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Abstract

This paper aims to find how short-term returns vary based on the way private companies go public. These mechanisms are either traditional IPOs or SPAC IPOs. The short-term returns of different IPOs are examined across 11 different industries. This is tested by running the Fama & French Three factor model on the first day of returns in different industries. The data required to test this is obtained from the Stock Analysis website as well as Stock MBA. The results have shown that traditional IPOs are more underpriced compared to SPAC IPOs. In addition, IPOs firms operating in the Financial Sector have higher first-day returns. When testing the effect of firm size, it was proven to be positively correlated with the first-day returns. Suggestions for future research could be to test the effect of different IPOs in various industries on long-term returns.

1 Introduction

Within the past few years, there has been a huge increase in the number of private companies going public via traditional IPOs and SPAC IPOs. Last year, in 2021, there was a total of 2300 IPOs globally, where 646 of them were SPAC IPOs. Both investment vehicles are essential, in the modern financial world, as they allow private companies to raise equity funding when they go public.

However, both traditional IPOs and SPAC IPOs have some misuses. This can be seen when underwriters over-allocate highly underpriced IPOs to specific clients that give them high trading revenues (Jenkinson, Jones & Suntheim, 2018). Also, SPAC IPOs have perverse incentive structures which may cause value destruction for their shareholders (Dimitrova, 2012). Though regulators have tried to address these problems, there seems to be another major disadvantage connected to IPOs and SPACs.

Since IPOs and SPACs are of a similar niche in the investment world, it is worth trying to compare both types of investments and to see which investment vehicle and within which industries can offer an investor the best returns. The research question this paper aims to answer is:

How do short-term returns of IPOs and SPAC IPOs differ in different industries?

This paper contributes to the current literature in several ways. Firstly, the papers considering the short-term returns of IPOs and SPAC IPOs in recent years are quite scarce. SPAC IPOs have become more popular in the past few years, therefore few papers have done their research on them and studying their short-term returns is considered a valuable addition to existing scientific literature. Another way this paper contributes to the existing literature is that this research paper studies how underpricing of IPOs and SPAC IPOs are different across industries.

In general, lots of research was done on IPOs compared to SPAC IPOs, where there are only a very few papers on it. This paper does not focus solely on SPAC IPOs; however, it is mainly a comparison of both IPO vehicles.

This paper is not only considered scientifically relevant but also socially relevant. This is because both IPOs and SPAC IPOs are financed using public money. Therefore, doing a research on them will help investors understand underpricing in financial markets today.

The paper is structured as follows. Firstly, the literature review describes the IPOs' process and their short-term returns as well as a description of SPAC IPOs and their underpricing. Then, the methodology is described. This is followed by a description of data sources and results are presented and analyzed. Finally, the results are concluded, and some limitations are mentioned with the discussion of some possibilities for future research.

2 Literature Review

This paper starts by finding the difference in short-term returns of IPOs in different industries, as well as investigating the effect of firm size on underpricing in these industries. Then, the paper compares the short-term returns of SPAC IPOs and traditional IPOs. This literature review provides a summary of what previous researchers have found regarding these topics.

2.1 Traditional IPOs

Initial Public Offering is the process where a private company offers its shares to the public for the first time to raise capital. The private company has a long process/ series of steps to do to go public. This process consists of finding an investment bank to work with, which acts as the underwriter, and then the due diligence, marketing, and regulatory requirements need to be ready. By analyzing the demand for the shares of the company, the company goals as well as the conditions in the market economy, an offer price needs to be set. Next, the underwriter should provide analyst recommendations and must market the stocks to potential investors. Once the company has gone public, its shares become available for anyone to buy.

2.1.1 Short-term returns of Traditional IPOs

A huge number of researchers have examined the effect of going public via a traditional IPOs on the short-term returns of companies. A paper by Killins (2019) has found that Canadian IPOs have a relatively lower underpricing, where the average first day returns is marginally underpriced at 1.45%. A paper by Gresse and Gajewski (2012) has analyzed a sample of 15 European countries'

IPO market and they have found evidence that the initial underpricing has an average of 22%. It was also found that this initial underpricing in the IPO market caused higher turnover shortly after the IPO but does not impact the trading volume after the first year of trading.

Padgett and Chi (2005) have studied the Chinese IPO market, where they found that there is a short-run underpricing. Loughran and Ritter (2004) have found evidence that the initial IPO underpricing have changed overtime. Analyzing IPOs in 1980 they found an average first day return of 7%, but for the period of 1990-1998 the first day return was 15%, which is approximately double. In the period of 1999-2000, when there was the internet bubble, these initial returns jumped to 65%. This constant change in the short-term returns is explained by the change in the risk composition of the firm. Also, overtime, the number of IPO firms that have no secondary shares has increased while the ownership of CEOs has decreased. This makes CEOs less willing to reduce the underpricing. Chi and Padgett (2005) examined the performance of 340 and 409 IPOs listed on China's two exchanges from 1996 to 1997. The results of this paper have shown that the average underpricing is 127.3%.

2.1.2 Factors that influence the IPO returns:

Several researchers have examined how different factors may influence the returns of an IPO. This includes the paper by Carter, Dark, and Singh (2002), which has proven that the more reputable the underwriters of the IPO are, the lower the short-run underpricing.

In addition, several other factors that influence the initial returns of an IPO, according to Chiraphadhanakul and Gunawardana (2005). The factors tested in this paper are the firm's age, debt ratio, return on assets, firm size, recent return on average of three-year return, trend of the SET index 60 days before the issue, trend of volume 60 days before the issue and the price earnings ratio at the time of issue as well as 3 years before the issue period. The effect of these factors on the initial returns is tested in several different factors. Firstly, in the Financial sector, the firm size had a positive effect on initial returns, but the debt ratio was negatively related to the initial returns. Secondly, for the service sector the short-run returns are positively correlated to the price earnings ratio 3 years before the issue period, and negatively correlated to recent returns on average of a three-year return. Two models need to be used to test this effect in the Industrial sector as well as

the property and construction material sector. For the Industrial sector, the first model is the initial return of an IPO with firm size and SET, where it was found that the initial returns were positively influenced by the firm size and SET, while the second model was the initial return of IPO with firm size and volume. In this second model, the stock returns were positively influenced by the logarithm of assets and volume. For the property and construction material sector, the first model is the initial return of IPO with Trend of the SET index, and the initial return of IPO with the trend of SET's volume. It was found that there is a positive relationship between the returns and both the SET and the SET's volume. However, for the Argo and Food Industrial sector, the market for alternative investments and the technology sector, the results were not significant.

In addition, in the research by Arnold, Fishe and North (2010), it was found that ambiguous information influences the short-term returns. In this paper, a sample of 1398 IPOs was examined to find the effect of "soft" or ambiguous information on investors' choices. It was found that there is a significant effect of this type of information on the chance of having a higher underpricing. In addition, it was found that investors demand higher premiums if they hold shares in a company, which is more exposed to ambiguous information.

2.2 SPAC IPOs

SPAC (Special Purpose Acquisition Company), also known as a blank check company, is a company that has no existing business operations and is a company that exists only on paper. This company is formed with the sole purpose of raising capital through an IPO to acquire another business or company within a specific period. This period is either 18 months or 24 months if the letter of intent to form this acquisition is announced in 18 months. If the business combination does not take place within this specified period, the company will be dissolved, and money will be returned to the investors (Hale and Miranda, 2007).

This is a long process that starts with the company going public through an initial public offering by going through the same process mentioned before, through which they raise capital from shares bought by the public. Using this capital raised, the management of the SPAC searches for an attractive private company to acquire through a merger, stock purchase or any other business combination.

2.2.1 Short term returns of SPAC IPOs

Compared to the traditional IPOs, very few papers are found that have evidence of the short-term returns of SPAC IPOs. One of these papers is by Boyer and Baigent (2008) where they have found evidence that when comparing short term returns of SPAC IPOs to traditional IPOs there seemed to be a higher underpricing in the SPACs. For 2004, 2005 and 2006, the first day returns for IPOs were 34%, 18% and 26%, respectively, while for SPAC IPOs in 2004, 2005 and 2006, the first day returns were 0.6%, -0.2% and 1.23%, respectively.

Boyer et al. (2008) have found that there are several factors that impact the share prices of SPACs, which impacts their short-term returns. There was evidence that there is a positive relationship between the price of the share and the size of the SPAC. In addition, the warrant price is positively linked to the share price. Comparing the ratio of the unit price to the offer price gives an indication of how well the market has performed with the SPAC, and this is also positively related to the share price. The first day returns of SPAC IPOs, in 2020, was 1.6% increase to almost double in the first quarter of 2021, with the first day returns reaching 3.7%, (Gahng, Ritter and Zhang, 2021).

Griffin (2019) has found that larger SPACs exhibit a higher underpricing and therefore higher short-term returns when compared to SPACs that are smaller in size and a reason for this may be the difference in the investor base. In addition, Abreu (2021) found in his paper that SPACs with high reputable investment banks as their underwriters have proven to have higher annualized returns at the time of announcement and at time the business combination is completed.

2.3 SPAC IPOs vs traditional IPOs:

In the paper by Agarwal (2021), the performance of both SPAC IPOs and traditional IPOs is compared. This paper has shown that although SPACs are becoming more popular now, there is no significant market outperformance for SPACs as there is for traditional IPOs.

Kellerman (2022) has done an event study comparing the performance of companies going public via traditional IPO and SPACs in 2020. This paper has found that the traditional IPO firms outperform SPAC IPO firms when doing their short-term analysis. It was also found that firms,

that went public via a traditional IPO, had highest abnormal returns right after the merger took place and then this has decreased as time passed.

Based on what previous researchers have found, it is assumed that traditional IPOs have higher short-term returns compared to SPAC IPOs. Therefore, the first hypothesis we are testing is:

H: Traditional IPOs have higher short-term returns compared to SPAC IPOs.

2.4 Firm Size

Large firms are usually monitored by investors, government, media, and others (Zhang 2006). Therefore, large companies, going through an IPO, are considered to face less uncertainty compared to smaller sized companies. In addition, smaller firms usually have less information available causing higher risk on their securities, and this may cause a demand for higher returns from investors to hold such securities (Barry & Brown, 1984).

On the other hand, many research papers have tried to investigate the relationship between the size of a company and the underpricing caused from an IPO. A paper by Islam, Ali and Ahmad (2010) have tested this effect and found a positive relationship between these two variables when examining 173 IPOs in the Bangladesh stock exchange during the period from 1995 to 2005. In addition, Mercado (2011) had a dataset of 282 US initial public offers that occurred from 1998 to 2000 and found that the larger the market capitalization of a company the higher the underpricing.

Following this, this paper assumes that there is a positive correlation between the two variables and therefore the second hypothesis to be tested is:

H: Firm size has a positive correlation with underpricing of IPOs in different industries.

A paper by Laokulrach (2015) has used the stock exchange Thailand to examine the short-term performance of IPOs in the period between 2003-2013. In this paper, the first day return of IPOs in different industries were compared and it was found that the Financial Services industry had the highest first day returns.

In line with this previous research, this paper aims to test the following hypothesis:

H: IPOs short-term returns are the highest in the Financial Services industry.

3 Methodology

First, this paper aims to compare the short-term returns of IPOs in different industries. For each industry, the average short-term returns are calculated and compared.

Next, the aim is to investigate whether the effect of firm size on underpricing is different across industries. The data set is divided so that the IPO data related to each industry are grouped together. A univariate regression model is run for each industry separately. The following regression equation is used:

$$ri = \alpha i + \beta 1_{\text{firm\_sizei}} + \varepsilon i$$

In addition, this research paper tries to investigate if there is a substantial difference in short-term returns between traditional IPOs and SPAC IPOs. Like Brav & Gompers (1997), this paper uses the Fama and French three factor analysis, to consider for the idiosyncratic returns of individual stocks to filter out the market risk. This way it is possible to compare the first day returns of stocks of companies that had their merger on different days. The three factors that Fama and French model controls for are market, size, and growth risk. The factor (Market) is calculated as the market return minus the risk-free return, while the factor (Size) is calculated by subtracting the returns of big companies from returns of small companies. In addition, the third factor which is the growth is calculated by finding the difference between the returns of companies with a high book to market ratio and companies with a low book to market ratio. These factors are used in the short-term analysis of returns, which tests the cross section of underpricing on the first day returns of companies.

Anderloni & Tanda (2017) have tested the difference in IPO initial returns or underpricing between green and non-green energy companies. Like Anderloni et al. (2017), the following equation to calculate the underpricing:

$$ri = \frac{Pi,1 - Pi,IPO/SPAC}{Pi,IPO/SPAC}$$

ri is the return of the company between the day of going public and the first next trading day. Pi, IPO/SPAC represents the stock price on the moment of the IPO or SPAC IPO. Typically, the Pi, IPO/SPAC for a SPAC IPO is $10. Pi,1 is the stock price at the end of the first day.

To test the difference in returns between traditional IPOs and SPAC IPOs, a univariate regression model is performed using the following equation:

$$ri = \alpha i + \beta 1_{\text{SPACi}} + \varepsilon i$$

$SPACi$ variable is a dummy variable which takes a value of one if a blank-check company went public and takes the value zero otherwise. The ri _is the end of day return on the merger-date for company i. The betas and alpha are coefficients estimated with an Ordinary Least Squares (OLS) regression. The epsilon represents the error term.

But, in the study by Anderloni & Tanda (2017), it was found that the firm age, size and the days between IPO announcement and the actual IPO date have an impact on the initial returns. Following this, these factors are used as control variables in the cross-sectional regression. The regression equation used is as follows:

$$ri = \alpha i + \beta 1_{\text{SPACi}} + \beta 2_{\text{Sizei}} + \beta 3_{\text{ROAi}} + \beta 5_{\text{EPSi}} + \beta 4_{\text{P}/\text{Ei}} + \beta 5_{(\text{Rmt}-Rf)} + \beta 6_{\text{HMLt}} + \beta 7\, SMBt + \varepsilon i$$

In the paper by Sugianto and Wijaya (2014), underwriter characteristics were suggested to affect short term returns. However, due to limitations in the data set it was not possible to control for these characteristics.

4 Data

This paper aims to focus on companies from the United States that went public in the period from January 2019- May 2022. A list of all companies that went public with a traditional IPO is obtained

from Stock Analysis website. Data on the closing price as well as the size, return on assets, PE ratio, earning per share are also obtained from this source. The industry each IPO belongs to is also obtained from this source. Stock MBA has been used to obtain a list of all SPAC IPOs and all the required variables, like traditional IPOs.

This collected data is used to calculate the control variables and the first day returns as explained previously in the Methodology section. Data from both sources has been added to the same database and a dummy variable SPAC was added, which takes a value 1 if a blank-check company went public and 0 otherwise. A total of 1858 IPO data has been collected, but daily financial data is not available and there were some missing points. Therefore, companies with missing data points and any duplicates have been removed. The total number of companies with size, ROA and EPS data were 1280. The companies with PE ratio were only 497 companies.

The extracted data is then added to Stata Software to be analyzed and used to run the different regression models. Using this software, the standard linear regression assumptions are tested to ensure the validity and robustness of the data set. After performing tests on the multicollinearity, and homoscedasticity, the results have shown that the data set is suitable to study the hypothesis researched in this paper.

5 Descriptive Statistics

A summary statistic for all control variables is done. For firm size, EPS, ROA as well as the PE ratio, a t-test is performed to find the difference in these firm characteristics for both traditional IPO and SPAC IPO companies. The results for this test are presented in Table 1.

Table 1: T-test to compare firm characteristics between traditional IPO and SPAC IPO firms

	Traditional IPO			SPAC IPO			Difference between Traditional IPO and SPAC IPO
Variables	*N*	*Mean*	*Std. Deviation*	*N*	*Mean*	*Std. Deviation*	*P value*
Firm Size	***550***	*5.8680*	*1.8164*	***728***	*5.4441*	*0.7595*	*0.001*
EPS	***550***	*0.0798*	*0.5910*	***728***	*-1.0362*	*3.3589*	*0.004*
ROA	***550***	*0.0145*	*0.0548*	***728***	*-0.2760*	*0.4604*	*0*
PE ratio	***174***	*119.9449*	*759.206*	***323***	*133.5915*	*437.5747*	*0.231*

Notes: The variable "size" is calculated as the natural logarithm of total assets. Earnings per share is total income divided by the total number of shares outstanding. P/E ratio is the price per share divided by the EPS. Return on assets is the firm's income divided by total assets of the company. These variables are separated based on whether the company went public via a traditional IPO or SPAC IPO. For each of these variables, the number of observations, mean and standard deviation is listed, and the traditional and SPAC IPOs are compared per variable, with the p-value listed in the final column.

Similar to the summary statistics of Gahng, Ritter & Shang (2021), the average return on assets is \$0.0145, which means that there is a \$0,0145 income on each \$1 of assets made. However, the size of the companies in this sample is much smaller compared to Gahng et al. (2021). The average size of companies in this sample is \$5,87, compared to \$21.1 found in the paper by Gahng et al. (2021).

Fama and French Three Factor Model

As previously mentioned, the Fama and French Three Factor model is used in the short-term analysis. The data on these three factors are collected from the website of French (2022). Since this paper focuses on US companies, the North American Fama and French factors are selected. Daily data was collected, which are then matched to the database with the correct day.

Next, this paper aims to find how short-term returns of IPOs differ across different industries. The companies are divided into 11 different industries, which are Aerospace & Defense, Biotechnology, Education, Financial Services, Healthcare, Insurance, Internet, IT services, Software, Pharmaceuticals, Software and Others. Companies in the same industry are listed together. The average first-day returns per industry is calculated using the same method mentioned in the Methodology section.

The descriptive statistics of short-term returns in each industry is reported in Table 2. The mean, standard deviation, minimum, and maximum are computed for the short-term returns of companies in each industry.

Table 2: Summary Statistics of short-term returns in different industries

Industry	*Mean*	*Std. Deviation*	*Min*	*Max*
Aerospace & Defence	*0.0155*	*0.3540*	*-0.3222*	*0.0592*
Biotechnology	*0.0378*	*0.5143*	*-0.9808*	*1.9120*
Education	*0.0225*	*0.7125*	*-0.9640*	*0.9471*
Financial services	*0.0834*	*1.1821*	-0.9800	*4.3225*
Healthcare	*0.0208*	*1.7198*	*-0.9641*	*1.5482*
Insurance	*0.0500*	*1.1133*	*-0.9662*	*2.9413*
Internet	*0.0025*	*0.5619*	*-0.9820*	*0.3295*
IT Services	*0.0650*	*0.3281*	*-0.9823*	*1.0967*
Pharmaceuticals	*0.0116*	*1.2391*	*-0.9777*	*0.1976*
Software	*0.0237*	*0.2219*	*-0.9807*	*0.4264*
Others	*0.0139*	*0.8772*	*-0.9431*	*4.3882*

Notes: This table presents the descriptive statistics of the short-term returns of companies in different industries. The descriptive statistic of each industry is listed in a row. The mean, standard deviation, minimum, and maximum are reported, each in a different column.

The mean returns show that the companies with the highest short-term returns are the ones operating in the Financial Services sector and in the Others, where the returns are 0.092 and 0.0513 basis points, respectively. However, the lowest average short-term returns were found in the Internet and Pharmaceuticals industries, with an average return of 0.0061 and 0.0056 basis points, respectively.

From these statistics, it can be concluded that the first day returns of IPOs in the Financial Services industry is the highest. Therefore, the hypothesis, that underpricing is highest in the Financial Services industry, cannot be rejected. Therefore, the results are aligned with the research done by Laokulrach (2015), which has also proven that IPO firms in the Financial Services sector have the highest first-day returns.

6 Validity

Before running linear regressions for the analysis, its assumptions are tested, and these include heteroskedasticity and multicollinearity.

6.1 Heteroskedasticity

If the model suffers from heteroskedasticity, this leads to estimation error. Therefore, like Singla (2019), the heteroskedasticity assumption is tested using the Breusch–Pagan test. The results of this test are presented in Table 3.

Table 3: Breusch–Pagan test Results

Test	Breusch–Pagan test for heteroskedacticity
Hypothesis	**H0: Constant Variance**
Chi Squared (P-Value)	33.51 (0.000)

Notes: This table shows the results of the Breusch-Pagan test for heteroskedasticity, where the Chi Squared value is stated and the p-value is stated in the parenthesis next to it.

The p-value in Table 3 of 0.000 is lower than 0.05, meaning that the hypothesis stating that variance is constant is rejected. This means that the data suffers from thenproblem of heteroskedasticity.

6.2 Multicollinearity

Collinearity occurs when 2 or more variables in the model are linearly correlated. The correlations between every two variables are calculated and presented in the correlation matrix in Table 4.

Table 4: Correlation Matrix

This table shows the correlation between all variables used in the model.

	Short-term returns	PE Ratio	ROA	EPS	Size
Short-term returns	1.0000				
PE Ratio	-0.0251	1.0000			
ROA	0.1227	-0.0462	1.0000		
EPS	0.2661	-0.1858	0.2575	1.0000	
Size	0.1836	-0.0180	0.0967	0.3537	1.0000

Notes: This table shows the correlation between every 2 variables that are used in the different regression models.

Based on the results in the table, no two variables are linearly correlated. All correlations between variables are lower than 0.5, which shows that variables are not highly colinear.

7 Results

This section shows the results of all regression models performed. First, both univariate and multivariate analysis are done to test the difference in first day returns between different types of IPOs. Then, the univariate regression analysis is done for the different industries to find the effect of firm size on underpricing.

7.1 Short-term Returns of Traditional IPO vs SPAC IPO

7.1.1 Univariate Analysis

An OLS regression model is run to find how different the first-day returns are for both SPAC IPOs and traditional IPOs. The results for this regression model can be seen in Table 5.

Table 5: Univariate OLS Regression results

This table reports estimates of how first-day returns are different for traditional and SPAC IPOs using the following regression:

$$ri = \alpha i + \beta 1_{SPACi} + \varepsilon i$$

p<0.1; p<0.05**; p<0.01****

Variabkes	*Coefficient*	*Standard Error*	*t*	*P > [t]*
SPAC	*0.0277*	*0.0045*	*6.20*	*0.000*
Constant	*0.0291*	*0.0029*	*9.90*	*0.000*
R^2	*0.0292*			
No of observations	*1280*			

Notes: This table shows the results of the univariate OLS regression of short-term returns on the type of IPO. A linear regression is run with the short-term returns as the dependent variable and the SPAC dummy as the independent variable. The coefficient, standard error, t statistic and p-value are stated.

Although these results are not considered statistically significant, these results are not consistent with the hypothesis stating that traditional IPOs have higher returns compared to SPAC IPOs. The results show that SPAC IPOs produce higher first-day returns by 0.0277 basis points compared to traditional IPOs.

A SPAC IPO firm has an average first day returns of 0.0568. When comparing this to the descriptive statistics of Gahng et al. (2021), the average short-term returns of SPAC-type companies in their paper ranged between 0 and 3,8% for each quarter. The results here are a bit

higher. This could be because the period Gahng's research was based on is completely different compared to this paper. Also, it could be because Gahng has only focused on SPAC IPOs.

This univariate regression is repeated for each industry separately. The results for these regressions are presented in Table 6.

Table 6: Univariate OLS Regression results per industry

This table reports estimates of how first-day returns are different for traditional and SPAC IPOs in each industry using the following regression:

$$ri = \alpha i + \beta 1_{SPACi} + \varepsilon i$$

p<0.1; p<0.05**; p<0.01***, t-statistics ae stated in parentheses*

Panel A

	Aerospace & Defence	*Biotechnology*	*Education*	*Financial services*	*Healthcare*	*Insurance*
SPAC	*0.0308***	*0.0432****	*0.0464****	*-0.0107*	*0.2172*	*0.0193*
	[2.49]	*[2.98]*	*[7.06]*	*[-0.70]*	*[1.39]*	*[0.64]*
Constant	*0.0331*	*0.0451*	*0.0502*	*0.0090*	*0.0189*	*0.0209*
R^2	*0.1927*	*0.0347*	*0.4343*	*0.0059*	*0.0131*	*0.0163*
No of Observations	*28*	*249*	*67*	*83*	*147*	*27*

Panel B

	Internet	*IT Services*	*Pharmaceuticals*	*Software*	*Others*
SPAC	*0.0552*	*0.0335*	*0.0594****	*0.0191*	*0.0144*
	[8.34]	*[4.62]*	*[7.31]*	*[1.46]*	*[1.19]*
Constant	*0.0564*	*0.0352*	*0.0617*	*0.0206*	*0.0163*
R^2	*0.4776*	*0.1728*	*0.5911*	*0.0144*	*0.0045*
No of Observations	*78*	*104*	*39*	*148*	*310*

Notes: This table shows the results of univariate linear regression for each industry separately. This table is separated into 2 panels; Panel A and Panel B. Panel A shows the results of regressions for Aerospace and Defense, Biotechnology, Education, Financial Services, Healthcare, and Insurance. Panel B shows the results for regressions of Internet, IT Services, Pharmaceuticals, Software and Others. For each industry, the traditional IPO and SPAC IPO are compared based on short-term returns. So, a linear regression is run with short-term returns as the dependent variable and the SPAC dummy as the independent variable. The coefficient of the SPAC dummy is stated, and the t statistic is stated in the parenthesis below it. For each regression, the R squared as well as the number of observations is stated.

It can be seen from the results in the table that the SPAC IPOs always have higher short-term returns compared to traditional IPOs, except for companies working in the Financial Services sector. Only the results for Biotechnology, Education and Pharmaceuticals are significant at 1%

significance level, and the Aerospace and Defense is significant at 5% significance level. Therefore, the hypothesis that traditional IPOs have higher short-term returns than SPAC IPOs is rejected.

7.1.2 Control Variables

A cross-sectional regression is then performed to find how SPAC IPOs and traditional IPOs differ when it comes to first-day returns, when adding control variables to the regression equation. The control variables used are return on assets, earnings per share, size, and PE ratio. The results of this are stated in Table 7.

Table 7: Cross-sectional regression of returns to SPAC and control variables

This table reports estimates of how first-day returns are different for traditional and SPAC IPOs using the following regression:

$$ri = \alpha i + \beta 1_{\text{SPACi}} + \beta 2_{\text{Sizei}} + \beta 3_{\text{ROAi}} + \beta 5_{\text{EPSi}} + \beta 4_{\text{P}/\text{Ei}} + \beta 5_{(\text{Rmt}-Rf)} + \beta 6_{\text{HMLt}} + \beta 7\, SMBt + \varepsilon i$$

p<0.1; p<0.05**; p<0.01****

Variables	*Coefficient*	*Standard Error*	*t*	*P > [t]*
SPAC	*0.0213*	*0.0192*	*0.55*	*0.691*
ROA	*-0.0781*	*0.0418*	*-2.11*	*0.049***
EPS	*-0.0091*	*0.0051*	*-1.40*	*0.162*
Size	*0.0122*	*0.0218*	*1.14*	*0.026***
PE Ratio	*-0.0002*	*0.0001*	*-0.80*	*0.422*
Constant	*0.1721*	*0.0891*	*2.41*	*0.021***
R^2	0.0819			
No. of obs	1280			

Notes: This table presents the results of the OLS regression model of short-term returns on type of IPOs and the control variables, which are return on assets, earning per share, size, and price per earnings ratio. The coefficient, standard error, t statistic and p-value of each variable is listed in a separate column. The R squared and the number of observations of the regression are listed.

The results presented in the previous table show that there is no significant effect of the way the company goes public and the average short-term returns. Blank-check companies that go public have a 2.13% higher first-day returns compared to traditional IPOs. Therefore, the results found in this table are not in line with the hypothesis this paper is testing.

Most of the control variables seemed to be negatively influence the first-day returns, except for the Size variable, which seems to positively impact those returns. The only control variables that were found to be significant predictors of first-day returns are the return on assets and the size of the company. Return on assets had a coefficient of -0.0781, which shows that this variable seems to have a negative effect on the first day returns of IPOs with a value of 0.0781 basis points. In addition, the size variable increases the short-term returns of IPOs by 0.0122 basis points. Other variables do not prove to have any significant effect on the returns of IPOs. The constant seems to be significant with a value of 0.1721 basis points. A white test was performed to check if the results were heteroskedastic. The results were positive and therefore the standard errors had to be corrected to heteroskedastic standard errors.

This multi-variate regression is repeated for each industry separately and the results are shown in Table 8.

Table 8: Multivariate OLS Regression results per industry

This table reports estimates of how first-day returns are different for traditional and SPAC IPOs in each industry using the following regression:

$$ri = \alpha i + \beta 1_{SPACi} + \beta 2_{Sizei} + \beta 3_{ROAi} + \beta 5_{EPSi} + \beta 4_{P/Ei} + \beta 5_{(Rmt-Rf)} + \beta 6_{HMLt} + \beta 7\ SMBt + \varepsilon i$$

Panel A

	Aerospace & Defence	*Biotechnology*	*Education*	*Financial services*	*Healthcare*	*Insurance*
SPAC	*0.0976***	*0.2486***	*0.4393****	*0.2358*	*-0.2369*	*0.2737****
	[3.25]	*[2.23]*	*[5.25]*	*[0.79]*	*[-1.31]*	*[9.15]*
PE Ratio	*0.0016****	*0.0002*	*0.0001*	*-0.0001*	*-0.0001*	*0.0000*
	[3.59]	*[0.70]*	*[0.80]*	*[-0.01]*	*[-0.99]*	*[0.64]*
ROA	*1.8513***	*1.6003****	*0.0186**	*2.2852*	*0.9155*	*1.0226*
	[2.96]	*[-4.42]*	*[1.99]*	*[0.57]*	*[0.67]*	*[1.65]*
EPS	*-1.2136*	*0.2715****	*-0.0813*	*0.0966*	*0.2346*	*0.1799**
	[-0.73]	*[7.89]*	*[-1.52]*	*[0.66]*	*[1.24]*	*[2.76]*
Size	*0.0272*	*0.0167*	*0.1526****	*0.2186***	*0.053*	*0.0186*
	[0.29]	*[0.25]*	*[3.85]*	*[2.14]*	*[0.64]*	*[0.52]*
Constant	*2.2781*	*0.4024*	*1.6368****	*1.4651**	*-0.1682*	*2.8012*
R^2	*0.7284*	*0.9786*	*0.6097*	*0.2149*	*0.2495*	*0.8921*
No of Observations	*13*	*41*	*35*	*52*	*53*	*9*

Panel B

	Internet	*IT Services*	*Pharmaceuticals*	*Software*	*Others*
SPAC	*0.6400****	*0.0999*	*0.3417*	*0.2447**	*0.0318*
	[6.99]	*[0.82]*	*[0.25]*	*[1.74]*	*[0.12]*
PE Ratio	*0.0029****	*0.0000*	*0.0009*	*-0.0002*	*0.0002*
	[3.82]	*[-0.75]*	*[0.60]*	*[-0.52]*	*[0.96]*
ROA	*3.5742****	*0.0087*	*4.9065*	*3.3052***	*0.5907*
	[4.71]	*[1.23]*	*[0.49]*	*[2.58]*	*[0.53]*
EPS	*0.3930****	*0.0166*	*-0.3569*	*0.0846****	*0.0155****
	[4.23]	*[0.71]*	*[-0.23]*	*[2.74]*	*[2.90]*
Size	*0.1438****	*0.0938***	*0.2566*	*0.1523*	*0.0658*
	[3.03]	*[2.59]*	*[1.80]*	*[2.79]*	*[0.90]*
Constant	*1.8467****	*0.2845*	*1.9810*	*1.1632*	*1.8279***
R^2	*0.7902*	*0.2913*	*0.5272*	*0.3079*	*0.0725*
No of Observations	*33*	*62*	*13*	*43*	*144*

Notes: This table shows the results of multivariate linear regression for each industry separately. This table is separated into 2 panels; Panel A and Panel B. Panel A shows the results of regressions for Aerospace and Defense, Biotechnology, Education, Financial Services, Healthcare, and Insurance. Panel B shows the results for regressions of Internet, IT Services, Pharmaceuticals, Software and Others. The coefficient of each variable is listed with the t statistic in the parenthesis below it. For each industry regression, the R squared, and number of observations are listed.

It can be seen from the table that the SPAC IPOs have higher underpricing compared to traditional IPOs, which is not in line with the hypothesis we are testing. This is the same for all industries except for the Healthcare industry, where the coefficient for SPAC variable is -0.2369, meaning that SPAC IPOs have lower short-term returns. The coefficient of the SPAC variable is only significant in the Aerospace and Defense, Biotechnology, Education, Insurance, Internet, and Software industries. From the regression results of the companies operating in the Internet industry, all coefficients are significant at 1% significance level.

The event study by Kellerman (2022) was very similar to the research done here as it compared traditional and SPAC IPOs short-term returns. However, the results are not in line with each other. Kellerman has found that traditional IPO firms have higher underpricing compared to SPAC IPO firms. This could be because he tested IPOs in the year 2020 alone, however this paper has a wider period in which IPO returns are tested; from 2019- 2022.

7.2 Industry Analysis

This section shows the results of the univariate analysis done for each industry to find out how firm size affects the underpricing in different industries for all IPO companies. A separate linear regression is run for each industry separately and the results are presented in Table 9.

Table 9: Univariate OLS Regression results per industry

This table reports estimates of how firm size affects the first-day returns in different industries using the following regression:

$$ri = \alpha i + \beta 1_{firm\_sizei} + \varepsilon i$$

p<0.1; p<0.05**; p<0.01***, t-statistics reported in parentheses*

Panel A

	Aerospace & Defence	*Biotechnology*	*Education*	*Financial services*	*Healthcare*	*Insurance*
Firm Size	*0.1019**	*0.2968****	*0.0262*	*0.2028****	*0.0811*	*0.0151*
	[1.93]	*[6.21]*	*[0.73]*	*[4.38]*	*[1.39]*	*[0.12]*
Constant	*-0.7325*	*-1.9448*	*-0.3756*	*-1.2253*	*-0.5274*	*-0.1878*
R^2	*0.1248*	*0.1345*	*0.0081*	*0.1912*	*0.0132*	*0*
No of Observations	*28*	*249*	*67*	*83*	*147*	*27*

Panel B

	Internet	*IT Services*	*Pharmaceuticals*	*Software*	*Others*
Firm Size	*0.0107*	*0.0105*	*0.0988***	*0.1133****	*0.0625***
	[0.29]	*[0.51]*	*[2.31]*	*[2.78]*	*[2.06]*
Constant	*-0.3124*	*-0.1246*	*-0.7586*	*-0.8382*	*-0.4785*
R^2	*0*	*0*	*0.1249*	*0.0503*	*0.0132*
No of Observations	*78*	*104*	*39*	*148*	*310*

Notes: This table shows the effect of firm-size on IPO underpricing for each industry separately. This table is separated into 2 panels; Panel A and Panel B. Panel A shows the results of regressions for Aerospace and Defense, Biotechnology, Education, Financial Services, Healthcare, and Insurance. Panel B shows the results for regressions of Internet, IT Services, Pharmaceuticals, Software and Others. A linear regression model is run with the firm size as the dependent variable and the firm size as the independent variable. For each regression, the coefficient of the firm size is listed with the t statistic listed in the parenthesis below it.

It can be seen from the results that most of IPO companies are from the Others and Biotechnology industries. All coefficients have shown that the firm size has a positive effect on the first day returns in all industries, but not all results are significant. The Biotechnology, Financial Services and Software are the only industries that have shown results significant at 1% significance level. The regression coefficient for companies in the Biotechnology field have shown that for every 1 basis point increase in firm size, the first day return increases by 0.2968 basis points. For the Financial Services and Software industry, every 1 basis points increase in firm size the returns rise by 0.2028 and 0.1133 basis points, respectively. The Pharmaceuticals and Others industry had coefficients of 0.0988 and 0.0625 respectively, which are significant at 5% significance level.

Finally, the Aerospace and Defense have shown results significant at 10% significance level. All remaining industries haven't shown any significant results.

Overall, the results show that the firm size is positively correlated to first day returns of IPOs. Therefore, we cannot reject the hypothesis that firm size has a positive correlation with underpricing of IPOs in different industries. This shows that the results here are like what Islam et al. (2010) has found when he examined 173 IPOs on the relationship between these two variables.

8 Conclusion

There has been an increase in popularity of traditional as well as SPAC IPOs in the recent years raising 435.3 billion USD in 2021 alone. The aim of this paper is to find how short-term returns of these two investment vehicles differ in different industries. The research question of this paper is:

How do short-term returns of IPOs and SPAC IPOs differ in different industries?

First, the average short-term returns of IPOs in each industry separately are calculated and it was found that companies in the Financial Sector had the highest underpricing, with an average first-day returns of 0.0834 basis points.

Next, the underpricing of traditional IPOs and SPAC IPOs were compared. When running the univariate regression, the results were not significant, but it showed that SPAC IPOs have higher underpricing. This was then repeated for each industry separately and with the addition of control variables. Out of the 11 industries being tested only 6 had significant results. So, in the Aerospace and Defense, Biotechnology, Education, Insurance, Internet, and Software industries, there were significant positive coefficients for the SPAC variable, meaning that SPAC IPO firms had higher returns. This coefficient was highest in the Internet industry. Therefore, the hypothesis stating that traditional IPOs have higher underpricing can be rejected.

Finally, the effect of firm size on short-term returns is tested. It was found that there is a positive correlation between the two variables, so the larger the firm the higher its first-day returns.

There are some limitations in this research. This includes that the data includes only 550 IPOs and 728 SPAC IPOs, which reduces the power of the results as the sample is relatively small. In addition, since the returns used are the post-merger returns, the results neglect the announcement effect on the short-term returns.

Possible area for future research is trying to analyze long-term returns of different IPOs and how these returns influenced by industry. This means doing a long-term analysis like the short-term analysis done in this paper. Also, it might be a good idea to increase the time period in which the returns are being analyzed, as this will also increase the number of IPO firms being tested.

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