM was used to match firms that received the treatment (SPAC merger) with control firms

that exhibited similar observable characteristics prior to the treatment (Caliendo & Kopeinig, 2008). This technique mitigates selection bias by matching firms based on their propensity scores, which reflect the likelihood of receiving treatment given a set of observed covariates. Nearest neighbor matching with NN=3 was applied, meaning each treated firm was matched with the three closest control firms based on propensity scores. This choice strikes a balance between reducing bias and controlling variance, as using a single match can lead to higher variance, while increasing the number of matches can introduce more bias. NN=3 is widely accepted in empirical research as a reasonable compromise for achieving robust results (Austin, 2011).

The matching was based on key covariates theoretically and empirically associated with both the likelihood of receiving treatment and the outcome variables, including: 1) Net Financial Position to Earnings Before Interest, Taxes, Depreciation, and Amortization (NFP/EBITDA), 2) Sales per Employee (SPE), 3) Ratio of Financial Expenses to Debt (ROD) and 4) Size

Once the matched sample was constructed, the Difference-in-Differences (DiD) approach was employed to estimate the treatment effect. This method compares changes in the outcome variables two years before and three years after the business combination for the treatment group with corresponding changes for the control group. This approach isolates the effect of the SPAC merger while controlling for unobserved, time-invariant factors.

Formally, the DiD estimator is represented as (Angrist & Pischke, 2009):

$$\delta^{\wedge} = [E(Y_{1,t} = 1 - Y_{1,t} = 0 \mid D = 1) - E(Y_{0,t} = 1 - Y_{0,t} = 0 \mid D = 1)] - [E(Y_{1,t} = 1 - Y_{1,t} = 0 \mid D = 0) - E(Y_{0,t} = 1 - Y_{0,t} = 0 \mid D = 0)]$$

where:

$Y_{i,t}$ is the outcome variable for firm i at time t .

D is a binary indicator variable that equals 1 for the treatment group and 0 for the control group.

$t=1$ denotes the post-treatment period, and $t=0$ denotes the pre-treatment period.

The empirical specification for our DiD model is as follows:

$$Y_{i,t} = \alpha + \beta_1 Treatment_i + \beta_2 Post_t + \beta_3 (Treatment_i \times Post_t) + \gamma X_{i,t} + \lambda t + \delta_i + \epsilon_{it}$$

where:

Y_{it} represents the dependent variable for firm i at time t .

$Treatment_i$ is a binary variable indicating whether firm i is in the treatment group.

$Post_t$ is a binary variable indicating the post-treatment period.

$Treatment_i \times Post_t$ is the interaction term capturing the DiD effect.

$X_{i,t}$ is a vector of control variables.

λ_t represents time fixed effects to control for common shocks.

δ_i represents firm fixed effects to control for time-invariant heterogeneity.

ϵ_{it} is the error term.

The coefficient of interest, β_3 , captures the average treatment effect on the treated (ATET), isolating the impact of the business combination on the dependent variables while controlling for other factors. This rigorous methodological framework ensures that this analysis yields robust and reliable insights into the effects of SPAC business combinations on various performance metrics.

Five key dependent variables were selected to capture various dimensions of firm performance:

1. Return on Equity (ROE): Measures profitability in relation to shareholders' equity, reflecting the firm's ability to generate profit from equity financing.
2. Return on Investment (ROI): Assesses the efficiency of capital allocation by comparing operating returns to total assets.
3. Sales Growth Rate (SGR): Represents revenue growth over time, indicating market expansion potential.
4. Employee Growth Rate (EGR): Indicates workforce changes, serving as a proxy for the firm's expansion and social responsibility.

As control factors the same variables used to build a matched sample were included to account for other factors influencing firm performance:

1. Net Financial Position to EBITDA (NFP/EBITDA). It captures the firm's leverage and debt sustainability, an important measure of financial health and liquidity (Mule & Mukras, 2015; Goyal et al., 2021).
2. Sales per Employee (SPE). It reflects labor productivity, measuring how effectively the workforce generates revenue (Syverson, 2011).
3. Ratio of Financial Expenses to Debt (ROD). It is a proxy of the cost of debt, representing the interest burden relative to total debt (Graham & Leary, 2011).
4. Firm Size (log of total sales) which is a proxy for market power and resource availability (Beck et al., 2005).

2.2. Sample

Since 2010, when Borsa Italiana and Consob allowed the introduction of SPACs in Italy, 28 SPACs have been listed as of December 2019. Of these, 9 were excluded from the analysis for the following reasons: a) five SPACs did not find a target company for a merger; b) data for two SPACs were unavailable for the two years preceding the Business Combination and c) two SPACs merged with financial intermediaries, whose balance sheet structures and management aspects differ significantly from non-financial firms. Including these would have resulted in a non-homogeneous comparison.

Therefore, the final analyzed sample consists of 19 SPACs that experienced a Business Combination (BC) between 2015 and 2019, as shown in Table 1.

Table 1: time to event distribution

Time to event	Freq.	Percent	Cum.
-6	4	2.11%	2.11%
-5	10	5.26%	7.37%
-4	15	7.89%	15.26%
-3	16	8.42%	23.68%
-2	19	10.00%	33.68%
-1	19	10.00%	43.68%
0	19	10.00%	53.68%
1	19	10.00%	63.68%
2	19	10.00%	73.68%
3	19	10.00%	83.68%
4	15	7.89%	91.57%
5	9	4.74%	96.31%
6	4	2.11%	98.42%
7	3	1.58%	100.00%

Table 2 shows the number of business combinations realized each year within the treatment range.

Table 2: Staggered Business Combinations (BC) Over Time

	year		of event			
	2015	2016	2017	2018	2019	Total
n. of BC	3	1	5	6	4	19

The research period was limited to 2019 to avoid distortions caused by the COVID-19 pandemic, which significantly affected corporate financial statements. Furthermore, the analysis required at least two years of pre-business combination and three years of post-business combination data, covering the period from 2013 to 2022.

In addition to the SPACs, it was necessary to construct a control group. The control group was built based on the industry code of the merged

firms and a minimum revenue threshold of over 50 million euros (as specified in EU Directive 2023/2775 for large firms) observed in 2022. The initial control group comprised 469 firms, but 53 were excluded due to incomplete or missing data, resulting in a final total of 416 control firms observed from 2013 to 2022.

Given the staggered nature of the business combinations, constructing a comparable control group posed a challenge. To address this, a fictitious treatment year was assigned to control firms, creating a variable representing the relative time to the treatment year for each firm. Random assignment of treatment years (2015–2019) ensured that the temporal distribution of control firms mirrored that of treated firms, allowing for consistent comparison across the pre- and post-business combination periods. Each SPAC was finally matched with control firms using PSM, as detailed in the methodology section.

3. Empirical results

3.1. Descriptive statistics

Table 3 presents an overview of the descriptive statistics for both the treated and control firms, comparing the two years prior to the Business Combination (pre-treatment) and the three years after (post-treatment). The table highlights key performance and control variables across the two groups.

Table 3: descriptive statistics

	Ante Business Combination			Post Business Combination			Totale		
	Control	Treated	t_test	Control	Treated	t_test	Control	Treated	t_test
ROE	0.178	0.156	0.802	0.046	0.060	0.7614	0.081	0.095	0.729
ROI	0.051	0.096	0.002***	0.060	0.042	0.014**	0.057	0.063	0.2762
SGR	0.485	0.218	0.2147	0.540	0.975	0.523	0.704	0.554	0.7206
EGR	0.168	0.403	0.4724	1.196	0.115	0.3142	0.717	0.216	0.377
NFP/EBITDA	2.808	1.398	0.6308	-2.815	1.319	0.095*	-14.554	0.856	0.26
SPE	706.580	359.470	0.000***	1023.229	317.607	0.000***	1014.362	324.899	0.000***
ROD	4.611	4.633	0.96	3.496	3.596	0.769	3.910	3.965	0.8277
Size	11.261	12.179	0.000***	11.564	12.339	0.000***	11.432	12.232	0.000***

The table presents the mean values of various variables for the two years preceding the Business Combination (pre-treatment) and the three years following it (post-treatment), distinguishing between the treated firms and the control group. The last three columns display the overall mean values, regardless of the pre- and post-treatment periods. The variable acronyms are as follows: ROE = Return on Equity; ROI = Return on Investment; SGR = Sales Growth Rate; EGR = Employee Growth Rate; NFP/EBITDA = Net Financial Position / Earnings Before Interest, Tax, Depreciation, and Amortization; SPE = Sales per Employee; ROD = Return on Debt; size = Ln of sales. T_test shows p_value. Statistical significance levels are indicated by *** for 1%, ** for 5%, and * for 10%.

As regard the dependent variables:

1. Return on Equity (ROE): Prior to the Business Combination, treated firms show a slightly lower ROE compared to control firms, while both groups exhibit a decline post-Combination. This indicates a general reduction in profitability following the event, with treated firms slightly outperforming controls after the merger.
2. Return on Investment (ROI): Treated firms initially display higher ROI compared to controls before the Business Combination. However, post-Combination, the control firms' ROI surpasses that of treated firms, suggesting that the efficiency of capital allocation deteriorated for treated firms after the merger.
3. Sales Growth Rate (SGR): Pre-treatment, treated firms lag behind in terms of sales growth. Post-treatment, however, they show a substantial improvement, outpacing the control group, which suggests that the Business Combination may have positively influenced their ability to expand revenues.
4. Employee Growth Rate (EGR): Before the Business Combination, treated firms expand their workforce more aggressively than controls. However, this trend reverses post-treatment, with control firms showing stronger employment growth, potentially indicating challenges for treated firms in scaling operations after the merger.

As regard the dependent variables:

1. Net Financial Position to EBITDA (NFP/EBITDA): Treated firms exhibit stronger financial health before the Business Combination, as reflected by a more favorable debt sustainability. Post-treatment, they maintain stability, whereas control firms experience a liquidity creation.
2. Sales per Employee (SPE): Productivity, as measured by sales per employee, is consistently lower for treated firms across both periods, suggesting they may face structural productivity challenges compared to the control group, despite a moderate post-Combination improvement.
3. Return on Debt (ROD): The cost of debt remains relatively stable for both treated and control firms before and after the Business Combination, indicating that the event did not significantly affect the firms' debt-servicing capacity.
4. Firm Size: Treated firms are consistently larger than control firms, both pre- and post-treatment, reflecting the tendency of larger firms to engage in SPAC mergers. Firm size likely plays a role in the decision to undergo a Business Combination.

In sum, the descriptive statistics reveal several noteworthy patterns. Treated firms generally experience more pronounced changes in performance metrics following the Business Combination, particularly in sales and employee growth. However, control firms tend to maintain more stability in profitability and financial leverage. These results suggest that while SPAC mergers may stimulate certain aspects of growth for treated firms, challenges remain in maintaining productivity and profitability after the merger. Moreover, the results indicate that while some differences between treated and control firms are statistically significant—particularly in terms of ROI, financial position (NFP/EBITDA), and sales per employee (SPE)—other metrics, such as ROE, SGR, and EGR, show no significant divergence between the two groups. This underscores the mixed impact of SPAC mergers on firm performance and suggests that while certain financial metrics improve post-merger, others remain unchanged.

Table 4 captures the dynamic evolution of key performance metrics over the three years following the Business Combination, distinguishing between treated firms and the control group. The t-test results indicate whether the differences in means between the treated and control firms are statistically significant.

Table 4: Temporal Evolution of Key Performance Metrics Following the Business Combination

	1 year after business combination			2 year after business combination			3 year after business combination		
	Control	Treated	T-test	Control	Treated	T-test	Control	Treated	T-test
ROE	0.050	0.117	0.249	0.085	0.034	0.326	0.003	0.027	0.828
ROI	0.060	0.062	0.835	0.060	0.037	0.057*	0.059	0.025	0.017**
SGR	0.313	1.511	0.403	0.256	1.305	0.374	1.069	0.062	0.267
EGR	3.286	0.150	0.323	0.180	0.137	0.703	0.073	0.055	0.831
NFP/EBITDA	-3.306	1.183	0.056*	-4.109	0.395	0.494	-0.987	2.438	0.080*
SPE	864.760	318.339	0.000***	1079.313	296.198	0.000***	1129.639	339.433	0.000***
ROD	3.676	3.463	0.661	3.401	3.818	0.562	3.403	3.507	0.875
Size	11.466	12.164	0.000***	11.567	12.427	0.000***	11.663	12.430	0.000***

The table highlights the temporal evolution of various variables in the years following the Business Combination, distinguishing between the treated firms and the control group. The variable acronyms are as follows: ROE = Return on Equity; ROI = Return on Investment; SGR = Sales Growth Rate; EGR = Employee Growth Rate; NFP_EBITDA = Net Financial Position / Earnings Before Interest, Tax, Depreciation, and Amortization; SPE = Sales per Employee; ROD = Return on Debt; Size = ln of sales. The t-test column shows the p-values, indicating the statistical significance of the differences between the treated and control firms. Statistical significance levels are indicated by *** for 1%, ** for 5%, and * for 10%.

Overall, Table 4 highlights that while treated firms benefit from short-term improvements in sales growth and profitability metrics following the Business Combination, these effects are not sustained in the longer term. Additionally, treated firms face ongoing challenges in maintaining

productivity and managing financial leverage, which could affect their performance trajectory.

The table 5 presents the balance of covariates between treated and control groups, assessing whether the matching process has successfully reduced selection bias. Specifically, the table compares mean values, standardized biases, and statistical significance for key control variables.

Table 5: Assessment of Covariate Balance Between Treated and Control Groups Post-Matching

	Mean			test		V(T)/
Variable	Treated	Control	% bias	t	p>t	V(T)/V(C)
NFP/EBITDA	2.4322	6.7698	-14.3	-1.54	0.125	0.07*
SPE	299.38	355.44	-3.2	-1.69	0.093	0.52*
ROD	3.9649	3.7242	7.7	0.58	0.559	0.46*
Size	12.27	12.305	-3.8	-0.27	0.787	0.88

If variance ratio outside [0.68; 1.46]

Ps R2	LR	chi2	p>chi2	MeanBias	MedBias	B	R	% Var
0.021		6.36	0.174	7.2	5.7	33.2*	0.25*	75

*if B>25%, R outside [0.5; 2]

The balance statistics (Ps R2, LR Chi2, and bias measures) provide an overview of the matching quality. The overall Ps R2 is low (0.021), indicating minimal systematic differences between groups post-matching. However, the balance metric B is above the 25% threshold, and the R value is slightly outside the optimal range (0.25), suggesting that while the matching procedure has substantially reduced selection bias, minor imbalances persist. These results highlight that while the matching process effectively aligns treated and control firms on key observed covariates, careful interpretation of the treatment effects is necessary due to potential residual imbalances.

3.2. Empirical analysis

An F-test was conducted for the interaction terms between the treatment and pre-treatment periods to verify the parallel trends assumption for each dependent variable. The results indicate that the parallel trends assumption holds for ROE, ROI, TSV and TSDIP (F-test: p-value = 0.7505, 0.109, 0.1601, 0.4564 respectively). These results validate the use of the Difference-in-Differences (DiD) approach for these variables.

Table 6 presents the Difference-in-Differences (DiD) analysis, estimating the Average Treatment Effect on the Treated (ATET) of the Business Combination on performance metrics, incorporating control variables and year fixed effects.

Table 6: Estimation Results of Difference-in-Differences Analysis on Firm Performance Metrics

Dependent variable	ROE	ROI	SGR	EGR
Treatment effect (ATET)	-0,0975*	-0,0378***	0,7621*	-0,2602
	(0,0502)	(0,0125)	(0,4191)	(0,4060)
Controls				
NFP/EBITDA	-0,0004	-0,0000	-0,0001	-0,0002
	(0,0005)	(0,0000)	(0,0001)	(0,0002)
SPE	0,0000	0,0000	0,0000	-0,0004*
	(0,0000)	(0,0000)	(0,0000)	(0,0002)
ROD	-0,0155	0,0004	-0,0010	-0,0102
	(0,0112)	(0,0008)	(0,0189)	(0,0169)
Size	0,0987	0,0230***	1,3204***	0,4444
	(0,1466)	(0,0083)	(0,2782)	(0,2822)
_cons	-0,9941	-0,2014**	-13,9328***	-43,606
	(1,6436)	(0,0931)	(3,1211)	(3,018)
Year fixed effect	yes	yes	yes	yes
N. Obs	1494	1494	1432	1426

Table 6 presents the estimation results based on the Difference-in-Differences (DiD) analysis. The "Treatment effect" represents the estimated impact of the business combination (e.g., SPAC merger) on each dependent variable and is obtained using the DiD approach. The Ordinary Least Squares (OLS) estimation method is employed, incorporating fixed effects at both the firm and time levels to analyze balanced panel data. The dependent variables are: ROE (Return on Equity), ROI (Return on Investment), SGR (Sales Growth Rate), and EGR (Employee Growth Rate). Control variables included in the models are: NFP/EBITDA (Net Financial Position/Earnings Before Interest, Taxes, Depreciation, and Amortization), SPE (Sales per Employee), ROD (Return on Debt), and size (log of total sales). Standard errors are reported in parentheses. Statistical significance levels are indicated by *** for 1%, ** for 5%, and * for 10%.

The results reveal that the Business Combination has a negative impact on both ROE and ROI. Specifically, the ATET for ROE is -0.0975, statistically significant at the 10% level, indicating a reduction in profitability relative to equity. Similarly, ROI experiences a statistically significant decline of -0.0378 at the 1% level. These findings align with previous studies suggesting that SPAC mergers often struggle to enhance profitability metrics in the post-merger phase (Lakicevic & Vulcanovic, 2013; Jenkinson & Sousa, 2011). The observed declines in ROE and ROI could be attributed to several factors, including integration challenges (Hitt et al., 2001), delayed synergy realization (King et al., 2004), overvaluation of target firms in SPAC mergers (Klausner & Ohlrogge, 2022), dilution effect (Gahng et al., 2023), limited due diligence (Jenkinson & Ramadorai, 2013), market sentiment and confidence (Lewellen, 2009), increased operational inefficiencies or costs associated with restructuring post-merger.

In line with the literature, the negative effects on ROE and ROI suggest that SPAC mergers do not consistently lead to improved financial performance for the acquiring firm. For instance, Dimitrova (2017) finds that post-merger profitability often deteriorates due to misaligned management incentives and market overvaluation at the time of the merger. Moreover, the lack of immediate positive returns questions the overall value creation capacity of SPACs, reflecting a broader skepticism noted in recent empirical analyses (Klausner & Ohlrogge; 2022).

Contrary to the trends observed in profitability metrics, the Business Combination positively influences sales growth, with an ATET of 0.7621, significant at the 10% level. This suggests that treated firms experience a substantial boost in sales expansion post-merger, likely driven by increased market access, enhanced brand presence, or synergistic opportunities realized through the merger. These findings are consistent with empirical evidence indicating that SPAC mergers can be beneficial in driving top-line growth, even if profitability does not concurrently improve (Floros & Sapp, 2011). The increase in sales growth could reflect the strategic repositioning of firms post-merger, where market expansion and revenue growth are prioritized over immediate profit margins. However, this also highlights a potential risk where firms might engage in aggressive growth strategies that could strain operational capacities and financial health, as suggested by recent studies emphasizing the trade-offs inherent in SPAC mergers (Kim et al., 2021).

The results show a non-significant reduction in Employee Growth Rate, with an ATET of -0.2602. This finding suggests that while treated firms may grow their sales, they do not necessarily expand their workforce at a comparable rate. This pattern could reflect a focus on efficiency improvements or cost-cutting measures post-merger, aligning with trends observed in other merger scenarios where employment growth lags behind revenue growth (Maksimovic et al., 2013).

This outcome may also be driven by strategic restructuring efforts where firms prioritize integrating existing human capital rather than expanding the workforce, possibly due to uncertainties or operational constraints faced during the post-merger phase. These dynamics are consistent with broader evidence suggesting that while mergers can drive growth, they do not always translate into broader employment benefits (Renneboog & Vansteenkiste, 2017; Okafar, 2019).

Control variables such as firm size and financial position (NFP/EBITDA) generally do not exhibit significant effects, indicating that these factors do not markedly influence the primary outcomes in the post-merger context. However, firm size negatively affects ROI and sales growth.

3.3. Robustness analysis

To ensure the robustness of the findings, additional analyses were conducted using different Propensity Score Matching (PSM) techniques beyond Nearest Neighbor Matching (NN=3), specifically Kernel Matching and Radius Matching. Kernel Matching utilizes weighted averages of all control firms to create a counterfactual for each treated firm, with higher weights assigned to firms with propensity scores closer to those of the treated firms. Radius Matching applies a caliper of 0.05, allowing only control firms within a specified distance of the treated firm's propensity score to be included, ensuring that only sufficiently similar control firms are used in the analysis. The results across these different PSM techniques (Kernel, Radius, and NN=3) showed consistent patterns, with only minor variations in the magnitude of effects. This consistency reinforces confidence in the findings, indicating that the observed negative impact on profitability and the positive effect on sales growth are not artifacts of the specific matching method used, but rather reflect robust trends in post-SPAC performance.

To further validate that the treatment effects observed in the primary analysis are genuinely attributable to the business combination event rather than spurious correlations or pre-existing trends, a placebo test was conducted. The placebo test applies the same estimation method as the main analysis but with a "false" or fictitious treatment period or group where no actual treatment occurred. The results, presented in Table 7, show that the ATET (Average Treatment Effect on the Treated) estimates for the placebo test are all statistically insignificant, as indicated by the lack of significance across the coefficients and their standard errors.

Table 7: Placebo test

	roe	roi	sgr	egr
Treatment effect (ATET)	0.0344	0.0234	-0.5307	-0.0067
SE	(0.0596)	(0.0127)	-0.3435	(0,0895)
P_value	0.564	0.102	0.126	0.945

The results demonstrate that the significant effects observed in the main analysis are not present when the treatment is artificially manipulated, thus reinforcing the validity of the primary findings. This reduces concerns about confounding variables or unobserved heterogeneity influencing the treatment effect.

To explore whether the effects of SPAC mergers differ based on firm size, the sample was divided into large and small firms using the median of the natural logarithm of firm revenue ($\ln = 12.29$) as the threshold. Firms with revenues above this threshold were classified as "large firms," and those below as "small firms." A Difference-in-Differences (DiD) regression was conducted to estimate the treatment effect on Return on Equity (ROE), controlling for firm size and other covariates. The results, presented in Table

8, show that the overall treatment effect remains consistent with the main analysis.

Table 8: Treatment Effects of SPAC Mergers on Firm Performance by Firm Size

	roe	roi	tsv	tsdip
Treatment effect	-0.0954***	-0.0651***	0.393*	-0.0929
	(0,0350)	(0.0197)	(0.9162)	(0.0920)
Large firm	-0.0665	-0.0059	0.5439	0.1593
	(0.0695)	(0.0065)	(0.4567)	(0.1709)
treatment effect * large firm	-0.0156	0.0301	1.2216	-0.5910
	(0.0516)	(0.0198)	(1.7902)	(0.5793)
control variables	yes	yes	yes	yes
N	1494	1494	1432	1426
r2_a	0,0012	0,0411	0,0118	0,0214

The table presents the results of DiD regressions examining the heterogeneous effects based on firm size. The variable "Large firm" is a dummy variable that takes the value 1 for firms with size above the median sample revenue. Only the coefficients related to the treatment effect and its interaction with the "Large firm" dummy variable are reported in the table (full results are available upon request). Standard errors are reported in parentheses. Statistical significance levels are indicated by *** for 1%, ** for 5%, and * for 10%.

When an interaction term between the treatment effect and large firm was introduced to test for heterogeneous effects, the interaction term was not statistically significant. This suggests that the impact of SPAC mergers on the dependent variables does not differ significantly between large and small firms, indicating that the challenges posed by SPAC mergers may not be mitigated by firm size or resources.

To further assess the robustness of the findings, a sensitivity analysis was conducted using different time windows before and after the SPAC treatment. Six windows were analyzed: (1) one year before and one year after the event, (2) one year before and two years after, (3) one year before and three years after, (4) two years before and one year after, (5) two years before and two years after, and (6) two years before and three years after.

The sensitivity analysis provides several insights:

1. ROE: The negative effect on ROE is generally more pronounced in the medium term (up to 2 years post-event), with a stronger effect observed in the two-year post-SPAC window. However, this effect diminishes over longer periods, potentially reflecting recovery or stabilization of firms post-SPAC.
2. ROI: Unlike ROE, the negative effect on ROI is robust and consistent across all windows, suggesting significant and persistent declines in investment returns post-SPAC merger. This aligns with literature

highlighting challenges faced by SPAC-acquired firms in maintaining performance post-merger.

3. TSV and TSDIP: The lack of significant results for TSV and TSDIP across all windows indicates that SPAC mergers do not significantly impact sales volatility or total sales dip during the analyzed periods. These findings suggest that while profitability metrics are affected, sales-related performance metrics are less responsive to the treatment.

Overall, the sensitivity analysis indicates that SPAC mergers may offer limited long-term benefits to firm performance, particularly regarding profitability and efficiency. These findings underscore the need for careful evaluation of SPAC mergers as a strategic growth option, given the uncertain potential for sustained performance improvements.

Conclusions

The SPAC phenomenon, originating in the U.S., has gained significant attention due to its rapid growth and unique market dynamics. Most existing studies focus on market performance within the U.S., while Italian SPACs remain underexplored, particularly in terms of profitability and growth metrics. This study addresses this gap by examining the evolution of key financial indicators (ROE, ROI) and growth measures (revenue and workforce) for Italian SPACs.

Empirical results, based on a sample of 19 SPACs with Business Combinations between 2015 and 2019, reveal that SPAC mergers do not consistently improve profitability. The declines in ROE and ROI are consistent with previous studies that cite challenges such as overvaluation, integration difficulties, and sponsor incentives misalignment as contributing factors. These findings suggest the necessity for thorough due diligence and realistic synergy evaluations to optimize post-merger profitability.

Conversely, the analysis highlights a significant improvement in Sales Growth Rate (SGR), indicating that SPAC mergers can effectively facilitate market expansion and revenue growth. However, the increase in sales does not always translate to proportional employee growth, suggesting a focus on efficiency rather than workforce expansion, which may have implications for long-term operational sustainability.

For management, these results underscore the importance of strategic planning and integration management. Emphasizing realistic growth strategies and managing financial risks are crucial to achieving sustained performance post-merger. Moreover, firms should carefully weigh the trade-offs between rapid revenue growth and operational stability.

Regulatory authorities can benefit from these findings by promoting stringent disclosure requirements and ensuring transparent due diligence processes in SPAC transactions. Enhanced regulatory oversight can mitigate the risks of overvaluation and protect investors from potential adverse outcomes, contributing to a more stable and reliable market environment.

Overall, while SPAC mergers present significant growth opportunities, they also pose unique challenges that necessitate careful management and oversight. By applying these insights, stakeholders can better navigate the complexities of SPAC transactions, fostering more effective and sustainable business practices.

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