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The Influence of a Private Equity Fund's Holding Period on the Performance of IPOs:

Empirical Evidence from the UK

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ABSTRACT

This paper analyses the effect of a private equity fund's holding period on the after-market performance of initial public offerings (IPOs) in the United Kingdom. We use a hand-collected sample of 166 sponsor-backed IPOs, which occurred on the London Stock Exchange's Main Market and Alternative Investment Market in the period from 2005 to 2015, to analyse the one-year and three-year buy-and-hold excess returns in relation to the private equity fund's holding period. First, we find that private equity backed IPOs significantly outperform the market, at least for the one-year time horizon post IPO. However, our results do not evidence the existence of significant differences in after-market performance based on the holding period. Instead we find that size and market timing are the most influential factors driving performance of sponsor-backed IPOs. Thus, our results indicate that sponsors tend to list their portfolio companies in times of hot market conditions instead of holding on to their investments. We additionally find that rather than classifying by holding period, a differentiation by sponsor type produces significant results as Buyout Capital-backed IPOs outperform Venture Capital-backed IPOs and highlight the resulting implications for future research.

Keywords: Financial Sponsors, Private Equity, Venture Capital, IPO, Holding Period

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1 INTRODUCTION

The first section of this paper introduces the academic setting, describing the main research areas and goals, as well as introducing relevant background information that serves to shape an understanding of the topic in question. Moreover, an initial description of the empirical methods used and our main results are presented.

1.1 INTRODUCTION AND MOTIVATION

In 2017 private equity activity in Europe has reached its highest level in a decade, both in terms of investments, with €71.7 billion spread across approximately 7,000 companies throughout the continent, as well as with respect to fundraising, which stood at €91.7 billion raised in 2017 alone (Invest Europe, 2018). The attractiveness of private equity has been fuelled by the current environment of all-time low interest rates, quantitative easing efforts in the European Union and investors' search for returns given the aforementioned.

This recent influx in capital towards the private equity industry in combination with buoyant market conditions have led to a series of sponsor-backed initial public offerings (IPOs), which have not gone unnoticed by the general public. While media and business press scrutinise the strong returns that financial sponsors have been able to generate for their capital providers – sometimes in very short time frames – the general public has started to wonder whether formerly sponsor-owned, privately-held companies provide good investment opportunities in the public markets. This is particularly interesting as numerous such opportunities will arise in the coming years driven by high levels of investment activity and the subsequent wave of exits by financial sponsor firms.

In general sponsor-backed offerings have attracted a great variety of empirical research throughout the past. More particularly, the performance of these offerings has been studied in closer detail, suggesting that sponsor-backed offerings outperform other IPOs and the market as a whole (Schöber, 2008; Cao and Lerner, 2009; Levis, 2011). While explanations for the outperformance vary greatly in nature, it is notable that the time the financial sponsor held its investment prior to IPO, i.e. the holding period, has not been at the core of previous studies trying to explain the performance of sponsor-backed IPOs. This is highly relevant given that holding periods are key in investment considerations for financial sponsors. Especially as capital raised for undertaking investments,

typically in form of closed-end funds with a limited life, needs to be returned to investors in a structured and timely manner, thereby restricting the possible holding period of a financial sponsor.

In light of the aforementioned outperformance of sponsor-backed IPOs and the identified research gap, this paper intends to understand if these equity offerings in public markets generate excess returns and whether they are influenced by the holding period of the financial sponsors. Our paper thus integrates the aspects of holding periods and post IPO performance of sponsor-backed offerings and aims at narrowing the gap in current academic research and literature.

We study a sample of 166 (158)¹ sponsor-backed offerings on the London Stock Exchange (LSE), more specifically on its Main Exchange and Alternative Investment Market (AIM), between 2005 and 2015. Our study focuses on the market in the UK as it is the biggest European capital market and has the highest sponsor activity (Invest Europe, 2018). The IPOs are split into three groups depending on the holding period: 1) 0 - 3 years (quick-flips), 2) 3 - 7 years (standard investments), and 3) 7+ years (long-holds). By examining the buy-and-hold returns of these offerings in the public markets for one year and three years as such and also in relation to its prior holding periods, this paper provides insights into how the holding period influences the post IPO performance.

We find that sponsor-backed IPOs significantly outperform the market for the first year after the IPO and that performance for the longer term, i.e. three years post IPO, is not statistically significant, while still positive. Moreover, our results do not evidence that there are significant differences in the after-market performance based on the holding period of financial, but rather that size and market timing are significant factors driving performance of sponsor-backed IPOs.

¹ n=166 for the performance in the first twelve months post IPO and n=158 for the performance in the first 36 months post IPO as some companies were delisted, acquired or went into administration during the three-year time frame

1.2 BACKGROUND ON FINANCIAL SPONSORS

1.2.1 DEFINITION OF PRIVATE EQUITY

While public equity, as the term suggests, is available to the general public and usually traded through regulated exchanges such as the LSE, private equity is capital provided to firms that are not publicly traded and thus not readily available for the general public to invest in. Invest Europe (2018) defines private equity as form of equity investment into companies that are not listed on the stock exchange, characterised by a medium- to long-term investment horizon in combination with active ownership. Söderblom (2011) points out that the aforementioned private equity investments may be used by the firms to develop new products and technologies, improve the financial position of the companies via investments in working capital or the company's balance sheet, to engage in mergers and acquisitions, or to acquire the interests of other shareholders.

1.2.2 TYPES OF PRIVATE EQUITY FIRMS

Private equity firms, often also referred to as financial sponsors, show a variety of characteristics, especially in terms of their investment criteria, industry focus and investment types. Generally, private equity firms are divided into two categories: Venture Capital (VC) and Buyout Capital (BO).

Venture Capital is a form of private equity investment that is supplied to mostly young companies that often do not generate any revenue to date but show strong future growth and value potential (Hahn, 2014). Besides acquiring minority stakes, VC firms usually provide know-how and a network of business contacts to their portfolio firms in order to accelerate the growth and improve their operational efficiency (Pott and Pott, 2012). On the other hand, BO capital is financing used to acquire the majority interest in a company, which is usually a mature firm providing stable cash flows and solid visibility on future performance. Moreover, BO may use significant borrowed capital in form of debt in order to be able to finance the acquisition (Invest Europe, 2018). This is also where the term leveraged buyout (LBO) stems from, which is often mistakenly used interchangeably with the private equity industry as a whole. Ultimately, it should be noted that the boundaries between the different types of private equity players are being increasingly blurred. For instance, BO firms have recently also engaged

in pursuing investment opportunities that resemble the ones of Venture Capitalists and Growth Equity firms (Cao and Lerner, 2009). This observation can further be exemplified by the fact that traditional buyout funds such as EQT have branched out to becoming multi-strategy alternative investment managers adding amongst others Venture Capital and infrastructure strategies to its portfolio.

1.2.3 THE CLOSED-END FUND STRUCTURE

Financial sponsors raise capital from investors, also known as limited partners (LPs), via a private equity fund, which is usually in the form of a closed-end investment vehicle. This holds true for the various sub-categories of private equity firms such as Venture Capital, Growth Capital and Buyout Capital. A closed-end structure implies that investors are unable to withdraw their capital until the fund is terminated and capital is redistributed to investors. An inherent advantage of this structure is that fund managers can rely on the capital commitments unlike in mutual funds, where capital can usually be withdrawn at any given point in time and positions, thus, need to be liquidated to satisfy distributions of capital (Stein, 2005). Closed-end fund structures such as most of the private equity funds typically have a fixed lifespan of ten years. However, partnership agreements often entail provisions for extending the designated life of the fund by up to three additional years. In the majority of these provisions some level of consent is required from the LPs (Sahlman, 1990). At the end of a fund's life all investments need to be exited, the capital is then distributed according to a predetermined distribution schedule and the fund's legal existence ceases to exist. Given the fixed life of the funds, the fund managers typically have up to five years to invest the committed capital into companies, the draw-down or investment period. After that, the remaining five to eight years are used for exiting the investments and realising returns. Consequently, the holding periods of private equity investments are limited. As the holding period is critical to this paper, please refer to a detailed literature review in section *2.2 Holding Periods of Sponsor Investments*.

2 LITERATURE REVIEW

The second chapter summarises previous academic papers in the field of private equity that are closely linked to this paper. First, the investment as well as the holding periods of private equity funds are closer examined as these are critical for this paper. Subsequently, a detailed discussion of the performance of private equity backed IPOs is provided. This chapter ends with a brief summary of previous studies that evolved around the influence of holding periods on after-market performance and thus provides a transition towards the empirical setting of this study.

2.1 PRIVATE EQUITY INVESTMENT PERIOD

After the initial deal sourcing and structuring, the investment period is initiated with the signing of the purchase agreement. VC firms typically acquire smaller minority stakes and build up their stake over several funding rounds, whereas BO firms acquire majority stakes at once (Visnjic, 2013). Once invested, PE firms initiate a set of changes that can be categorised in financial, governance and operating improvements. Noteworthy initiatives from BO firms are aligning management incentives via equity programs, using leverage, establishing a professional board of directors, assisting with add-on acquisitions and improving capital efficiency (Kaplan and Strömberg, 2009). As VC firms do not have majority control within their portfolio firms, initiatives to improve and expand the operations of their portfolio companies differ from the ones of their BO counterparts. VCs, thus, assist managements with providing a vast business network, implementing governance structures and improving capital efficiency amongst others (Pott and Pott, 2012). As implementing changes within organisations requires time, financial sponsors typically aim at holding their investments for three to seven years (Söderblom, 2011). This time frame enables the portfolio firms to improve and expand operations, which should ultimately lead to a higher valuation, while being well-positioned for a new owner.

2.2 HOLDING PERIODS OF SPONSOR INVESTMENTS

Closed-end fund structures with a determined life and thus a limited investment horizon have major implications on how financial sponsors go about evaluating investment opportunities. One of the key considerations that naturally arises is evaluating potential exit routes before the fund has even invested in a company. A

financial sponsor's ability to successfully exit its portfolio holdings is deemed to be crucial for the generation of returns. In light of the topic of this paper, it is therefore important to understand how long sponsor-backed firms are held before being floated on the stock exchange. Existing literature refers to this aspect of temporality in private equity investments as longevity (Cao, 2011).

2.2.1 IPO TIMING

There is widespread evidence that financial sponsor firms create value for their investors and within their portfolio companies (Weir et al., 2008; Guo et al., 2011). Yet, some critics argue that sponsor firms primarily create value by exploiting favourable market conditions, which is also referred to as timing the market (Cao, 2011). Studies on market timing suggest that market conditions are the single most important factor when entrepreneurs and owners decide on whether to go public (Ritter and Welch, 2002; Pástor and Veronesi, 2005). One significant benefit of timing the market is that taking a firm public when valuations are high reduces the effect of ownership dilution (Lerner, 1992).

Evidence from Cao (2011) and Lerner (1992) shows that the holding periods are negatively related to hot stock market conditions, meaning that BO- as well as VC-backed firms go public when valuations are high. Interestingly, seasoned financial sponsor firms appear to be highly sophisticated in that regard, as they float portfolio companies near peak valuation levels in the public markets (Lerner, 1992). Albeit the fact that being able to time the market improves returns generated for sponsor firms, it also has negative impacts on the operating performance of the firm that went public. More specifically, firms that were only held for a shorter period of time before being pushed into the public market experience greater deterioration of operating metrics such as Return on Asset and EBITDA margins compared to others and also the probability of financial distress increases significantly (Cao, 2011). From the above, it can be inferred that a financial sponsor's efforts towards improving the operating performance of portfolio companies succumb to timing the market.

2.2.2 EXIT BEHAVIOUR OF FINANCIAL SPONSORS FOLLOWING IPOS

Generally financial sponsors have three ways of exiting their investments: (i) trade sale to a strategic acquirer, (ii) sale to another financial sponsor, or (iii) sale to the

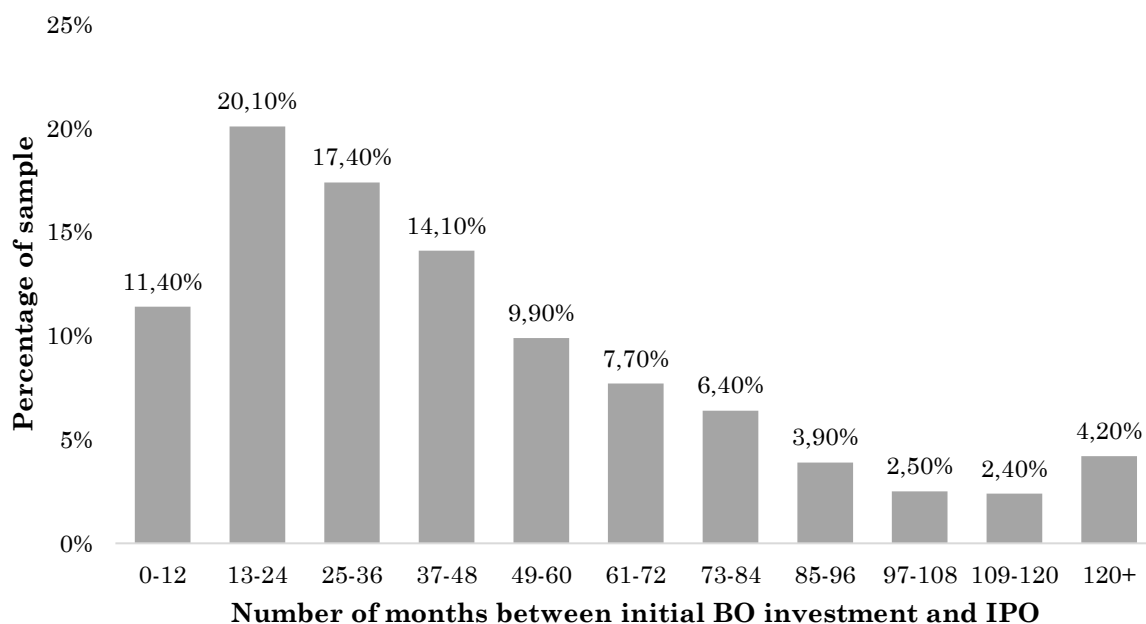
general public by means of an IPO. Evidence suggests that there is a significant relationship between the exit strategy and longevity. More particularly, investments that are exited via public markets are held shorter than those exited through secondary buyouts or trade sales to strategic acquirers (Sudarsanam and Nwaghodoh, 2005). However, it should be noted that under normal circumstances an IPO is not the equivalent of a full exit of the sponsor, but often merely the beginning of the exit process. PE firms typically retain a significant stake within the firm that went public and remain invested a substantial time, two to three years, post IPO before fully exiting via subsequent stake sales in the public market (Barry et al., 1990; Lin and Smith, 1998; Brav and Gompers, 2003; Fürth and Rauch, 2014). One restriction that prevents financial sponsors from selling shares during an IPO is the lock-up agreement. This provision prevents insiders (investors, management, and employees) from selling shares for a period of typically 180 days post IPO and is designed to align interests between insiders, such as the sponsor firms, and the general public (Schöber, 2008).

2.2.3 EVIDENCE OF HOLDING PERIODS

Söderblom (2011) finds that the holding period for later stage investments, such as BOs, is expected to be around three to five years, while earlier investments, such as VC-type investments, tend to be longer in nature with an expected holding period between five to seven years. Moreover, she argues that during economic downturns financial sponsors are forced to keep their investments longer than the aforementioned three to five years. This is intuitive given the lack of exit opportunities in times of economic crisis, as there will be lower interest from potential strategic or financial acquirers or the general public when considering an IPO as exit route. Also, as mentioned earlier, the sponsor's ability and desire to time the market plays a significant role when it comes to exiting investments. One of the first studies on the longevity of LBOs by Kaplan (1991), finds that the median holding period of LBOs is just under seven years (6.82 years). In a more recent study of 921 BO-backed IPOs, Schöber (2008) finds that the median holding

period is a short 38 months. *Figure 1* shows the distribution of holding periods in Schöber's (2008) sample.

Figure 1. Distribution of holding periods for BO-backed IPOs



Histogram of the time between the initial buyout-type investment and the IPO based on a sample of 921 buyout-backed IPO firms (Schöber, 2008).

Even shorter holding periods than the ones found by Schöber for BO-backed IPOs were found by Cao (2011) for reverse leveraged buyouts (RLBOs). His sample comprising 594 RLBOs between the years 1981 and 2006 shows a median holding period of 2.83 years. This shorter period of being held privately by a PE fund can partly be explained by a better IPO readiness of firms that undergo RLBOs, as these were publicly listed previously and are, thus, very likely to already have governance and reporting structures in place similar to those of public companies.

Evidence for VC-backed firms suggests that the timing of going public is strongly influenced by current levels of market valuations (Lerner, 1992; Cumming and McIntosh, 2001; Giot and Schwienbacher, 2007; Hochberg et al., 2008). Lerner (1992) and Hsu (2009) – both examining VC-backed IPO firms – find that the median holding period is 4.30 years and 4.49 years respectively. The observed differences in holding periods for VCs and BO firms can be related back to Söderblom's (2011) statement that investments at an earlier stage are expected to be held longer by financial sponsors.

2.3 PERFORMANCE OF SPONSOR-BACKED IPOs

Existing literature provides mixed results with respect to the after-market performance of sponsor-backed IPOs. For instance, Brav and Gompers (1997), using equally weighted returns, find that VC-backed IPOs outperform non-VC-backed IPOs, examining a sample of 934 VC-backed IPOs in the US between 1972 and 1992. They argue that the outperformance stems from better corporate governance in the interplay with more professional management teams. Contrary to the findings of outperformance in the US by Brav and Compers, Hamao et al. (2000) using a sample of 355 IPOs of Japanese companies find no evidence that VC-backed IPOs perform better than their non-VC-backed counterparts. Their findings only show outperformance of IPOs that are either backed by independent VC funds or international VCs that are based outside Japan, suggesting that conflicts of interest stemming from the institutional affiliation of Japanese VC firms have an impact on the long-run performance of the IPOs. Consistent with these findings in Japan, Rindermann (2003) finds, studying a sample of 303 IPOs in Germany, France and the UK, that VC-backed IPOs do generally not perform better than IPOs of firms without VC-backing, but that merely a subset of internationally operating VC funds have a positive effect on the after-market performance. In line with Rindermann's findings, Coakley et al. (2007) do not find evidence of significant differences in terms of performance of VC-backed IPOs, studying a sample of 571 non-VC-backed and VC-backed IPOs in the UK between 1985 and 2000. Yet, their findings indicate that VC-backed IPOs outperform in normal macro-economic environments and market conditions. These findings in combination with those of Rindermann further suggest that the observations of long-run after-market outperformance of VC-backed firms in the United States do not simply hold true in Europe.

Beyond flotations backed by VC funds there is also empirical evidence on the performance of IPOs backed by buyout funds and more specifically the performance of reverse leveraged buyouts. An RLBO is a special type of IPO in which the firm has been taken private by a PE fund, in other words delisted from a stock exchange, and is then again floated on the stock exchange as means of an exit for the BO firm. Given the prior public status of firms undergoing a RLBO, it is important to mention that prevailing literature suggests that these types of

offerings are associated with a lower degree of information asymmetry (Schöber, 2008). One of the earliest studies published by DeGeorge and Zeckhauser in 1993, examining a sample of 62 RLBOs in the US between 1983 and 1987, finds no evidence that the after-market performance of these equity offerings underperform the market as such. In line with these findings, the results from Holthausen and Larcker (1996) show no evidence of market underperformance, examining 90 US RLBOs between 1983 and 1988. Different from previous findings, Mian and Rosenfeld (1993) examine 85 RLBOs between 1983 and 1988 and first find these offerings significantly outperforming the market. They attribute this outperformance primarily to activity in mergers and acquisitions, especially in the second year of being publicly listed. Moreover, Schöber (2008) finds that BO-backed IPOs significantly outperform the market, studying 496 BO-backed US IPOs between 1990 and 2001. Lastly, Cao and Lerner (2009) studying a sample of 496 RLBOs during 1980 to 2002 provide empirical evidence that RLBOs outperform the market and other IPOs in the first five years after going public but find that leverage is not enhancing performance. Prevailing literature therefore seems to suggest that there is evidence of BO-backed IPOs consistently outperforming, at least in the US. In Europe, however, the availability of previous studies is quite limited. Bergström et al. (2006), using a rather small sample of 38 BO-backed IPOs and 68 non-BO-backed IPOs between 1985 and 1998 on the Amsterdam Stock Exchange, find that BO-backed IPOs outperform their counterparts. More recently, Levis (2011), examining a large sample of 1,595 IPOs listed on the London Stock Exchange between 1992 and 2005, finds evidence that BO-backed IPOs achieve positive and significant performance, both in equal and value weighted terms, throughout the entire 36-month period in the after-market. In contrast hereto, Levis' research finds that UK IPOs backed by VC funds are poor performers, especially on a value weighted basis.

While there is evidence that BO-backed IPOs are associated with superior long-run performance regardless of whether these IPOs took place in the US or in Europe, VC-backing prior to IPOs tends to provide mixed evidence. Generally, there is a large number of literature available that evidences outperformance of VC-backed IPOs for a limited amount of time post IPO. These findings are linked to the end of lock-up periods that VCs are bound by when listing their portfolio

companies (Levis, 2011). Furthermore, studies of US-based VC-backed IPOs evidence after-market outperformance compared to non-backed flotations while data from Western Europe is unable to confirm these findings. As of today, the drivers of these vast performance differences remain unclear and should be subject to further research.

2.4 INFLUENCE OF HOLDING PERIOD ON AFTER-MARKET PERFORMANCE

Only a few academic papers elaborate on whether there is a relationship between the holding period of financial sponsor firms and the performance post IPO. First, Napier et al. (2001), examining a sample of 133 VC-backed IPOs in 1999, as well as Hsu (2009), using an extensive sample of 1,755 VC-backed IPOs between 1980 and 2004, find that a longer holding period relates to better after-market performance. Their findings suggest that firms that have been held longer by VC firms earn more patents and have a stronger financial position, which contributes to better performance in the public market. As regards the performance of BO-backed IPOs, both Schöber (2008) and Cao and Lerner (2009) provide evidence that the length of the BO funds' holding period prior to the IPO is hump-shaped related to the after-market performance of these IPOs. Evidently, BO-backed firms that go public within 12 months of the BO investment perform significantly worse than those held three to five years. The main driver of this underperformance seems to be the sponsor firm timing the market and pushing a not IPO-ready as well as often overleveraged company into the public market, without having realised many operating improvements within the firm. This can be related back to the investment period of financial sponsors, as implementing changes to a firm's operating, financial as well as governance structures usually requires time. Notably, showcasing the effective implementation of these changes is important before marketing a company to potential acquirers, i.e. strategic buyers, other financial sponsor or the general public, as a better, more valuable company, thereby paving the way for a successful exit on behalf of the financial sponsor. Interestingly, both papers find that firms held longer than the respective median holding period prior to IPO perform slightly worse than the median IPO, while still outperforming other IPOs and the market (Schöber, 2008; Cao and Lerner, 2009).

A common view would be that longer holding periods allow for more changes to the portfolio firms operations and thus creating a stronger firm for the public markets. However, longer holding periods might also be driven by operational problems, leading to a lengthier restructuring process that coincides with the closed-end fund structure. This in turn might force a sponsor to list a firm that is not entirely IPO-ready, thus explaining the lower after-market performance.

3 RESEARCH QUESTIONS AND HYPOTHESIS

The third chapter outlines the principal research topics of this research paper and lays out our hypotheses in light of the existing literature discussed above.

3.1 PERFORMANCE OF SPONSOR-BACKED IPOs

Prior research provides evidence of significant outperformance of BO-backed IPOs, whereas VC-backed IPOs show no clear sign of outperformance. Despite the differences in performance, we argue that sponsor-backed investments in general showcase advantages compared to other firms and the wider market, especially in terms of corporate governance structures. Therefore, we propose a hypothesis that somewhat differs from the results of prior academic research.

H1: Sponsor-backed IPOs, i.e. VC- and BO-backed firms that go public, outperform the market in the United Kingdom.

3.2 EFFECT OF HOLDING PERIOD ON POST-IPO PERFORMANCE

The performance of sponsor-backed IPOs in light of the respective holding period has received little coverage in current literature. What has already been documented is that BO-backed firms that have been held for a short period of time prior to the IPO perform poorly in the public markets. Moreover, research on VC investments shows evidence that longer holding periods are related to better after-market performance. Therefore, combining prior research with investing characteristics of financial sponsors provide reason to believe that the performance of sponsor-backed IPOs is related to the holding period. Therefore, we formulate our hypothesis in line with the results of previous literature.

H2: The performance of firms that have been held between three and seven years prior to the IPO, i.e. the standard anticipated holding period of financial sponsors that allows them to implement operational changes to their portfolio companies, outperform the market and other IPOs with holding periods other than three to seven years.

4 DATA AND METHODOLOGY

The fourth chapter provides a summary of the collected data and the statistical methods used for the research model. First, an overview of the collection, compilation and cleaning of the sample data is provided. Then, overall trends found in the data are described and discussed. At last, the statistical framework of the research model is introduced and relevant variables are explained as introduction to the main results.

4.1 DATA COLLECTION

The dataset is a hand-collected sample of 166 sponsor-backed firms that went public on the London Stock Exchange and its Alternative Investment Market over the period January 2005 until September 2015. The sample is focused on IPOs in London, because the UK is Europe’s biggest capital market and has the highest sponsor activity (Invest Europe, 2018), giving access to a sufficiently large sample within one geographic region. Focusing on the LSE and AIM further allows consistency within the sample in terms of stock market regulations, harmonised publication requirements and liquidity. The lower boundary of January 2005 was set to exclude the effect of the dot-com bubble, especially with regards to VC-backed technology firms, and also as the online availability of prospectuses prior to 2005 is rather limited. The upper boundary of September 2015 was set in order to enable observing three year buy-and-hold-returns at the time of data collection and also to ensure that most financial sponsors will have completely exited their investments.

4.1.1 SAMPLE SELECTION

Initially, a list of all sponsor-backed IPOs in the UK between January 2005 and September 2015 was retrieved from Bloomberg. This list was then cross-checked and amended with similar lists retrieved from S&P’s Capital IQ, FactSet, academic papers and industry reports. The total initial sample contained 219 sponsor-backed IPOs and was subsequently cleaned in accordance with the criteria i. – v. shown in *Table 1*.

Table 1. Sample collection and cleaning

Source:	# of IPOs
<i>Bloomberg</i>	125
<i>CapIQ</i>	23
<i>FactSet</i>	53
<i>Other sources: Industry reports, Academic papers</i>	18
Total Initial Sample:	219
Data Cleaning Criteria	
<i>i. Not PE-/VC-backed</i>	16
<i>ii. Reverse Takeovers</i>	4
<i>iii. Special Purpose Vehicles used to raise funds</i>	8
<i>iv. Global Depositary Receipts</i>	6
<i>v. Lack of data availability</i>	19
Total Excluded from Sample	53
SAMPLE SIZE (ONE YEAR)	166
<i>No data available for three-year excess returns</i>	8
SAMPLE SIZE (THREE YEARS)	158

Overview of the sample collection and sample cleaning according to criteria i. – v.

Exclusions on criterion i. were made as the firms were not sponsor-backed before the IPO, but mostly the public equity arms of private equity firms that acquired stakes during the IPO. Further, we exclude sponsor-backed firms that rose to public status by means of a reverse takeover under criterion ii. These were mostly performed by US-based sponsor-backed firms, who intended on shifting their tax base to the UK. Exclusions on criterion iii. were made as these were sponsor-backed vehicles used to raise funds in the public markets, mostly for real estate investment purposes. Also, IPOs of firms that had already been listed and priced on a stock exchange other than the LSE or AIM were excluded under criterion iv. These, therefore, do not meet the formal requirement of an IPO. Lastly, exclusions on criterion v. were made due to lack of data availability such as no information found on retained stake, the initial investment date and missing prospectus amongst others. Moreover, eight observations had to be excluded from the full sample for three-year returns, as these were delisted before completing three years on the market.

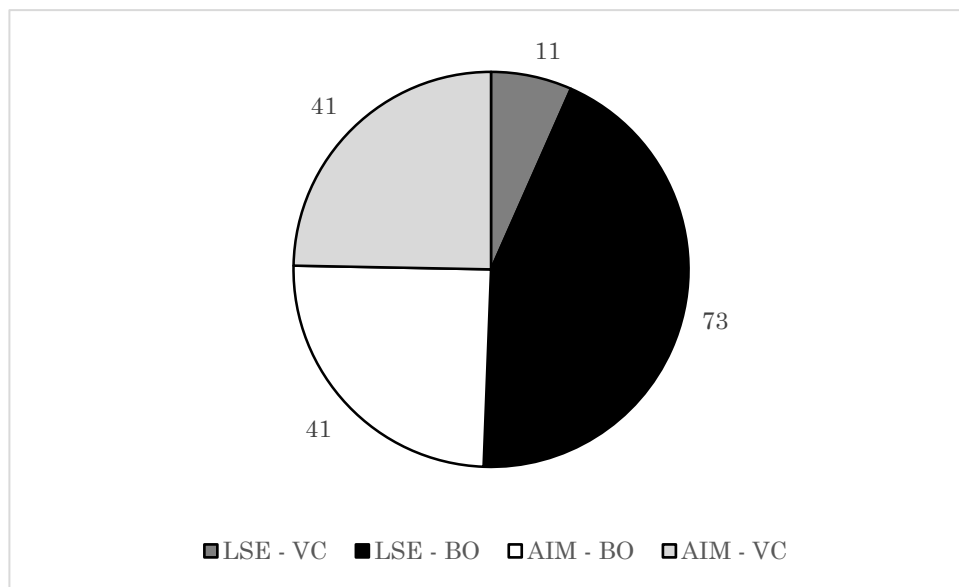
4.2 DESCRIPTIVE STATISTICS

The final dataset contains data for each company from before, during and after the IPO. It contains a total of 166 sponsor-backed initial public offerings between 2005

and 2015 in the UK that comply with the conditions set for our analysis. Therefore, it is worth mentioning that the data is only a subset of all sponsor-backed IPOs that happened in the given time frame. Nevertheless, the provided dataset still allows for meaningful statistics to be extracted.

First, we examine the distribution of sponsor-backed IPOs across UK's two main stock exchanges – the London Stock Exchange and the Alternative Investment Market – as well as the type of sponsor that backed the IPO, as visualised in *Figure 2*.

Figure 2. Split of IPOs between stock exchanges and types of sponsor

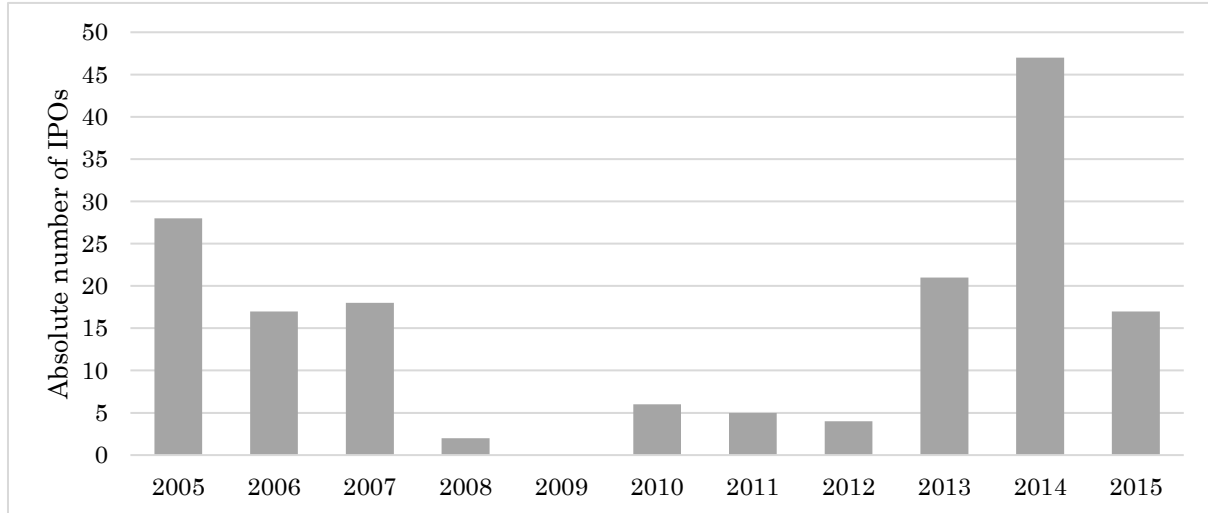


Distribution of the sponsor-backed IPOs in the sample between the UK's two main stock exchanges LSE and AIM as well as the type of sponsor that backed the IPO – either BO or VC.

The sample IPOs are evenly split between the two exchanges with 84 IPOs on the LSE and 82 on the AIM. In terms of the type of sponsor involved up until the IPO, we find 114 listings backed by one or more BO funds compared to 52 that are VC-backed. It is worth noting that we define an IPO as VC-backed if a Venture Capital fund had any involvement in the company in earlier growth stages that lasted until the offering. This means that companies that were backed by a VC in the earlier stages, but which subsequently sold its whole stake in the company prior to the IPO are not counted as VC-backed whereas VC-backed companies that were later joined by BO funds still count as VC-backed. As can be seen in *Figure 2*, over 85% of sponsor-backed IPOs listed on the LSE are BO-backed compared to

an even split between BO- and VC-backed IPOs on the AIM. This mainly due to higher regulatory and size requirements for newly listed companies at the LSE as the AIM aims to help smaller growing companies to raise capital (London Stock Exchange, 2018). Next, we present the number of sponsor-backed IPOs per year,

Figure 3. Distribution of sponsor-backed IPOs over time

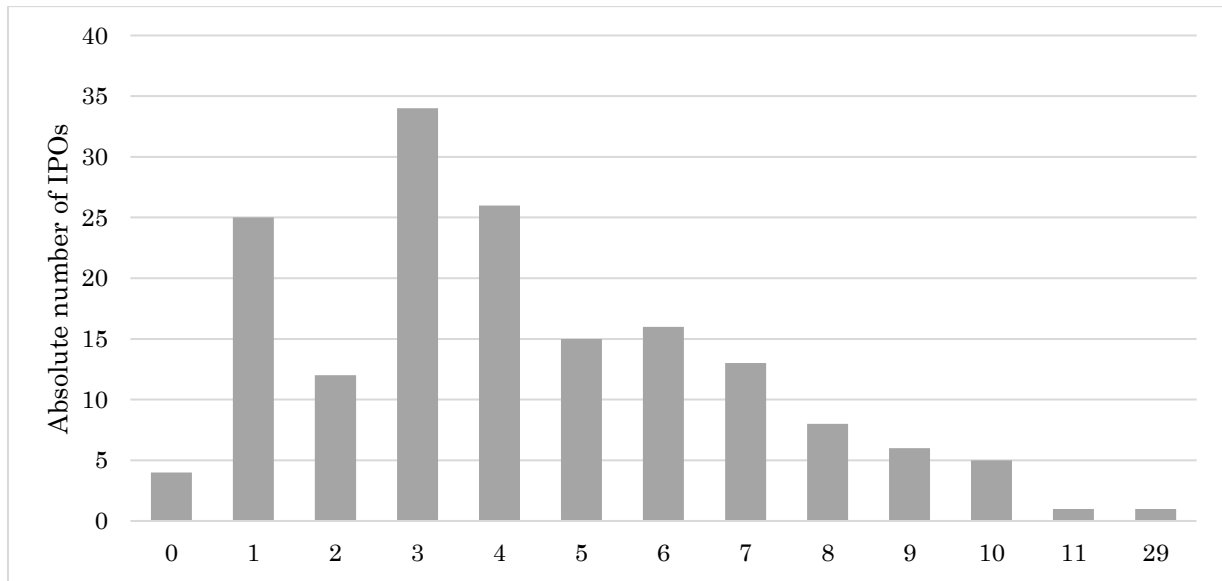


which is shown in *Figure 3*.

Total number of sponsor-backed IPOs per year between 2005 and 2015 based on the cleaned sample of 166 IPOs.

Yung et al. (2008) find that the number of new market listings in the US has a strong positive correlation with the general state of the economy. A similar cyclical trend can be observed within our sample. In times of economic booms, namely 2005 to 2007 and after 2013, a far higher number of sponsor-backed IPOs can be observed than during and shortly after the economic crisis with not a single sponsor-backed IPO at the height of the downturn in 2009. The trend of the latest boom continues until today. This is in line with studies previously mentioned in our literature review in which market timing is considered the single most important factor when deciding whether to take a company public (Ritter and Welch, 2002; Pastór and Veronesi, 2005). *Figure 4* shows the length of the period between initial investment and IPO for the companies in our sample.

Figure 4. Distribution of holding periods



Total number of IPOs based on the time period between initial investment or buyout and IPO of the portfolio company. Holding periods are rounded down and based on the cleaned sample of 166 IPOs.

Due to the closed-end nature of most private equity funds, the maximum holding period in our sample is 11 years with one VC-backed outlier with a holding period of 29 years. The typical holding period for sponsors, i.e. three to seven years, shows the majority of total IPOs. When looking at *Figure 4* one can see a steep increase of sponsor-backed IPOs between holding periods of two and three years as well as a relatively large decrease between years seven and eight. This distribution supports our classification of holding periods into the three groups zero to three years (quick-flips), three to seven years (standard investments) and more than seven years (long-holds). When comparing our holding period distribution to the research of Schöber (2008) presented in *Figure 1*, we find a similar right-tailed hump shape in our distribution. However, Schöber's sample has the highest percentage of IPOs with a holding period of 13-24 months, where our sample shows a significant drop. This could be explained by our research looking at a different time period and also Schöber's sample being considerably larger with a total of 921 buyout-backed IPOs. Another reason for this classification is process-related, as described in *2.2 Holding Periods of Sponsor Investments*. Buyout funds usually buy portfolio companies to implement improvements to their operating, financial and governance structures before

selling or listing them to generate returns. In case of a quick-flip, however, the time between buyout and listing is generally too short to implement lasting changes. These IPOs are typically driven by other factors, one of which is market timing. In times of hot markets, newly listed companies benefit from untypically high valuations, which is a main reason why PE funds might list a portfolio company at an exchange despite not having implemented substantial operational improvements (Yung et al., 2008). One strong indicator for this is that over 90% of quick-flips were listed at the peak of one of the two booms that coincided with our observed time period. This is supported by research from Cao (2011) and Lerner (1992) in which they find that holding periods are negatively related to hot market conditions. In most cases the efforts of sponsors to improve the operating performance of their portfolio companies therefore take on a lower priority than timing the market to achieve higher valuations.

The following table summarises the one-year and three-year excess returns of our dataset split by the groups of holding periods.

Table 2. Summary statistics

Summary statistics					
Holding period	Mean	Median	St. Dev.	Min.	Max.
<i>One-year performance (n=166)</i>					
0-3 years	12.8%	7.2%	0.5553	-76.8%	225.3%
3-7 years	8.9%	3.5%	0.5482	-82.2%	302.5%
7+ years	17.9%	12.4%	0.4683	-62.9%	208.2%
<i>Three-year performance (n=158)</i>					
0-3 years	24.4%	-17.0%	1.9998	-116.4%	1136.4%
3-7 years	3.5%	-14.9%	0.9088	-118.2%	392.8%
7+ years	-0.5%	-25.7%	0.6687	-84.7%	168.1%

Summary of the mean and median excess returns, standard deviation from the mean as well as minimum and maximum excess return for the one-year and three-year period after the IPO distributed across the three holding period groups.

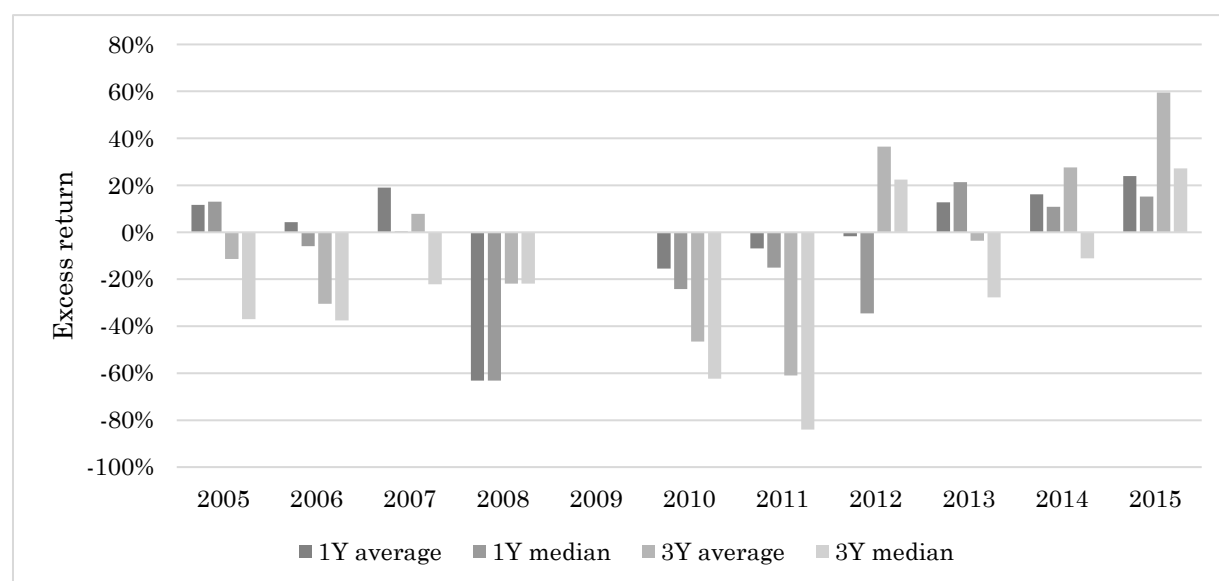
For the one-year performance both the mean and median excess return are highest for the long-holds, followed by quick-flips and standard investments of

three to seven years. However, all values are clearly positive, which could indicate market outperformance of sponsor-backed IPOs over a one-year time horizon. The standard deviations and minima are very similar, whereas the maximum of the standard investment group is nearly 80 percentage points higher than the second highest. At the same time that group also shows the lowest minimum, resulting in the largest spread of excess returns. Due to the increased time frame the three-year performance is more scattered, which can be observed by the higher standard deviations, especially for quick-flips. The means for this time frame vary greatly between 24.4% for quick-flips and -0.5% for long-holds. These values are strongly influenced by a small number of very well-performing stocks, as outperforming stocks can in theory have excess returns of several thousand percent compared to underperforming stocks that in worst cases show excess returns of just under -100% when compared to the market. This leads to a generally overstated performance when looking at the means and is also supported by the median numbers for the one-year excess returns as they all show substantially negative values. For the three-year performance the spread between the extremes becomes even larger compared to the one-year horizon with a global maximum of 1136.4% in the quick-flip group and a minimum of -118.2% for IPOs in the standard investments group. *Figures 7 and 8* in the appendix further show boxplots of the one-year and three-years return in relation to the holding period to support these observations. In general, it seems that the performance of the companies in our sample deteriorates quite substantially between one year and three years after IPO. This is in line with Schöber's (2008) research that finds a deterioration of performance between the 8th and 32nd month post IPO, which can be explained by the financial sponsors selling a substantial number of shares as they fully exit the investment. However, a trend in performance does not become apparent and the relations between the different holding periods differs from the hump-shaped trend observed by Schöber (2008) and Cao and Lerner (2009).

We further analyse different solvency and profitability measures for the companies in our sample (*Table 5* in the appendix). In general, we find that these measures vary greatly within our sample and as we lack the respective values for our benchmark, we are unable to make direct comparisons in this regard. However, if we plot the performance of the companies over the different profitability ratios,

we can see a positive correlation between the excess return and each of the four return figures, i.e. ROE, ROA, ROCE and ROIC, for both the one-year and three-year period. *Figures 9 and 10* (in the appendix) show the one-year and three-year performance of our sample companies over the return on equity. Since this profitability ratio constitutes the return generated for equity holders, it is the most closely related to market performance, which could indicate a positive correlation between operational performance and excess return. This supports one of the main assumptions of our research hypotheses as we expect portfolio companies that underwent a more thorough restructuring process, i.e. being held between three to seven years, to show a better after-market performance. In *Figure 5* we compare average and median one-year and three-year excess returns based on the year of the companies' IPOs.

Figure 5. Performance by IPO year

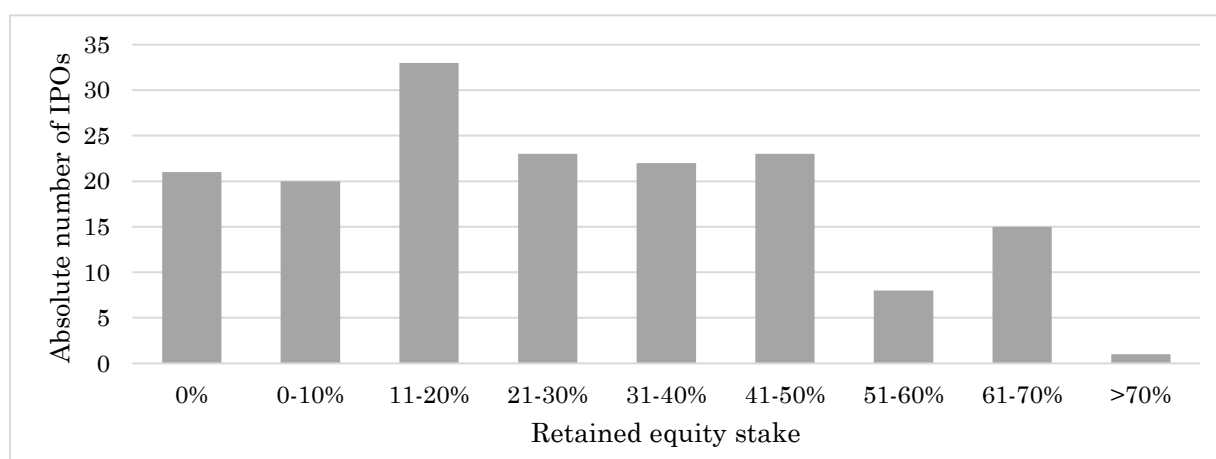


Average and median performance per year – Comparison of the performance of IPOs based on the IPO year shown as mean and median excess return over the market one year and three years after IPO.

As with the number of sponsor-backed IPOs per year, we can observe cyclicity in the performance of the individual companies – even more so since we also look at three-year returns. As a result, the majority of one-year returns between 2005 and 2008 are positive while the three-year returns are negative for the most part due to the end date of the three-year period coinciding with the global financial crisis. From 2012 going forward the returns start to become mostly

positive again as the overall economy moves into another growth phase. Between 2008 and 2011 all returns are strongly negative except for the peak of the crisis in 2009, where not even one sponsor-backed company was listed on the LSE or AIM for the whole year. However, the negative returns from this period are amplified by the generally low number of IPOs. In the five-year period between 2008 and 2012 only 17 companies from our sample were newly listed, which constitutes roughly 10% of the dataset. One individual company therefore has a much higher weight in a year's performance during this period. Another point worth noting is the relationship between one-year and three-year returns for a given year. As mentioned before, the three-year returns for IPOs right before the crisis are far lower than the one-year returns. For 2008 the logic is reversed as the one-year returns fall into the peak of the crisis whereas the three-year returns already benefit from recovered markets. For all other years the relationship seems rather arbitrary as we examine the firm's excess returns compared to the market rather than on its own. Therefore, an overall trend that could be extracted from the chart is that sponsor-backed IPOs in general outperform the market during good times but underperform during bad times. At last, we look at the equity stake of newly listed companies that sponsors retain immediately following the IPO.

Figure 6. Retained equity stake after IPO



Sponsor's retained equity stake after IPO – Stake of the company's equity the sponsors hold immediately after IPO. Does not include stakes of other types of investors involved before the IPO.

Between a retained equity stake of 0% and 50% the stakes are fairly equally distributed but the number of IPOs with a retained majority stake shows a sharp

decrease. Financial sponsors typically use IPOs to (partly) exit an investment, making it less desirable to remain the controlling shareholder. Another factor possibly conflicting with the fund's closed-end structure is the fact that it takes more time to liquidate a large percentage of a company's equity in the public markets. Furthermore, just over 10% of all sponsors do not retain any equity stake after the IPO. Fully exiting the investment at IPO has a negative signalling effect, which could impact the share price negatively. Furthermore, we can observe that only one of the 21 complete exits at IPO was VC-backed. This observation is likely attributable to the differentiated investment focus of VC firms, who generally target younger companies. Their primary objective of going public is to raise new funds instead of a pure exit strategy compared to IPOs of BO-typical portfolio companies. Therefore, IPOs should generally not be viewed as full exit of financial sponsors, but rather as an event that initiates the exit process with sponsors typically giving away majority control. Moreover, common literature suggests that sponsors typically hold their retained stake for two to three years before exiting fully, which we can additionally consider in our research when looking at the three-year performance (Fürth and Rauch, 2014).

4.3 METHODOLOGY

4.3.1 STATISTICAL FRAMEWORK

For our regression we run a Fixed Effects Multivariate Ordinary Least Squares (OLS) model with robust standard errors.

A standard OLS model is generally used as basis for linear regression as it models one response variable as a function of a single or multiple explanatory variables by minimising the squared deviations between predicted and observed values to determine the best-fitting model (Aiken et al., 1991). Since we also have to account for several control variables, a multivariate OLS model is the best choice for our regression.

We further need to expand this model with time fixed effects to control for the fixed effects the IPO years have on a company's excess return. This is due to the omitted variables problem, which describes the potential risk that not all effects of a regression can be explicitly explained by the underlying model. This can be exemplified by following model:

$$y_{it} = \beta_0 + \beta_1 x_{it} + v_i + u_{it}$$

In the given model u_{it} describes the idiosyncratic errors term and v_i refers to the unobserved effect. This unobserved effect is introduced to explain the remaining effects that the explanatory variables are unable to. That can either be seen as a random effect or a fixed effect. This effect could then be calculated for each of the respective observations, in our case years. It is important to note that an effect being fixed does not implicate this effect being non-random. Instead, it can be seen as unobserved fixed effect that – in contrast to the other explanatory variables amongst each other – can be correlated with those variables.

In the last expansion of our model we control for robust standard errors. We do this to correct our regression for potential heteroscedasticity. Heteroscedasticity refers to the residuals of a regression having a systematically different spread across the values measured by the model. Since standard OLS regressions assume homoscedasticity, we have to control our model for this additional factor. Heteroscedasticity increases the variance of and covariance between coefficient estimates. A standard OLS model would therefore underestimate these values, potentially leading to wrongly announced statistical significances (Johnston, 1972). Including this factor into our model and thus controlling for potential heteroscedasticity results in a more relevant and less skewed model.

4.3.2 REGRESSION MODEL

The regression model used to examine our main hypotheses is a Fixed Effects Multivariate Ordinary Least Squares (OLS) model with robust standard errors. We use following model to predict excess returns of sponsor-backed IPOs for the one-year and three-year period after IPO:

$$r_{i,t} - r_{index,t} = \beta_0 + \sum_{j=1}^3 \beta_{1j} Hold_j + \beta_2 Size_i + \beta_3 Stake_i + \sum_{t=1}^{11} \beta_{4t} Year_t + u_i$$

In our model β_0 denotes a constant, u_i a residual and the fixed effects year variables are dummy variables for the IPO years 2005 to 2015. The dummies are numbered $t=1$ to $t=11$, where the first year of our examined time frame 2005 is

year 1, 2006 is year 2 and so on until 2015, which is considered year 11. Since we further split our sample into three groups by holding period, the same is true for the holding periods. In this case $j=1$ refers to standard investments, $j=2$ to quick-flips and $j=3$ to long-holds. A short explanation of each variable can be found in *Table 3* below. Section 4.3.3 *Variable Specifications* explains the variables in further detail.

Table 3. Variable definitions

Variable definitions		
Variable	Definition	Denotation
<i>Company return</i>	Buy-and-hold stock return for firm i based on the first-day closing price as measure of performance	$r_{i,t}$
<i>Index return</i>	Return of the FTSE All-Share Index during the same time period as company i as market return	$r_{index,t}$
<i>Holding period</i>	Dummy variable for the time between initial sponsor investment and IPO for a company. Has the value 1 if the company falls in the respective holding period category and 0 otherwise	$Hold_j$
<i>Size</i>	Size of company i , measured as market capitalisation at IPO	$Size_i$
<i>Retained equity stake dummy</i>	Retained equity stake of all relevant, previously involved sponsors in company i right after IPO. Has the value 1 if a stake was retained and 0 otherwise	$Stake_i$
<i>Year fixed effects dummy variables</i>	Dummy variable for the IPO year of a company. Has the value 1 if the company was newly listed in year t and 0 otherwise	$Year_t$

Overview of all relevant regression variables, a short definition and their denotation in our model.

Following our definition, $r_{i,t} - r_{index,t}$ calculates the difference between company and index return, which represents company i 's approximated excess return above the market for a given period of time. This is used to both simplify the model and draw additional conclusions regarding the sponsor-backed IPO's performance compared to the market.

4.3.3 VARIABLE SPECIFICATIONS

Excess return ($r_{i,t} - r_{index,t}$)

We define a company's excess return as the difference between its compounded stock return after the IPO and the compounded return of the respective benchmark index, in our case the FTSE All-Share Index, during the same time period. This is also called the buy-and-hold abnormal return. We choose this indicator for several reasons. First, it represents the exact return a private investor would generate if they had invested into the company on its first day of trading, which has the closest real-life application. Second, it is easier to compute, as we only require four data points to calculate these returns, i.e. stock price and index level at IPO as well as stock price and index level after the observed time horizon. Thus, this approach is easier to calculate than for example cumulative abnormal returns for which monthly excess returns have to be calculated and summed up. Last, despite opinions in relevant literature varying as to which method to choose, they tend to lean towards buy-and-hold abnormal returns (Schöber, 2008).

The company return is defined as the buy-and-hold return for the company's stock price over a one-year and three-year period after IPO. We choose these two time frames to have an indicator for short-term and long-term performance as sponsors typically have completely exited their investments after three years. This is calculated by dividing the company's stock price exactly one and three years after the IPO date (or the closest trading day prior to that in case the exact date is a non-trading day) by the first-day closing price of the stock after IPO and subtracting one. The data was further adjusted for any developments that influenced stock price changes, e.g. (reverse) stock splits. By using the first-day closing price as calculation base, we already exclude the factor of underpricing in our model and do not have to further account for it with an additional control variable. Underpricing has been widely studied in relevant literature as one of the biggest factors influencing stock performance right after IPO (Dietrich, 2012). In the majority of cases the first-day underpricing, defined as the difference between first-day closing price and IPO price, is used synonymous to a stock's underpricing. Since we use the first-day closing price as starting value, we take any potential first-day underpricing out of the equation. The effects of general underpricing on our model is further discussed in section 5.3 *Data Limitations*.

We use the FTSE All-Share Index as the benchmark index in order to assess the excess return. The FTSE All-Share Index is comprised of over 600 of the more than 2,000 companies that are traded on the LSE and represents over 98% of the capital value of all companies listed in the UK (London Stock Exchange, 2018). Therefore, this is the best approximation of a real market index available for the UK. We calculate the market performance accordingly for the same period as the company's performance. Subsequently, we calculate the excess return as the difference between company and market performance. Bloomberg was used to collect relevant data.

Holding period ($Hold_j$)

The difference in performance between holding periods is the main focus of this paper. We define the holding period as the time between initial investment (for VCs) or initial buyout (for BOs) and the day of the IPO of the respective portfolio company. Thereby we define the initial investment time as the first time one of the sponsors that was still involved during the IPO held a stake of the company's equity. If a company has been sold from one financial sponsor to another and subsequently was listed on the stock exchange, the holding period would compromise the time between sale and IPO. However, if a VC made an early-stage investment in a company and a BO fund later joined the VC without buying it out, the time between first investment and IPO is regarded as the holding period.

We divide all 166 companies into three groups according to their holding period to test our *Hypothesis 2*. The main group comprises companies that were held between three and seven years prior to IPO. In section 2.2.4 *Evidence of Holding Periods* we discuss based on relevant literature that the typical holding period for a buyout-type investment is three to five years, whereas it takes five to seven years on average to exit a VC investment. On that basis we decided that the holding period for our standard investments should span three to seven years to cover exactly the periods mentioned in relevant literature. The second group are the so-called quick-flips with holding periods between zero and three years. These holding periods are shorter than the ones for standard investments, stemming from a variety of reasons. One possible reason is a hot market that would urge financial sponsors to initiate a quick IPO to benefit from higher valuations even

though the time frame is potentially too short to undertake lasting operational improvements in a company. This is also one of the main reasons we expect quick-flips to underperform compared to the standard investments. The third group encompasses all long-holds – companies that were held for over seven years prior to IPO. Due to the closed-end structure of BO funds, long-holds are rather rare to find as the companies must have been bought in the beginning of the new fund and only sold close to the end of the fund's life. BO firms are typically able to transform and sell portfolio companies in a shorter time frame, which could imply difficulties with operational changes or the sale of the company. An IPO might be the only option to liquidate an asset after not being able to find a buyer in a trade sale or secondary buyout. This in turn could indicate poorer future performance of the assets as we assume in our *Hypothesis 2*.

In our model we use dummy variables for the three groups to extract the influence that being in a certain group has on the performance. We denote the groups with $j=1$ for standard investments, $j=2$ for quick-flips and $j=3$ for long-holds. The dummy variables take on the value 1 if a given company belongs to the respective group and 0 otherwise. The holding periods for the respective companies were calculated based on announcements, media articles and IPO prospectuses.

Retained equity stake ($Stake_i$)

We define the retained equity stake as the share of a company's equity, that is controlled by all previously involved financial sponsors immediately after the IPO. In most cases the sponsors sell a part, but not their entire equity stake for a number of reasons. For instance, they want to partly liquidate their investment, reduce dilution of the retained shares, continue to influence the company and participate in future potential upsides. The resulting smaller size of the remaining stake also facilitates the future liquidation for the sponsor. Other investors view a complete exit immediately at IPO as a bad signal, which is why the sponsors' remaining stake is subject to a lock-up period in most cases.

We include the retained equity stake of the sponsors as a control variable in our model as it can be used as a proxy for continued involvement and alignment of interests between the sponsor, the portfolio company and the universe of outside investors. Since we also use the holding period and its implied influence on a

company's operational performance as an indicator for future stock performance, it can be argued that a retained equity stake has a positive influence on these factors going forward (Bruton et al., 2010). We decided to include the retained equity stake as a dummy variable because the data is rather noisy and also subject to a potential exercise of an overallotment options days after IPO. Furthermore, we believe that a higher retained stake does not necessarily equal more future involvement, especially when looking at minority stakes. For these reasons we decided to solely make a distinction between any and no future involvement in the company. The data on retained equity stakes for the respective IPOs was collected from Bloomberg, announcements, media articles, sponsors' websites and IPO prospectuses.

Size ($Size_i$)

Including the size factor of a company in the calculation of excess returns is widely used in relevant literature and also accounted for in one of the most famous economic theorems – the Fama-French three-factor model. One of the factors used in the model to explain a company's excess return is the factor SMB, standing for small minus big with regards to a company's market capitalisation. They state that smaller companies on average yield a higher return than bigger companies, which should be taken into account when predicting excess returns (Fama and French, 1992). This is also in line with earlier research by Modigliani and Miller (1963).

Thus, we include size as one of the control variables in our model. For this we take a company's market capitalisation at IPO as indicator for its size, which is the most commonly used proxy for size in prevailing literature as suggested by Fama and French (1992). We gathered the relevant data from the IPO prospectuses and Bloomberg.

Year fixed effects ($Year_t$)

For our model we use one fixed effects dummy variable per year in our observed time period between 2005 and 2015. A dummy takes on the value 1 if a given company was listed on an exchange in the respective year and 0 otherwise.

According to Torres-Reyna (2007), fixed effects models are widely used for time-varying variables for which a regression is supposed to capture changes in

the variables over time. In relation to that, Yung et al. (2008) make an argument for hot and cold IPO markets. Due to general market cyclicalities some companies' shares will float during times of higher average returns than others, making excess returns more dependent on the timing than other variables. This occurrence in OLS models is called endogeneity, which can lead to biased estimators. If some sponsors are able to benefit from good market conditions during their IPO more than others – which is what quick-flips usually try to accomplish – higher excess returns would be due to market timing instead of other factors. Statistically speaking, the state of the market would be considered an omitted variable that is allowed to be correlated with other independent variables, e.g. the holding period, taking the factor of market timing out of the equation.

5 RESULTS

The fifth chapter of this research paper summarises our research results. First, we present the results of the regressions we did to test our hypotheses. Second, we further analyse our regressions for statistical quality and accuracy. Last, we discuss potential problems and limitations of our regressions.

5.1 REGRESSION RESULTS

We use the statistical software environment of R to do all of the regressions. When using robust regressions in R, the program already controls for extreme outliers by down-weighting the respective observations. Thus, it is not necessary for us to winsorise the data, i.e. exclude extreme outliers from the sample, manually.

In a first step – prior to making any statement about the differences in performance dependent on holding periods – we test whether a general outperformance by sponsor-backed IPOs compared to the market can be observed. Therefore, we run a one-sided t-test as well as a similar regression to the one presented in *4.3.2 Regression Model* without accounting for the different holding periods. The results of the regressions and t-tests can be found in *Tables 6* and *7* in the appendix. We find that sponsor-backed IPOs outperform the market over the first year on a 99% confidence level with an expected excess return of 11.7%. Over three years the IPOs do not outperform the market on a statistically significant level, even though the expected excess return lies at 7.7%. Sponsor-backed IPOs therefore outperform the market in the short-term, but do not generate statistically significant excess return in the long-term. Furthermore, we test for the outperformance of the market for our three sub-samples based on their holding periods. Here we also find that all three groups – quick-flips, standard investments and long-holds – significantly outperform the market on their own over a one-year horizon whereas there is no statistically significant excess return for any of the groups over a three-year period. We believe that the short-term outperformance is due to stronger operational performance implemented by the sponsors during the holding period and less asymmetric information when listing the company. We furthermore think that the deterioration of performance between one year and three years after IPO is likely a result of sponsors fully exiting their

investments and putting downward pressure on the stock prices. We discuss this in more detail in section 6.1 *Performance of Sponsor-Backed IPOs*.

The results of our main regressions are presented in *Table 4* below.

Table 4. Regression results

Regression results								
one-year					three-year			
	(1)		(2)		(3)		(4)	
<i>Quick-flips</i>	6.319	(0.87)	6.613	(0.62)	1.641	(0.11)	26.73	(1.06)
<i>Long-holds</i>	5.131	(0.66)	6.018	(0.52)	-0.367	(-0.03)	-14.19	(-0.52)
<i>Size</i>	-0.0015	(-4.94)***	-0.0017	(-1.36)	0.031	(3.59)***	-6.0e-04	(-0.21)
<i>Retained stake</i>	-17.71	(-1.69)*	-6.514	(-0.50)	-11.67	(-0.61)	-14.73	(-0.48)
<i>Constant</i>	21.77	(1.85)*	15.447	(1.00)	-29.07	(-1.15)	-7.466	(-0.21)
<i>R</i> ²	0.1637		0.0659		0.1551		0.0727	
<i>Robust</i>	Yes		No		Yes		No	

Results of our main regression. Model (1) is the fixed effects OLS regression with robust standard errors for the one-year performance after IPO. Model (2) is the same regression without robust standard errors. Models (3) and (4) are the same regressions for a time period of three years. The respective t-values are presented in parentheses. Significance at the 10%, 5% and 1% level is shown by *, ** and *** respectively.

We run two different regressions for each of the two observed time periods – a fixed effects OLS regression with and without robust standard errors to control for heteroscedasticity. In both cases we can observe that the model with robust standard errors provides a superior regression with regards to the significance of certain coefficient estimates and the explanatory power of the model as a whole. Due to the way R sets up coefficients in a regression, the excess return of investments with a holding period of three to seven years are already accounted for under the constant. The coefficient estimates for quick-flips and long-holds are therefore relative to the standard holding periods. As can be seen from in *Table 4*, the estimates for quick-flips and long-holds are respectively 6.319% and 5.131% higher compared to standard investments. However, none of the two values differs significantly. In line with SMB factor in the Fama-French three-factor model, the

size of a company has a very significant (1% level) negative influence on the excess return of sponsor-backed IPOs with a coefficient of -0.0015%. Despite the low coefficient, the effect can be quite sizeable as the largest IPOs in our sample have market capitalisations north of a billion British pounds. The retained equity stake has also a significantly negative effect on a 10% level with an estimate of -17.71%.

When looking at the performance after three years, both models show hardly any statistically significant results. Size is the only factor in the model with robust standard errors that shows a statistically significant coefficient estimate with 0.031% on a 1% significance level. The coefficients for quick-flips and long-holds are 1.641% and -0.367% respectively, depicting low estimates that do not differ significantly from the standard investments. For this time horizon the retained equity stake also shows a negative effect on the excess return with -11.668% as an estimator, which also is not statistically significant. We find that the main reason for these statistically insignificant results is that there are other explanatory variables that have a stronger influence on the performance – namely market timing and size. This is discussed further in section 6.2 *Effect of the Holding Period on Performance*.

Our regression results further show the R^2 of each of the four models. R^2 refers to the explanatory power of a model. A R^2 of 0.1637 for our first model therefore means that the model is able to explain 16.37% of the variance in performance one year after IPO whereas the model without heteroscedasticity correction is only able to explain 6.59%. For the three-year performance, the model with robust standard errors has a similarly better fit compared to the standard model with a R^2 of 15.51% and 7.27% respectively.

5.2 TEST DIAGNOSTICS

In order to judge the statistical quality and accuracy of our main regression we perform some test statistics, which can be found in *Table 8* in the appendix. We provide statistics for both the regression with and without robust standard errors for the one-year and three-year performance. We perform an F-test to evaluate the quality of our models as it gives us the probability that all coefficient estimates are equal zero. Especially the high p-values for the non-robust models that show a high probability of all coefficient estimates being equal to zero stand out, indicating a

limited predictive power of those regressions. Since our p-values for the two models with robust standard errors are very low, there is no real risk that all estimates equal zero, which validates our choice of these models. This is further supported by the lower residual standard errors for the robust models, which means that they provide a better-fitting regression.

According to Woolridge (2010), standard OLS regressions are supposed to fulfil certain criteria in order to guarantee clear results that are not compromised in any way. For instance, there should be no correlation between the error term of the regression and any of the explanatory variables. Furthermore, the model should have no to very little correlation between each of the independent variables. This serves as a guarantee that each explanatory variable in the model is not too dependent on another variable, which could call into question whether a variable should be included in the model at all. With this check we ensure the contribution of every independent variable to the overall explanatory power of the model. In order to control our models for these requirements, we calculate the respective correlation matrices for the one-year and three-year performance in *Tables 9 to 12* in the appendix. As can be seen from these tables, the correlation values are generally comparably small, which further validates our model choice.

5.3 DATA LIMITATIONS

The test diagnostics above establish our model choice and even though the R^2 of the robust models seems low for general statistical regressions, for such scattered economic data it is comparably high with 16.37% and 15.51%. Nonetheless, our model still has limitations.

Throughout our cleaning process we had to narrow down our original sample of 219 companies to 166 and 158 companies, which represents roughly 70%. Paired with the fact that we had to obtain data from several different sources during the selection process, there is the risk of an underlying selection bias in our sample. We had to exclude 19 companies from our sample due to a lack of data. Smaller companies are more prone to be among the excluded firms, based on the fact that they do not follow the same strict publishing standards as bigger companies listed on the LSE, thus leading to an overrepresentation of the latter. Furthermore, we focus our research on the UK as the only European country with a sufficiently large

number of sponsor-backed IPOs. However, our sample size is still comparably small with a total of 166 listings. The last factor that could lead to a bias is the choice of observed time period, as we only observe a comparably short time period from 2005 to 2015.

In our model we account for first-day underpricing by basing the excess return on the first-day closing price of the company's stock. However, it is impossible to completely control for underpricing as stock prices are rather noisy in the days and weeks following an IPO. This could further skew our data since any additional underpricing would inflate the performance we analyse in our research. It should also be taken into account that the level of underpricing could differ between BO- and VC-backed IPOs due to BO funds exiting their investments through IPOs more often and consequently being able to better price their floatations.

At last, additional control variables that would improve the overall accuracy of our regression, i.e. leverage and industry, could have been introduced but were not included for a variety of reasons. Sponsor-backed IPOs often have a comparably higher leverage and as can be seen between the years 2008 and 2011 in *Figure 5*, they generally underperform in times where the market itself already performs poorly. Since a financial crisis can put an even stronger strain on the ability to repay debt for highly levered companies, this could be one factor influencing the performance analysed in this paper. However, due to limited data availability, we have to exclude this factor from our regression. Another factor we have to exclude was the industry in which the newly listed company is operating in. As can be clearly observed in such events as the dot-com bubble, it is obvious that the industry of a company can have a major influence on its market performance. We did not control for industry dynamics for the following two reasons. First, introducing two fixed effect variables with 11 effects each would constitute a too granular distribution of our small sample of 166 companies. Second, as market timing is a very prominent factor in existing literature, we decided to only include the IPO timing as a control variable (Lerner, 1992; Cao, 2011).

6 DISCUSSION AND ANALYSIS

The sixth chapter discusses the primary results of our empirical study. Moreover, interpretations of general patterns are linked to existing literature and insights developed throughout the course of this paper are presented to frame the discussion.

6.1 PERFORMANCE OF SPONSOR-BACKED IPOs

We find that sponsor-backed IPOs in the UK significantly outperform the market for the one-year time horizon. However, when considering the three-year time horizon, our results show that performance of sponsor-backed IPOs is positive while not being statistically significant. Thus, our results are along the lines of previous studies conducted by Schöber (2008), Cao and Lerner (2009) as well as Levis (2011), who all report that sponsor-backed IPOs outperform the overall market for certain periods of times. Therefore, we are able to hold on to *Hypothesis 1* at least for the one-year time horizon as our results reject the antithesis. On the other hand, we cannot draw conclusions for the three-year horizon, as the results are not statistically significant. Potential reasons for this outperformance over the first year post IPO could be that sponsor-backed firms have stronger corporate governance structures as well as the fact that public offerings backed by financial sponsors are associated with a smaller degree of asymmetric information, which is valued by investors in the public markets.

The difference in performance between the more short-term, one-year, time horizon and the long-term, three-year, time horizon can potentially be explained by the exit behaviour of financial sponsors. As it usually takes sponsor firms two to three years to fully exit their investment post IPO, the stock price is negatively affected by the subsequent sales of comparably large stakes by the exiting financial sponsor. Moreover, as sponsors gradually exit their investment, the extent of managerial oversight and involvement on behalf of the sponsor will also decrease, leading to looser corporate governance, which in turn can potentially have negative effects on operational performance. The difference between significant one-year outperformance and lower, not significant, three-year performance might further be explained by weakened management incentives. As the management of sponsor-backed firms usually has skin in the game, i.e. owns a sizeable equity stake, going public and being able to cash out on their investment after the lock-up might lead

to a disincentivised management team. Even if the management compensation includes an equity component of the public company, it is very probable that management will have cashed out a substantial portion of their stake and thus incentives are not as strongly aligned as when the firm was privately held. Lastly, the question remains whether the performance in the first three years can be further explained by the fact that financial sponsors are especially good at timing operating performance and/or are superior at fetching high valuations that the companies do not live up to within the first years of being public.

6.2 EFFECT OF THE HOLDING PERIOD ON PERFORMANCE

We find that for the one-year time horizon firms that were held between three to seven years prior to IPO do significantly outperform the market. However, we do not find that the performance of firms held fewer than three years or more than seven years differs significantly from the ones held three to seven years. Moreover, for the three-year time horizon we find that there is no significant evidence that suggests that the sponsor's holding period has an effect on the performance of these IPOs. The results of our study thus suggest that the holding period does not have a significant effect on the after-market performance of sponsor-backed IPOs. Therefore, we reject *Hypothesis 2*. Given the fact that we lack statistical significance in our results as regards the effect of the holding period, we cannot derive that the outperformance in terms of holding periods follows a hump shaped pattern as the one we laid out in our hypothesis.

The lack of influence stemming from holding periods might be explained by two factors from our model that we find to have significant effect on the performance of sponsor-backed IPOs, at least for the one-year time horizon, the first being size and the second being market timing. In line with SMB in the famous three-factor model by Fama and French (1992), we find that size is significantly negatively related to the after-market performance in the context of sponsor-backed IPOs. Moreover, we also find that market timing has a significant effect on the performance of sponsor-backed IPOs. Consequently, the sponsor's ability to time the market in turn also has an effect on the holding period, as financial sponsors will list firms on the public market if the valuation is favourable, thereby deprioritising operational improvements that would have required a

longer holding period. A factor that might potentially also affect the market timing and thereby the holding period is the type of financial sponsor firm. Previous literature suggests that more seasoned financial sponsors are better at timing the market, which affects holding periods, especially in hot market conditions (Lerner, 1992). As we do not control for the sophistication of the financial sponsor, this is subject to further research. Lastly, it should be noted that for the three-year time horizon the exit behaviour of the financial sponsors seems to be the driving force behind the deterioration of performance, limiting the effect from other factors such as size, timing and holding period.

6.3 VENTURE CAPITAL VERSUS BUYOUT CAPITAL

We further analyse the difference in performance by type of financial sponsor. More specifically, we classify financial sponsors in two categories: (i) Venture Capital and (ii) Buyout Capital. We find that VC-backed firms significantly underperform BO-backed firms, while still outperforming the market for the one-year time horizon (see *Table 13* in the appendix). This underperformance becomes even more apparent when analysing the three-year time horizon. Furthermore, it can be argued that if VC-backed IPOs were the same size as BO-backed firms at IPO, underperformance of VC-backed firms would be even more severe. This is due to the fact that VC-backed IPOs in our sample are on average an eighth of the size of BO-backed IPOs and that size is significantly negatively related to performance, as Fama and French (1992) find.

A potential reason for this significant underperformance of VC-backed IPOs is the fact that VCs typically own minority stakes, which brings about several disadvantages. First, a minority shareholder's power to control and guide the firm is quite limited and depends heavily on the shareholder agreement. This can prevent VCs from being able to successfully establish sophisticated corporate governance structures. More importantly, the minority ownership negatively affects the VC's ability to time the market, as the decision of when to exit via the public market is typically not up to the minority owner. Lastly, the aforementioned sophistication of the financial sponsor might have an effect on the post IPO performance. Accordingly, a factor that would be further able to explain the difference in performance between VC-backed and BO-backed IPOs might be that

the average VC firm in our sample is less sophisticated and seasoned than its BO-counterpart.

7 CONCLUSION AND LIMITATIONS

The last chapter concludes this paper by briefly summarising the key findings of our empirical study. Subsequently, implications for sponsor-backed IPOs are derived. Ultimately, potential areas for future research are discussed.

7.1 CONCLUSION

This paper analyses whether sponsor-backed IPOs outperform the market for the near term, one-year, and long-term, three-year, time horizon and if the holding periods of financial sponsors have an influence on the after-market performance of these IPOs. To do so, we examine a hand-collected sample of 166² sponsor-backed IPOs that went public on the London Stock Exchange's Main Market and Alternative Investment Market between January 2005 and September 2015.

We find four major results. First, our study suggests that sponsor-backed IPOs significantly outperform the market in the first year after going public. We can thus confirm the evidence from previous studies that find outperformance of sponsor-backed firms for a short time period, i.e. one year, post IPO. One reason for this outperformance might be that public offerings from sponsor-backed firms are associated with less information asymmetry, which reduces the risk for investors in public markets and therefore creates value. Second, our study finds that the performance of sponsor-backed IPOs deteriorates between the first year and the third year post IPO. While the performance of these offerings for the three-year horizon is not significant, we argue that the difference in performance can be attributed to the exit behaviour of financial sponsors. As the lock-up period expires, financial sponsors sell down their stakes, creating downward pressure on the firm's share price. This finding suggests that the exit behaviour of financial sponsor firms has negative implications on the stock market performance, as has been evidenced by previous studies. Third, we find that holding periods do not have a significant effect on the performance of sponsor-backed IPOs in the UK. This is the case for both the short-term, one-year, as well as the long-term, three-year horizon. Our results suggest that factors such as size and market timing are the driving forces behind the performance of sponsor-backed IPOs, as we obtain

² n=166 for the performance in the first twelve months post IPO and n=158 for the performance in the first 36 months post IPO as some companies were delisted, acquired or went into administration during the three-year time frame

significant coefficients. Fourth and last, we find that while VC- as well as BO-backed firms both outperform the market in the first year, VC-backed IPOs significantly underperform the offerings of their BO counterparts. This is potentially related to the fact, that VCs acquire minority stakes and are therefore limited in their ability to time the market compared to BO firms.

7.2 FUTURE RESEARCH

One interesting prospect for future research would be studying the holding period's effect on performance separately for the type of financial sponsor, i.e. VC and BO. Our sample, due to its size, did not allow us to make the aforementioned distinction in our research setting. Moreover, as the number of IPOs in the UK for our studied time horizon is limited, it might be sensible to either tap a bigger market such as the one in the United States or including IPOs that date further back in time. Another interesting topic would be whether the type of financial sponsor in terms of reputation and experience has an impact on the holding period of sponsor-backed investments and whether this in turn could be related to the post IPO performance of sponsor-backed investments.

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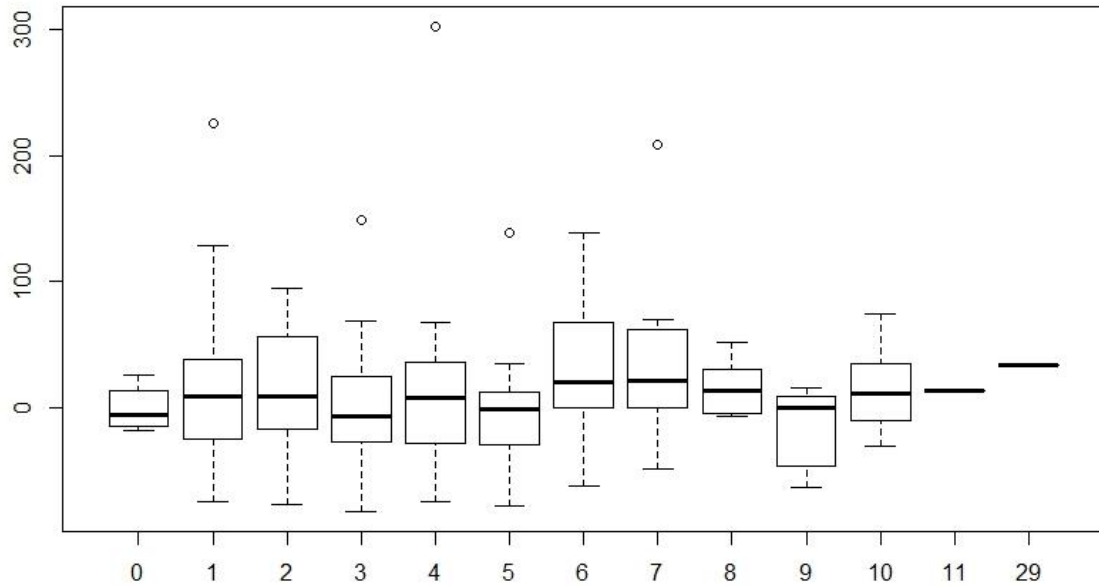
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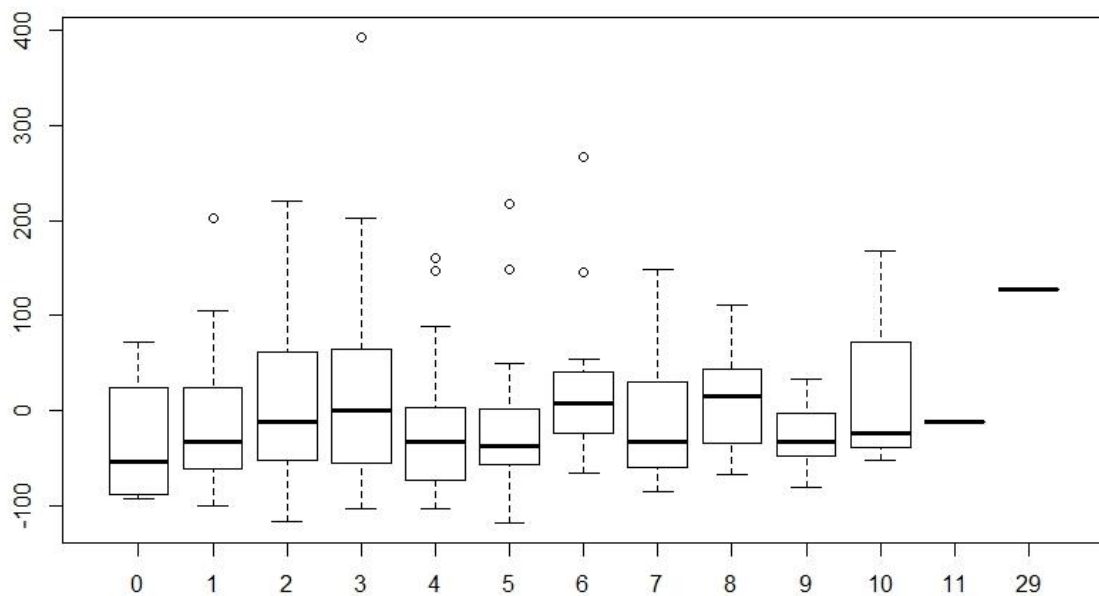
APPENDIX

Figure 7. Boxplot of one-year excess returns over holding periods



Boxplot illustrating the one-year performance of the companies in our sample dependent on their holding periods.

Figure 8. Boxplot of three-year excess returns over holding periods

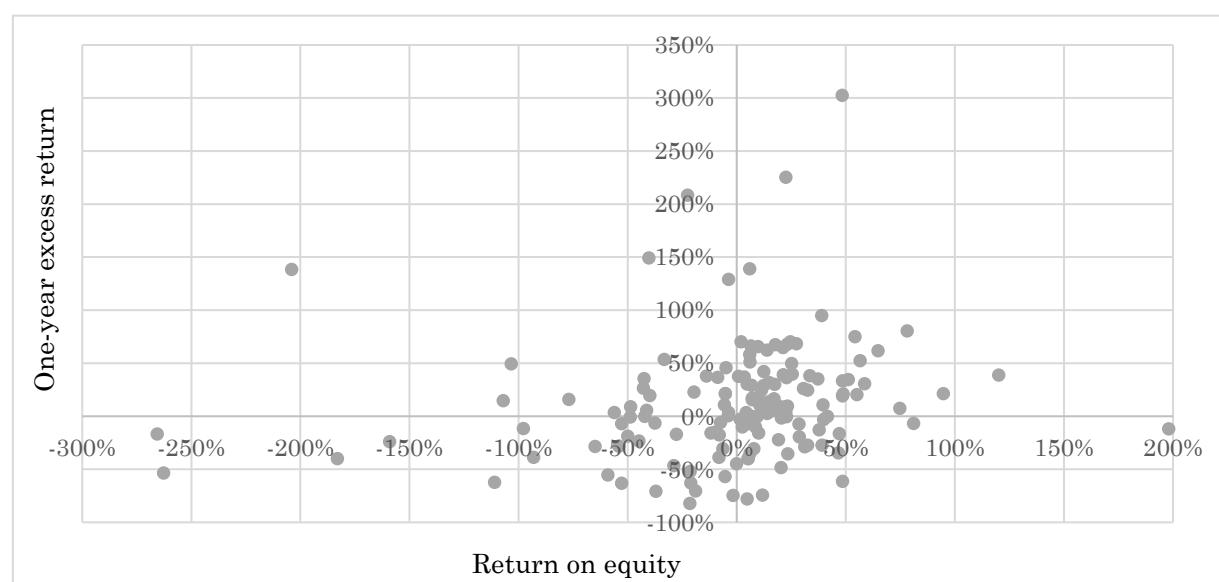


Boxplot illustrating the one-year performance of the companies in our sample dependent on their holding periods. We omitted one data point with a performance of 1136% and a holding period of one year in the graph to show a better overview of the boxplots.

Table 5. Balance sheet statistics

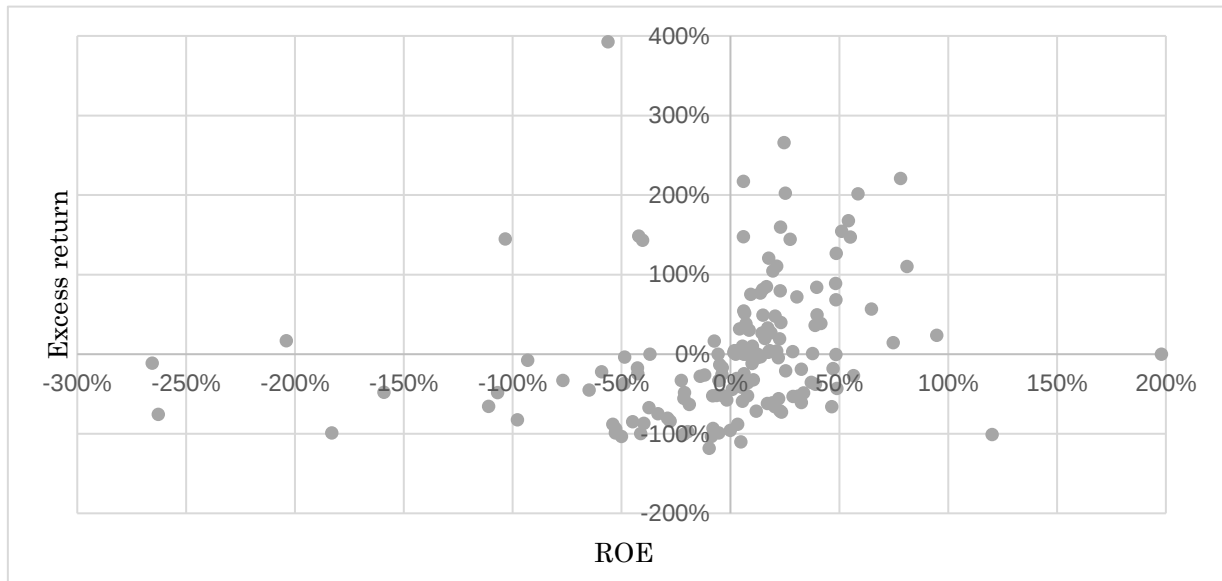
Balance sheet statistics						
Statistic	Observations	Mean	Median	St. Dev.	Min	Max
Debt to Market Cap	128	38.6%	24.0%	47.4%	0.0%	252.7%
ROE	162	-1.5%	7.1%	56.3%	-265.6%	198.0%
ROA	164	-7.9%	2.1%	33.2%	-215.2%	39.4%
ROCE	104	57.5%	31.2%	123.6%	-64.8%	895.9%
ROIC	152	2.4%	7.4%	39.2%	-189.5%	191.2%

Summary of the mean and median values, standard deviation from the mean as well as minimum and maximum values for several solvency and profitability ratios for the companies in our sample. We look at debt to market capitalisation, return on equity, return on assets, return on capital employed and return on invested capital.

Figure 9. Plot of one-year excess return over ROE

Scatterplot of the one-year performance over the earliest published return on equity of the company at or after IPO based on 162 companies from our dataset for which the respective data was available.

Figure 10. Plot of three-year excess return over ROE



Scatterplot of the three-year performance over the earliest published return on equity of the company at or after IPO based on 162 companies from our dataset for which the respective data was available. We omitted one data point with a performance of 1136% and a ROE of 22% in the graph to show a clearer distribution.

Table 6. Results of the regression for general outperformance of sponsor-backed IPOs

	Regression results							
	one-year		one-year		three-year		three-year	
<i>Size</i>	-0.0014	(-5.28)***	-0.0016	(-1.33)	0.031	(3.62)***	-2.95e-04	(-0.11)
<i>Retained stake</i>	-17.652	(-1.69)*	-6.458	(0.62)	-11.474	(-0.61)	-9.172	(-0.30)
<i>Constant</i>	23.916	(2.05)**	17.516	(1.17)	-28.579	(-1.28)	-3.627	(-0.10)
<i>R²</i>	0.161		0.062		0.154		0.061	
<i>Robust</i>	Yes		No		Yes		No	

Results of our regression testing for the performance of sponsor-backed IPOs compared to the market. We show the results of two regressions for a one-year and three-year period. In both cases one regression is a standard OLS regression and one has robust standard errors. The respective t-values are presented in parentheses. Significance at the 10%, 5% and 1% level are shown by *, ** and *** respectively.

Table 7. Results of the t-test for market outperformance

	T-test results			
	mean	t-value	p-value	significance
<i>Total sample</i>				
one-year	11.701	2.805	0.0028	***
three-year	7.690	0.781	0.2179	
<i>Quick-flips</i>				
one-year	12.772	1.455	0.0768	*
three-year	24.360	0.741	0.2317	
<i>Standard investments</i>				
one-year	8.905	1.541	0.0634	*
three-year	3.479	0.357	0.3609	
<i>Long-holds</i>				
one-year	17.895	2.195	0.0177	**
three-year	-0.523	-0.044	0.5172	

Results of the one-sided t-tests regarding the outperformance of the respective sample compared to the market. We test this for our total sample of 166 companies as well as for each of the three groups based on holding periods. Significance at the 10%, 5% and 1% level are shown by *, ** and *** respectively.

Table 8. Test statistics for the main regression

Statistic	Test statistics			
	one-year		three-year	
<i>Robust</i>	yes	no	yes	no
<i>Observations</i>	166	166	158	158
<i>Groups</i>	11	11	11	11
<i>F statistic</i>		0.8248		0.8678
<i>Chi-squared</i>	134.91		32.188	
<i>p-value</i>	2.2e-16	0.6333	0.0023	0.5883
<i>Correlation (u_i, Xb)</i>	-0.095	-3.86e-16	-0.675	1.25e-15
<i>Residual standard error</i>	38.04	54.12	60.23	124.4

Test statistics for the one-year and three-year main regressions. The p-value denotes the probability that all coefficient estimates of the model are equal to zero with the respective test statistics in the two rows above that. The table further shows the correlation between the error term and the regressors as well as the residual standard error.

Table 9. Correlation with error terms for the one-year regression

Correlation with error term						
	$r_i - r_{index}$	$Hold_2$	$Hold_3$	$Size_i$	$Stake_i$	u_i
<i>Excess return</i>	1					
<i>Quick-flips</i>	0.0114	1				
<i>Long-holds</i>	0.0587	0.2983	1			
<i>Size</i>	-0.1121	0.0015	0.0253	1		
<i>Retained stake</i>	-0.0452	-0.0772	-0.0384	-0.0953	1	
<i>Error term</i>	0.814	-0.0741	0.0098	-0.6267	0.0322	1

Correlation between the dependent variable, the independent variables and the error term for the one-year main regression. The main diagonal shows the correlation of a variable with itself, which is always one.

Table 10. Correlation between independent variables in the one-year regression

Correlation between independent variables					
	$Hold_2$	$Hold_3$	$Size_i$	$Stake_i$	β_0
<i>Quick-flips</i>	1				
<i>Long-holds</i>	0.2983	1			
<i>Size</i>	0.0015	0.0253	1		
<i>Retained stake</i>	-0.0772	-0.0384	-0.0953	1	
<i>Constant</i>	-0.2162	-0.0452	-0.0858	-0.6765	1

Correlation matrix for the independent variables in the one-year main regression.

Table 11. Correlation with error terms for the three-year regression

Correlation with error term						
	$r_i - r_{index}$	$Hold_2$	$Hold_3$	$Size_i$	$Stake_i$	u_i
<i>Excess return</i>	1					
<i>Quick-flips</i>	0.076	1				
<i>Long-holds</i>	-0.0336	0.1564	1			
<i>Size</i>	-0.0294	-0.1065	0.0843	1		
<i>Retained stake</i>	0.0032	0.0208	0.1715	-0.0905	1	
<i>Error term</i>	0.7333	-0.0346	-0.0206	-0.6919	-0.0165	1

Correlation between the dependent variable, the independent variables and the error term for the three-year main regression.

Table 12. Correlation between independent variables in the three-year regression

Correlation between independent variables					
	$Hold_2$	$Hold_3$	$Size_i$	$Stake_i$	β_0
<i>Quick-flips</i>	1				
<i>Long-holds</i>	0.1564	1			
<i>Size</i>	-0.1065	0.0843	1		
<i>Retained stake</i>	0.0208	0.1715	-0.0905	1	
<i>Constant</i>	-0.2641	-0.1529	0.1546	-0.6794	1

Correlation matrix for the independent variables in the three-year main regression.

Table 13. Results of the regression for differences in performance between PE- and VC-backed IPOs

Regression results								
	one-year		one-year		three-year		three-year	
<i>VC dummy</i>	-9.818	(-1.20)	-18.049	(-1.82)*	-17.85	(-1.36)	-47.53	(-2.05)**
<i>Size</i>	-0.0015	(-6.14)***	-0.0018	(-1.50)	0.027	(3.22)***	-8.16e-04	(-0.29)
<i>Retained stake</i>	-14.13	(-1.30)	-0.811	(-0.06)	-4.727	(-0.24)	5.897	(0.19)
<i>Constant</i>	26.2	(2.21)**	21.093	(1.40)	-24.815	(-1.01)	4.711	(0.13)
<i>R²</i>	0.1696		0.08261		0.1644		0.08769	
<i>Robust</i>	Yes		No		Yes		No	

Results of our regression testing for the differences in performance between IPOs backed by PEs and VCs. We show the results of two regressions for a one-year and three-year period. In both cases one regression is a standard OLS regression and one has robust standard errors. The respective t-values are presented in parentheses. Significance at the 10%, 5% and 1% level are shown by *, ** and *** respectively.