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Exploring the Enigma: A Comparative Analysis of the Underpricing Anomaly in Traditional and SPAC IPOs of the UK

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ABSTRACT

This paper aims to investigate how short-term returns of traditional and SPAC IPOs differ across various UK stock market industries. In doing so, it intends to provide valuable contributions and insights into an area of research that, until now, is comprised of scarce and contradictory findings. IPO data for a sample of 1239 UK IPOs is collected and the research question is studied through several univariate and multivariate cross-sectional regressions, carried out at both the industry and market level. Simultaneously, this paper investigates the effect that IPO size, amongst other firm-specific control variables, has on their short-term returns (undepricing). Furthermore, the Fama French 3 factor model is applied to obtain a better understanding of the risk-adjusted returns of said IPOs. Despite obtaining results that occasionally lack statistical significance and adhere to the contradictory nature of previous research, this paper draws the conclusion that SPACs and larger IPOs are associated with lower degrees of underpricing.

Keywords: IPO underpricing, traditional IPO, SPAC, short-term returns

JEL codes: look up the fitting JEL codes: http://www.aeaweb.org/journal/jel_class_system.html

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CHAPTER 1 Introduction

Although Special Purpose Acquisition Company (SPAC) initial public offerings (IPOs) have been considered a feasible option for private companies to become publicly traded for some time now, it was not until this decade that markets across the globe experienced a significant surge in SPAC listings. In fact, 2020 and 2021 were record years for this alternative to traditional IPOs, especially in the US where over 50% of new public listings were SPACs, generating approximately $162 billion in proceeds. A SPAC, also known as a "blank check" company, refers to a firm with the primary objective of raising capital through an initial public offering, ultimately trying to achieve its goal of acquiring or merging with another business. On a larger scale, despite its uncertain environment, the entire global IPO market experienced a significant increase in listings during this period, which can be attributed to COVID-19 vaccine rollouts and government stimulus programs (Izzi, 2021). Typically, SPAC IPOs are associated with faster execution, lower fees and more certainty in returns. Despite their differences, both methods of going public fall victim to the IPO anomaly and global phenomena known as IPO underpricing. IPO underpricing refers to the scenario in which the shares of a company that has just gone public are initially listed at a price lower than the market value, and therefore experience a significant increase in price from the initial offer price to the first day closing price. With companies such as Snowflake missing out on potential profits of $3.8 billion (CNBC, 2020) it has become clear that understanding this phenomenon remains relevant in order to mitigate this resulting market inefficiency known as money "left on the table".

Various previous literary works make an attempt at providing valuable insights into this field of study and shed light on this anomaly. Loughran and Ritter (2004) conducted a study that provides evidence for varying levels of IPO underpricing in the US. To summarize, their findings conclude that average first day returns of IPOs increased from 7% to 15% to 65% in the periods 1980, 1990-98 and 1999-2000, respectively. Loughran and Ritter turn to information asymmetry and agency problems as the leading explanation for the observed pattern in underpricing. On the other hand, Casia et. al (2006) conducted a similar study within Europe, specifically Italy, and found a mean positive underpricing of 21.87% from 1985-2001. Contrary to the findings of Loughran and Ritter however, it was found that levels of underpricing actually decreased in the late 1990s. Moreover, whilst acknowledging a correlation between information asymmetry and the level of underpricing, Casia et. al identify investor sentiment and uncertainty, the book building process and the composition of IPO companies as the central determinants of underpricing instead. On the other hand, Griffin (2018) analyzes first day returns of SPACs, comparing said short-term returns to those of traditional IPOs. His findings imply that on average SPAC IPOs are underpriced to a larger extent than the latter. In accordance with Casia et. al, Griffin attributes his findings to investor uncertainty. Nonetheless, an earlier study carried out

by Baigent et. al (2008) opposes Griffin's findings, suggesting it is traditional IPOs that experience more underpricing.

Although there is existing research on traditional IPOs and SPAC IPOs, most of it dates relatively far back. Therefore, conducting more recent research, especially now that this surge in listings provides us with larger amounts of data to select a sample from, can help provide more accurate and relevant findings. Moreover, whilst various papers concern themselves with the underpricing of traditional and SPAC IPOs on an individual level, there is a lack of published papers that explicitly compare the difference in underpricing of the two. Therefore, this paper aims to do precisely that, ideally providing valuable insights for investors, companies and underwriters to make informed decisions regarding initial pricing of shares, their future potential and methods of going public. Furthermore, several implications and conclusions drawn from previous research contradict one another, thus it would be compelling to see which are supported by recent history, i.e the findings of this paper. Whilst most previous research, such as that of Loughran and Ritter chooses to focus solely on the US IPO market, likely because the US stock market is the leading market in terms of SPAC listings, this paper will carry out its research under a different context. Instead, it will differentiate itself by looking at the stock market of the United Kingdom. It can be expected that this research will therefore yield different results as IPO underpricing is believed to be influenced by a multitude of country specific factors including market environment, legal and regulatory environment, investor behavior and cultural differences. In fact, Costa et al. (2013) found that his three-factor model of cultural dimensions could explain almost 40% of global variation in IPO underpricing. In conclusion, the research question of this paper can be explicitly stated as the following:

How do short-term returns of traditional and SPAC IPOs differ within various UK stock market industries?

To begin with, this paper will collect & compute the average short-term returns along with other relevant IPO data. Then, in order to ensure effective matching, the IPO data will be categorized and separated according to industry. This allows for a standardized comparison and the aligning of SPAC IPOs with comparable traditional IPOs. Whilst investigating the effect that the method of going public has on the level of underpricing, this paper will simultaneously look at the size of said IPOs as an additional variable of interest. To do so, two distinct univariate regressions are introduced and performed for each industry. Next, a more extensive regression model is run on both the industry and market level. This cross-sectional multivariate regression contains both a dummy variable to distinguish the SPAC IPOs from traditional IPOs, as well as several firm-specific control variables that are predicted to influence short-term returns. Similar to that of Brav et. al (1997), this study will also apply the Fama French 3 factor model given that it is an efficient method to account for size,

value and market risk, allowing for a better understanding of the sources of returns. The data on Fama French and Momentum factors will be obtained from Gregory et. al (2013) who aim to replicate the data provided by French's US website but for the UK market. The sample studied within this paper will consist of data from the UK IPO market (e.g., London Stock Exchange) as this is one of the largest IPO markets outside of the US. The time frame that will be considered within this study spans from the beginning of the 21st century up until present time (June 2023). The data will be extracted from the Bloomberg terminal and exported to Stata Software where the regression models and statistical techniques will be performed.

Based solely on the findings of previous research and prior to conducting this study, my hypothesis for this paper is that there exists a positive correlation between the size of an IPO and the degree of underpricing, regardless of industry. In addition, I predict that traditional IPOs will generate higher short-term returns, i.e. experience larger degrees of underpricing, than SPAC IPOs. I believe that by redirecting more attention towards Europe, this thesis will contribute to the discourse on the underpricing and short-term returns of IPOs, which until now seems to be focused on the US. Ultimately, this paper has the potential to contribute towards elucidating the IPO underpricing anomaly by offering valuable insights that can help researchers gain a better understanding of its underlying factors. Nonetheless, there are still numerous aspects of IPOs that have yet to be thoroughly researched, including the analysis and comparison of the long-run returns and underperformance of traditional and SPAC IPOs.

The remainder of this paper is structured as follows: Section 2 begins by offering necessary background information to facilitate the understanding of the subsequent discussion of relevant literature and previous research. Section 3 proceeds by describing the sample, the data collection method and providing descriptive summary statistics. Next, Section 4 discusses the methodology and its validity and assumptions. Section 5 then depicts, interprets and discusses the results of the paper and their implications. Finally, Section 6 will summarize the findings of this papers and answer the research question.

CHAPTER 2 Theoretical Framework

2.1 Traditional IPO

If a private company seeks to transition into a public entity and thereby raise equity capital through public investors, it must, with some exceptions, undergo an initial public offering. This process involves the initial issuance of shares to both retail and institutional investors (such as mutual and hedge funds) for the very first time. The decision to go public is among one of the most significant and consequential decisions a board can take over the course of a company's entire existence as it can have a considerable impact on the organization and operation of said companies moving forward.

If executed well, an IPO can have valuable implications that further justify the decision to go public. According to Ritter & Welch (2002), the central and most apparent reason would be to raise the capital needed to fund a firm's essential operations such as R&D, marketing, growth opportunities and other capital expenditures. Moreover, whether it be via the capital raised or the use of a company's publicly traded shares as an exchange currency, an IPO can aid the acquisition of other companies. On top of that, an IPO presents itself as an opportunity for previously existing shareholders such as employees and venture capitalist investors to liquidize/monetize their equity stake, which is difficult if a company remains private. Lastly, going public not only enhances a company's exposure, public image and recognition but also establishes a transparent and readily available method of valuing companies for both internal and external benchmarking.

Despite its advantages, going public is associated with certain costs and risks that companies often cannot afford to take, compelling them to opt for the alternative of remaining private. To begin with, the IPO process takes time. In general, the process is company specific, nonetheless, even if accomplished efficiently it can take anywhere from nine months to multiple years until completion. In addition, there exists the financial burden of covering the monetary expenses associated with an IPO, i.e., engaging with underwriters, lawyers, accountants and other professionals. When going public a company must be prepared to disclose substantial amounts of financial and operational information to the general public, including its competitors, whilst at the same time adhering to the regulations set by the Securities and Exchange Commission (SEC). These regulatory and organizational consequences of going public lead to increased degrees of transparency and can raise privacy concerns within companies due to loss of control and agency problems. Finally, Maksimovic and Pichler (2001) point out that public trading and high public prices can attract unwanted product market competition.

In reality, despite appearing relatively straightforward, an IPO tends to be far more tedious than anticipated as it requires a large degree of coordination and vested interests between all of the involved parties. To begin with, the company must choose an investment bank to act as an underwriter. The underwriter acts as a broker between the company and the investing public. In fact, Michaely & Shaw (1995) believe the choice of a prestigious auditor and underwriter may serve as an effective vehicle to reduce uncertainty about future cash flows and speak on the quality of the newly traded firm. Then, the company works together with its underwriter, lawyers, accountants and the SEC to carry out due diligence, regulatory filings and the underwriter arrangements. Once approved by the SEC, the effective date is decided upon, and it is up to the underwriter to market the shares to potential investors and propose an initial offer price based on their analysis of the market demand and environment. The shares are then issued on the respective IPO date and the capital received is recorded as shareholders equity.

2.2 SPAC IPO

Despite a questionable beginning in the 1980s, marked by fraud and regulatory gaps, blank-check companies, now known as SPACs, have experienced a resurgence in various stock markets this decade. With rebranding efforts and the establishment of new regulatory frameworks, SPACs are now seen as a lucrative alternative to traditional IPOs.

According to Gang et al. (2021), a SPAC is a shell company and financial vehicle, characterized as an inactive company created by a sponsor with no commercial operations and the sole purpose of merging with a non-listed company. In doing so, the SPAC takes the operating company public. Following its establishment, this SPAC has a time frame of two years to merge with or acquire another company. If it fails to do so, the company will be liquidated, and the investments are returned to investors. The stakeholders involved in this process usually consist of sponsors, management teams, investors and targets. Prior to identifying a target firm to merge with, the creation of the SPAC is announced, and sponsors are tasked with developing a business plan and providing the necessary capital to fund the initial operating expenses. Then as is done in the traditional IPO process, the SPAC is taken public and its shares become available to public investors. Subsequently, the SPAC management team enters discussion with privately held companies and identifies the most suitable target. Upon formalities such as the negotiation of terms and the signing of agreements, the deal is approved, and the merger is completed.

When comparing the two, it becomes evident that each method of going public comes with its advantages and that, in practice, there is no clear better alternative. This decision is one that is highly firm specific, depending on the goals of the company given its funding considerations, ideal investor base etc. Nonetheless, if time is of the essence to the company, a SPAC is likely a more appropriate

choice as they are associated with faster execution times than traditional IPOs. On average, an SPAC merger takes between 3-6 months, while as mentioned a traditional IPO can take more than an entire year. Moreover, if the market is very volatile, a SPAC is beneficial as the price at which the SPAC acquirees the private company is negotiated prior to the merger rather than determined by the market conditions as is the case with traditional IPOs. Klausner et al.(2022) claim that due to non-redeeming SPAC shareholders bearing the majority of the inherent costs, SPACs tend to be cheaper from the perspective of the company wanting to go public. Lastly, SPACs do not require the rigorous due diligence that traditional IPOs set in place to protect investors. Nevertheless, finding and selecting the most appropriate sponsor and target firm in a wide range of possibilities presents itself to be one of the primary challenges brought upon by SPACs.

2.3 IPO Underpricing

The IPO underpricing phenomenon has been prevalent since the commencement of IPOs. At this stage, it is conspicuous that this substantial jump in price following the commencement of trading is in fact unfavourable, with shares being sold at a price set too low and the dilution of post-IPO shares. This anomaly has prompted many researchers to develop theoretical models, turning to empirical data of the past in search of an explanation. According to Ljungqvist (2007), most theories on underpricing fall under one of four headings, namely, asymmetric information, behavioural reasons, institutional reasons and control considerations. The following section discusses ideas and findings from previous scientific literature that is particularly relevant to the research conducted within this paper.

2.3.1 Underpricing of Traditional IPOs

In his study, Ljungqvist (2007) analyzed the underpricing of traditional IPOs within the US during the 20th century. His findings provide evidence for consistent underpricing, with an average of approximately 19% since the 1960s. When honing down to decades, like Loughran and Ritter (2004), he too found that underpricing fluctuates a great deal, with a low of 12% in the 1970s and a high of 40% in the late 1990s and early 2000s, capturing the lingering effects of the late 1990s internet boom. To conclude, the empirical evidence seemed to support the notion that information frictions indeed influence underpricing, but nonetheless cannot exclusively explain the entirety/large extent of variation. Like Ljungvist, Coakley et al. (2009) encountered a larger degree of underpricing during the internet bubble in their analysis of short-term returns of 20th century UK IPOs rather than those of the US. However, they found that reputable and prestigious underwriters and venture capitalists can account for higher degrees of underpricing. They also highlight the influence of the IPO Spinning hypothesis on the elevated underpricing, which refers to the act of underwriters or brokerage firms offering preferred customers underpriced shares in order to keep or obtain their business. This practice is now considered to be highly unethical and illegal. Yu et al. (2006) examined IPOs in China from

1995-1998 and found that the winner's curse hypothesis, as proposed by Rock (1986), is responsible for the large degrees of underpricing encountered during this time period. This refers to the idea that uninformed investors in the IPO market are allocated less shares than informed investors when confronted with underpricing (vice versa with overpriced shares). Hence, in order to compensate these uninformed investors and incorporate them into the market a larger number of shares are deliberately underpriced.

As evident by now, the underpricing of IPOs is a persistent global phenomenon that manifests in different ways across the world. Hopp (2011) analyzed underpricing across 24 countries from 1988-2005 and found that countries with more enforced institutional and legal environments, i.e., law enforcement experience lower underpricing while those who have high degree of protection of outside investors experience higher underpricing. With the UK's constitutional monarchy setting its legal and institutional environment apart from those of other countries, the significance of my research is highlighted as it is likely the results will diverge from those obtained in other countries, such as the US. Lastly, Chiraphadhanakul et al. (2005) have studied the effect of various company specific factors such as ROA, PE Ratio, Firm Size etc on underpricing of Thai IPO. The investigation revealed varying effects across diverse industries, prompting the inclusion of company-specific factors in the analysis carried out within this paper.

2.3.2 Underpricing of SPAC IPOs

The number of studies specifically examining the short-term returns of SPACs, as compared to those focusing on traditional IPOs, is significantly lower. Nevertheless, the following attempts were undertaken to address this gap in the literature. Sun et al. (2007) are among some of the first to analyze the performance of SPACs, encountering only slight underpricing of 1.9%, on average, across their sample of 62 SPACs during 2003-2006. They consider this lack of underpricing to be expected as SPACs have no operating history and are therefore mis-valuation by underwriters or issuers is unlikely. Vulanovic's (2013) findings exhibit the same pattern, showcasing an even lower average first-day underpricing of 0.0001% across 107 SPACs, linked to the reduction of uncertainty regarding movement of price. On the contrary, they observe abnormal returns of -9.59% ten days after the acquisition date, suggesting that the IPO was likely overpriced. O'brien et al. (2012) look at ownership structure and corporate governance characteristics to explain the approximately 3% positive short-term returns (underpricing) of their SPAC sample, yet it was found that they exhibit no significant effect on returns. Nonetheless, they encountered the seemingly recurring long-term underperformance of -14% half year returns. Lastly, Shachmurove (2016) studied a sample of SPACs targeting companies within China, investigating the characteristics of SPACs and their performance. It was found that SPAC size has a significant effect on returns, with the smaller Chinese SPACs outperforming the other, larger,

SPACs. Conversely, Griffin (2018) found that greater underpricing tends to be observed in larger SPACs. He attributes his findings to the investor base, arguing that SPACs that aim to raise a larger amount of capital will likely rely on larger institutional investors who possess stronger bargaining power regarding favorable investment terms.

2.3.3 Traditional vs SPAC Comparison

Griffin went one step further and compared the returns of said SPAC IPOs to those of traditional IPOs. Contrary to Sun et al. and Vulanovic, it was found that the SPAC IPOs not only exhibited substantial underpricing, but also do so to a greater extent than traditional IPOs. A possible explanation offered by Griffin, opposing the view of Sun et al., entails the idea that the lack of tangible data on cash flows and operation that accompanies SPAC, actually makes it harder for investors to value the company. Shatalov (2021) is faced with the same results, arguing that the underpricing of SPACs serves as a form of compensation for the risk connected to this absence of information. In contrast, Kellermans (2022) findings challenge these, suggesting that traditional IPOs outperform, i.e. are underpriced more, SPACs in both the short run and long run. Baigent et. al. (2008) findings are in line with Kellerman's, with mean first-day returns of 1.23% for SPACs compared to a much larger 26% for traditional IPOs, indicating higher underpricing of traditional IPOs. Carol & Glenn (2008) are faced with coinciding results, observing mean first-day returns of 0.60%, -0.20%, 1.23% for SPACs and 12.20%, 9.30%, 13.20% for traditional IPOs in the years 2004,2005 and 2006, respectively. As evident, the first-day returns of SPACs once again seems to follow the prevailing trend of small magnitude, gravitating around zero and even taking a negative value in 2005, suggesting slight overpricing. Jog & Sun (2007) reason that this is expected considering investors possess a certain degree of VETO power and misvaluation being rather unlikely with over-allotment options providing underwriters the option to issue additional shares if the initial issuance failed to meet demand. However, they acknowledge that it may nonetheless be possible for underwriters to misjudge the market demand, even after exercising this option.

This contradicting nature and disparity of findings warrants further research. Prior to carrying out said further research, and solely based on the previous research mentioned above, the following hypotheses are formulated:

H1: SPACs are associated with lower degrees of underpricing than traditional IPOs

H2: IPO Size is positively correlated with the degree of underpricing

CHAPTER 3 Data

This paper examines data of UK IPOs that were completed between January 2000 and June 2023 (present day). The initial data sample consisted of a total of 2160 observations, i.e., IPOs completed within this time frame. Of these 2160 observations, 2080 were traditional IPOs whilst a much smaller sample consisting of the remaining 80 IPOs were SPACs. This disparity in sample size was to be expected considering that SPAC IPOs have only recently gained traction as a preferred method of taking a firm public, particularly in the UK, where we have seen even less adoption in comparison to other countries such as the US or China. This scarcity of data also partially explains the lack of published studies examining SPACs within the UK, which this study aims to address and mitigate. Subsequently, this sample of 2160 observations was refined to ensure data completeness and more accurate results, considering that for a substantial number of IPOs the accompanying control variable data was not made available. Furthermore, some extreme outliers for certain variables were removed to avoid skewed and misleading results. The resulting data set comprises 1203 traditional IPOs and 36 SPACs.

In order to help ensure reliability, accuracy, comparability and consistency in the structure and quality of the data, all the IPO data stems from a single database, namely Bloomberg. The Bloomberg terminal is one of the leading global tools when it comes to the provision of financial market data and financial developments. Within Bloomberg the "Advanced Search IPO" function was utilized to obtain the following IPO data:

Contrary to most previous papers analyzing short term returns of IPOs, this study will investigate the underpricing anomaly using first-week returns rather than first day returns. This decision was made not only due to data availability, but also because it presents a valuable opportunity to provide further insights into a relatively novel approach to underpricing. Therefore, the outcome variable of this study will be "first-week returns", referring to the percentage change in the share price from initial offer to first-week close. Like Bask and Nätter (2021), they are computed by the following equation:

$$First - Week\ Return\ = \frac{(End\ of\ First\ Week\ Price\ - Initial\ Price)}{Initial\ Price}$$

On the other hand, the central predictor variable of this study will take the form of a dummy variable named "Traditional IPO", taking a value of 1 if the company that went public did so through a traditional IPO, and 0 otherwise. Moreover, similar to Chiraphadhanakul et al. (2005), Offer Size, Basic EPS and ROA are included as control variables within this study to make more accurate and reliable inferences regarding the effect of the IPO type on underpricing/short-term returns. Offer size refers to the monetary amount of capital raised by the offering of shares to the public. Meanwhile,

basic EPS and ROA are firm-specific financial fundamentals measuring profitability with respect to shares and asset utilization, calculated as follows:

$$Basic\ EPS = \frac{Net\ Income - Preferred\ Dividends}{Weighted\ Average\ of\ Common\ Shares\ OUtstanding}$$

$$ROA = \frac{Net\ Income}{Average\ Total\ Assets}$$

As the data on Fama French and Momentum factors is not available on Bloomberg it is obtained from Gregory et. al (2013), who aim to replicate the data provided by French's US website but for the UK market. The factors that constitute the Fama French three factor model are SMB (Small-Big), HML (high minus low) and the rm-rf (portfolio return less risk-free rate of return). The daily values for these factors were collected from the beginning of 2000 up until 2018 and matched with the corresponding IPO dates.

3.1 Summary Statistics

The following table provides the summary statistics, including the mean, standard deviation, minimum and maximum values for the above-mentioned variables

Table 3.1: Descriptive Summary Statistics

Offer Type		Mean	Standard Deviation	Min.	Max.
	Offer To Week 1	0.4131611	1.15431	-0.008	6.4
SPAC	Offer Size	224.1339	606.1644	0.29	3487.37
	Basic EPS	0.0866667	0.6118123	-1.34	2.94
	ROA	-9.955278	25.36744	-86.9	45.1
	Offer To Week 1	0.2108836	0.5785599	-0.9881	7
Traditional	Offer Size	255.5152	668.1474	0.18	7894.64
	Basic EPS	-0.0566833	5.567203	-80.14	116.45
	ROA	-18.78292	54.37894	-670.1	186.9
	Offer To Week 1	0.2167609	0.6031772	-0.9881	7
Total	Offer Size	254.6034	666.2245	0.18	7894.64
	Basic EPS	-0.0525182	5.486679	-80.14	116.45
	ROA	-18.52642	53.77242	-670.1	186.9

Notes: Table providing summary statistics (mean, standard deviation, minimum and maximum values) for the outcome and explanatory variables. Distinguished between statistics for exclusively SPACs, traditional IPOs and the overall sample.

When comparing the results seen above, it becomes evident that the sample of SPACs at hand are faced with, on average, significantly higher first-week returns, simultaneously implying higher degrees of underpricing. The mean first-week returns of SPACs amount to 41.3%, effectively doubling the mean first-week returns of 21.1% attributed to traditional IPOs. Nonetheless, as the large majority of IPOs are traditional IPOs rather than SPACs, the overall sample mean falls very closely to that of the traditional IPO sample, at 21.7%. Less discrepancy across the IPO types is observed when it comes to the offer size, with mean values of £224.1 and £255.5 million for SPAC and traditional IPOs, respectively. It is also worth noting that whilst SPACs encounter a slightly positive EPS on average, traditional IPOs encounter slightly negative EPS. Lastly, we observe that traditional IPOs, on average, encounter lower ROA than SPACs. These two metrics allude to the sample of traditional IPOs being less able to generate earnings for its shareholders and profit from its assets.

Table 3.2: Industry Distribution of IPOs

Industry Sector	Frequency	Percentage (%)
Basic Materials	84	6.7
Communications	137	11.06
Consumer, Cyclical	135	10.90
Consumer, Non-Cyclical	265	21.39
Diversified	25	2.02
Energy	113	9.12
Financial	226	18.24
Industrial	95	7.67
Technology	147	11.86
Utilities	12	0.97
Total	1,239	100

Notes: Table providing an overview of the distribution of IPOs across all 10 industries

Table 3.3: First-Week Returns Summary Statistics

Industry Sector	Mean	Standard Deviation	Min	Max
Basic Materials	0.216702	0.4410128	-0.5857	1.85
Communications	0.2211737	0.5845297	-0.4271	4.75
Consumer, Cyclical	0.1521622	0.2706142	-0.2143	2.16
Consumer, Non-Cyclical	0.1896366	0.5095741	-0.9881	6.08
Diversified	0.304808	1.27144	-0.008	6.4
Energy	0.2338752	0.6246316	-0.2588	5.75
Financial	0.2175978	0.6624336	-0.7692	6.875
Industrial	0.1737642	0.3080263	-0.1867	2.26
Technology	0.3277578	0.8903754	-0.2399	7
Utilities	0.110975	0.1988672	-0.3333	0.45
Total	0.2167609	0.6031772	-0.9881	7

Notes: Table providing summary statistics of the explanatory variable (first-week returns) across all 10 industries

Table 3.2 above, depicts the distribution of IPOs across UK industries whilst Table 3.3 illustrates the descriptive statistics of first-week returns within each of these industries. Each IPO corresponds to one of the following 10 industries: Basic Materials, Communications, Consumer-Cyclical, Consumer Non-Cyclical, Diversified, Energy, Financial, Industrial, Technology and Utilities. We observe that the Consumer Non-Cyclical Industry, closely followed by the Financial Industry, accounts for the largest share of IPOs with 265 (21.39% of the overall sample) individual offerings occurring within this industry sector during the given time frame. On the other hand, the Utilities industry constitutes only 0.97% of the overall sample, with a sample low of 12 public offerings. Furthermore, the Technology industry seems to be the leading industry in terms of underpricing, encountering mean first-week returns of 32.7%. In stark contrast we once again observe the Utilities industry with first-week returns of only 11.1% on average, a sample low.

CHAPTER 4 Method

Before proceeding, it is important to clarify that most of the statistical methods mentioned here on after will be carried out both on an industry and overall market level. This process is facilitated by having a comprehensive firm level data set representing the entire market, which is subsequently divided into 10 additional separate datasets, each corresponding to one industry.

To begin with, a simple univariate ordinary least squared (OLS) regression will be run in order to address the central concern of this study, namely, how alternate methods of taking a firm public affect the degree of IPO underpricing. This regression can be represented by the following equation where alpha beta and epsilon represents the estimated constant, coefficient and error term, respectively:

$$r_i = \alpha_i + \beta 1_{Traditional} + \epsilon_i$$

In this case, we are interested in the beta of the previously defined "Traditional" dummy variable, i.e. the difference in first-week returns associated with going public through a traditional IPO rather than SPAC, and seeing how its value varies across industries. Next, yet another similar univariate regression will be carried out, instead investigating the effect that the size of an initial public offering has on the underpricing. This regression includes "Offer Size" as the independent variable as depicted by the equation below:

$$r_i = \alpha_i + \beta 1_{Offer\ Size} + \epsilon_i$$

Although the main variables of interest have been analyzed through the use of univariate regressions, the influence of additional factors that affect the relationship between short-term returns and IPO method must be considered. This is accounted for by the inclusion of various control variables that are said to affect the underpricing of IPOs, namely, offer size, ROA and basic EPS, ideally reducing omitted variable bias and isolating the specific effect of IPO type on underpricing. The resulting multivariate cross-sectional regressions is as follows:

$$r_i = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \epsilon_i$$

Lastly, the study will go one step further and extend the multivariate cross-sectional regression through the addition of the Fama French 3 factor model, incorporating market risk, size and value factors into the regression. This facilitates a better understanding of the risk-adjusted returns of IPOs and the factors, beyond general market movements, that drive said returns. The final equation can be seen below:

$$r_i = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \beta 5_{SMB} + \beta 6_{HML} + \beta 7_{(rm-rf)} + \epsilon_i$$

4.1 Validity

Classical Linear regression models operate under certain assumptions that need to be tested prior to being carried out. Two testable assumptions are heteroskedasticity and multicollinearity.

4.1.1 Heteroskedasticity

Heteroskedasticity, refers to the violation of the assumption of constant variances of errors and can result in incorrect standard errors and biased coefficients. The Breush-Pagan and White test can be utilized to detect heteroskedasticity. In this case, both were executed, and the result are depicted in the tables below:

Table 4.1: Breusch-Pagan Test

Test	Breusch-Pagan Test for Heteroskedasticity (P-Value provided within parentheses)
	Coefficent
Hypothesis	Ho: Constant Variance
Chi Squared	219.27 (0.000)

Notes: Table providing the results of the Breusch-Pagan test for Heteroskedasticity

Under the Breusch-Pagan test the null hypothesis assumes constant variance of errors (homoscedasticity). As visible above, the prevailing p-value of 0.000 (<0.05) is highly significant, meaning the null hypothesis is rejected, indicating the presence of heteroskedasticity.

Like the Breusch-Pagan test, the null hypothesis of the White test assumes constant variance of errors. Nonetheless, the results of this test have slightly different implications in this case. As none of the p-values obtained for the explanatory variables are <0.05 we are unable to reject the null hypothesis at a 5% significance level and are therefore faced with homoscedasticity and constant variance of errors. At a 10% significance level however, this is not the case as we observe a p-value <0.10 for the "Traditional" dummy variable (See Appendix A). Considering both the Breusch-Pagan test and White test indicate some sort of heteroskedasticity, robust standard errors will be used from here on out in order to obtain more efficient estimates.

4.1.2 Multicollinearity

Multicollinearity refers to a situation where various independent/predictor variables are highly correlated with one another, suggesting they are linearly related. This will likely result in imprecise estimation of the coefficients. Multicollinearity can easily be detected by looking at a correlation matrix of the variables.

Table 4.2: Correlation Matrix

	Offer To Week 1	Offer Size	Basic EPS	ROA
Offer To Week 1	1.0000	-	-	-
Offer Size	-0.0755	1.0000	-	-
Basic EPS	-0.0004	0.0121	1.0000	-
ROA	-0.0336	0.1212	0.0984	1.0000

Notes: Table providing an overview of the correlation between every combination of variables used

As seen above, there are no two variables dealt with throughout this study that are highly correlated with one another. All correlations take value close to zero, indicating a very weak or negligible linear relationship. Therefore, the regressions that will be carried out do not suffer from multicollinearity.

CHAPTER 5 Results & Discussion

The following section will discuss and provide a visualization of the results obtained when conducting each regression mentioned in Chapter 4. Furthermore, the outcomes will be both statistically and economically interpreted.

5.1 Market Analysis

To begin with, we will perform a market level analysis of first week returns, concerning ourselves with only those regressions conducted for the entire sample of 1239 IPOs. In order to avoid falling victim to omitted variable bias and the inconsistent and biased estimators that may result from such, a multivariate regression with various firm-specific performance indicators/characteristics acting as control variables is carried out. The following results were obtained:

Table 5.1: Market Multivariate Regression Results

$$r_i = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \epsilon_i$$

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

	Coefficient	Robust Standard Errors	t	P>[t]
Traditional	-0.2028351**	0.1017466	-1.99	0.046
Offer Size	-0.000065***	0.0000141	-4.62	0.000
Basic EPS	0.0003182	0.0012509	0.25	0.799
ROA	-0.0002995	0.0002975	-1.01	0.314
Constant	0.4247292**	0.1889122	2.25	0.025
Number of observations	1,239			
R-squared	0.0095			

Notes: Table displaying the results of the multivariate regression carried out at the overall market level. The regression coefficients, robust standard errors, test statistics and p-values are provided.

Based on Table 5.1, it appears that the regression has yielded significant results, generating regression coefficients for the main variables of interests, namely offer type and offer size, that exhibit statistical significance at the 5% and 10% level, respectively. The coefficient of the "Traditional" dummy variable can be interpreted such that, on average, traditional IPOs are associated with approximately 20% lower first week returns than SPACs. Logically, it follows that SPACs therefore reflect approximately 20% higher levels of underpricing. It is important to note that when interpreting said regression coefficients, no causal relationship/inferences can be made, instead merely an association between the variables can be drawn. Whilst to a lesser degree, these results are in line with those found by Griffin (2018) who found that SPACs experience 700% higher first-day underpricing, on average.

Nonetheless, Griffin's more extreme outcomes are relative, we must acknowledge the small nature of magnitude in underpricing observed within his study. Furthermore, his study examines first day returns rather than first week returns. Meanwhile, the "Offer Size" coefficient implies that, on average, an increase of one million GBP in the monetary value of the initial offering, is associated with a 0.0065% decrease in first week returns. Based on the market-level regression above, it can be concluded that the data does not provide evidence to support either of the initially formulated hypotheses. Lastly, the statistically insignificant nature of the coefficients belonging to the firm specific fundamentals, suggests there is not enough evidence to imply a meaningful association with first week returns.

When incorporating the Fama French market risk, size and value factors into the cross-sectional regression above, the following results were obtained:

Table 5.2: Fama French Model Results

$$r_i = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \beta 5_{SMB} + \beta 6_{HML} + \beta 7_{(rm-rf)} + \epsilon_i$$

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

	Coefficient	Robust Standard Errors	t	P>[t]
Traditional	-0.1101459	0.1145046	-0.96	0.336
Offer Size	-0.0000636***	0.0000153	-4.16	0.000
Basic EPS	-0.0003307	0.0011312	-0.29	0.770
ROA	-0.0002193	0.000283	-0.77	0.439
Constant	0.3332021***	0.1139649	2.92	0.004
Number of observations	1,071			
R-squared	0.0180			

Notes: Table displaying the results of the multivariate regression when incorporating the Fama French market risk, size and value factors, carried out at the overall market level. The regression coefficients, robust standard errors, test statistics and p-values are provided.

In doing so, the offer type variable becomes statistically insignificant. Besides this, the results seem to be relatively similar. The Offer Size variable remains statistically significant at a 1% significance level and of similar negative magnitude as before. It is worth noting that as the Fama French factors of the UK were only made publicly available until 2018, the number of observations decreased slightly to 1,071 IPOs.

5.2 Industry Analysis

Next, in order to obtain a more focused perspective and identify discrepancies in effects, or industry-specific trends, the regression analysis is conducted at the industry level. Simultaneously, this ensures the matching of firms with other comparable firms. A hierarchal approach is employed, starting with univariate regressions of the primary variables of interest, followed by the inclusion of control variable. To begin with, the univariate regression analyzing the effect that the method of going public has is performed. The following results were obtained:

Table 5.3: Univariate Regression Results I

$$r_i = \alpha_i + \beta 1_{Traditional} + \epsilon_i$$

p<0.1*; p<0.05**; p<0.01*** [Robust Standard Errors provided in parentheses]

Panel A:

	Basic Materials	Communications	Consumer, Cyclical	Consumer, Non-Cyclical	Diversified
Traditional	0.0045793 [0.0945407]	-0.5901314 [0.6191908]	-0.0375692 [0.0425899]	-0.2611257 [0.2117845]	-0.5894867 [0.6313153]
Constant	0.2125*** [0.0805138]	0.794075 [0.6173765]	0.18834*** [0.0350248]	0.44485** [0.2094099]	0.6585 [0.6310048]
Number of observations	84	137	135	265	25
R-squared	0.0000	0.0291	0.0007	0.0058	0.0537

Panel B:

	Energy	Financial	Industrial	Technology	Utilities
Traditional	0.2113662*** [0.0623726]	0.0815632 [0.058482]	-0.0214617 [0.0321095]	(Omitted)	(Omitted)
Constant	0.02625 [0.0169444]	0.1382*** [0.0369296]	0.195*** [0.00005]	0.3277578*** [0.0734369]	0.110975* [0.057408]
Number of observations	113	226	95	147	12
R-squared	0.0020	0.0004	0.0001	0.0000	0.0000

Notes: Table displaying the results of the offer type univariate regression carried out at the industry level. Panel A entails the results for the first 5 industries whilst panel B entails the results for those of the remaining five. The regression coefficients, robust standard error and significance indicators are provided.

When looking at Table 5.3 it becomes evident that this time around the results are far less significant, with only the Energy industry yielding an offer type coefficient that is statistically significant at the 1% level. Nonetheless, contradictory to the coefficients obtained for the market analysis above, this

coefficient is of positive magnitude. It can be implied that, within the Energy industry, traditional IPOs are associated with, on average, 21% higher first week returns than SPACs. These results reinforce those found by researchers such as Kellerman (2022) and Baigent et. al (2008), with the latter concluding that, mean underpricing of traditional IPOs is, a similar, 25% higher. One possible explanation for the outcome at hand, is the low likelihood of mis-valuation by underwriters or issuers attributed to SPACs having no operating history. The reason omitted variables are observed for the Technology and Utilities industries, is that neither industry recorded any firms going public through SPACs during the timeframe of this study. To conclude, the univariate regression provides evidence supporting our initial hypothesis (H1).

Subsequently, a univariate regression investigating the effect of the monetary size of the offering is conducted for each industry. The following results were obtained:

Table 5.4: Univariate Regression Results II

$$r_i = \alpha_i + \beta 1_{Offer\ Size} + \epsilon_i$$

p<0.1*; p<0.05**; p<0.01*** [Robust Standard Errors provided in parentheses]

Panel A:

	Basic Materials	Communications	Consumer, Cyclical	Consumer, Non-Cyclical	Diversified
Offer Size	0.0000498* [0.0000298]	-0.0000642** [0.0000301]	-0.0000613** [0.0000273]	-0.0000588** [0.0000267]	-0.0009498 [0.0008769]
Constant	0.2243615*** [0.0508733]	0.2401787*** [0.0560807]	0.1754014*** [0.0288102]	0.201493*** [0.0351306]	0.6099499 [0.5257421]
Number of observations	84	137	135	265	25
R-squared	0.0047	0.0078	0.0257	0.0038	0.0540

Panel B:

	Energy	Financial	Industrial	Technology	Utilities
Offer Size	-0.0001392** [0.0000536]	-0.0000575** [0.0000248]	0.00000909 [0.0000479]	-0.0002824 [0.0002238]	0.000067 [0.0001011]
Constant	0.2602193*** [0.0659786]	0.2400084*** [0.0511565]	0.17185*** [0.0348266]	0.357898*** [0.0958832]	0.0859311 [0.0806925]
Number of observations	113	226	95	147	12
R-squared	0.0134	0.0067	0.0003	0.0036	0.0340

Notes: Table displaying the results of the offer size univariate regression carried out at the industry level. Panel A entails the results for the first 5 industries whilst panel B entails the results for those of the remaining five. The regression coefficients, robust standard error and significance indicators are provided.

This univariate regression rendered far more significant results across industries than the previous industry regression analysis. Statistically significant coefficients were obtained for all industries other than the Diversified, Industrial, Technology and Utilities sectors. Amongst those industries yielding significant results, all but one (Basic Materials) suggest an inverse relationship between offer size and first week returns. The most extreme, absolute, effect is observed within the Energy industry sector, where an increase of one million GBP in the monetary value of the initial offering, is associated with a 0.01392% decrease in first week returns. These results are consistent with those of Shachmurove (2016), yet do not provide evidence to support the initial hypotheses (H2).

Lastly, as done for the overall market analysis, a multivariate regression with various firm-specific fundamentals acting as control variables is carried out for each industry. The following results were obtained:

Table 5.5: Industry Multivariate Regression Results

$$r_i = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \epsilon_i$$

p<0.1*; p<0.05**; p<0.01*** [Robust Standard Errors provided in parentheses]

Panel A:

	Basic Materials	Communications	Consumer, Cyclical	Consumer, Non-Cyclical	Diversified
Traditional	0.0616136 [0.1559119]	-0.5601308 [0.613511]	-0.0133983 [0.046067]	-0.2600407 [0.2133579]	-0.6684211 [0.5147293]
Offer Size	-0.0000355 [0.0000294]	-0.0000642** [.0000303]	-0.0000654** [.0000279]	-0.0000464** [0.000022]	-0.0003485 [0.0004291]
Basic EPS	0.0116966 [0.0085744]	0.0120426 [0.0098109]	0.011405 [0.0140108]	0.0031021* [0.0016667]	0.5956707 [0.4009217]
ROA	-0.0019108 [0.0017075]	0.0006663 [0.0006496]	0.0001577 [0.0001771]	-0.0007518 [0.0009101]	-0.0358462 [0.0261105]
Constant	0.1280412 [0.1536787]	0.7999422 [0.6148115]	0.1892641*** [0.0348733]	0.4371379** [0.2123611]	0.4441651 [0.3824089]
Number of observations	84	137	135	265	25
R-squared	0.0282	0.0417	0.0299	0.0173	0.4342

Panel B:

	Energy	Financial	Industrial	Technology	Utilities
Traditional	-0.0040693 [0.1845922]	0.1215692* [0.0662535]	-0.0113918 [0.0366308]	(omitted)	(omitted)

Offer Size	-0.0001483**	-0.0000525**	0.00000547	-0.0002993	0.0001694
	[0.0000599]	[0.0000238]	[0.0000416]	[0.0002234]	[0 .0001335]
Basic EPS	-0.0024469***	0.0112766	-0.0230561	0.0044464	0.06449
	[0.0007498]	[0.0094857]	[0.0253333]	[0.0227212]	[0.1685129]
ROA	0.0006605	-0.001416	-0.0000283	0.0002601	-0.0043391
	[0.0004867]	[.0010048]	[0.0008557]	[0.0003193]	[0.0029852]
Constant	0.2833378	0.1034249**	0.1846408***	0.366532 ***	-0.0348781
	[0.2002737]	[0.0424413]	[0.0108031]	[0.0946064]	[0.1323424]
Number of observations	113	226	95	147	12
R-squared	0.0194	0.0160	0.0047	0.0040	0.2434

Notes: Table displaying the results of the multivariate regression carried out at the industry level. Panel A entails the results for the first 5 industries whilst panel B entails the results for those of the remaining five. The regression coefficients, robust standard error and significance indicators are provided.

Concerning the method of going public, only the financial industry sector generated a statistically significant coefficient (at the 10% level) for the traditional dummy. This coefficient can be interpreted as follows: within the financial industry, traditional IPOs are associated with, on average, 12% higher first week returns than SPACs, providing further evidence to support the initial hypothesis (H1). Although in this case this was the only significant coefficient attained across all industries, these results coincide with those of Laokulrach (2015) who, within his study of Thai IPOs, also found that the financial industry sector had the highest short-term returns. Regarding the effect of the offer size, on the other hand, we obtain significant results across several industries, namely: Communications, Consumer Cyclical, Consumer Non-cyclical, Diversified, Energy and Financial. All of which suggest a negative association between the offer size and the first week returns, providing evidence to go against the initial hypothesis (H2). Generally speaking, the coefficients obtained for the firm specific fundamentals were insignificant, with the exception of the Basic EPS coefficient of the Consumer, Non-Cyclical regression implying an increase of 1 in the basic EPS of a firm is associated with, on average, a 0.03% increase in first week returns.

Lastly, it is a worth noting that on average the R-squared of the multivariate regression models for each industry is higher than that for the univariate regression models, which is to be expected as this is usually the case when adding additional explanatory variables. Nonetheless, none of the regression models ran throughout this entire study have a substantially high R-squared (>0.5), indicating a relatively weak performance and ability of the explanatory variables to explain the variation of the first week returns.

CHAPTER 6 Conclusion

6.1 Purpose of this Study

Given their recent resurgence in popularity and rebranding as a lucrative alternative to traditional IPOs, it was decided that this paper will perform a comparative analysis on how the IPO anomaly and global phenomena of IPO underpricing, differs for SPACs. The research question of this paper can be explicitly stated as the following:

How do short-term returns of traditional and SPAC IPOs differ within various UK stock market industries?

After extensive investigation, it has become evident that the already existing knowledge and research on this topic is not only scarce, but also of contradicting nature. When it comes to identifying which alternative to going public is faced with a greater degree of underpricing, several previous studies have found evidence to support either side of the argument. Furthermore, the limited amount of research that is available to public, seems to be concentrated within the US stock market, considering it is the global hub of SPACs. Hence, this study offers an unprecedented and important perspective/approach to the IPO anomaly. With companies such as Snowflake missing out on potential profits of $3.8 billion (CNBC, 2020) it has become clear that understanding this phenomenon remains relevant in order to mitigate this resulting market inefficiency known as money "left on the table".

6.2 Method, Results & Implications

In order to address the prevailing research question, IPO data for a sample of 1,239 UK IPOs was obtained from the financial database "Bloomberg". This data was then processed and used to run several univariate and multivariate cross-sectional regressions on both the market and industry level. Additionally, the Fama French 3 factor model was carried out, incorporating market risk, size and value factors into the regression, thereby facilitating a better understanding of the risk-adjusted returns of IPOs and the factors, beyond general market movements, that drive said returns.

Unfortunately, the findings of this study were far from ideal, leaving much to be desired in terms of statistical significance. Despite the overall market analysis generating statistically significant coefficients for the central variables of interest, namely offer type and offer size, the significance of individual industry regression coefficients fluctuated immensely. Furthermore, the results seem to adhere to the contradicting nature of the studies discussed within previous literature section, often yielding opposing relationships from one industry to another. Nonetheless, if we take a step back and consider exclusively the entirety of significant results obtained from all regressions, certain conclusions can be drawn regarding our initially formulated hypotheses.

To summarize, whilst both the univariate and multivariate regressions of the industry analysis provide evidence supporting the first hypotheses (H1), the results of the overall market analysis go against the former. Nonetheless, as the industry analysis entails a far greater number of regressions and ensures more efficient comparability through effective matching of firms, the overall stigma likely tends to support H1, suggesting SPACs are faced with lower degrees of underpricing and first week returns. When it comes to the second hypotheses (H2), which states that IPO size is positively correlated with the degree of underpricing, we are faced with a more consensus view supported by both the industry and overall market analysis. All the evidence goes against H2, suggesting the monetary proceeds/value of the IPO is negatively correlated with the degree of underpricing. These results can help underwriters, investors and private firms make more informed decisions regarding the initial pricing of shares, the future potential and risk associated with certain investment opportunities and ultimately the method for taking a firm public.

6.3 Limitations & Future Research

However, this study suffers from a certain number of limitations that cannot simply be ignored. To begin with, of the 1239 IPOs within our final sample, only 36 of these were SPAC. This discrepancy in sample size leads to a more limited representation, loss of statistical power and precision of estimates and ultimately may present comparative challenges. This substantial difference in IPOs is a result of the nature of our data and cannot be prevented considering SPACs are still trailing far behind traditional IPOs in terms of popularity. What other researchers can however do in future studies to reduce the potential bias caused by the sample size discrepancy is introduce a weighting system in their regression models to accurately reflect the contribution of each observation. Furthermore, the regressions conducted within this study likely suffer from omitted variable bias resulting in endogeneity and inconsistent estimators, as it is not possible to account for all known factors that affect IPO underpricing and the various explanatory variables. Underwriter characteristics such as rankings are known to effect IPO underpricing and can therefore represent a potential omitted variable.

Like the IPO underpricing phenomenon, the long-term underperformance is another of the IPOs many anomalies that has yet to be explored thoroughly. A study like this one, comparing the long-term returns of traditional IPOs and SPACs, could offer valuable insights into this untapped field and present a solid foundation for future research.

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APPENDIX A

Table A: Auxiliary Regression "White Test" results

$$Squared\ Residuals = \alpha_i + \beta 1_{Traditional} + \beta 2_{Offer\ Size} + \beta 3_{Basic\ EPS} + \beta 4_{ROA} + \epsilon_i$$

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

	Coefficient	Standard Errors	t	P>[t]
Traditional	-0.965766*	0.5004228	-1.93	0.054
Offer Size	-0.0001501	0.0001271	-1.18	0.238
Basic EPS	-0.0013827	0.0153935	-0.09	0.928
ROA	-0.0023247	0.0015829	-1.47	0.142
Constant	1.29285***	0.4940689	2.62	0.009
Number of observations	1,239			

Notes: Table displaying the results of the auxiliary regression "White test" which entails regressing the squared residuals of the original multivariate cross-sectional regression on the explanatory variables. The regression coefficients, robust standard errors, test statistics and p-values are provided.