Lockups and Long-Run IPO Performance

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Abstract

We analyse the relationship between the lockup length and the long-run performance of initial public offerings (IPOs) on London Stock Exchange Main Market during the period 1995-2006. Our findings suggest that IPOs with longer lockups consistently show superior performance relative to IPOs with shorter lockups across different benchmarks and factor models in both event time and calendar time analysis. Moreover, our cross-sectional results confirm lockup length as a significant predictor of long-run IPO performance. In addition, we investigate abnormal returns around lockup expiry and find that negative abnormal returns around lockup expiry are concentrated in IPOs with shorter lockups. Overall, we document that longer lockups are related to better long-run performance of IPOs and our findings are consistent with the view that issuing firms signal their quality through longer lockups.

Keywords: IPO, IPO lockups, long-run performance

JEL Classification: G24, G32

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1 Introduction

Long run underperformance of IPOs has been well documented in the literature. Ritter (1991) and Loughran and Ritter (1995) document underperformance for US IPOs while Levis (1993) and Espenlaub et al. (2000) report similar results UK. Evidence form other markets also shows underperformance for IPOs in the long run.[1] There is, however, also evidence to suggest that the long run underperformance is not an IPO effect per se and the underperformance is concentrated in the small firms with low book-to-market ratios (Brav et al., 2000, Brav and Gompers, 1997). Moreover, there are studies which document long run IPO performance differences based on certain IPO characteristics such as reputed underwriters (Carter et al., 1998, Dong et al., 2011) venture capital (VC) backing and reputed VCs (Brav and Gompers, 1997, Krishnan et al., 2011a), founder CEO (Gao and Jain, 2011), multinationality of issuing firms (Mudambi et al., 2012) etc. Despite these and other studies, the sources of long run performance differences in IPOs remain unresolved. In this paper, we relate long run performance of IPOs to the length of lockup period. Specifically, we evaluate the impact of lockup length in explaining three years stock return performance following IPO, and on the return performance around the lockup expiry dates.

Using long run stock return performance after IPO and abnormal returns around lockup expiry as a measure of quality, we examine whether there is a significant difference in quality between IPOs with longer lockups and shorter lockups. Prior research on IPO lockups suggests two main motives for lockups: signal of quality and commitment device to reduce moral hazard. Moreover, evidence also suggests that IPOs experience significant negative abnormal returns around the expiry of lockups. We argue that if longer lockups signal quality of issuing firm, then IPOs with longer lockups should exhibit superior long run performance. Over time, positive inside information and true value of the firm signalled by longer lockup

[1] For a detailed survey see Jenkinson and Ljungqvist, 2001.

should be realised and reflected in the stock price. On the other hand, if longer lockups are used as a commitment device to minimise moral hazard then this should result in poor long run performance due to the increased agency costs. Similarly, a better return performance around lockup or after lockup expiry for longer lockup IPOs would support the signalling role of the lockups. Insiders of high quality firms with positive inside information about future prospects of firms are less likely to sell shares at lockup expiry. Moreover, insider sales in high quality firms around lockup expiry are more likely to be for portfolio diversification reasons instead of trading on private information. Conversely, if longer lockups reduce moral hazard, insiders are more likely to sell shares around lockup expiry and their trades are more likely to be based on private information. This would predict poor return performance around lockup expiry, if any, for IPOs with longer lockups. Based on these arguments, we try to answer two related questions. First, do IPOs with longer lockups experience superior post issue long-run performance? Second, do IPOs with longer lockups show better performance around lockup expiry period?

We test the above predictions on a sample of 268 IPOs with lockups from 1995-2006 on the LSE Main Market. Following is the summary of main findings of our analysis. First, we document that our full sample of IPOs significantly outperforms the market index and control firms based on size and size and book-to-market basis using equally weighted buy-and-hold abnormal returns (BHARs). Using value weighted BHARs, however, greatly reduces the outperformance and statistical significance of the abnormal returns, yet, BHARs for two and three years holding periods are still positive. These results are not consistent with the widely documented long run underperformance of IPOs in the literature (Ritter, 1991, Loughran and Ritter, 1995). Second, we compare BHARs between IPOs with lockups longer than median and IPOs with lockups shorter than median. We find that IPOs with lockups longer than median consistently perform better than IPOs with lockups shorter than median on both equal and value weighting basis. We find similar results when IPOs are grouped on the basis of top and bottom quartile of their lockup length instead of the median. The BHARs of IPOs in top quartile of lockup length are constantly higher than the IPOs in bottom quartile of lockup length irrespective of the weighting scheme used. Moreover, we find similar results when wealth relatives are used as a measure of long run performance instead of the BHARs. Third, we check robustness of our results by employing a calendar time portfolio approach and compare the abnormal returns of IPOs grouped on the basis of median lockup length cut off and top and bottom quartile of lockup length. Comparing the abnormal returns of IPOs grouped on the basis of median length, we find weak evidence that IPOs with lockups longer than median outperform IPOs with lockups shorter than median as the results depend on the choice of model and portfolio period. However, results for IPO groups based on top and bottom quartile of lockup length are more clear-cut as calendar time abnormal returns are consistently higher for IPOs in top quartile compared to the IPOs in the bottom quartile. We obtain similar results when weighted least square (WLS) regressions instead of ordinary least square (OLS) are used in calendar time approach. Fourth, our cross-sectional regression analysis reveals that lockup length significantly predicts the post-issue long run performance of IPOs. Our results suggest that longer lockups are positively related to the long run performance and these results are robust to the different benchmarks and period of performance measurement. Finally, we analyse the stock returns around the lockup expiry for full sample of IPOs and sub-samples of IPOs based on median cut off and top and bottom quartiles of lockup length. Our results show no significant abnormal returns for shorter expiry windows (i.e. 5, 3 days etc.) around the lockup expiry date. The abnormal returns for relatively longer windows (41 and 21 days) around lockup expiry are, however, significantly negative across all the models used. The returns are also negative and significant in immediately post lockup expiry periods. Comparing the abnormal returns between IPOs with longer lockups and shorter lockups, we find significant evidence to suggest that the severe underperformance around lockup expiry resides in the shorter lockup IPOs. We further analyse the abnormal returns around lockup expiry between venture capital (VC) and non-VC backed IPOs and find that our previous results are robust even for VC and non-VC backed samples.

Collectively, our evidence strongly supports the signalling hypothesis for IPO lockups. Our findings suggest that insiders in high quality IPO firms signal their quality by accepting longer lockups which in turn is related to the superior post-IPO performance in the long run. Longer lockups ensure that the founding entrepreneurs and key employees and managers remain with the IPO firm for a long time after the firm has gone public (Field and Hanka, 2001). Additionally, the interests of these insiders are closely aligned with those of investors and the continued monitoring and presence of these insiders adds value to the firm. Moreover, lack of significant negative performance around lockup expiry on part of IPOs with longer lockups further complements the signalling role of lockups.

Our paper is closely related to two recent papers on IPOs and seasoned equity offerings (SEOs) lockups on the US markets. Gao and Siddiqi (2012), for example, find a negative relation between long run stock performance and lockup length and conclude that longer lockups are used to control agency problem and do not signal firm quality. In another study, Cline et al. (2014) also fail to find evidence that lockups signal firm quality in terms of superior long run performance for SEOs with longer lockups. We, however, contend that there are significant differences in US and UK lockups in terms of their characteristics. Contrary to the standardised lockups of 180 days in US, studies in UK have reported substantially longer and diverse lockups for issuing firms (Espenlaub et al., 2001, Hoque, 2011). These diverse and longer lockups in UK may have different implications in terms of signalling or commitment hypothesis compared to the US markets. Based on these institutional differences between US and UK, we argue that UK market provides a unique setting to test the relationship between lockup length and post IPO long term performance. Moreover, substantially longer lockups in UK IPOs may act as a more credible quality signal relative to standard and shorter lockups in US markets (Hoque, 2011).

This study makes important contributions to the IPO lockups literature and long run IPO underperformance literature. Prior research has identified that lockups signal quality and help to reduce uncertainty of firms at the time of IPO (Arthurs et al., 2009, Brau et al., 2005, Goergen et al., 2006), we show that lockups not only reduce uncertainty about issuing firm at the time of IPO but they also predict issuing firm quality in the long run measured as stock return performance. Our study is also related to the strand of literature that identifies factors affecting long run IPO performance. We suggest that lockup length could potentially explain long run IPO performances in addition to the VC backing and reputation (Brav and Gompers, 1997, Krishnan et al., 2011b), underwriter reputation (Carter et al., 1998), founder CEOs (Gao and Jain, 2011) and management quality (Chemmanur et al., 2014) etc.

The rest of the paper is organised as follows: in section 2, we briefly review relevant literature and develop hypotheses. Section 3 presents data, sample construction and the methodology. Results and discussion are provided in section 4. In section 5, we present analysis on the lockup expiration returns. Finally, section 6 gives the conclusion of the paper.

2 Related literature and hypothesis

There is ample evidence to suggest that IPOs underperform in the long run compared to the market or matched seasoned firms. However, literature also suggests that the underperformance does not seem to be evenly distributed across firms and can be differentiated on the basis of some IPO and issue characteristics. For example firm age, size, risk, founder CEO, global offerings, multinationality of IPO and earnings management in

IPOs etc. have been studied in the previous literature and found to have predictive power for the long run IPO performance (Ritter, 1991, Gao and Jain, 2011, Wu and Kwok, 2007, Mudambi et al., 2012, Teoh et al., 1998). Research on the role of third party certification has also documented positive impact of this certification on the long run performance of IPOs. VC backing (Brav and Gompers, 1997) and backing by reputed VCs (Krishnan et al., 2011a) improves the long run performance of IPOs. Levis (2011) reports that IPOs backed by private equity outperform IPOs backed by VCs and other IPOs in the UK. IPOs underwritten by more reputed underwriters perform better than those underwritten by less reputed underwriters (Carter et al., 1998, Dong et al., 2011, Chan et al., 2008). Similarly, long run performance differences could be related to the signalling theories of IPO. Signalling by underpricing and retained ownership are among the prominent signalling models (Allen and Faulhaber, 1989, Grinblatt and Hwang, 1989, Welch, 1989). High quality firms underprice more to signal their better quality and in the long run underpricing is positively related to the stock return performance (Álvarez and González, 2005). Leland and Pyle (1977) develop a model in which insiders signal quality of their firm by retaining large equity stakes. However, this signal might not be credible as the insiders can sell overvalued shares immediately following the IPO (Gale and Stiglitz, 1989). Courteau (1995) propose that length of lockup works as a mechanism to signal quality and private information and complements the signal provided by equity retention.

Prior research suggests two main motives for lockups in equity offerings: signalling theory and commitment theory. Under the signalling theory, longer lockups reduce information asymmetry prevalent between insiders and outside investors of an IPO firm. Due to the significant illiquidity and non-diversification costs associated with longer lockups, insiders of only high quality firms will accept longer lockups to signal their positive inside information. Consistent with the arguments of Courteau (1995), Brau et al. (2005) develop a model and find empirical support for the signalling theory. The lockup length may also act as a substitute quality signal when other signals of quality (VC and reputed underwriter backing) are not present (Arthurs et al., 2009). Furthermore, Arthurs et al. (2009) find that venture with going concern issues can reduce the money left on the table by accepting longer lockups. Similarly, Chong and Ho (2007) find that lockups act as signal and add credibility to the earnings forecasts in the IPO prospectuses for a sample of IPOs in Singapore. In a recent study on UK IPOs, Ahmad and Jelic (2014) find that lockups predict long term survival of IPOs in the aftermarket whereby longer lockups are related to higher survival rates and time for IPOs. The commitment hypothesis, on the other hand, suggests that longer lockups are used by insiders of firms subject to severe agency or moral hazard problems. By accepting longer lockups, insiders in these firms reassure investors that managers have little incentive to engage in informed trading following IPO and wealth expropriation from the outside investors. Brav and Gompers (2003) support the commitment hypothesis and find that longer lockups are used to reduce moral hazard in IPOs. Cline et al. (2014), in a recent study on lockups in seasoned equity offerings, find that lockups are used as a commitment mechanism to reduce the moral hazard and support commitment hypothesis. The empirical evidence for the signalling and commitment devise hypotheses is, at best, mixed.

2.1 Lockup length and long run IPO performance

We argue that the signalling hypothesis predicts a superior long run performance for IPOs with longer lockups. Given that a longer lockup is costly signal in terms of illiquidity and potential wealth losses for insiders, only insiders in high quality firms with positive information about the true future value of the firm will accept longer lockups. This true value will be revealed over time in the market and should have a positive impact on the stock return performance of the firm. Moreover, longer lockup also ensure that the founding entrepreneurs, key managers and employees remain with the firm for a longer period of time and their contribution to firms' performance will be add more value to firms performance. A superior performance on the part of IPOs with longer lockups compared to IPOs with shorter lockups would provide support to the signalling explanation of lockups. Conversely, if longer lockups are in place to reduce moral hazard then longer lockups represent more serious agency related problems and this would result in performance deterioration over time in the post-IPO market.

2.2 Lockup expiration performance

Market reaction to the expiry of lockups has also received considerable attention in the literature. Studies, mainly from US markets, have documented significant negative abnormal returns around lockup expiry day (Field and Hanka, 2001, Bradley et al., 2001, Brav and Gompers, 2003). These findings are puzzling as information regarding the lockups and lockup expiry date is disclosed in IPO prospectus well before the actual expiry date and the expiry event is devoid of informational content. Studies outside the US markets, however, have failed to find significant negative abnormal returns around the lockup expiry (Espenlaub et al., 2001, Goergen et al., 2006)

Insiders in IPOs firms are free to sell shares after the lockup expiry, although evidence suggests that insiders could be released from lockups even before the expiry (Brav and Gompers, 2003, Hoque and Lasfer, 2009). Chen et al. (2012), recently, find that insider sales by top executives following lockup expiry are negatively related to long run performance of IPOs supporting the information selling hypothesis. We, however, assert that insiders in high quality IPOs are less likely to sell shares and engage in the informed trading at time of lockup expiry. It is also more likely that the insiders in high quality firms sell shares due to portfolio diversification reasons and their trades around lockup expiry do not convey any information about the future prospects of IPO firm. If the portfolio diversification argument for IPOs with longer lockups is correct, the insider selling around lockup expiry does not necessarily result in weaker return performance around and after lockup expiry. On the contrary, trading around lockup expiry by insiders of low quality firms with shorter lockups might reveal information about the future prospects of the firm. The insiders of low quality firms are more likely to be involved in informed trading predicting weak stock return performance around and after lockup expiry. Based on the above arguments, if longer lockups signal quality, then IPOs with longer lockups are expected to perform better than IPOs with shorter lockups around lockup expiry. However, a poor performance for longer lockup IPOs relative to shorter lockup IPOs would support the argument that longer lockups are a commitment solution to moral hazard.

3 Data and Methodology

3.1 Data and Sample construction

Our sample consists of UK IPOs that went public on the main market (Official List) of London Stock Exchange (LSE) between January 1995 and December 2006. We obtain the initial sample of issuing firms from new issues list available from LSE website for the period 1998-2006[2]. For the years 1995-1997, issuing firms have been identified from Thomson One Banker and Perfect Filings database. In line with the existing IPO literature, we exclude all financial firms (SIC code 6xxx) including investment trusts and venture capital trusts (VCTs), utility firms (SIC code 49xx), foreign issuers, re-admissions and firms with missing prospectuses. After applying these filters, there are only 19 firms from 1995 to 2006 which reported no lockup provision in their IPO prospectuses. As the sample of no lockup firms is very small, we do not attempt to compare the performance differences between firms with lockups and with no lockups. Our final sample consists of 268 IPOs with lockups reported in their prospectuses. We use Perfect Filings database to download IPO prospectuses and hand collect variables such as lockup and its duration, insider ownership, VC backing, underwriter,

[2] http://www.londonstockexchange.com/statistics/new-issues-further-issues/new-issues-further-issues.htm
LSE reports all new and further issues on monthly basis. But the details of Main Market IPOs are only available from January 1998 onwards.

company founding date etc. Relevant financial variables for IPO and control firms are from WorldScope database and from IPO prospectuses when information is missing in WorldScope. Finally, data on stock prices is collected from DataStream.

Table 1 presents the yearly distribution of sample IPOs from 1995 to 2006 (Panel A) and distribution of sample IPOs across industry sectors based on two-digit SIC codes (Panel B). We also show the descriptive statistics of lockup period in months across sample years and industry. Panel A shows the highest number of sample IPOs in year 2000, which accounts for one fifth of the total sample. The earlier years of our sample period also account for large number of IPOs. For example IPOs in years 1995, 1996 and 1997 account for about 38% for the total IPOs. However, the IPO activity dropped after year 2000 mainly due to the dotcom crisis. The mean lockup period for the sample is 15 months but there is large variation in mean lockup length across the sample years. The longest mean lockup length is observed for IPOs that went public in years 1997 and 2001. The mean lockup length across sample years decreases after the year 2000 with a mean length of 10 months in year 2003. An inspection of median lockup length reveals that median lockup period converges to 12 months particularly in later years of sample period. In fact, seven out of twelve sample years have a median lockup period of 12 months.

In panel B of Table 1, we observe that a large portion (28%) of our IPO sample is from “Computer equipment and services” sector. Other industry sectors with highest IPO frequency are “Retail”, “Engineering and management services” and “Chemical products” accounting for about 21% of the total sample. There is large variation in terms of average lockup length across different industry sectors. For instance, IPOs in “Transport” sector have a mean lockup period of 11 months while IPOs in the “Scientific instruments” and “Paper and paper products” sectors have average lockup periods of 19 months. Similar pattern is observed for median length and dispersion (Std. dev.) of lockup period across industry sectors. Overall, the results from Table 1 indicate that lockup in UK are quite heterogeneous in terms of their length across different industries and times.

3.2 Methodology

3.2.1 Buy-and-hold abnormal returns and wealth relatives

Following previous IPO literature, we use buy-and-hold abnormal returns (BHARs) to measure the long run performance of our sample IPOs. BHARs are an advantageous method for IPO performance because they capture the return which an investor can earn over the long run and are more representative of an investor experience (Kothari and Warner, 1997, Barber and Lyon, 1997). In order to show robustness for our results, we use three different benchmarks as well as equal and value weighting for calculating BHARs. For each sample IPO, the listing day is defined as event day zero and each IPO is tracked for one, two and three years from the day after the IPO (event day). Consistent with previous literature (Loughran and Ritter, 1995, Brau et al., 2012), a month defined as 21 trading days, with 252 days in a year, 504 days in two years and 756 days in three years. The BHAR of an IPO is calculated on a daily basis as;

$$BHAR(t_1, t_2) = \prod_{t=t_1}^{t_2}(1 + R_{it}) - \prod_{t=t_1}^{t_2}(1 + R_{bt}) \qquad (1)$$

Where R_{it} the daily is return of firm i on the date t and R_{bt} is the return on the respective benchmark on the same date. The holding period begins with the day after the IPO is listed (t_1) and ends on t_2 where t_2 is earlier of the end of one year (252 days), two years (504 days) or three years (756 days) window. If a sample firm delists before the end of holding period, the returns from respective benchmark are included from the delisting date until the end of tracking period (i.e. one, two or three years). This procedure doesn't change the weight of each of the remaining IPOs and the sample size also remains the same for the whole tracking period. For each holding period, we compute both equal weighted and value weighted average BHARs for full sample and different sub-samples. For value weighted average BHARs, weight is the relative market capitalisation of an IPO after the offer.

To measure benchmark returns, we use three alterative benchmarks. Our first benchmark is the market return where we use value weighted market index. FTSE Allshare index is used as a proxy for the market return. Secondly, we use a non-issuing control firm matched on the size of the IPO as a benchmark. Size is defined as the market capitalisation of the sample firm at the end of IPO month. For selecting a size matched control firm, we obtain the market capitalisation of all firms (excluding the sample firms) listed on the LSE from London Share Price Database (LSPD) at the end of every month when we have a corresponding IPO issue firm in that month. A size matched control firm is the firm with the closest but higher market capitalisation to the corresponding IPO firm. This is because the market capitalisation of the IPOs is expected to increase in the post-IPO period. Our final benchmark is a size and book-to-market (BM) matched control firm approach based on the method of Barber and Lyon (1997). For size and BM matched control firm, we first select a sub set of all non-issuing listed firms (excluding the sample firms) with a market capitalisation within ±30% of the market capitalisation of the issuing firm in the month of IPO. This subset is selected from the firms used in our previous benchmark (i.e. size matched). Next, the selected firms are ranked according to their book-to-market ratios measured in the IPO year. The control firm is the firm with the closet book-to-market ratio to that of the sample IPO firm. If a matching firm delists before the end of holding period, the next matched firm is included after the delisting date of original matched firm.

We employ a skewness-adjusted t-test in order to mitigate the problem of positively skewed long run abnormal returns following Lyon et al. (1999) as:

$$T_{skewness-adjusted} = \sqrt{N}\left[S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6N}\hat{\gamma}\right] \qquad (2)$$

where

$S = \frac{\overline{BHAR}(t_1,t_2)}{\sigma(BHAR)}$, $\hat{\gamma} = \frac{\sum_{i=1}^{n}[BHAR_i(t_1,t_2)-\overline{BHAR}(t_1,t_2)]^3}{N\sigma(BHAR)^3}$ and N is the number of firms in the sample.

In addition to using BHARs as a performance measure, we also adopt wealth relatives as a performance measure in line with previous IPO studies (Ritter, 1991, Brav and Gompers, 1997). We compute wealth relatives for one year, two years and three years using the three benchmarks discussed earlier for full IPO sample and different sub-samples based on lockup length. In accordance with Ritter (1991), the wealth relatives are estimated as:

$$WR = \frac{1 + average\ \ BHR\ for\ IPO\ firms}{1 + average\ BHR\ for\ benchmark} \qquad (3)$$

Where BHR is the average buy-and-hold return on one, two or three year relevant portfolio of IPO firms and the respective benchmarks. A wealth relative greater than 1 indicates that the IPO portfolio outperforms the relevant benchmark while a wealth relative of less than 1 indicates that the IPO portfolio underperforms the relevant benchmark. Similarly, a higher wealth relative for a sub sample of IPOs relative to the other sub sample implies better performance for the former sub sample.

3.2.2 Calendar Time Factor Model Regressions

We also use calendar time factor regressions as a further robustness test of our results. Fama (1998) and Mitchell and Stafford (2000) strongly recommend the monthly calendar time approach for measuring the long term abnormal performance. First, monthly returns in calendar time are less susceptible to the bad model problem. Second, monthly portfolios take into account the cross-sectional dependence among the sample firms which could allow better statistical inferences. Third, portfolio returns do not compound spurious abnormal returns which could lead to biases over the longer event windows.

In our calendar time models, we form an equally weighted portfolio of each of the two types of IPO portfolios. Our first type of portfolios is based on the median length of lockup period. In this type we divide IPOs in two groups of portfolios: IPOs with lockups less than median lockup period and IPOs with lockups greater than the median lockup period. In second type of portfolios, the IPOs are divided into two groups based on their quartiles of lockup length. More specifically, IPOs with lockups period in bottom quartile (12 months) are grouped together and in other group IPOs with lockups in top quartile (18 months) are grouped together. Based on each type and group, we develop time series of monthly returns of IPOs which occurred in the previous T months (where T equals 12, 24 or 36 months). For example, a 12 monthly portfolio is composed of monthly returns of all firms (for different subsamples as described above) that had an IPO in the previous 12 months. Because this approach requires a 12 month look back window, our monthly portfolio formation starts in January 1996 and extends to December 2007[3]. So, in all of these portfolios, the number of monthly observations is 144.

We use three regression models to test for the abnormal performance of IPOs in different sub samples after the issue. Our first model is the standard Capital Asset pricing Model (CAPM), second is Fama and French (1993) three factor model, and third is the Carhart (1997) four factor model which is an extension of the Fama and French (1993) model.

$$R_{pt} - R_{ft} = \alpha + \beta\left(R_{mt} - R_{ft}\right) + \varepsilon_t \qquad (4)$$

$$R_{pt} - R_{ft} = \alpha + \beta\left(R_{mt} - R_{ft}\right) + sSMB_t + hHML_t + \varepsilon_t \qquad (5)$$

$$R_{pt} - R_{ft} = \alpha + \beta\left(R_{mt} - R_{ft}\right) + sSMB_t + hHML_t + mUMD_t + \varepsilon_t \qquad (6)$$

[3] Our sample starts in January 1995 and ends in December 2006. Similarly, for a 24 month portfolio, monthly portfolio formation starts in January 1997 and extends to December 2008. For 36 monthly portfolios, we start monthly portfolio formation in January 1998 and include monthly returns (starting from January 1998) of all firms which had an IPO in previous 36 months. This portfolio extends to December 2009.

where

R_{pt} = the monthly return on an equal-weighted calendar time portfolio of IPOs of different sub-samples (based on median lockup length and top and bottom quartiles) in month t;

R_{ft} = the monthly return on three month Treasury Bills in month t;

R_{mt}= the total return on FTSE Allshare index in moth t; thus, $R_{mt} - R_{ft}$ is the market risk premium;

SMB_t= the difference in the returns of small stocks and big stocks in month t;

HML_t= the difference in returns of high book-to-market stocks and low book-to-market stocks in month t;

UMD_t= the difference in returns of high and low momentum stocks in moth t;

α = the intercept term, which provides the mean monthly abnormal return on the calendar time portfolio.

A positive and significant intercept term, alpha, in the above models can be interpreted as outperformance of sub sample of IPOs. The above stated models estimated with the OLS technique could suffer from the potential hetroskedasticity problem because the number of firms is unequal and keep changing every month due to the rolling nature of monthly portfolios. In order to solve this problem and for the robustness of results, we also estimate all the above models using weighted least squares (WLS). The number of firms in each monthly portfolio is used as weights in the WLS regressions. The monthly factors for UK are from Gregory et al. (2013)[4].

[4] http://business-school.exeter.ac.uk/research/areas/centres/xfi/research/famafrench/files

3.2.3 Cross sectional regressions of long run IPO performance

This section conduct further analysis to test whether the post IPO long run performance is related to lockup length after controlling for other firm and offer characteristics that may be attributed to long run performance. Consistent with Chen et al. (2012), following regression models are estimated;

$$LBHR = \alpha + \beta_1 Lu\ Months + \beta_2 VC + \beta_3 UW\ Reputation + \beta_4 Ln(\ Assets) + \beta_5 Insider\ Ownership + \beta_6 Ln(Age) + \beta_7\ IR + \beta_8\ ROA + \varepsilon \quad (7)$$

$$LBHAR = \alpha + \beta_1 Lu\ Months + \beta_2 VC + \beta_3 UW\ Reputation \beta_4 Ln(\ Assets) + \beta_5 Insider\ Ownership + \beta_6 Ln(Age) + \beta_7\ IR + \beta_8\ ROA + \varepsilon \quad (8)$$

Where $LBHR$ is defined as ln(1+IPO firm's 1, 2 or 3 years BHR) and $LBHAR$ is IPO firm's $LBHR-$ ln(1+ benchmark's 1,2 or 3 years BHR). The benchmarks are as discussed earlier; market return (FTSE Allshare index), a size matched control firm, and a size and BM matched control firm. Our primary variable of interest is *LU Months* and is measured as the length of lockup period in month. *VC* is a dummy variable and equals one for IPOs backed by VC/PE, and zero otherwise. *UW Reputation* is a continuous variable representing the reputation of underwriters and is measured as percentage of IPOs sponsored by an underwriter in the year prior to IPO. *Ln (Assets)* is the natural log of assets before IPO in £ millions and is a proxy for the size of IPO. *Insider Ownership* is the percentage of equity retained by the insiders. *Ln (Age)* is the natural log of the age of IPO measured in years from initial founding date to the IPO date. *IR* is the initial returns (underpricing) calculated as percentage difference between offer price and first day closing price. Finally, ROA is the return on assets calculated as the earnings before extraordinary items divided by total assets in the year before the IPO.

The inclusion of the above mentioned control variables in our regression models are motivated from the previous literature on the long term performance of IPOs. For example, VC backing may act as certification of IPO quality and has the potential improve long term performance through improved governance, increased institutional investor interest and greater analyst coverage (Megginson and Weiss, 1991, Brav and Gompers, 1997, Suchard, 2009). Similarly, IPOs backed by reputed underwriters perform better in the long run due to better screening, certification of quality and marketing by prestigious underwriters (Carter et al., 1998, Dong et al., 2011). We include age and size of the firm to control for the size and age effect of IPOs in line with the previous literature (Gao and Jain, 2011, Wu and Kwok, 2007, Ritter, 1991). Following Goergen et al. (2007) and Thomadakis et al. (2012), we also include equity retained by insiders at the time of IPO in our regression analysis. We include underpricing (first day returns) in regressions models because prior literature documents a negative relation between the underpricing and long term performance (Ritter, 1991, Houge et al., 2001). Finally, we include ROA as a proxy of pre IPO operating performance of the issuing firms following Gao and Jain (2011).

4 Empirical Results

4.1 Buy-and-hold Abnormal Returns (BHARs) and Wealth Relatives (WRs)

In table 2, we report the one, two and three years BHARs for full sample and for portfolios of IPOs with lockups greater than and less than the median lockup length. Results are presented using all three benchmarks (market return, size matched and size and BM matched control firm) adopted in this study. Moreover, we report both equal weighted and value weighted BHARs to draw a comparison between the weighting schemes. We find that our sample IPOs consistently outperform the market index over the one, two and three year holding periods when returns are equal weighted, as reported in Panel A. The returns for one, two and three years are 15.56%, 31.36% and 36.98% respectively and these returns are significantly different from zero at the 1% significance level. Even when size and size and MB matched benchmarks (Panel B and C) are used, the returns are positive and significant for at least one year holding period. Moreover, the magnitude of the returns decreases when we use size or size and BM matched firms. Similarly, significance levels of returns over different holding periods vary across the three benchmarks. For example, only one year returns are significant in size matched benchmark, while both one year and two years abnormal returns are significant when size and BM matched benchmark is used. Our results for full sample are in contradiction to the previous studies which document significant IPO underperformance over the long run for US and UK markets (Loughran and Ritter, 1995, Ritter, 1991, Espenlaub et al., 2000). These results for full sample of IPOs are, however, different in at least three ways when value weighting is used. First, one year abnormal returns become negative across all the benchmarks indicating underperformance relevant to the benchmarks. For example, we report a negative mean size and BM adjusted return of -8.42% for the first year after the IPO. Second, although the mean abnormal returns for two and three years are positive across all three benchmarks, their magnitude is less than that of equal weighted returns. Finally, none of the mean abnormal returns are significant using the value weighting scheme. This still is consistent with our previous finding of a lack of significant underperformance for our sample IPOs, in case of equal weighted abnormal returns. Moreover, our results of a reduced degree and significance of abnormal long run performance when using vale weighting are consistent with previous IPO literature (Brav et al., 2000, Brav and Gompers, 1997, Gao and Jain, 2011, Wu and Kwok, 2007).

Next, we discuss the abnormal performance differences between our portfolios of IPOs. We stratify the full sample IPOs in two portfolios based on the median lockup length (12.34 months) of our full sample. First portfolio comprises of all IPOs with lockups longer than the median lockup length and the second portfolio consists of all IPOs with lockups shorter than the median lockup length. Columns 3-7 of Table 2 presents the results of mean BHARs for these two portfolios. A comparison of the two portfolios reveals that IPOs with lockups longer than median length consistently outperform the IPOs with lockups shorter than the median length across all the three benchmarks and for all holding periods (except three year returns for size and BM matched firms). For instance, the one year equal weighted abnormal return for IPOs with lockups longer than median are significantly different from zero at 1% level and are 24.13%, 24.63% and 19.66% respectively for market adjusted, size matched and size and BM matched firms. On the other hand, one year equal weighted abnormal returns for IPOs with lockups shorter than median are 6.99%, -1.63% and 3.43% respectively for the three benchmarks and are not significantly different from zero. This shows that although IPOs with lockups shorter than median do not significantly underperform, IPOs with lockups longer than median have higher abnormal returns and significantly outperform their respective benchmarks. Similar pattern is observed for two and three year holding periods across all the benchmarks. When we compare the value weighted returns, the performance difference between our portfolios is even more pronounced. The abnormal returns of IPOs with lockup longer than median are consistently higher than the returns of IPOs with lockups shorter than median for all the benchmarks and holding periods. Moreover, four out of the nine value weighted BHARs for IPOs with lockups longer than median are significantly different from zero, which is also in contrast with the full sample as none of the value weighted returns for full sample are statistically significant. For IPOs with lockups shorter than median, four out of nine value weighted BHARs are negative and one year BHAR for size matched benchmark is also statistically significant, which show significant underperformance relative to the benchmark. These results also show that the underperformance in case of value weighting for full sample is mainly driven by the poor performance of IPOs with lockups shorter than median. Our overall results from Table 2 show that the portfolio of IPOs with lockups longer than median outperforms the various benchmarks used in this study. On the other hand, IPOs with lockups shorter than median have some negative BHARs although statistically insignificant (except for one year BHAR in case of size matched benchmark) and these BHARs are generally lower than the BHARs of other portfolio (IPOs with lockups longer than median). In sum, the IPOs with lockups shorter than median do not perform as well as IPOs with lockups longer than median and there is also evidence of underperformance relative benchmarks in case of former IPO portfolio.

In order to further check the robustness of our results, we form two portfolios of IPOs based on bottom and top quartile cut offs of lockup length. More specifically, we combine all IPOs with lockups in the top quartile (18 months) of lockup duration in one portfolio. In the next portfolio, we combine all IPOs with lockups in the bottom quartile (12 months) of lockup duration. So our two portfolios are respectively, IPOs with lockups longer than 18 months and IPOs with lockups shorter than or equal to 12 months. In table 3, we compare the long run performance of these two portfolios based on the three benchmarks already discussed. Again the results are presented for both equal weighting and value weighting. We would expect more strong performance differences between these two portfolios (compared to the earlier cut off based on median lockup length) as the lockup duration difference between the two portfolios has been widened. In line with our expectation, we find that performance differences between our two portfolios (based on quartile cut offs) are even more pronounced. IPOs with lockups longer than 18 months consistently outperform the relevant benchmarks and the BHRAs for this portfolio are significantly different form zero in most of the cases (7 out of 9 BHARs are significant at 1% or 5% level). For example, we observe a 60.12% statistically significant abnormal return for two years holding period when a size matched firm is used a benchmark. Similar, pattern emerges when value weighting is used. All the returns (across benchmarks and for different holding periods) are positive and two and three year returns for size and BM matched benchmark are significantly different from zero. For IPOs with lockups less than or equal to 12 months, we find that although these IPOs do not underperform the relevant bench marks, the returns are not significantly different from zero with the exception of three year BHAR for market adjusted benchmark. Again value weighting reduces the size of BHARs and almost half the returns turn negative although statistically insignificant, except one year return for size matched benchmark which is significantly negative. Overall, we find evidence of superior long run performance on the part of IPOs with longer lockups relative to the IPOs with shorter lockups, with the caveat that the significance of results depends on the weighting scheme and the choice of benchmark.

Table 4 presents the results of wealth relatives for full sample and different sub samples based on median lockup length cut off and top and bottom quartiles of lockup length. The wealth relatives for different holding periods are above one across the three benchmarks which shows that the overall IPO sample outperforms the relevant benchmarks. A comparison of wealth relatives between IPOs with lockups longer that median and IPOs with lockup shorter than median shows that the wealth relatives for former group are consistently higher than the latter group. Similar results are observed for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months, which further supports that longer lockup IPOs perform better than the shorter lockup IPOs. Moreover, these results are also consistent with the results of BHAR reported in Table 2.

4.2 Factor regression models

In Table 5, we report the results of CAPM, Fama and French (1993) three factor model and Carthart's (1997) four factor model using OLS for monthly portfolios of IPOs with lockups longer than median and IPOs with lockups shorter than median lockup length. The results for a 12-, 24- and 36-month portfolio are reported in panel A, B and C respectively. As discussed in the methodology section, a 12-, 24- ad 36-month portfolio includes all the IPOs which occurred during the last 12, 24 and 36 month respectively. In Panel A, we find that the coefficient of intercept i.e. alpha is positive and statistically significant in all three models for IPOs with lockups longer than median. Similarly, for IPO with lockups shorter than median, the alpha is positive in all three models but significant only in three- and four-factor models. Moreover, the magnitude of alpha is higher for IPOs with lockups longer than median for CAPM and four-factor models than IPOs with lockup shorter than median but lower in case of three-factor model. These results suggest a weak evidence of better return performance for IPOs with longer lockups compared to shorter lockups in case of 12-month portfolio. The results for a 24-month portfolio are reported in Panel B of Table 5. We find that the intercept is positive, although insignificant, in all models for IPOs with lockups longer than median. For IPOs with lockups shorter than median, the intercept term is negative for CAPM model but it is positive for three-and four-factor models. We, however, find that the intercept terms for IPOs with lockup longer than median are consistently higher than that for IPOs with lockups shorter than median, which shows better return performance for the former group of IPOs. Panel C of Table 5 reports the results of a 36-month portfolio. We find that the intercept term is positive in all models for both groups of IPOs and none of these intercepts are statistically significant. Unlike the results for 12-and 24-month portfolios, there is no evidence of superior performance on part of IPOs with longer lockups compared to the IPOs with shorter lockups.

In order to test for the robustness of our results, we re-estimate all the factor regression models in Table 5 using the weighted least squares (WLS) regressions. The results of WLS regressions are presented in Table 6. Similar to the OLS results for 12-month portfolio, in panel A we find that IPOs with lockups longer than median outperform the IPOs with lockups shorter than median when CAPM is used, although the intercept term is not statistically significant in either of these two portfolio groups. However, results from other two models (FF3F and FF4F) show significant intercept terms and better performance for IPOs with lockups shorter than median compared to the IPOs with lockups longer than median. However, results for 24-month portfolio in panel B clearly indicate IPOs with lockups shorter than median perform poorly as compared to the IPOs with lockups longer than median as the intercept term is negative in all three models and significant in case of CAPM. On the other hand, intercept term is only negative in case of CAPM and positive, although statistically insignificant, for other two models for IPOs with lockups longer than median. The results from Panel C for the 36-month portfolio also show a better performance for IPOs with lockups longer than median as intercept terms in all three models are positive and higher than that of IPOs with lockups shorter than median.

Overall results from Table 5 and 6 show a weak evidence of better performance on the part of the IPOs with lockups longer than median compared to the IPOs with lockups shorter than median. Although statistically insignificant, the mean monthly returns measured by intercept terms for 24- and 36-month portfolios of IPOs with lockups longer than median are positive and higher than the intercept terms of IPOs with lockups shorter than median. The results for 12-month portfolio are, however, inconsistent for some models as IPOs with lockups longer than median underperform as compared the IPOs with lockups shorter than median. But this is consistent with our earlier discussion that dividing IPOs on the basis of median might not show strong performance differences between IPOs with lockups longer than and shorter than median lockup length.

In order to provide more robust evidence of our earlier results, we next divide IPOs on the basis of quartile of their lockup length. We compare the performance of IPOs in the bottom quartile of their lockup length with the IPOs from top quartile of lockup length. Effectively, our first portfolio consists of IPOs with lockups longer than 18 months (top quartile) and our second portfolio consists of all IPOs with lockup shorter than or equal to 12 months (bottom quartile). We believe that dividing IPOs based on the quartiles of their lockup length would provide more robust results for performance differences between longer and shorter lockup IPOs. The results of OLS regression models for both groups of IPOs are presented in Table 7 using three models earlier discussed. Evaluating the results of 12-month portfolio from Panel A of table 7, we find that the intercept terms of IPOs with lockup longer than 18 months are statistically significant and consistently higher than the intercepts of IPOs with lockups shorter than or equal to 12 months. For IPOs with lockups shorter than or equal to 12 months, the intercepts are significant for three and four factor models while insignificant for the CAPM model. These results clearly indicate that IPOs with longer lockups perform better than IPOs with shorter lockups for a 12-month calendar portfolio. Similar results are observed for a 24-month portfolio in Panel B where, the intercept term is positive and statistically significant in two out of three models for IPOs in longer lockup group. For IPOs in shorter lockup group, all intercept terms are statistically insignificant and positive in two out of three models. Further, the size of intercept terms is larger relative to those for IPOs in shorter lockup group. Finally, for 36-month portfolio for IPOs in both groups, there is clear evidence that the IPOs in longer lockup group consistently outperform the IPOs in shorter lockup group. For instance, intercepts in all three models for IPOs in longer lockup groups are positive, statistically significant and consistently higher relative to the intercepts for IPOs in the shorter lockup group. On the other hand, although positive only one out of three intercepts in shorter IPO group is significant at 10% level. In Table 8, we re-estimate all models using the WLS regressions for IPOs with lockups longer than 18 months and IPOs with lockups shorter than or equal to 12 months. Consistent with earlier results reported in Table 7, we find that IPOs in the longer lockup group outperform the IPOs in the shorter lockup group using the WLS regressions. For example, the intercept terms for IPOs in longer lockup group are consistently higher than those in shorter lockup group across all models and portfolio formation periods (12-, 24 and 36-months). The intercept terms are significant in six out of nine regression models for IPOs in the longer lockup group. However, for IPOs in the shorter lockup group, the intercepts are positive in five out of nine models but significant only in two models.

The overall results from our factor models provide evidence that IPOs with longer lockups generally perform better than the IPOs with shorter lockups using different factor models and portfolio weighting methods. When IPOs are divided into two portfolio groups based on their median lockup length, IPOs with lockups longer than median have higher excess returns relative to IPOs with lockups shorter than median for 24- and 36-month portfolios. The results for 12-month portfolio, though, depend on the model used. We, therefore, find weak evidence of superior long run post-IPO performance for longer lockup IPOs relative to shorter lockup IPOs when median cut-off is used. However, when IPO are grouped on the basis of top and bottom quartiles of lockup length, we find that the intercept terms for IPOs with lockups in the top quartile (longer than 18 months) are consistently positive and significant irrespective of the factor model, weighting scheme or the portfolio period. On the other hand, intercept terms for IPO with lockups in the bottom quartile (shorter than or equal to 12 month) are mostly negative and statistically insignificant. As such, we fund strong evidence to suggest that IPOs with longer lockup show better post-IPO performance relative the IPOs with shorter lockups for calendar time factor model regressions. Moreover, these results are consistent with our earlier analysis suing BHAR methodology.

4.3 Cross-sectional regressions of long-run performance

Next, we conduct a multivariate analysis to further test the robustness of our results. We use raw IPO return (BHR), market adjusted BHAR, size matched firm adjusted BHAR and a size and BM matched firm adjusted BHAR as the dependant variables in our different model specifications. We run the regression model using one, two and three year returns respectively in all model.

In Table 9, we present the descriptive statistics of all variables used in the cross-sectional regressions. The mean (median) length of lockup period is 15.205 (12.367) months for our sample of IPOs. More than half (56.3%) of the IPOs have venture capital/private equity backing. The average market share of the underwriter based on the number of IPOs sponsored in the preceding year is 2.36%. The mean pre-IPO year total assets for sample IPOs are £195.451 million with a median of just £22.637 million. Due to the highly skewed distribution of total assets, we use natural log of total assets in all our regression models. Insiders retain an average of 24.646% of post-IPO equity in IPO firms. The average age of the issuing firm is 15.73 years with a median of 9.56 years, where age is measured as difference in years between the IPO date and company founding date. IPO firms experience an average first day returns of 12.017% over the sample period. The ROA for the sample is -25.7% with a median value of 7.00%.

Table 10 reports the results of regression models when raw log returns (LBHRs) are used for one, two and three post-IPO years. Consistent with our earlier findings using event time and calendar time methodology, length of lockup is positively and significantly related to the long-run performance of IPOs irrespective of the holding period used. Among other control variables, ROA is significant in all three models showing that profitability at the time of IPO is a significant predictor of the post-IPO stock return performance and is consistent with the findings of Gao and Jain (2011). Assets, our proxy for size of the firm is positive and significant in model (2) and (3) indicating that large firms are likely to perform better after the IPO. Age of the IPO firm is also a significant predictor of the post-IPO return performance. For instance the coefficient of Age is positive for all three models and statistically significant for two and three year holding period reruns, consistent with other studies (Dong et al., 2011, Ritter, 1991). The coefficients of VC and UW Reputation are negative but statistically insignificant showing the negative impact of VC backing and reputed underwriters on the post-IPO long run performance.

Regression results for the abnormal returns (LBHARs) using market adjusted, size matched control firm and a size and BM matched control form benchmarks are presented in Tables 11,12 and 13 respectively. Moreover, we estimate the regressions for one, two and three year holding period abnormal returns. Consistent with our prediction, lockup length is positively and significantly related to the abnormal log returns in all three holding periods and across all the benchmarks. For instance, the coefficient of Lu Months is significant at either 1% or 5% in Table 11 and 12. Using size and BM matched benchmark reduces the statistical significance of results in Table 13, yet the Lu Months is significant at 10% for one and two year abnormal holding period returns and significant at 5% for the three year abnormal returns. Overall, we find a consistent evidence to suggest that the length of lockup has a positive impact on the post IPO long run performance of IPOs and our results are robust to the choice of holding period and benchmark. The results regarding other control variables are also consistent across the different regression models. ROA, for example, has a consistently positive and significant coefficient across all the regressions. Similarly, size measured by the log of total assets has a positive impact on two and three year holding period abnormal returns with a varying levels of statistical significance. The coefficient of age is also positive and significant at least for market adjusted and size matched firm adjusted benchmarks. Rest of the control variables are generally insignificant across different model specifications.

5 Lockup expiry returns

5.1 Methodology

In this section, we analyse the return performance of sample IPOs around the lockup expiry day by conducting a standard event study. The lockup expiry day is taken as day zero, and cumulative average abnormal returns (CAARs) are calculated over several short and long windows around the lockup expiry day. We calculate CAARs for 41 days (-20, +20), 21 days (-10, +10), 5 days (-20, +2) and 3 days (-1, +1) around the lockup expiry day following existing studies on market reaction to lockup expiration (Field and Hanka, 2001, Brav and Gompers, 2003, Espenlaub et al., 2001). We also calculate abnormal returns on the day of lockup expiry (day 0) and for two post lockup expiry windows of 9 days (+2, +10) and 19 days (+2, +20).

Prior studies on market reaction to the lockup expiration have mostly used a single model approach to calculate the abnormal returns. For example, Field and Hanka (2001) and Brav and Gompers (2003) use a market-adjusted model to calculate the abnormal returns around lockup expiry day[5]. Market-adjusted model is easy to implement in the sense that it does not require any model parameters to be estimated from the pre-event return data. Brau et al. (2004) use a market model with the CRSP equal weighted index as the proxy for market return. As the market model requires model parameters to be estimated from pre-event data, Brau et al. (2004) use data beginning at 90 days prior and ending at 11 days prior to the lockup expiry for calculating the estimated betas. Similar models have been used in the lockup expiry return analysis in the UK studies. For instance, Hoque and Lasfer (2009) and Hoque (2011) use market-adjusted and market model respectively for UK IPOs. Unlike these studies, we use a multi model approach to examine the market reaction around lockup expiry day in order to provide more robust results. We calculate abnormal returns for the IPOs relative to three different models. Our first model is the simple market-adjusted model, where return on FTSE Allshare index is used as a proxy for market return. Our second model is a standard CAPM model and third model is Fama and French (1993) three factor model. As these two models require estimation of the model parameters from the pre-event data, we use an estimation window starting at 240 days prior to and ending at 21

[5] Filed and Hanka (2001), however, also use market model and raw returns analysis but don not report the results for these models.

days prior to the lockup expiry date for our main 41 day event window.[6] . Due to the longer lockup length for UK IPOs, we are able to use this long estimation window for most of our IPO sample[7]. Below we explain the calculation for abnormal returns, cumulative average abnormal returns and the estimation of expected or normal returns using three models described earlier.

The Abnormal Return (AR_{it}) for individual security and event date is defined as the difference between the realised return and the expected return;

$$AR_{it} = R_{it} - E(R_{it}) \qquad (9)$$

Cumulating the abnormal returns across time gives the cumulative abnormal return;

$$CAR_i(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{it} \qquad (10)$$

The cross-sectional average for cumulative abnormal returns is;

$$CAAR_i(\tau_1, \tau_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i(\tau_1, \tau_2) \qquad (11)$$

We use three commonly employed models in literature to estimate the expected or normal return (R_{it}) : market-adjusted model, capital asset pricing model and Fama and French (1993) three factor model (FF3F). For market-adjusted model, we use FTSE Allshare index to proxy the daily market returns. For CAPM and FF3F, we use -240 to -21 days relative to the lockup expiry day (0) as the estimation window to estimate model parameters.

More specifically the Abnormal Return (AR_{it}) is calculated as;

For market-adjusted model;

$$AR_{it} = R_{it} - R_{mt} \qquad (12)$$

Where R_{it} the daily is return on security i on day t and R_{mt} is the daily return on FTSE Allshare index on day t.

For CAPM;

$$AR_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_i\left(R_{mt} - R_{ft}\right)\right] \qquad (13)$$

[6] Similarly, the estimation window for 21 day event window is -240 to -11 days relative to lockup expiry and so on for rest of the shorter windows.

[7] There are only 17 IPOs for which we use shorter estimation window as their lockup period is shorter than the 240 day estimation window.

Where R_{ft} is the return on three month Treasury bill on day t and β_i is the CAPM beta estimated by an OLS time series regression of daily excess returns $(R_{it} - R_{ft})$ of security i on the market risk premium $(R_{mt} - R_{ft})$ over the estimation period (-240 to -21 days).

For Fama and French (1993) three factor model;

$$AR_{it} = R_{it} - \left[R_{ft} + \hat{\beta}_i\left(R_{mt} - R_{ft}\right) + \hat{\gamma}_i(SMB_t) + \hat{\delta}_i(HML_t)\right] \qquad (14)$$

where β_i, γ_i and δ_i are estimated by OLS regression of security $i's$ daily excess return on the daily market excess return, size and book-to-market factors over the estimation period. SMB_t and HML_t are Fama and French size and boo-to-market factor returns where SMB_t is the small minus big portfolio return on day t and HML_t is the high minus low book-to-market portfolio return on day t. The daily return factors are from Gregory et al. (2013).

The cross-sectional t-test of the CAAR is calculated as:

$$T_{cross} = \frac{CAAR(\tau_1, \tau_2)}{\hat{\sigma}_{CAAR_\tau}} \qquad (15)$$

Under the null hypothesis, the CAAR is equal to zero. The variance estimator for this statistics is based on the cross-section of abnormal returns:

$$\hat{\sigma}_{CAAR(\tau_1,\tau_2)} = \sqrt{\frac{1}{N(N-d)}\sum_{i=1}^{N}[CAR_i(\tau_1,\tau_2) - CAAR(\tau_1,\tau_2)]^2} \qquad (16)$$

5.2 Results and discussion

Table 14 presents the results of event study around the lockup expiry for full sample of IPOs using different windows discussed earlier. The mean CAAR and t-statistic are presented for market-adjusted model, CAPM and Fama and French three factor model. We find that our sample IPOs experience negative returns around wider lockup expiry windows of 41 (-20, +20) and 21 (-10, +10) days. These results are statistically significant for market-adjusted and CAPM models. For instance, a mean CAAR of -3.49% and -1.97% is observed for 41 and 21 day windows using the CAPM and both returns are statistically significant at 5% and 10% levels respectively. Similarly, we find significant negative returns for post lockup expiry windows of (+2, +10) and (+2, +20) days across all the models.

Our results provide evidence of poor performance around wider lockup expiry windows. However, we do not find poor performance in our sample around the shorter lockup expiry windows. For example, the CAARs for 3 (-1, +1) and 5 (-2, +2) day windows around the lockup expiry are generally positive although statistically insignificant across different models. Moreover, the average CAAR on the day of lockup expiry (day 0) is also positive but statistically insignificant. This shows that sample IPOs do not perform poorly for the shorter windows around the lockup expiry. Our results for short lockup expiry windows are inconsistent with the earlier documented evidence for the US and UK markets (Field and Hanka, 2001, Brav and Gompers, 2003, Hoque and Lasfer, 2009). For example, Field and Hanka (2001) report a significant abnormal return of -1.5% for 3 day window around the lockup expiration date for US IPOs. The lack of negative performance around the shorter lockup expiry windows in our IPOs is, however, consistent with the findings of Espenlaub et al. (2001) for UK IPOs. Although, Espenlaub et al. (2001) report negative CAARs around shorter lockup expiry windows, none of their abnormal returns are significantly different from zero. Overall, although we find significant negative performance for wider windows (41 and 21 days) around lockup expiry, our results for shorter lockup expiry windows exhibit lack of negative performance for sample IPOs which is inconsistent with the earlier reported evidence (as discussed above).

Next, we divide our sample IPOs in groups based on their lockup length and examine their performance around the lockup expiry. In line with our earlier analysis on the long run performance in previous section, the IPOs are grouped on two bases: median lockups length and top and bottom quartile of lockup period. In Table 15, we compare the mean CAARs for IPOs with lockups longer than median and IPOs with lockups shorter than median for different windows using market-adjusted, CAPM and FF3F models. The results reveal that that IPOs with lockups shorter than median experience significant negative CAARs around lockup expiry dates. For instance, the mean CAARs for 41 and 21 days around lockup expiry for IPOs with lockups shorter than median range from -5.89% to -3.17% across all models. Moreover, these CAARs are statistically significant at 1% or 5% level for different models. On the other hand, for IPOs with lockups longer than median, mean CAARs range from -1.51% to 1.87% for 41 and 21 day windows around lockup expiry and none of these CAARs are significantly different from zero. Similar results are reported for post lockup expiry windows (+2, +10 and +2, +20) where we find high negative and significant CAARs for IPOs with lockup shorter than median compared to the IPOs with lockups longer than median. We observe similar results for shorter windows around lockup expiry as mean CAARs are higher for IPOs with lockups longer than median relative to IPOs with lockups shorter than median although none of these CAARs are statistically significant. However, inconsistent with other event windows, CAARs for IPOs with lockups shorter than median are higher compared to the CAARs for IPOs with lockups longer than median. Overall, most of the CAARs for market-adjusted and FF3F model are positive for IPOs with lockups longer than median for most of the event windows. For instance, we observe positive CAARs for six out of seven event windows in case of FF3F model and four out of seven event windows in case of market-adjusted model for IPOs with lockups longer than median. As such, based on event study results from Table 15, we find evidence that IPOs with shorter lockups experience significant negative returns around the lockups expiry date relative to IPOs with longer lockups where returns are insignificantly negative or positive. Furthermore, the returns for IPOs with longer lockups are consistently larger than that of IPOs with shorter lockups. Our results clearly suggest that the presence of a longer lockup reduces the negative return performance around lockup expiry.

In Table 16, we provide a comparison of return performance of IPOs with lockup longer than 18 months versus IPOs with lockups shorter than or equal to 12 months around different lockup expiry windows. Consistent with our results in Table 15, IPOs with longer lockups continue to outperform IPOs with shorter lockups. It is also important to note that the negative performance on part of IPOs with lockups shorter than or equal to 12 months has become more severe compared to the results in Table 15[8]. For example, using FF3F model in Table 16, the mean CAARs for two sub-samples of IPOs for 41 day window are 2.97% (lockups >18 months) and a statistically significant -4.93% (lockups ≤ 12 months) compared to 1.87% (lockups > median) and significant -4.69% (lockups < median) in Table 15. We also find that most of the CAARs for IPOs with lockups longer than 18

[8] It is expected because in Table 16 we are comparing the performance of IPOs in two extreme quartiles of lockup length (top and bottom quartile).

months are positive although insignificantly different from zero[9]. Whereas, the mean CAARs are mostly negative and significantly different from zero at least for wider event windows around lockup expiry in case of IPOs with lockup shorter than or equal to 12 months.

Overall, results from Table 15 and 16 provide a strong evidence of better return performance around lockup expiry for IPOs with longer lockups relative to IPOs with shorter lockup. The results also reveal that the significant negative returns performance around wider lockup expiry windows (41 and 21 days) and for post-lockup expiry windows (+2, +10 and +2, +20) in full sample (Table 14) is mainly driven by IPOs with shorter lockups. Finally, our results are robust to choice of different expected return models and shorter and wider windows around lockup expiry.

5.3 Robustness of Lockup expiry returns

Prior research on return performance around lockup expiry provides evidence that VC/PE backed IPOs exhibit severe negative performance compared to the non VC/PE backed IPOs. Field and Hanka (2001), for example, find that the three-day abnormal return in VC backed firms is three times larger than in non VC backed companies (-2.3% vs -0.8%). They attribute this severe negative performance to the more aggressive selling by venture capitalists at the time of lockup expiry. Similarly, Brau et al. (2004) argue that VCs are less likely to hold their shares in the long run than other insiders and find a negative relation between the VC presence and abnormal returns around lockup expiry. Bradley et al. (2001) also report that losses around lockup expiry in their sample are concentrated in VC backed IPOs. Espenlaub et al. (2003) report similar results for the UK IPOs and find that CAARs for VC backed IPOs are lower than that of non VC backed IPOs for most of their short event windows around lockup expiry day. In order to provide more robustness for our results, we extend the analysis in Tables 15 and 16 and further classify IPOs into VC/PE backed and non VC/PE backed. In panel A of Table 17, we first classify IPOs based on their VC/PE backing status and then within each sub-sample IPOs are further divided into two groups: IPOs with lockups shorter than median and IPOs with lockup longer than median. Panel B reports the comparative CAARs for IPOs with lockups longer than 18 months and IPOs with lockup shorter than or equal to 12 months for each of the VC/PE

[9] However, the CAARs for 5 day window (-2, +2) are 2.01 and statistically significant at 10% in FF3F model for IPOs with lockups longer than 18 months.

backed and non VC/PE backed IPOs. We find that IPOs with lockups shorter than median have significant lower returns compared to IPOs with lockups longer than median regardless of their VC/PE backing status. IPOs with longer lockups consistently perform better around lockup expiry in both VC/PE backed and non VC/PE backed sub-samples. The results from Panel B show the similar performance differences between IPOs with lockups longer than 18 months and IPOs with lockups shorter than or equal to 12 months across both VC/PE backed and non VC/PE backed sub-samples. IPOs with lockup shorter than or equal to 12 months are the worst performers regardless of their VC/PE backing status. A comparison of the IPOs in the longer lockup groups across VC and non VC backed IPOs reveals that most of the CAARs for different event windows are positive although none of the CAARs in these groups are significantly different from zero. This shows that longer lockups reduce negative performance in VC as well as non VC backed IPOs alike. On the other hand, comparing the IPOs in shorter lockup groups across VC and non VC backed IPOs shows that most of the CAARs for different event windows are negative and statistically significant. The results regarding the level of underperformance between VC and non VC backed IPOs with shorter lockups are, however, inconsistent and depend on the model used. Finally, the results also show that there are more statistically significant negative CAARs in VC backed sample relative to non VC backed sample in shorter lockup groups. This suggests that VC backed IPOs with shorter lockups suffer more compared to the non VC backed IPOs. In sum, results from Table 17 provide evidence that longer lockups help to reduce negative return performance around lockup expiry even in VC backed IPOs and lend more robustness to our earlier analysis.

6 Conclusion

The literature on lockup agreements has largely focused on the motivations of lockups at the time of IPOs and market reaction to the expiry of the lockups. Two competing hypothesis for the existence of (longer) lockups are suggested in the prior literature. Signalling hypothesis argues that longer lockups signal firm quality, while commitment hypothesis suggest that longer lockups help to reduce moral hazard or agency problem. However, the role of lockups beyond IPO and particularly in relation to the long run post-IPO performance has received little attention. Recently two studies have attempted to fill this gap by relating lockup length with post issue performance of IPOs and SEOs in US. Both the studies find support for the commitment hypothesis and suggest that lockups are not indicative of issuer quality.

In this study, we argue that there are significant institutional differences in the US and UK/European markets in terms of lockups and the relation between lockup length and post-IPO long run performance merits further investigation. The relatively longer and diverse lockups in UK compared to the US markets may serve as a more credible signal of quality and a prolonged involvement and monitoring of insiders may also reduce agency problems resulting in better long run performance of IPOs.

Our focus is on two related research questions aimed at assessing that whether longer lockups predict better long run IPO performance as well as better return performance around the lockup expiry event. Using both event time and calendar approaches to long run IPO performance, we document several interesting results. We find that, in contrast to the extant literature on IPO underperformance, our sample IPOs outperform the benchmarks, at least on equal weighted return basis in event time analysis using BHARs and wealth relatives. A comparative analysis of BHARs between IPOs with longer lockups and shorter lockups reveals that IPOs with longer lockups consistently perform better than IPOs with shorter lockups irrespective of the benchmark and weighting scheme. Similar results are observed when long run performance is measured on the basis of wealth relatives. Comparing long run performance in calendar time approach using different factor models and regression techniques also reveals that portfolios of IPOs with longer lockups consistently earn higher abnormal returns relative to than that of shorter lockups. Our cross sectional regressions provide further support to these results and we document and positive and significant relation between lookup length and long run IPO performance. These results clearly suggest that lockup length signals firm quality which is evident from superior long run performance on the part of IPOs with longer lockups.

We also analyse stock return performance around lockup expiry dates for IPOs with longer and shorter lockups. Our results show that IPOs with shorter lockups experience significant negative abnormal returns around relatively longer lockup expiry windows. On the other abnormal returns for IPOs with longer lockups, although negative, are statistically insignificant. These results are robust to different models specifications and sub-samples of VC and non-VC backed IPOs. These results provide further support to our conjecture that high quality IPOs are less likely to suffer negative performance around lockup expiry.

Our study adds to the literature on determinants of long run IPO performance and shows that lockup length is an important yet relatively ignored factor in long run performance studies. Although one can argue that in a rationale and efficient market, the signalling effect of lockups should be quickly absorbed in the valuations and there should not be performance differences between shorter and longer lockup IPOs. However, our evidence suggests that investors do not fully understand and incorporate the true value of longer lockup signal instantaneously but only gradually over time (as the positive information is realised in terms of frim performance). This would imply higher future stock returns for firms with longer lockups.

Table 1- Sample Distribution

This table presents distribution of sample IPOs across years and industry groups. Panel A presents sample distribution and Lockup period in months across offer years. Panel B gives the industry distribution of sample IPOs and Lockup period. The mean, median and standard deviation of lockup period in months is shown across offer years and industry sectors.

Panel A: Time distribution

			Lockup Months		
Year	Freq.	%	Mean	Median	Std. dev.
1995	27	10.07	18	16	7
1996	40	14.93	17	16	5
1997	36	13.43	19	18	6
1998	27	10.07	15	14	6
1999	18	6.72	14	12	5
2000	54	20.15	12	12	5
2001	6	2.24	19	20	6
2002	12	4.48	11	12	4
2003	5	1.87	10	12	3
2004	15	5.60	13	12	3
2005	14	5.22	15	12	7
2006	14	5.22	15	12	7
Total	**268**	**100**	**15**	**12**	**6**

Panel B: Industry (SIC) distribution

				Lockup Months		
Industry	Two-digit SIC	Freq.	%	Mean	Median	Std. dev.
Oil and Gas	13	10	3.73	16	13	7
Paper and Paper Products	24-27	7	2.61	19	12	11
Chemical Products	28	17	6.34	18	17	6
Electronic Equipment	36	13	4.85	12	12	3
Scientific Instruments	38	13	4.85	19	17	8
Communications	48	16	5.97	12	12	5
Durable Goods	50	15	5.60	15	15	4
Computer Equipment and Services	35,73	75	27.99	15	12	6
Engineering and Management Services	87	20	7.46	17	16	6
Retail	53,54,56,57,59	20	7.46	14	13	5
Eating and Drinking Establishments	58	6	2.24	15	13	5
Transportation	37,39,40-42,44,45	6	2.24	11	12	3
All Others		50	18.66	15	13	6
Total		**268**	**100**	**15**	**12**	**6**

Table 2- BHARs for full sample and IPOs Stratified by Median Lockup Period

This table presents the one, two and three-year buy-and-hold abnormal returns (BHAR) for full sample and IPOs stratified by the median lockup length. The sample consists of 268 IPOs with lockups that occur between 1995 and 2006 on the LSE Main Market. The equal weighted (EW) and value weighted (VW) buy-and-hold abnormal returns are reported using three benchmarks; market index (FTSE AllShare) in Panel A, Size matched firms in Panel B, and Size and Book to Market (BM) matched firms in Panel C. For value weighted returns, weights are based on the market capitalisation of the IPOs. The holding period begins from 1st day after the day of issuance. The skewness adjusted test statistics are reported within brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively.

Holding	Full Sample		Lockup > Median		Lockup < Median	
Period	EW (%)	VW (%)	EW (%)	VW (%)	EW (%)	VW (%)
Panel A: Market Return						
One Year	15.56***	-6.50	24.13***	9.72	6.99	-10.15
	[3.54]	[-1.10]	[3.68]	[1.34]	[1.22]	[-1.43]
Two Years	31.36***	9.11	43.47***	28.79**	19.25	4.68
	[3.29]	[0.85]	[3.24]	[2.03]	[1.42]	[0.37]
Three Years	36.98***	18.22	43.09***	35.01**	30.87	14.44
	[3.22]	[1.42]	[2.97]	[2.35]	[1.61]	[0.74]
Panel B: Size Matched Firms						
One Year	11.50**	-9.35	24.63***	11.66	-1.63	-14.09*
	[2.09]	[-1.42]	[3.24]	[1.45]	[-0.20]	[-1.70]
Two Years	19.16	4.48	37.77**	31.87*	0.54	-1.70
	[1.46]	[0.35]	[2.02]	[1.69]	[0.09]	[-0.02]
Three Years	19.65	10.97	27.98	36.6*	11.33	5.19
	[1.26]	[0.69]	[1.31]	[1.71]	[0.53]	[0.29]
Panel C: Size and BM Matched Firms						
One Year	11.55**	-8.42	19.66**	3.04	3.43	-11.00
	[1.98]	[-1.31]	[2.06]	[0.32]	[0.52]	[-1.45]
Two Years	24.84**	4.68	35.87**	18.1	13.81	1.65
	[2.35]	[0.43]	[2.33]	[1.13]	[0.97]	[0.18]
Three Years	18.01	15.63	9.16	16.95	26.86	15.33
	[1.36]	[1.17]	[0.52]	[0.95]	[1.40]	[0.79]

Table 3- BHARs for IPOs in Top and Bottom Quartile of Lockup Period

This table presents the one, two and three-year buy-and-hold abnormal returns (BHAR) for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months. The sample consists of 268 IPOs with lockups that occur between 1995 and 2006 on the LSE Main Market. The equal weighted (EW) and value weighted (VW) buy-and-hold abnormal returns are reported using three benchmarks; market index (FTSE AllShare) in Panel A, Size matched firms in Panel B, and Size and Book to Market (BM) matched firms in Panel C. For value weighted returns, weights are based on the market capitalisation of the IPOs. The holding period begins from the 1st day after the day of issuance. The skewness adjusted test statistics are reported within brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively.

Holding	Lockup > 18 months		Lockup ≤ 12 months	
Period	EW (%)	VW (%)	EW (%)	VW (%)
Panel A: Market Return				
One Year	38.52***	14.05	7.26	-10.14
	[3.91]	[1.23]	[1.25]	[-1.40]
Two Years	55.07***	20.82	20.98	5.02
	[2.62]	[0.91]	[1.54]	[0.39]
Three Years	44.32**	25.42	33.14*	14.9
	[1.97]	[1.08]	[1.72]	[0.75]
Panel B: Size Matched Firms				
One Year	42.35***	15.6	-1.63	-14.11*
	[3.90]	[1.26]	[-0.20]	[-1.67]
Two Years	60.12**	25.68	1.36	-1.49
	[2.58]	[1.02]	[0.13]	[-0.01]
Three Years	39.99	29.8	12.5	5.49
	[1.51]	[1.11]	[0.57]	[0.31]
Panel C: Size and BM Matched Firms				
One Year	27.16***	14.26	3.47	-11.03
	[2.82]	[1.45]	[0.51]	[-1.43]
Two Years	38.9**	39.69**	14.88	1.89
	[2.01]	[2.06]	[1.03]	[0.19]
Three Years	29.55	40.78*	28.11	15.6
	[1.28]	[1.76]	[1.45]	[0.79]

Table 4- Wealth Relatives for Full Sample and Different Lockup Lengths

This table reports the one, two and three-year Wealth Relatives for full sample, sub-sample stratified by the median lockup length, and IPOs with lockups greater than 18 months and IPOs with lockups less than and equal to 12 months. The sample consists of 268 IPOs with lockups that occur between 1995 and 2006 on the LSE Main Market. The equal weighted Wealth Relatives are reported using three benchmarks; market index (FTSE AllShare) in Panel A, Size matched firms in Panel B, and Size and Book to Market (BM) matched firms in Panel C. The holding period begins from the 1st day after the day of issuance.

Holding	Wealth Relatives				
Period	Full Sample	Lockup > Median	Lockup < Median	Lockup > 18 months	Lockup ≤ 12 months
Panel A: Market Return					
One Year	1.15	1.22	1.07	1.35	1.07
Two Years	1.28	1.37	1.19	1.46	1.20
Three Years	1.33	1.35	1.30	1.36	1.33
Panel B: Size Matched Firms					
One Year	1.10	1.23	0.99	1.40	0.99
Two Years	1.16	1.31	1.00	1.53	1.01
Three Years	1.15	1.20	1.09	1.31	1.10
Panel C: Size and BM Matched Firms					
One Year	1.11	1.17	1.03	1.32	1.03
Two Years	1.21	1.29	1.13	1.36	1.14
Three Years	1.14	1.25	1.06	1.27	1.22

Table 5- OLS Calendar Time Portfolio Regressions for Lockups Stratified by Medians

This table presents regression results of the calendar-time monthly abnormal returns using the Capital Asset pricing Model (CAPM), the Fama and French (1993) three factor model (FF3F) and Carhart (1997) extension of the Fama and French (1993) model (FF4F). For each calendar month, return on a 12-, 24 and 36-month portfolio is calculated for IPOs with lockups greater than median and IPOs with lockups less than median. The ordinary least square (OLS) time series regressions in each model are estimated with portfolio excess return as dependant variable, where portfolio excess return is the return on a 12-, 24- or 36-month portfolio of IPOs minus the risk free return. The Intercept shows the average monthly abnormal return on each portfolio. (R_m - R_f) is the excess return on the market portfolio, SMB is the difference in the returns of portfolios of small and large stocks, HML is the difference in the returns of portfolios of high and low book-to-market stocks and UMD is the difference in returns of portfolios of high and low momentum stocks. The factors are from Gregory et al. (2013). The t-statistics are in brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Lockup > Median			Lockup < Median		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel A: 12 months Portfolio						
Intercept	0.0124*	0.0146**	0.015**	0.0103	0.015***	0.0137**
	[1.90]	[2.85]	[2.49]	[1.50]	[2.88]	[2.49]
R_m - R_f	1.055***	0.956***	0.947***	1.409***	1.264***	1.292***
	[6.32]	[6.65]	[6.29]	[7.68]	[9.20]	[9.01]
SMB		0.621***	0.618***		0.652***	0.657***
		[3.47]	[3.44]		[4.03]	[4.05]
HML		-0.605***	-0.625***		-1.081***	-1.011***
		[-4.37]	[-3.59]		[-8.19]	[-6.17]
UMD			-0.027			0.094
			[-0.20]			[0.71]
Adj. R^2	0.24	0.44	0.45	0.29	0.61	0.62
Panel B: 24 Month Portfolio						
Intercept	0.0036	0.0042	0.0076	-0.0017	0.0009	0.0007
	[0.57]	[0.73]	[1.30]	[-0.30]	[0.23]	[0.16]
R_m - R_f	0.924***	0.843***	0.777***	1.140***	1.063***	1.068***
	[6.30]	[6.30]	[5.73]	[8.37]	[10.38]	[10.12]
SMB		0.781***	0.753***		0.731***	0.733***
		[4.70]	[4.57]		[5.84]	[5.82]
HML		-0.277**	-0.471***		-0.765***	-0.751***
		[-2.02]	[-2.88]		[-7.29]	[-5.90]
UMD			-0.271**			0.019
			[-2.11]			[0.19]
Adj. R^2	0.22	0.36	0.40	0.32	0.62	0.63

Table 5- Continued.

	Lockup > Median			Lockup < Median		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel C: 36 Month Portfolio						
Intercept	0.0015	0.0001	0.0009	0.0054	0.0061	0.0083
	[0.29]	[0.02]	[0.18]	[0.88]	[1.20]	[1.60]
$R_m - R_f$	0.702***	0.586***	0.562***	0.986***	0.906***	0.841***
	[6.02]	[5.26]	[4.85]	[7.07]	[7.60]	[6.86]
SMB		0.644***	0.624***		0.762***	0.711***
		[4.92]	[4.68]		[5.51]	[5.11]
HML		-0.551	-0.118		-0.581***	-0.751***
		[-0.50]	[-0.86]		[-4.90]	[-5.17]
UMD			-0.080			-0.217**
			[-0.78]			[-1.98]
Adj. R^2	0.21	0.31	0.34	0.26	0.49	0.51

Table 6- WLS Calendar Time Portfolio Regressions for Lockups Stratified by Medians

This table presents regression results of the calendar-time monthly abnormal returns using the Capital Asset pricing Model (CAPM), the Fama and French (1993) three factor model (FF3F) and Carhart (1997) extension of the Fama and French (1993) model (FF4F). For each calendar month, return on a 12-, 24 and 36-month portfolio is calculated for IPOs with lockups greater than median and IPOs with lockups less than median. The weighted least square (WLS) time series regressions in each model are estimated with portfolio excess return as dependant variable, where portfolio excess return is the return on a 12-, 24- or 36-month portfolio of IPOs minus the risk free return. The number of firms in each portfolio every month is used as the weight. The Intercept shows the average monthly abnormal return on each portfolio. ($R_m - R_f$) is the excess return on the market portfolio, SMB is the difference in the returns of portfolios of small and large stocks, HML is the difference in the returns of portfolios of high and low book-to-market stocks and UMD is the difference in returns of portfolios of high and low momentum stocks. The factors are from Gregory et al. (2013). The t-statistics are in brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively

	Lockup > Median			Lockup < Median		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel A: 12 months Portfolio						
Intercept	0.0059	0.0108**	0.0126***	-0.0001	0.0136**	0.0151***
	[1.14]	[2.49]	[2.70]	[-0.01]	[2.56]	[2.72]
$R_m - R_f$	0.889***	0.811***	0.790***	1.747***	1.360***	1.318***
	[6.50]	[7.02]	[6.74]	[9.32]	[9.93]	[9.11]
SMB		0.765***	0.743***		0.453***	0.459***
		[5.44]	[5.23]		[2.72]	[2.75]
HML		-0.454***	-0.546***		-1.114***	-1.185***
		[-3.67]	[-3.59]		[-9.23]	[-8.23]
UMD			-0.118			-0.101
			[-1.03]			[-0.91]
Adj. R^2	0.25	0.48	0.49	0.37	0.68	0.69
Panel B: 24 Month Portfolio						
Intercept	-0.0042	0.0005	0.0032	-0.0102*	-0.0045	-0.0004
	[-0.87]	[0.13]	[0.83]	[-1.71]	[-1.00]	[-0.09]
$R_m - R_f$	0.789***	0.711***	0.677***	1.425***	1.184***	1.097***
	[7.07]	[8.36]	[7.95]	[9.77]	[10.89]	[9.72]
SMB		0.926***	0.889***		0.736***	0.729***
		[8.79]	[8.45]		[5.65]	[5.69]
HML		-0.283***	-0.444***		-0.747***	-0.907***
		[-3.17]	[-3.92]		[-7.31]	[-7.52]
UMD			-0.203**			-0.227*
			[-2.25]			[-2.40]
Adj. R^2	0.26	0.58	0.60	0.40	0.68	0.69

Table 6- Continued.

	Lockup > Median			Lockup < Median		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel C: 36 Month Portfolio						
Intercept	0.0055	0.0032	0.0044	-0.0037	-0.0021	0.0016
	[1.16]	[0.79]	[1.11]	[-0.65]	[-0.47]	[0.35]
$R_m - R_f$	0.692***	0.625***	0.570***	1.201***	1.047***	0.937***
	[6.30]	[6.63]	[6.03]	[9.02]	[10.10]	[8.69]
SMB		0.692***	0.681***		0.813***	0.794***
		[6.07]	[6.09]		[6.25]	[6.26]
HML		-0.071	-0.265**		-0.503***	-0.708***
		[-0.96]	[-2.55]		[-5.19]	[-6.02]
UMD			-0.229**			-0.272***
			[-2.61]			[-2.93]
Adj. R^2	0.22	0.43	0.45	0.36	0.62	0.64

Table 7- OLS Calendar Time Portfolio Regressions for Lockups in Top and Bottom Quartile of Lockup Period

This table presents regression results of the calendar-time monthly abnormal returns using the Capital Asset pricing Model (CAPM), the Fama and French (1993) three factor model (FF3F) and Carhart (1997) extension of the Fama and French (1993) model (FF4F). For each calendar month, return on a 12-, 24- and 36-month portfolio is calculated for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months. The ordinary least square (OLS) time series regressions in each model are estimated with portfolio excess return as dependant variable, where portfolio excess return is the return on a 12-, 24- or 36-month portfolio of IPOs minus the risk free return. The Intercept shows the average monthly abnormal return on each portfolio. (R_m - R_f) is the excess return on the market portfolio, SMB is the difference in the returns of portfolios of small and large stocks, HML is the difference in the returns of portfolios of high and low book-to-market stocks and UMD is the difference in returns of portfolios of high and low momentum stocks. The factors are from Gregory et al. (2013). The t-statistics are in brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Lockup >18 month			Lockup ≤ 12 Months		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel A: 12 months Portfolio						
Intercept	0.0192***	0.0196***	0.022***	0.0109	0.0155***	0.0142**
	[3.08]	[3.71]	[3.92]	[1.57]	[2.98]	[2.57]
R_m - R_f	0.951***	0.764***	0.803***	1.421***	1.274***	1.304***
	[5.85]	[6.22]	[5.72]	[7.74]	[9.28]	[9.11]
SMB		0.765***	0.760***		0.652***	0.658***
		[4.47]	[4.45]		[4.03]	[4.06]
HML		-0.411***	-0.527***		-0.079***	-1.006***
		[-3.24]	[-3.34]		[-8.19]	[-6.14]
UMD			-0.160			0.100
			[-1.23]			[0.76]
Adj. R^2	0.23	0.47	0.49	0.29	0.61	0.61
Panel B: 24 Month Portfolio						
Intercept	0.0094	0.0101*	0.0131**	-0.0019	0.0017	0.0015
	[1.41]	[1.80]	[2.28]	[-0.17]	[0.40]	[0.34]
R_m - R_f	0.868***	0.758***	0.692***	1.147***	1.071***	1.074***
	[5.29]	[5.65]	[5.01]	[8.40]	[10.42]	[10.15]
SMB		0.971***	0.953***		0.733***	0.734***
		[5.97]	[5.90]		[5.84]	[5.81]
HML		-0.427***	-0.597***		-0.766***	-0.755***
		[-3.29]	[-3.70]		[-7.29]	[-5.91]
UMD			-0.223*			0.016
			[-1.75]			[0.16]
Adj. R^2	0.18	0.46	0.47	0.33	0.63	0.63

Table 7- Continued.

	Lockup >18 month			Lockup ≤ 12 Months		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel C: 36 Month Portfolio						
Intercept	0.0115**	0.0107**	0.0125**	0.0061	0.0068	0.0089*
	[1.98]	[2.01]	[2.27]	[0.99]	[1.35]	[1.72]
$R_m - R_f$	0.705***	0.604***	0.566***	1.006***	0.927***	0.487**
	[5.18]	[4.81]	[4.39]	[7.18]	[7.75]	[7.02]
SMB		0.798***	0.784***		0.765***	0.717***
		[5.16]	[5.06]		[5.52]	[5.13]
HML		-0.056	-0.162		-0.589***	-0.748***
		[-0.44]	[-1.06]		[-4.95]	[-5.14]
UMD			-0.149			-0.205*
			[-1.23]			[-1.86]
Adj. R^2	0.16	0.31	0.33	0.26	0.49	0.5

Table 8- WLS Calendar Time Portfolio Regressions for Lockups in Top and Bottom Quartile of Lockup Period

This table presents regression results of the calendar-time monthly abnormal returns using the Capital Asset pricing Model (CAPM), the Fama and French (1993) three factor model (FF3F) and Carhart (1997) extension of the Fama and French (1993) model (FF4F). For each calendar month, return on a 12-, 24- and 36-month portfolio is calculated for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months. The weighted least square (WLS) time series regressions in each model are estimated with portfolio excess return as dependant variable, where portfolio excess return is the return on a 12-, 24- or 36-month portfolio of IPOs minus the risk free return. The number of firms in each portfolio every month is used as the weight. The Intercept shows the average monthly abnormal return on each portfolio. (R_m - R_f) is the excess return on the market portfolio, SMB is the difference in the returns of portfolios of small and large stocks, HML is the difference in the returns of portfolios of high and low book-to-market stocks and UMD is the difference in returns of portfolios of high and low momentum stocks. The factors are from Gregory et al. (2013). The t-statistics are in brackets. ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Lockup >18 month			Lockup ≤ 12 Months		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel A: 12 months Portfolio						
Intercept	0.0122**	0.0154***	0.0182***	0.0003	0.0141**	0.0155***
	[2.13]	[3.35]	[3.75]	[0.04]	[2.64]	[2.77]
R_m - R_f	0.798***	0.732***	0.709***	1.759***	1.373***	1.333***
	[5.15]	[5.77]	[5.61]	[9.38]	[10.02]	[9.20]
SMB		0.873***	0.843***		0.453***	0.459***
		[5.81]	[5.61]		[2.72]	[2.75]
HML		-0.379***	-0.536***		-1.114***	-1.181***
		[-3.01]	[-3.44]		[-9.24]	[-8.21]
UMD			-0.204*			-0.095
			[-1.69]			[-0.86]
Adj. R^2	0.19	0.48	0.50	0.38	0.68	0.69
Panel B: 24 Month Portfolio						
Intercept	-0.0051	0.0001	0.0029	-0.0093	-0.0035	0.0004
	[-1.00]	[0.03]	[0.75]	[-1.55]	[-0.80]	[0.09]
R_m - R_f	0.710***	0.624***	0.591***	1.453***	1.208***	1.119***
	[5.67]	[7.14]	[6.79]	[9.89]	[11.05]	[9.84]
SMB		1.044***	1.005***		0.727***	0.721***
		[9.67]	[9.38]		[5.54]	[5.59]
HML		-0.346***	-0.522***		-0.756***	-0.916***
		[-3.85]	[-4.54]		[-7.39]	[-7.60]
UMD			-0.219*			-0.228**
			[-2.39]			[-2.40]
Adj. R^2	0.20	0.62	0.63	0.41	0.68	0.69

Table 8- Continued.

	Lockup >18 month			Lockup ≤ 12 Months		
	CAPM	FF3F	FF4F	CAPM	FF3F	FF4F
Panel C: 36 Month Portfolio						
Intercept	0.0011*	0.0075*	0.0089**	-0.0032	-0.0015	0.0022
	[1.96]	[1.70]	[2.08]	[-0.55]	[-0.32]	[0.47]
$R_m - R_f$	0.699***	0.638***	0.574***	1.221***	1.068***	0.958***
	[5.98]	[6.23]	[5.67]	[9.13]	[10.23]	[8.80]
SMB		0.688***	0.682***		0.817***	0.799***
		[5.54]	[5.67]		[6.23]	[6.24]
HML		-0.036	-0.287**		-0.506***	-0.706***
		[-0.46]	[-2.61]		[-5.16]	[-5.95]
UMD			-0.296***			-0.267***
			[-3.17]			[-2.85]
Adj. R^2	0.21	0.40	0.44	0.36	0.62	0.64

Table 9- Descriptive Statistics for Variables used in Regression Models

This table presents descriptive statistics of variables used in the regression analyses. *LU Months* is the length of lockup period in months. *VC* is a dummy variable equal to one if the IPO is backed by venture capital/private equity, and zero otherwise. *UW Reputation* is underwriter reputation measured as the number of IPOs sponsored by an underwriter as a percentage of the total number of IPOs during the year prior to the IPO year. *Assets* is the total assets before IPO in £ millions. *Insider Ownership* is percentage of post-IPO equity retained by the directors and officers. *Age* is IPO firm age calculated as the difference (in years) between the date of IPO and the date company was founded. *IR* is initial returns calculated as first day closing price minus offer price divided by the offer price. *ROA* is earnings before extraordinary items divided by total assets in the year before IPO.

Variable	Mean	Median	First Quartile	Third Quartile	Std. Dev.
LU Months	15.205	12.367	12.000	18.000	6.022
VC	0.563	1.000	0.000	1.000	0.497
UW Reputation (%)	2.360	2.410	1.030	3.185	1.377
Assets	195.451	22.637	9.575	100.643	570.040
Insider Ownership (%)	24.646	19.800	5.370	40.850	21.980
Age	15.727	9.558	5.808	16.790	18.277
IR (%)	12.017	7.974	1.460	17.522	18.019
ROA	-0.257	0.070	-0.080	0.170	1.380

Table 10- Cross-Sectional Regressions of BHR of IPO Firms

This table presents the results of cross-sectional ordinary least squares (OLS) regressions for raw buy-and-hold returns (BHRs) of IPOs. The dependant variables are *LBHR1*=ln(1+IPO firm's 1-year BHR), *LBHR2*=ln(1+IPO firm's 2-year BHR) and *LBHR3*=ln(1+IPO firm's 3-year BHR) respectively. *LU Months* is the length of lockup period in months. *VC* is a dummy variable equal to one if the IPO is backed by venture capital/private equity, and zero otherwise. *UW Reputation* is underwriter reputation measured as the number of IPOs sponsored by an underwriter as a percentage of the total number of IPOs during the year prior to the IPO year. *Assets* is the natural log of total assets before IPO in £ millions. *Insider Ownership* is percentage of post-IPO equity retained by the directors and officers. *Age* is the natural log of IPO firm age calculated as the difference (in years) between the date of IPO and the date company was founded. *IR* is initial returns calculated as first day closing price minus offer price divided by the offer price. *ROA* is earnings before extraordinary items divided by total assets in the year before IPO. The t-values in brackets are corrected using hetroskedasticity consistent standard errors (White, 1980). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Raw Log Returns		
Variables	LBHR1 (1)	LBHR2 (2)	LBHR3 (3)
LU Months	0.029***	0.040***	0.046***
	(3.80)	(3.08)	(3.30)
VC	-0.072	-0.040	0.115
	(-0.69)	(-0.23)	(0.61)
UW Reputation	-0.016	-0.018	-0.075
	(-0.46)	(-0.33)	(-1.10)
Assets	0.026	0.084*	0.107*
	(0.83)	(1.79)	(1.92)
Insider Ownership	-0.001	-0.004	-0.004
	(-0.47)	(-0.89)	(-0.89)
Age	0.039	0.206***	0.312***
	(0.86)	(2.64)	(3.03)
IR	0.003	-0.001	-0.002
	(1.18)	(-0.11)	(-0.44)
ROA	0.173***	0.284***	0.246***
	(2.96)	(4.73)	(3.31)
Constant	-0.577**	-1.489***	-1.959***
	(-2.17)	(-3.34)	(-4.04)
N	268	268	268
Adjusted R^2	0.139	0.180	0.177
F-Statistic	4.206	8.928	7.519
Prob. (F-Statistic)	0.000	0.000	0.000

Table 11- Cross-Sectional Regressions of Market Adjusted BHAR of IPO Firms

This table presents the results of cross-sectional ordinary least squares (OLS) regressions for market adjusted buy-and-hold abnormal returns (BHARs) of IPOs. The dependant variables are *LBHAR1*=IPO firm's *LBHR1*−ln(1+market index 1-year BHR), *LBHAR2*=IPO firm's *LBHR2*−ln(1+market index 2-year BHR) and *LBHAR3*=IPO firm's *LBHR3*−ln(1+market index 3-year BHR) respectively, where market index is the FTSE Allshare index. *LU Months* is the length of lockup period in months. *VC* is a dummy variable equal to one if the IPO is backed by venture capital/private equity, and zero otherwise. *UW Reputation* is underwriter reputation measured as the number of IPOs sponsored by an underwriter as a percentage of the total number of IPOs during the year prior to the IPO year. *Assets* is the natural log of total assets before IPO in £ millions. *Insider Ownership* is percentage of post-IPO equity retained by the directors and officers. *Age* is the natural log of IPO firm age calculated as the difference (in years) between the date of IPO and the date company was founded. *IR* is initial returns calculated as first day closing price minus offer price divided by the offer price. *ROA* is earnings before extraordinary items divided by total assets in the year before IPO. The t-values in brackets are corrected using hetroskedasticity consistent standard errors (White, 1980). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

Variables	Abnormal Log Returns-Market Adjusted		
	LBHAR1 (1)	LBHAR2 (2)	LBHAR3 (3)
LU Months	0.023***	0.029**	0.031**
	(3.08)	(2.42)	(2.44)
VC	-0.062	-0.026	0.102
	(-0.63)	(-0.17)	(0.59)
UW Reputation	-0.008	-0.005	-0.057
	(-0.25)	(-0.10)	(-0.92)
Assets	0.026	0.092**	0.110**
	(0.92)	(2.16)	(2.24)
Insider Ownership	-0.001	-0.002	-0.001
	(-0.37)	(-0.45)	(-0.36)
Age	0.030	0.157**	0.242**
	(0.68)	(2.13)	(2.57)
IR	0.004*	0.001	-0.000
	(1.75)	(0.27)	(-0.07)
ROA	0.157***	0.242***	0.183**
	(2.98)	(4.34)	(2.56)
Constant	-0.552**	-1.427***	-1.777***
	(-2.23)	(-3.43)	(-4.05)
N	268	268	268
Adjusted R^2	0.118	0.146	0.127
F-Statistic	3.569	7.427	5.586
Prob. (F-Statistic)	0.001	0.000	0.000

Table 12- Cross-Sectional Regressions of Size Adjusted BHAR of IPO Firms

This table presents the results of cross-sectional ordinary least squares (OLS) regressions for size-matched firms' adjusted buy-and-hold abnormal returns (BHARs) of IPOs. The dependant variables are *LBHAR1*=IPO firm's *LBHR1*−ln(1+size matched firm's 1-year BHR), *LBHAR2*=IPO firm's *LBHR2*−ln(1+ size matched firm's 2-year BHR) and *LBHAR3*=IPO firm's *LBHR3*−ln(1+ size matched firm's 3-year BHR) respectively. *LU Months* is the length of lockup period in months. *VC* is a dummy variable equal to one if the IPO is backed by venture capital/private equity, and zero otherwise. *UW Reputation* is underwriter reputation measured as the number of IPOs sponsored by an underwriter as a percentage of the total number of IPOs during the year prior to the IPO year. *Assets* is the natural log of total assets before IPO in £ millions. *Insider Ownership* is percentage of post-IPO equity retained by the directors and officers. *Age* is the natural log of IPO firm age calculated as the difference (in years) between the date of IPO and the date company was founded. *IR* is initial returns calculated as first day closing price minus offer price divided by the offer price. *ROA* is earnings before extraordinary items divided by total assets in the year before IPO. The t-values in brackets are corrected using hetroskedasticity consistent standard errors (White, 1980). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Abnormal Log Returns-Size Adjusted		
Variables	LBHAR1 (1)	LBHAR2 (2)	LBHAR3 (3)
LU Months	0.030***	0.042***	0.043***
	(3.32)	(2.82)	(2.66)
VC	-0.086	0.003	0.180
	(-0.74)	(0.02)	(0.84)
UW Reputation	0.018	0.023	-0.034
	(0.47)	(0.36)	(-0.49)
Assets	0.051	0.146***	0.185***
	(1.45)	(2.71)	(2.98)
Insider Ownership	0.000	0.002	0.002
	(0.02)	(0.42)	(0.46)
Age	0.006	0.154	0.251**
	(0.12)	(1.65)	(2.23)
IR	0.004	-0.001	-0.003
	(1.13)	(-0.16)	(-0.48)
ROA	0.162***	0.250***	0.179*
	(2.83)	(3.04)	(1.71)
Constant	-0.734**	-1.874***	-2.316***
	(-2.39)	(-3.71)	(-4.26)
N	268	268	268
Adjusted R^2	0.110	0.139	0.126
F-Statistic	3.173	5.185	5.126
Prob. (F-Statistic)	0.002	0.000	0.000

Table 13- Cross-Sectional Regressions of Size and BM Adjusted BHAR of IPO Firms

This table presents the results of cross-sectional ordinary least squares (OLS) regressions for size and book-to-market (BM) matched firms adjusted buy-and-hold abnormal returns (BHARs) of IPOs. The dependant variables are *LBHAR1*=IPO firm's *LBHR1*−ln(1+size and BM matched firm's 1-year BHR), *LBHAR2*=IPO firm's *LBHR2*−ln(1+ size and BM matched firm's 2-year BHR) and *LBHAR3*=IPO firm's *LBHR3*−ln(1+ size and BM matched firm's 3-year BHR) respectively. *LU Months* is the length of lockup period in months. *VC* is a dummy variable equal to one if the IPO is backed by venture capital/private equity, and zero otherwise. *UW Reputation* is underwriter reputation measured as the number of IPOs sponsored by an underwriter as a percentage of the total number of IPOs during the year prior to the IPO year. *Assets* is the natural log of total assets before IPO in £ millions. *Insider Ownership* is percentage of post-IPO equity retained by the directors and officers. *Age* is the natural log of IPO firm age calculated as the difference (in years) between the date of IPO and the date company was founded. *IR* is initial returns calculated as first day closing price minus offer price divided by the offer price. *ROA* is earnings before extraordinary items divided by total assets in the year before IPO. The t-values in brackets are corrected using hetroskedasticity consistent standard errors (White, 1980). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Abnormal Log Returns-Size and BM Adjusted		
Variables	LBHAR1 (1)	LBHAR2 (2)	LBHAR3 (3)
LU Months	0.014*	0.023*	0.028**
	(1.66)	(1.80)	(2.00)
VC	-0.088	-0.084	0.054
	(-0.82)	(-0.50)	(0.28)
UW Reputation	-0.017	-0.000	-0.025
	(-0.45)	(-0.01)	(-0.33)
Assets	-0.006	0.058	0.094*
	(-0.19)	(1.18)	(1.67)
Insider Ownership	-0.001	0.000	0.002
	(-0.29)	(0.04)	(0.49)
Age	0.003	0.012	0.065
	(0.06)	(0.13)	(0.54)
IR	0.002	-0.004	-0.003
	(0.54)	(-0.70)	(-0.55)
ROA	0.230***	0.277***	0.196***
	(5.38)	(5.36)	(3.28)
Constant	-0.081	-0.651	-1.112**
	(-0.28)	(-1.42)	(-2.28)
N	268	268	268
Adjusted R^2	0.127	0.100	0.055
F-Statistic	4.661	6.240	4.000
Prob. (F-Statistic)	0.000	0.000	0.000

Table 14- Lockup Expiry Returns for Full Sample

This table presents Cumulative Average Abnormal Returns (CAARs) over different event windows around the lockup expiry for full sample of IPOs from 1995-2006. Abnormal returns are calculated using three benchmarks; Market Returns (daily return on FTSE Allshare index around event windows), Capital Asset Pricing Model (CAPM) and a Fama and French (1993) three factor model (FF3F). The estimation window for CAPM and FF3F models is -240 days to -21 days prior to lockup expiration (day 0) and simple ordinary least regressions (OLS) are used. The daily factors are from Gregory et al. (2013). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Market Return		CAPM		FF3F	
Period	Mean CAAR (%)	T-Stat	Mean CAAR (%)	T-Stat	Mean CAAR (%)	T-Stat
Day (-20,+20)	-3.7	-2.579**	-3.49	-2.333**	-1.41	-0.886
Day (-10,+10)	-2.44	-2.172**	-1.97	-1.742*	-0.82	-0.719
Day (-2,+2)	-0.01	-0.019	0.08	0.127	0.39	0.643
Day (-1,+1)	0.47	0.972	0.44	0.911	0.66	1.427
Day (0 , 0)	0.18	0.788	0.15	0.687	0.27	1.287
Day (+2,+10)	-2.27	-3.382***	-1.97	-2.923***	-1.47	-2.183**
Day (+2,+20)	-3.32	-3.394***	-2.79	-2.724***	-1.87	-1.734*

Table 15- Lockup Expiry Returns for Lockups Stratified by Medians

This table presents average Cumulative Average Abnormal Returns (CAARs) over different event windows around the lockup expiry for IPOs with lockups greater than median and IPOs with lockups less than median. Abnormal returns are calculated using three benchmarks; Market Returns (daily return on FTSE Allshare index around event windows), Capital Asset Pricing Model (CAPM) and a Fama and French (1993) three factor model (FF3F). The estimation window for CAPM and FF3F models is from -240 days to -21 days prior to lockup expiration (day 0) and simple ordinary least regressions (OLS) are used. The daily factors are from Gregory et al. (2013). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

Period	Lockup > Median		Lockup < Median	
	Mean CAAR (%)	T-Stat	Mean CAAR (%)	T-Stat
Panel A: Market Return				
Day (-20,+20)	-1.5	-0.862	-5.89	-2.598**
Day (-10,+10)	0.05	0.039	-4.94	-2.755***
Day (-2,+2)	0.69	0.959	-0.71	-0.716
Day (-1,+1)	0.89	1.515	0.04	0.049
Day (0 , 0)	0.04	0.115	0.32	1.009
Day (+2,+10)	-0.58	-0.691	-3.96	-3.855***
Day (+2,+20)	-2.09	-1.628	-4.55	-3.089***
Panel B: CAPM				
Day (-20,+20)	-1.51	-0.814	-5.65	-2.429**
Day (-10,+10)	-0.26	-0.190	-4.03	-2.232**
Day (-2,+2)	0.66	0.891	-0.6	-0.616
Day (-1,+1)	0.71	1.165	0.16	0.216
Day (0 , 0)	-0.04	-0.147	0.42	1.363
Day (+2,+10)	-0.46	-0.547	-3.49	-3.334***
Day (+2,+20)	-1.53	-1.145	-4.05	-2.614***
Panel C: FF3F				
Day (-20,+20)	1.87	0.87	-4.69	-2.02**
Day (-10,+10)	1.7	1.25	-3.17	-1.77*
Day (-2,+2)	1.28	1.76*	-0.51	-0.53
Day (-1,+1)	1.09	1.86	0.25	0.34
Day (0 , 0)	0.03	0.11	0.53	1.25
Day (+2,+10)	0.11	0.13	-3.08	-3.02***
Day (+2,+20)	-0.26	-0.17	-3.59	-2.34**

Table 16- Lockup Expiry Returns for Lockups in Top and Bottom Quartile of Lockup Period

This table presents average Cumulative Average Abnormal Returns (CAARs) over different event windows around the lockup expiry for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months. Abnormal returns are calculated using three benchmarks; Market Returns (daily return on FTSE Allshare index around event windows), Capital Asset Pricing Model (CAPM) and a Fama and French (1993) three factor model (FF3F). The estimation window for CAPM and FF3F models is from -240 days to -21 days prior to lockup expiration (day 0) and simple ordinary least regressions (OLS) are used. The daily factors are from Gregory et al. (2013). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

	Lockup ≥ 18 months		Lockup ≤ 12 months	
Period	Mean CAAR (%)	T-Stat	Mean CAAR (%)	T-Stat
Panel A: Market Return				
Day (-20,+20)	-0.93	-0.436	-6.09	-2.650***
Day (-10,+10)	0.59	0.307	-5.04	-2.777***
Day (-2,+2)	1.02	0.860	-0.68	-0.680
Day (-1,+1)	0.74	0.744	0.06	0.08
Day (0 , 0)	0.23	0.659	0.32	1.009
Day (+2,+10)	-0.8	-0.724	-4.25	-4.096***
Day (+2,+20)	-1.74	-0.950	-4.62	-3.097***
Panel B: CAPM				
Day (-20,+20)	-0.45	-0.198	-5.86	-2.488**
Day (-10,+10)	0.71	0.380	-4.14	-2.262**
Day (-2,+2)	1.21	1.028	-0.57	-0.576
Day (-1,+1)	0.73	0.720	0.19	0.252
Day (0 , 0)	0.05	0.146	0.44	1.411
Day (+2,+10)	-0.49	-0.452	-3.62	-3.424***
Day (+2,+20)	-0.56	-0.303	-4.11	-2.618***
Panel C: FF3F				
Day (-20,+20)	2.97	1.049	-4.93	-2.103**
Day (-10,+10)	2.72	1.427	-3.49	-1.927*
Day (-2,+2)	2.01	1.697*	-0.49	-0.512
Day (-1,+1)	1.32	1.355	0.27	0.367
Day (0 , 0)	0.15	0.426	0.52	1.327
Day (+2,+10)	0.08	0.073	-3.2	-3.101***
Day (+2,+20)	0.66	0.311	-3.64	-2.338**

Table 17- Lockup Expiry Returns by VC Backing and Different Lockup Lengths

This table presents average Cumulative Average Abnormal Returns (CAARs) over different event windows around the lockup expiry for sub-samples; VC backed and non-VC backed IPOs. CARs for IPOs with lockups greater than median and IPOs with lockups less than median within each sub-sample are reported in Panel A. Panel B reports the CARs for IPOs with lockups greater than 18 months and IPOs with lockups less than or equal to 12 months within each sub-sample. Abnormal returns are calculated using three benchmarks; Market Returns (daily return on FTSE Allshare index around event windows), Capital Asset Pricing Model (CAPM) and a Fama and French (1993) three factor model (FF3F). The estimation window for CAPM and FF3F models is from -240 days to -21 days prior to lockup expiration (day 0) and simple ordinary least regressions (OLS) are used. The daily factors are from Gregory et al. (2013). ***, ** and * represent 1%, 5% and 10% significant levels respectively.

Panel A

Period	VC Backed		Non VC Backed	
	LU > Median	LU < Median	LU > Median	LU < Median
	Mean CAAR (%)	Mean CAAR (%)	Mean CAAR (%)	Mean CAAR (%)
1. Market Return				
Day (-20,+20)	-2.2	-6.66**	-2.53	-6.91*
Day (-10,+10)	1.16	-5.08**	-2.4	-5.78*
Day (-2,+2)	0.8	-1.19	0.33	-0.25
Day (-1,+1)	0.52	-0.19	1.23	0.25
Day (0 , 0)	-0.05	0.59	0.12	-0.07
2. CAPM				
Day (-20,+20)	-1.7	-5.78**	-0.89	-5.46
Day (-10,+10)	1.43	-3.83*	-1.52	-4.18
Day (-2,+2)	0.79	-1.1	0.72	0.19
Day (-1,+1)	0.27	0.12	1.23	0.24
Day (0 , 0)	-0.24	0.70	0.01	0.04
3. FF3F				
Day (-20,+20)	1.41	-3.6	2.42	-6.2
Day (-10,+10)	2.9	-2.65	0.36	-4.37
Day (-2,+2)	1.35	-0.75	1.3	-0.17
Day (-1,+1)	0.69	0.45	1.6	1.65
Day (0 , 0)	-0.03	0.83	0.11	0.30

Table 17- Continued.

Panel B

Period	VC Backed		Non VC Backed	
	LU > 18 Months	LU ≤ 12 Months	LU > 18 Months	LU ≤ 12 Months
	Mean CAAR (%)	Mean CAAR (%)	Mean CAAR (%)	Mean CAAR (%)
1. Market Return				
Day (-20,+20)	-1.61	-6.78**	-2.2	-7.25*
Day (-10,+10)	0.88	-5.22**	-0.75	-5.85*
Day (-2,+2)	2.1	-1.17	-0.18	-0.22
Day (-1,+1)	1.03	-0.16	0.31	0.27
Day (0 , 0)	0.25	0.60	-0.60	-0.08
2. CAPM				
Day (-20,+20)	-1.23	-5.89**	0.28	-5.82
Day (-10,+10)	0.95	-3.94*	0.62	-4.29
Day (-2,+2)	1.9	-1.07	0.58	0.22
Day (-1,+1)	0.71	0.16	0.74	0.26
Day (0 , 0)	0.15	0.73	0.50	0.03
3. FF3F				
Day (-20,+20)	2.37	-3.7	3.54	-6.65*
Day (-10,+10)	3.09	-2.77	2.37	-4.49
Day (-2,+2)	2.91	-0.72	1.24	-0.15
Day (-1,+1)	1.55	0.49	1.18	-0.03
Day (0 , 0)	0.21	0.86	-0.40	0.10

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