IPO Lockup Arrangements and Trading by Insiders

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Abstract:

We document that the average lockup of 365 days in the UK is higher than the US 180 days and many insiders trade within the lockup period. We find that prestigious underwriters and underwriter power (longer lockup) drive their trades. However, they sell in over-performing, large, and low institutional holding IPOs, but buy in underperforming IPOs with lower underpricing and proportion of shares locked. On the lockup expiry dates, there is significant price drop for early buy but not for early sell IPOs. We suggest that this early trading activity is pre-arranged with the underwriters to mitigate information asymmetries.

Key words: Initial public Offering, Lockup, insider trades, information asymmetry, London Stock Exchange.

JEL Classification: G12, G14, G24.

Lockups are voluntary agreements between the underwriter and corporate insiders not to sell shares without the written consent of the underwriter during a specified post-IPO period. A typical lockup agreement may specify that insiders should not offer, issue, sell, contract to sell, issue options in respect of or otherwise dispose of, directly or indirectly, ordinary shares or any securities of the company that are substantially similar to the ordinary shares or any other securities exchangeable for or convertible into ordinary shares. These agreements contained in the prospectuses indicate clearly the number (or proportion) of shares locked and the length (or the expiry date) of the lockup period. While nearly all IPOs contain these clauses, a number of questions remain as to how underwriters set them up and enforce them in practice, and whether they release insiders in some IPOs by allowing them to sell their shares before the lockup expiry date, while increase the commitments in others by making them buy more shares when they are already locked up.[1] If this is the case, when do underwriters make these decisions? Are early sell IPOs different from early buys? What are the drivers of these early sell and buy trades? Do they convey any information to the market? Do they affect the documented expiry dates returns?

Previous studies do not analyze directly these questions. They focus mainly on the determinants of the lockups, their lengths (Brav and Gompers (2003), Brau, Lambson, and McQueen (2005)), and the stock market reaction on the lockup expiry dates (Brav and Gompers (2003) and Field and Hanka (2001)). They argue that lockup contracts may emanate from the (i) agency costs, (ii) information asymmetries between managers and shareholders, (iii) signalling of firm's quality, (iv) rent seeking by underwriters, and, (v) commitment hypothesis. However, the empirical evidence provided to-date is mixed. Most studies agree that lockup agreements exist to mitigate the information asymmetries between managers and shareholders, and to avoid any

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potential negative impact on share prices of block sells by insiders after the IPO. However, while, Brav and Gompers (2003) argue that lockups are driven by the commitment hypothesis, Brau et al (2005) provide support for the signalling hypothesis as Brav and Gompers' (2003) evidence of an inverse relationship between transparency and lockup length supports the signalling as well as the commitment hypotheses. These studies also find that longer lockups are associated with high information asymmetries, low idiosyncratic risk, and high potential for moral hazard. On the lockup expiry dates, previous studies report significant share price drop, but it is not clear as to whether the negative abnormal returns reflect the potential signalling, agency costs, market microstructure effects, and/or the actual sell trades by insiders.[2]

In this paper, we focus on insider trading before and on the lockup expiry dates. This issue is not extensively analysed in previous studies. We also expand the predominantly US[3] evidence on the determinants of lockups, and we follow Brav and Gompers (2003) plea for more research that exploits the rich variation in international differences in lockup options. We do this by constructing a unique data set of 831 UK IPOs containing all lockup information from prospectuses. Our sample period is limited to 1999-2006, as data on insider trading is available for only 1999 to 2007, and we need one extra year post-IPO insider trading data. We first gather a set of information from the London Stock Exchange (LSE) on IPOs issued on the Main Market and the Alternative Investment Market (AIM), a relatively less regulated market for smaller and younger companies. We then collect data on lockup options and other characteristics by hand from each IPO's prospectus extracted from *Perfect Filing*, and other accounting and stock market data from *DataStream*. Finally, we use a fourth database, *Directors' Deals*, which records all the trades undertaken by insiders in the UK market.

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We match all insider trading event dates with the dates of the lockups, and select all IPOs where insider trading occurs during the IPO dates and the lockup expiry dates. We define early sell/buy trades as insider trades that occur before the lockup expiry dates. We assess the market reaction to these early trades to evaluate their information content, and relate the probability of their occurrence to the underwriter reputation, IPO performance, lockup length, venture capitalist backing, and institutional ownership. Finally, we analyse the impact of these early sell and buy trades on the behaviour of stock prices around the lockup expiry dates.

We document that the average length of the lockup arrangements of 365 days is significantly higher than the 180 days in the US, and we show that considerable buy and sell trades by insiders occur before the lockup expiry dates. Interestingly, while both trades occur in IPOs with longer lockups and the presence of prestigious underwriters, we find strong differences in stock price performance on the trading and lockup expiry dates between early buy and early sell IPOs. We show that in the 40 days preceding the trade, IPOs subject to insider early sells generate significant positive abnormal returns of 9.72%, compared to -8.43% for early buy IPOs. These results suggest that this early trading activity is likely to be pre-arranged with the underwriters, as while the sell trades are early releases following good performance, the buy trades are likely to be undertaken to support the price of underperforming IPOs. However, we find that for the early buy trades, although the event date returns of 2.49% are positive and significant, the post-event period abnormal returns are not significant, implying that the information content of the buy trade or the price support is short-lived. For the early sell trade IPOs, the negative performance in the event and post-event period does not extend to the lockup expiry dates.

We also find that, while the average lockup length is evenly distributed across our sample period, the early buy and sell trades are relatively new phenomenon as about 80% occur in the period 2004 to 2006, and the vast majority are in lockups longer than or equal to the average of one year. However, we find strong differences between the early sell and early buy samples. First, the frequency of early buys of 31% of our sample IPOs is larger than the 14% of firms that have insider sells prior to the lockup expiration date. On average, insiders undertake two sell trades and three buy trades and they occur about half way the lockup period. Moreover, the proportion of shares sold is significantly higher than those bought. The analysis of the drivers of these trades shows that whiles insiders sell in large, and low institutional holding IPOs, they buy in IPOs with lower underpricing and proportion of shares locked.

In line with previous evidence, we find significant price decline for the whole sample on the lockup expiration dates of -1.85% ($t = -3.70$). We also expand previous evidence by identifying IPOs with actual sell trades on the expiry dates. We find that their abnormal returns of -2.5% ($t = -3.55$) are significantly lower than the remaining IPOs. Interestingly, no IPO with actual sells is from our two subsamples of early buy and sell IPOs. However, IPOs where insiders sell generate significant positive abnormal returns in the pre-event and no negative returns in the post-event period. In contrast, IPOs subject to buy trades underperform on and during the lockup expiry date, relatively like the IPOs where insiders actually sell their holdings on the lockup expiry dates. These results hold even after we account for other effects, as our regressions show that the abnormal returns on the lockup expiry dates are significantly lower for IPOs with early buys and actual sell trades on the lockup expiry dates, but positive, though not significant, for early sell IPOs.

Finally, consistent with Brau et al (2005), we find that lockups are likely to serve as commitment devices to overcome potential adverse selection at the offering and to signal firm's quality. Although the average lockup is relatively larger than the US, we find that the drivers of lockup lengths are relatively similar, as they are relatively shorter when IPOs are large, underwritten by prestigious investment banks, backed by VCs, held by institutions, and issued in hot market and in the main market rather than AIM. When we split the two markets, we find relatively similar results, except that size and shares locked are significant in the main market, while hot market dummy is significant in AIM. Our overall results are consistent with the signalling and commitment hypothesis, but do not support the rent-seeking hypothesis, as the gains from such trades are relatively small and our IPOs did not raise additional capital during the lockup period. They also highlight the relative power of UK underwriters, as implied by Chambers and Dimson (2009), by setting up relatively longer lockups, but releasing some insiders of IPOs that do well, and at the same time, making others of underperforming IPOs increase their lockup commitments.

As far as we are aware, our paper is unique as we focus mainly on insider trading behaviour before and on the lockup expiry dates in the UK market, which is different from the US. For example, we show that the relationship between IPOs and their underwriters is likely to be long-term in the UK, since all quoted firms need to have a corporate broker, usually the IPO underwriter, as an interface with the London Stock Exchange and the shareholders, and arranges insider trades, seasoned equity offerings and share buybacks. This requirement implies that lockups are likely to be more binding in the UK, and insiders are not expected to break them for fear of incurring costs of finding new brokers or risk of delisting, particularly for AIM firms. At the same time, the rent seeking potential is likely to be higher as insiders have to

use their corporate broker to undertake their trades.[4] Chambers and Dimson (2009) also argue that in the UK, investment bankers have increased their market power through time, because of the erosion of trust. Thus, we test whether UK underwriters exert a stronger impact on lockups and their enforcement. Moreover, the relatively stricter disclosure rules in the UK (e.g., Korczak and Lasfer (2009)) allows us to analyse the trading behaviour before and on the expiry dates of insiders who are limited to directors, rather than in the US where officers, directors and shareholders holding more than 10% shares are included. We also assess further the role of institutional holding which is relatively larger in the UK (e.g., Franks, Mayer and Renneboog (2001) and Faccio and Lasfer (2000)). These institutional differences between UK and US allow us to expand previous evidence in various ways.

We provide evidence of early trades and their likely determinants and we link lockups to the role of reputation in the IPO process and the mitigation of adverse selection. Since the going-public process is subject to Myers and Majluf (1984) adverse selection problems, IPOs use costly signals to convey credibly their quality. Lockups can have this function, as they are strong commitment mechanisms (Welch, 1989, p. 437). Since in the UK corporate brokers are pre-requisite for the continuity of listing, the commitment is likely to be stronger. The reputation of underwriters also increases this commitment and reduces the adverse selection, as Carter and Manaster (1990) find a negative correlation between investment banker reputation and IPO under-pricing. Similarly, Megginson and Weiss (1991) show how the reputation of VC investors can affect the IPO first day returns. We show that the lockup lengths are lower for IPOs with VC backing, prestigious underwriters, and institutional investors, but it is mainly the underwriters, the lockup lengths, and the pre-trade price performance that determine the probability of insider trading within the lockup period.

Finally, we relate our results to the impact of trading by insiders on securities prices. Previous studies examine the short and long-run price impacts of trading by insiders in the US (e.g., Seyhun (1986, 1988) and in the UK (e.g., Korczak and Lasfer (2007), Fidrmuc, Goergen and Renneboog (2006)). We provide new empirical evidence on trading by insiders conditional on lockup arrangements, and show that insiders in IPOs are also contrarians as they buy (sell) in stocks that under- (over-) perform, and their trades convey information to the market, albeit in the short-run.

The rest of the paper is organized as follows. Section I describes the UK institutional features, reviews the literature and sets up the hypotheses. Section II presents a discussion of our data. Section III provides the empirical results, and the conclusions are in Section IV.

I. Theoretical Background

A. *Lockup Agreements in the UK Markets*

The London stock exchange (LSE) has two markets, the main market (called Official List - OL) and the Alternative Investment Market (AIM). The main market is the London Stock Exchange's principal market for listed companies from the UK and overseas. It has approximately 1,600 companies listed in 2008, including over 300 international companies. In 2007, 264 companies raised US$87 billion in London compared to 298 in the US raising US$15 billion on the New York Stock Exchange and US$20 billion on NASDAQ.

Launched on June 1995, AIM is the exchange for smaller companies. It is to the main market as the AMEX and NASDAQ are to the NYSE. In 2007, 284 companies joined AIM, 182 of which were IPOs, raising a total of £6.5 ($10) billion in new issues. There are approximately 1,700 companies (including more than 350

international companies) trading on AIM in 2008.[5] This market is less regulated than the Official List. For example, there is no requirement of three years trading statement, leading a way to listing of any new company. Another advantage of AIM is the ability of firms to choose a method of listing. They can either have regular IPO; pure introduction allowing firms to list without issuing equity to the public within five years of listing; or two-stage offering where firms first list without issuing equity and then raise funds from the public within five years of listing.

Companies listed in both markets are required to maintain what is referred to as corporate broker, or sponsor, who is usually the underwriter. The Financial Services Authority (FSA), equivalent to SEC in the US, requires an approved sponsor to act as advisers and provide certain services. This regulatory model, similar to Hong Kong, has the most defined and extensive role for an advisor to a listed company to act as an intermediary between the company and the regulator. In contrast, in the US, the investment bank has no direct obligations to the SEC (FSA Listing Rules, 2007). The sponsor is particularly responsible for any transaction the company undertakes, such as raising capital, share buybacks and trades undertaken by insiders. For AIM companies, the sponsor, referred to as NOMAD (Nominated Adviser), has relatively similar functions as the advisors of Main Market firms.

While in the US there are no legal rules about lockup periods (Ofek and Richardson, 2000), in the UK certain types of companies are subject to compulsory lockups. Until January 2000, lockup agreements are mandatory for UK mineral and scientific research-based companies that did not satisfy the standard minimum-age requirement of three years. More specifically, the directors and other key employees of these companies are not allowed to sell shares either in the IPO or during the period of two years commencing with the first day of listing. Shareholders holding at least

10% of the securities are not allowed to sell during the first six months following the IPO or until the publication of the semi-annual results, whichever is longer, and they could not sell more than 40% of their holdings during the first two years following the IPO. In January 2000, the new listing rules scrapped these compulsory lockups, but companies with less than three years of trading records are now required to include a statement in their prospectus detailing the lockup arrangements or provide reasons for their absence. An additional chapter on innovative high-growth companies was included to the Listing Rules in January 2000 making lockup agreements not compulsory for innovative high-growth companies, but if these firms do not satisfy the three years minimum age requirement, they have to include a lockup statement in their prospectus, if not specify the reasons.

Companies state the lockup expiry date as a definite calendar date (e.g., 7 June 2007) as in the US, or it may be related to a specific corporate event, such as the earnings announcement or the publication of the annual report. Finally, lockups may be staggered if the locked up shares are only gradually released before the expiry date. We find that the lockup lengths are relatively more standardized compared to the Espenlaub et al (2001) who report that in the UK lockup periods and characteristics are not homogeneous during their study period, probably because of these new rules.

B.   *Review of the Literature*

Previous studies argue that lockup contracts reduce the information asymmetry and mitigate agency problems between the insider-managers and the outside shareholders (Brau et al, 2004). Ibbotson and Ritter (1995) argue that investors are ready to pay more for a firm with a lockup agreement for two reasons: (i) any negative information being withheld is likely to be revealed before the locked-

up shares can be sold, reducing the benefit of withholding information, and (ii) as long as insiders retain large holdings, their incentives are aligned with outsiders' incentives. Empirically, a large number of studies provide support for these arguments as insiders refrain from selling shares during the lockup period for fear of conveying negative signals to the market (e.g., Brau and Fawcett (2006)). Since significant selling activity occurs in the post-lockup period (e.g., Brav and Gompers (2003)), insiders do wait until lockup agreement is expired to reduce the holding in their IPO.

Brav and Gompers (2003) develop three additional competing hypotheses to explain the existence and length of the lockup period (i) signalling firms' quality, (ii) commitment hypothesis, and (iii) rent seeking by underwriters. They find that lockups are driven by the commitment hypothesis, but reject the signalling and the rent seeking hypotheses. However, Brau et al (2005) contradict these results and provide support for the commitment and signalling hypotheses. They show that Brav and Gompers (2003) evidence of an inverse relationship between transparency and lockup length supports the signalling model at least as much as the commitment explanation. They also report that the length of the lockups is positively associated with high information asymmetries, low idiosyncratic risk and high potential for moral hazard.

On the lockup expiry dates share prices, in general, tend to decline independently of whether insiders do actually trade (e.g., Brau et al. (2004), Brav and Gompers (2000, 2003), Bradley et al. (2001), Ofek and Richardson (2000), Field and Hanka (2001)). These results are puzzling as, since lockups are well-known agreements at the time of the IPO and all their parameters are specified in the IPO prospectus, the price reaction on their expiry dates will normally not be statistically different from zero, unless if insiders sell their holdings. Previous studies provide several explanations to try to explain this phenomenon.

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The first group of studies relate to the potential increase in agency conflicts. As long as insiders retain large holdings, they are likely to align their incentives with those of outsiders (Ibbotson and Ritter, 1995). Brau et al. (2004) argue that since, lockup expiration dates provide an opportunity for insiders to sell their holdings, the potential for un-alignment of objectives and agency conflicts increases, resulting in a potential decrease in investors' demand for shares. They find a significantly positive relationship between the percentage of management ownership after the IPO, their proxy for agency costs, and the five-day cumulative abnormal returns. Another related explanation is the information content of insider trading if they sell on the lockup expiry date. These arguments are in line with previous studies on insider trading that report significant price decline on the announcement of sell trades (e.g., Seyhun, 1986, 1988) as the market considers that such trades reflect negative private information. Field and Hanka (2001) provide alternative hypotheses that may explain the observed pattern in the returns around the lockup expiration. Consistent with the downward-sloping demand curve hypothesis, they find that the abnormal returns are more negative when the trading volume is abnormally high. They also find that the abnormal returns are significantly more negative when insiders sell shares around the expiry of the lockup, but fail to support the hypothesis that the decline is solely driven by worse-than-expected insider selling. Other studies focus more on market micro-structure factors, such as the bid-ask bounce, liquidity effects and biased expectations of supply shocks. Overall, the empirical support for the drivers of the negative lockup expiry date abnormal returns is mixed (e.g., Ofek and Richardson (2000)). This is most probably due to the difficulties in distinguishing between IPOs that are actually subject to sell trades and others with potential sells, because of the lack of data on the actual insider selling trades around the lockup expiry dates.

C.   *Testable Hypotheses*

The previous two sections highlighted the differences between the US and the UK institutional settings, and the controversies surrounding lockups. The existence of corporate brokers, the lockup requirements for IPOs with less than three years trading activity, and the UK insider trading disclosure rules, which specify that any trades should be disclosed on or within five working after the actual trade,[6] allow us to assess further the main hypotheses underlying lockups, and to expand more previous evidence. We first start by analysing the existence and the determinants of the lockup lengths. In the US, informational asymmetries between insiders and outsiders is mitigated to a lesser extent, since their periods are relatively short, and firms disclose little information between their IPO and the lockup expiration date. Given the UK institutional setting, particularly, the existence of corporate brokers and the disclosure requirements of any insider trades, we expect stricter lockup contracts, and the information production to be higher within the lockup period, to reduce the information asymmetry between insiders and outside shareholders. We, thus, contrast our results with previous predominantly US evidence (e.g., Brav and Gompers (2003)) and provide evidence on lockup lengths under different institutional settings. We test the hypothesis that the lockup lengths reflect the firms' quality, asymmetric information and agency problems. We focus particularly on the potential role and power of underwriters in setting up locks ups and enforcing them. Moreover, we assess whether the institutional holding, which is relatively large in the UK, affects lockup lengths and the probability of early trades. In the US, Chen, Jegadeesh and Wermers (2000), Chen, Hong & Stein (2002) and Ben Dor (2003) report that institutional ownership is positively related to performance while in the UK they appear to be passive (e.g., Franks et al (2001), and Faccio and Lasfer (2000)).

In the second stage, we assess the observed relatively significant insider selling as well as buying activity during lockup periods, and determine the characteristics of IPOs that are subject to early insider sell or buy trades. We test the hypothesis that insiders are likely to be able to sell their locked up shares before the expiry dates if the post-IPO performance is abnormally positive. Such price performance will be consistent with the mitigation of the information asymmetry problem, and a reduction in the commitment of insiders (Brau et al., 2005). In addition, if the post-IPO share prices are high, underwriters can extract rent from the execution of trades by insiders, and, as shown in previous studies, insider sell trades are likely to occur after stock price run-ups (e.g., Seyhun (1986)). Therefore, we expect insider sells before the lockup expiry dates to be consistent with the four main hypotheses underlying the existence of lockups, i.e., information asymmetry, signalling firm quality, commitment, and rent seeking hypotheses (Brav and Gompers (2003)). In contrast, insiders are likely to increase their holdings before the lockup expiry dates if stock prices decline in the post-IPO period. We also analyse the market reaction to such trades and assess whether the event period abnormal returns are similar to conventional insider trading returns, as in the UK, companies have to announce any insider trades to the market when they are undertaken.

Finally, we analyse the stock market behaviour around the lockup expiry dates and assess whether the actual sell trades and the pre-lockup early trades affect the well-documented stock prices decreases. We contribute to this literature in several ways. First, we assess whether, as in the US, stock prices drop on the lockup expiry dates. Second, we differentiate between actual and expected sell trades by analysing separately IPOs where insiders sell on the expiry dates. Third, we relate the actual sell trades, if any, and lockup expiry dates abnormal returns to the trading behaviour of

insiders before the lockup expiry dates. We expect a higher propensity to sell on the expiry dates in IPOs where insiders increase their holding, i.e., early buy trades IPOs, leading to significantly lower returns than the remaining IPOs. In contrast, for IPOs with early sells, the expiry dates abnormal returns are expected to be positive as insiders have already sold before the lockup expiry dates. The commitment and signalling hypothesis suggest that firms that have good (bad) news or are less (more) subject to moral hazard, and potential agency conflicts, should have lower (higher) lockup expiry dates abnormal returns. Overall, we expect the sign and the magnitude of abnormal returns to be lower (higher) in IPOs where insiders buy (sell) before lockup expiry dates.

II   Data Sources

We start with all the 1,117 IPOs that went public on AIM and London main market between January 1999 and 2006. We use the following filters to construct our final sample. We exclude 76 companies for which we could not find the prospectuses in *Perfect Filings* database. We exclude a further 15 companies with missing share price data on *DataStream*, and 195 firms with missing lockup date or ownership data from the prospectuses. Our final sample includes 831 (74%) IPOs with complete data.

We use the LSE database to collect data on the quotation market (AIM or Main market), admission date, country of incorporation, issue price, market value, money raised, name of the broker, and for AIM IPOs, the advisor. We download all prospectuses from *Perfect Filings* database and hand-collect all information relating to lockup arrangements, including lockup dates, percentage of shares locked-up, fraction of insider shares locked up, directors' ownership before and after IPO, percentage sold in the IPO, institutional ownership, and venture capital backing. We

further use *DataStream* to collect any delisting dates, and accounting and market data, which includes daily stock prices and indices to compute the stock returns, market capitalization and turnover, which we use as proxy for size, accounting return on assets to measure profitability, and price-to-book ratio to proxy for growth.

Finally, we use *Directors Deals*, a large database of all UK firms' directors' trades spanning from January 1999 to December 2007, to collect data on trades undertaken by insiders of our sample IPOs. The database includes news items on directors' trades disclosed by all UK firms to the Regulatory News Service (RNS). We exclude a number of observations that are not likely to be driven by private information, such as exercise of options or derivatives, script dividends, bonus shares, rights issues, awards made to directors under incentive plans or reinvestment plans. We also exclude all directors' transactions in investment companies. After this screening, we obtain 36,943 insiders' trades from the UK market. We check the data for errors and exclude 2,952 (8%) trades as the difference in announcement and transaction date is more than 5 days. Our final sample includes 33,991 directors' trades in 2,664 listed companies, split into 26,268 (77%) purchases and 7,723 (23%) sell trades. This insider-trading database includes transaction price, amount, and value, post-transaction holding, change in holding, name and position of the insider, and announcement and transaction dates, as UK insiders can delay up to five days the announcement of their trade, but most report their trades on the RNS on the transaction date (Korczak and Lasfer (2009)).

We match the IPO sample with the insider trading data. We find 4,762 transactions in 657 IPOs, split into 3,513 (74%) buy and 1,249 (26%) sell trades. The remaining 358 IPOs do not have any insider transactions. We then match the dates of the trades with the lockup expiry dates. We include in our sample of early sells and

buys, any trade that occurs during the period spanning from the IPO date to one day before the lockup expiry date. We exclude any events when both buy and sell trades occur to eliminate any sells from the post-IPO buys. Our final sample includes 186 early sell and 694 early buy trades in 116 and 254 IPOs, respectively.

We use the standard event study methodology to assess the market reaction on the insider trading events and lockup expiration dates. We use the market model to compute the abnormal returns over the event window [-42, +42] relative to these events. The market model coefficients are obtained from the regression of the security returns against the corresponding market indices, the AIM all share price[7] and FTSE All share indices, for AIM and main market companies, respectively, over the period [-290, -43] trading days relative to each event date.

III. Empirical Results

A.   The Distribution of Lockups and Early Insider Trades

Table I provides descriptive statistics of our sample firms. Panel A. reports the lockup and fundamental characteristics of the data, with mean, 10th, 50th and 90th percentiles. Interestingly, the average (median) length of the lockup is 391(365) days,[8] more than double that in the US, where, for example, Brav and Gompers (2003) and Field and Hanka (2001) find a median of 180 days. Our IPOs offered 38.6% (32.9%) of their shares in the market, and the mean (median) shares locked amounts to 29.5% (24%) of the shares outstanding. The average underpricing of 22.5 % is close to Chambers and Dimson (2009) of 24.9% over the period 1999-2006, but higher than the 14.7% reported by Brav and Gompers (2003), although this is mainly due to differences in our sample periods.[9] In terms of fundamentals, the results indicate that, while the average market value of equity of our firms is £140m (about $210m), our

sample includes small as well as large firms. Consistent with Brav and Gompers (2003), our IPOs are high growth and make losses, as the average (median) market-to-book ratio is 3.88 (3.01), and return on equity is -34.6% (-2.6%).

In Panel B., we report the annual distribution of our IPOs and the lockup lengths. The volume of IPOs is relatively high in 2000, the 'Bubble' period, followed by a relatively quiet period 2001-2003, and then a heavy IPO activity period of 2004-2006. These results are in line with Chambers and Dimson (2009). In terms of money raised, IPOs appear to be relatively larger in 1999-2000 with an average of £200m per issue, compared to £88m in the post-2001 period. The most interesting results relate to the distribution of the average lockup lengths. The results show that the maximum of 437 days is reached in 2002 and the minimum of 374 is in 2000. However, we note that the distribution is relatively homogeneous, higher than the median of 365 days and in no single year is the average close to the 180 days documented in the US. Finally, we report the annual distribution of insider buy and sell trades that occur before the lockup expiry dates. Interestingly, the results indicate that 74% of early sells and 85% of early buys occur in 2004-2006, indicating that early trades are relatively more recent and probably reflecting the increase in IPO volume. During the internet boom and early 2000s, very few IPOs have early insider trades. These results suggest that, while the early trading activity is sample period dependent, which we account for in our analysis below, the lockup lengths are relatively constant across our sample period.

Panel C. reports the distribution of the lockup length by ranges and shows that more than 67% (560 companies) of our sample firms have lockups of one year. It is interesting to note that less than 1% of IPOs have lockups lower than 3 months (89 days) and only about 4% have lockups less than 180 days. In contrast, 19% have

lockups above one year, and more than 7% lockups are higher than 2 years (721 days). The concentration of lockups in the 365 days period suggests that they appear to be more standardised than Espenlaub et al (2001).[10] Similarly, Field and Hanka (2001) and Brav and Gompers (2003) also find clustering of the lockup lengths in US, but closer to relatively shorter period of 180 days.

Panel C also shows the distribution of the early buy and sell trades. We note that the vast majority (56%) of the buy trades occur in lockups of one year, and 33% in lockups higher than one year, and thus, only 11% are in lockups lower than one year. In contrast, the sell trades are relatively more evenly distributed, as 38% of the sell trades occur in lockups of either one, or more than one year and 24% are in lockups lower than one year. It is interesting to note that only 5% of the sell trades occur in lockups of less than 180 days, suggesting that, on an average, the holding period of UK insiders in their IPO shares is relatively longer than that in the US.

Panel D reports the distribution of lockup length, percentage of shares locked and underpricing, split into various categories. We find that the average lockup length is independent of the IPO size and the bubble period,[11] but it is lower in IPOs with prestigious underwriters,[12] venture capitalist backing, main market quotation, institutional holding and those issued in cold market. However, the median lockup length across these groups of 365 days is relatively constant. In addition, the lower means are relatively close to 365 days than the 180 days in the US. In particular, Brav and Gompers (2003) report the average (median) lockup lengths of IPOs with prestigious underwriters of 193 (180) days in the US, compared to our findings of 338 (365) days, suggesting that, in the UK underwriters are able to exert more power to lock insiders over a longer period. We also note that their prestigious underwriters represent about 50% of their sample, while our data shows 20% (166/831).

The second column reports the proportion of shares locked. The results indicate that this proportion is significantly lower in IPOs that are large, underwritten by prestigious investment banks, backed by venture capitalists, held by institutional investors, and issued in the main market (as opposed to AIM), and in non-bubble and hot periods. Our results are not consistent with Brav and Gompers (2003). First, their average (median) proportion of shares locked of 57.0% (60.9%) is much larger than our 29.4% (24.0%). Second, they find that this proportion is positively related to IPO size, prestigious underwriters and venture-backed IPOs. It is interesting to note that prestigious underwriters IPOs have relatively shorter lockup length but also smaller proportion of shares locked than the remaining IPOs.

The last column shows that while the level of underpricing is unaffected by venture capitalist backing, market of quotation, institutional holding and hot market period, it is lower in small IPOs, underwritten by prestigious investment banks, and issued in non-bubble periods. These results are also not fully consistent with Brav and Gompers (2003) who show that venture capitalists and prestigious underwriters do not affect their underpricing, but it is higher in larger IPOs.

[Insert Table I here]

B.   *The Determinants of Lockup Lengths*

The results in the previous section are based on univariate analysis. In this section, we explore further the determinants of lockup lengths by running a set of regressions to account for simultaneous effects of all the potential factors, and contrast our results with US evidence. The dependent variable is the logarithm of lockup lengths in days. The independent variables are similar to previous studies (e.g., Brav and Gompers, 2003) for comparative purposes. They include a set of dummy variables to capture venture capitalist backing, *Venture-backed;* underwriting by

prestigious/global investment bank, *Prestigious underwriter;* the presence of large institutional investors, *Institutional holding;* issuance of the IPO during the period when the IPO volume increases significantly, namely, January 1999 to March 2001 and January 2004 to end of 2006, *Hot market;* industry impact, i.e., if the IPO is in the following industries: computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment, *High-tech Dummy;* and finally, listing on AIM as opposed to the main market, *AIM Dummy.*

We also control for other lockup characteristics and IPO fundamentals by including *Size,* the log of market value of equity in 2008 constant terms, *Market-to-book,* the ratio of market value at the IPO divided by the book value of the equity in the first reporting period after IPO, *Shares locked,* the fraction of insider shares subject to lockup restrictions, *Shares issued,* the ratio of shares issued and fully traded over number of shares outstanding and, *Cash Flow Margin,* the ratio of operating cash flows to sales. We replace observations whose values are either lower than the 1st or higher than 99th percentiles by the sample median to eliminate any effect of outliers for each variable. We show separate results for the main market and AIM to capture any other unobservable legal and institutional differences across the two markets.

Table II reports the results. For the sample as a whole, the lockup lengths are negatively related to venture capital backing, prestigious underwriter, institutional holding, size and hot market dummy, but positively related to shares locked. In the second regression, we include AIM dummy instead of size to overcome the multicollinearity problem. As expected, AIM IPOs have longer lockups than those listed on the main market. We find similar results when we split our sample into the two markets, with the exception of size and shares locked up that are significant in the main market but not on AIM, and the hot market dummy that affects more AIM IPOs.

Consistent with Brav and Gompers (2003), our overall results indicate that larger firms, underwritten by prestigious underwriter, backed by venture capitalist, and firms with institutional investors all have, on average, shorter lockups. Each of these variables is associated with less informational asymmetry about the IPO's aftermarket value and future prospects. For example, insiders in firms with high quality underwriters or venture capital backing are less likely to refrain from disclosing private information to outside investors, and, therefore have less need for commitment of a longer lockup. The presence of institutional investors in the firm is also an alternative proxy for a reduction in the information asymmetries and an increase in monitoring of insiders, resulting in shorter lockups. These results provide further support for the commitment as well as the signalling hypotheses.

In line with Brav and Gompers (2003), shares issued at IPO, and cash flow margin do not affect the lockup length. We also include high tech dummy as we expect high-tech companies to have longer lockup lengths as they are more risky but the coefficient is negative and not significant. However, unlike Brav and Gompers (2003), market-to-book is not significant, suggesting that high-growth companies do not necessarily have high lockup periods. Such companies are likely to have high-risk, and, therefore, should have longer lockup lengths. Although the coefficient is positive, it is not significant. Nevertheless, our overall results are relatively similar to US evidence as reported by Brav and Gompers (2003) and suggest that institutional setting has relatively smaller effect on the design of lockups.

[Insert Table II here]

C.   Insider Trading Prior to Lockup Expiration

In this section, we explore the behaviour of insider equity selling from IPO allocation and buying prior to the lockup expiration. Since the UK financial regulator, the Financial Services Authority (FSA), does not mandate lockups, as they are only an agreement between the underwriter and the IPO firm, insiders can sell their stock prior to lockup expiration if the underwriter chooses to free them from the obligation to hold shares until lockup expiration. Since lockups are a commitment mechanism, we consider that insiders are likely to be released from lockup restrictions if their potential to take advantage of outside shareholders is reduced. Following Brav and Gompers (2003) and Brau et al. (2005), the commitment and signalling hypotheses predict that insiders in high quality IPOs are more likely to be released early from lockup contracts. We, therefore, expect these firms to have higher post-IPO abnormal returns, as well as prestigious underwriters, and to be backed by venture capitalists.

For the buy trades, we consider two hypotheses: (i) the IPO is a good company and insiders want to increase their holdings and (ii) the company is doing badly and insiders buy to support the price and to increase the commitment and signalling effects. In the first case, the test is consistent with the asymmetric information hypothesis put forward in the context of trading literature. For example, Brennan and Cao (1996) argue that informed investors are contrarians while uniformed investors are trend followers. In this case, we expect insider purchases to be driven by only the decline in share prices, and other variables such as venture capital backing, the presence of institutional investor, and the quality of underwriters are not likely to be important. The post-event CARs are expected to be positive and significant. In contrast, if the objective of insiders' purchases is to support the price following price decline, then it is possible that they are driven by the underwriters and the locked in

venture capitalists, by making insiders increase their commitments and the signalling of the firm's quality. In this case, we expect the insider purchases to be related to the presence of venture capitalists, high quality underwriters, shares locked, and length of the lockup. The post-event CARs may not be significant if the signal is not credible.

C.1.   Univariate Analysis

Table III presents a summary of insider trading prior to the lockup expiry dates. Panel A. shows that the average and median number of early insider sells amount to two. The average lockup period of such companies is 423 days. Since the average for the sample as a whole is 391 days, as reported in Table I, Panel C., the results imply that the sell trades are likely to occur in longer lockups. The average (median) sells occur 58% (62%) of the way from the IPO to the lockup date, i.e., about 245 days after the IPO date. The average (median) proportion of share locked relative to shares outstanding is 33% (30%), but these shares locked represent 95% (100%) of the holdings of insiders, out of which they sold 5.63% (0.51%). In relation to the shares outstanding, the average (median) sell trades represent 2.54% (0.23%). Interestingly, before they sell, share prices increase by an average (median) of 9.72% (8.15%), suggesting that such sells occurs in IPOs that appear to have done very well.

Panel B. reports the results for the buy trades. The results are qualitatively similar to Panel A., with the exception of the proportion of shares bought and the pre-trades share price behaviour. On average, insider buys represent a smaller proportion of the shares locked (0.91%), and shares outstanding (0.21%). In contrast to the sell trades, the buy trades are more likely to occur in underperforming IPOs, as the mean (median) abnormal stock returns are -8.47% (-4.64%).

[Insert Table III here]

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Table IV presents a comparative analysis of early trades firms against the remaining IPOs. Panel A. reports summary statistics of the 116 firms that are released from lockups compared to the 715 with no early sell trades. The early sell trades represent 14% out a total sample of 831 IPOs, in line with US evidence of 17% and 15% reported by Field and Hanka (2001) and Brav and Gompers (2003) respectively. Interestingly, the vast majority (85%) of these companies released are from AIM. These companies are also more likely to have longer lockups (423 days vs. 389), a larger proportion of shares held, a smaller proportion with institutional presence, and they are larger, not from high-tech industry and backed by venture capitalists. Compared to the remaining 715 IPOs, our test IPOs generate significantly larger returns prior to the insider sells (9.72% vs. 0.52% for the remaining IPOs),[13] and they had significantly lower underpricing at the time of IPO (9.53% vs. 23.09%). These results appear to suggest that the early sell trades are more likely to occur in lower moral hazard and information asymmetry firms, and imply that underwriters do not allow early sells in low-liquidity firms, those not backed by venture capitalist and with low returns because of the higher level of asymmetric information. Consistent with previous evidence on insider trading (e.g., Korczak and Lasfer, 2009), the announcement and post-announcement abnormal returns are negative and significant, suggesting that the sell trades provide negative information to the market.

Panel B. reports the results for the 694 buy trades undertaken in 254 IPOs. The number of IPOs with buy trades represents 31% of our total sample firms, and as far as we know, no previous study considers such trades. Interestingly, nearly all the 254 IPOs with buy trades (94%) are quoted on AIM, and as a result, only 6% of the remaining 577 companies without insider buy trades are from the AIM. In line with the sell trades reported in Panel A., the buy trades appear to occur in IPOs with longer

lockup days, high proportion of shares locked relative to shares held, and those with high venture capitalists backing. Unlike the early sell trades reported in Panel A., the buy trades do not appear to occur in large and IPOs with low institutional block ownership. The most interesting findings relate to the level of underpricing and the share price performance around the event dates. Unlike the early sell trades IPOs, the average underpricing of the 254 early IPOs of 18.87% is statistically higher than that of early sell IPOs (Panel A.), but similar to the 22.99% of the remaining 577 IPOs. In addition, the results indicate that early buy trades IPOs underperform significantly in the pre-event period, as the CAR$_{-42,-2}$ of -8.47% are statistically significant and lower than the -3.01% observed for the remaining 577 IPOs. On the event period, the abnormal returns increase by 2.43%, but this positive share price performance appears to be limited as the post-event abnormal returns of 1.02% are not significant. These results suggest that early insider buys are more likely to be undertaken to support prices for underperforming IPOs rather than to convey private information about future performance.

[Insert Table IV here]

C.2. *Multivariate Analysis*

We estimate logit regressions to determine which firms are more likely to have insider trades prior to lockup expiration. We report the results in Table V. The dependent variable is a dummy equal to one if the early insider sell (Panel A.) or buy (Panel B.) occur prior to lockup expiration, and zero otherwise. As predicted by the commitment and signalling hypothesis, Panel A. shows that firms that have reduced information asymmetry problems are more likely to have early insider sells. The abnormal returns over the preceding 40-day period are positively related to the probability of early sells, suggesting that investors are less likely to be concerned with

the insiders cashing out in firms that have done well in the past. Interestingly, the probability of early sell trades is not affected by venture capitalist backing, underpricing and the proportion of shares locked. Instead, it is positively related to prestigious underwriter, lockup length, and size, but negatively related to institutional holding. These results suggest that underwriters are likely to be behind the insiders' decision to sell shares before the lockup expiry dates, and since these IPOs are doing well, they suggest that underwriters release insiders when there is no need for signalling, and the potential agency costs that might arise from insiders selling are likely to be small. Since these IPOs have a lower institutional ownership, and the coefficient of venture-backing is not significant, our results suggest that underwriters do not face constraints from these two investors when they decide to release insiders from their lockup commitments.

Panel B. reports the results for early buy trades. Unlike the results for the early sell trades, the coefficient of the pre-trade cumulative abnormal returns ($CAR_{-42,-2}$) is now negative and significant, suggesting that insiders buy in underperforming IPOs. The probability of insider buy trades is also affected by the IPO under-pricing, venture capitalists backing and the proportion of shares locked. In addition, institutional holding, size and high tech dummy are now not statistically significant. However, in line with the results for the sell trades, prestigious underwriters and the lockup lengths are significantly related to the probability of insider early buy trades. These results suggest that underwriters are likely to play a significant role in the insiders' decision to increase their holdings before the lockup expiry dates to support the price of underperforming IPOs. However, in this case, it may be done with the help of venture capitalist, but not necessarily institutional investors, as institutional holding is not statistically significant. Overall, these results provide support for the

commitment hypothesis, as they suggest that insiders increase their holdings to support the price of their IPOs, and increase their stakes when their proportion of shares locked up is low and probably not sufficient to reduce the information asymmetries.

We test for robustness checks using alternative measures and excluding some variables. We find similar qualitative results. In particular, the coefficient of $CAR_{-42,-2}$ is always positive for early sell and negative for early buy trades and statistically significant. We also find that *Prestigious Underwriter* is correlated with *Under-pricing* (-0.106) and *Venture-Backed* (0.040), in line with Brav and Gompers (2003). When we exclude these two variables, we find that for both the buy and sell trades *Prestigious Underwriter* is positive and significant (coefficient = 1.48, *p*-value = 0.00 for sell, and for the buy trades 0.161, 0.01, respectively). When we exclude this variable, we find that for both early sell and early buy trades, underpricing is negative and venture-backed is positive, and both variables are statistically significant. The remaining results are qualitatively similar.

Finally, we test the rent-seeking hypothesis. As in Brav and Gompers (2003), we consider that investment banks may request lockups to commit insiders to maintain the IPO underwriters in future seasoned equity offerings (SEOs). As argued above, this commitment is likely to be stronger in the UK as companies need to maintain their underwriters throughout their quotation life. We first look through all the news announcements of our IPOs to assess whether they had any SEOs. We find only seven out of the 116 early sell trade IPOs (6%) and 15 out of 254 early buy trades (5.9%) had SEOs over the sample period. These results suggest that investment bankers' gains from underwriting the relatively small number of SEOs are likely to be insignificant. We further estimate the gains from insider dealing as in the UK

companies have to use their underwriters in any insider transactions. We find that the average (median) market making fee for sell trades are £35610.8, equivalent to about $ 50,000 (£1101.6, $1,500), and £2944.2, $4100 (£97.2, $136) for the buy trades. We think that these gains are very small to provide support to the rent-seeking hypothesis.

[Insert Table V here]

D. *Market Reaction on Lockup Expiration Dates*

In this section, we explore the market reaction to the lockup expirations. As stated in Section I, previous studies provide mixed evidence on the drivers of the puzzling price drop on the lockup expiry dates. We contribute to this literature by isolating the impact of IPOs where insiders actually sell on the lockup expiry dates and assess whether the early insider buy/sell trades affect this drop. In particular, we assess whether the price drop is higher (lower) in IPOs with early buy (sell) trades as investors may expect a higher selling probability from early buy than early sell IPOs.

In line with previous evidence (e.g., Brav and Gompers, 2003), we compute the abnormal returns for each IPO over the event window-10 to +10, where day 0 is the lockup expiry date. As in Table IV, we compute the abnormal returns using the market model with the FTSE AIM All Share Price Index[14] and the FTSE All Share Price index as the corresponding market returns for AIM and main market IPOs, respectively. Table VI reports the results of the cumulative abnormal returns over various event windows. Panel A. shows that for the sample as a whole, the average event date abnormal returns of -1.85% are statistically significant (*t* = -3.7). This negative performance extends to the seven days post event period, as share prices decrease abnormally by -0.95% in the +3 to +10 days. In the pre-event period and on the event date zero, the abnormal returns are not significant. Overall, our results are

relatively consistent with previous evidence. For example, Brav and Gompers (2003) and Field and Hanka (2001) report event date abnormal returns of -1.5%, and -2.0%, respectively, and suggest that lockup expiry dates are likely to increase the agency conflicts between managers and outside investors and opens up ways for trading on insider information.[15] However, it is not clear as to whether this negative abnormal performance is driven by the actual sell trades of insiders or market expectations.

We expand previous evidence in a number of ways. First, we split our sample into early buy and early sell trade IPOs. We find contrasting results. In particular, the abnormal returns of IPOs with early sell trades are significantly higher than the early buy trade IPOs. For the early sells sample, share prices increase substantially in the pre-event period as the $CAR_{-10,-3}$ of 4.13 are positive and statistically significant. During the event period, the $CAR_{-2,\ +2}$ of -1% are significant, but only 42% observations are negative. In the post-event period and on the event date zero, the abnormal returns are not significant. Overall, the results indicate that IPOs subject to early sell trades are not affected significantly by the lockup expiry dates.

In contrast, IPOs with early buy trades generate significantly lower abnormal returns on the lockup expiry dates. The pre-event abnormal returns of -0.01% are not statistically different from zero, but on the event and post-event periods, the abnormal returns are all negative and significant. These abnormal returns are also significantly lower than the corresponding abnormal returns for the early sell trade sample, as reflected in the *p*-value of differences in means reported in the last column of Table VI. These results appear to imply that the market is expecting more sell trades from early buy IPOs as insiders increased their holdings in the pre-lockup expiry period.

We check further these results by identifying IPOs where insiders actually sold their stakes during the lockup expiry dates. Given the requirements of insiders to

report their trades up to five days after the actual transaction, we select days -5 to day +5 around the lockup expiry dates. We also use the transaction date as opposed to the announcement date of insider trades. We find no trades before or after day zero, but we identify 10 trades on the event date. Interestingly, none of these transactions is in early buy/sell sub-samples. Table VI, Panel B, presents the abnormal returns around the lockup expiry dates of IPOs without and with actual sell trades. The results of the former sub-sample are relatively similar to the results in Panel A. However, as expected, the abnormal returns of IPOs with insider sells on the expiry date underperform significantly those without sells, particularly in the event and post-event periods, with 70% to 80% negative returns, compared to 57% and 52% for IPOs without actual sell trades.

Figure 1 plots the daily average cumulative abnormal return (CAR) over the 21 event days. The results clearly indicate the dominance of early sell trade IPOs over the remaining IPOs throughout the whole period. These results confirm our early findings that early sell IPOs do very well, and, thus, underwriters do not need to commit further insiders to lockup contracts. For the remaining IPOs, while the pre-event CARs are relatively homogeneous, the event and post-event period abnormal returns are significantly lower for IPOs with actual sell trades, but they are also negative for IPOs with early buy trades. We also find that the -1.68% $CAR_{+3,+10}$ for the early buy IPOs are significantly lower than the -0.95% for the whole sample ($p =$ 0.00), but relatively similar to the -1.50% for the actual sell trades IPOs ($p = 0.77$). These results provide further support to our earlier findings that insiders buy before the lockup expiry dates in underperforming IPOs and that they are likely to be made to increase their holdings to support the price, but such price support is likely to be short-lived.

The price drop on the lockup expiration leads us to examine whether volume is abnormally high around the event period. The abnormal volume may partly reflect the shares sold for the first time in the market by insiders, but other investors may also sell by following the trading strategy of the insiders. The analysis of the trading volume will also allow us to assess whether the price drop detected in the previous section is the result of actual sell trades or market makers' decrease in price. We, therefore, assess whether the price drop on the lockup expiration dates is associated with greater abnormal volume.

We follow Field and Hanka (2001) methodology in calculating the abnormal volume. We, first, obtain the daily volume from DataStream. We, then define normal volume as the mean daily volume in days t-71 to t-11 relative to the lockup expiry date. The abnormal volume is the daily volume divided by the mean daily volume minus 1. To eliminate the effect of outliers in our analysis we set observation greater than 99th percentile in each event day equal to the median observation. For the sample as a whole, the abnormal trading volume before the lockup expiry dates is mainly insignificant but it starts picking up at date -3. The significant increases occur in day zero when the pick of 80% is reached and did not revert to zero, even when we increase the post event period, suggesting a permanent change in trading activity. Our results are consistent with Field and Hanka (2001) and Brav and Gompers (2003) but the latter find that a peak of 56% on day +2.

Given the data availability on the actual trades in the UK market, we are able to extend previous studies by stratifying our overall sample into sub-groups. Figure 2 indicates that the abnormal trading volume is not homogeneously distributed. The volume of IPOs subject to buy and sell trades is relatively random with no significant change in the pre- and post-event period. In contrast, in the remaining IPOs, the

abnormal volume is highly volatile. As expected, the volume of IPOs subject to actual sell trades increased significantly on day zero to reach about 60%. However, the figure implies that, since for the overall sample the increase is 80%, the remaining IPOs, i.e., those not subject to early buy/sell trades or actual sell trades on the lockup expiry dates appear to drive the higher abnormal trading volume. These results are surprising and suggest that the high volume reflects expectation of investors of potential, not actual, insider sell trades. As robustness check, we increase the post event window and find that abnormal volume does not revert to zero, while the trend in IPOs subject to early buy/sell trades remains relatively random.

[Insert Table VI and Figure 1 and 2 here]

These results of stock price performance around the lockup expiry dates are puzzling for two main reasons. First, we expect sell trades to occur more in IPOs where insiders purchase shares before the lockup expiry dates. Given that these IPOs underperform, insiders are expected to rush to sell when their lockup contract expired. We find no sell trades in these companies. Could it be that underwriters extend further the lockup expiry dates in these IPOs? We could not find data to test this hypothesis. Second, consistent with previous evidence, the abnormal returns of all IPOs, independently of the actual sell transactions, decrease on the lockup expiry dates. Although the price decline may appear to be consistent with a simple downward sloping demand curve story, it is hard to explain in a rational expectations framework. In the case of lockups, investors already know that a higher amount of shares will be available after the lockup expiration day. The market is expected to foresee the number of shares sold at expiration accurately, and, thus, on average, the abnormal returns should be zero (Allen and Postlewaite, 1984). For downward-sloping demand curves to explain the price decline that we observe, as in the case of Field and Hanka

(2001), the market must hold consistently inaccurate prior beliefs about the fraction of equity that will be sold at expiration, and hence must be consistently surprised by how many shares actually come to the market.

Under the efficient market hypothesis, this temporary mispricing should be arbitraged away, as rational arbitrageurs will even leverage and drive the price to the fundamental level, and reap all the rewards of the arbitrage. In this case, we expect zero price reaction. However, various studies document possible cases where returns on the lockup expiry dates may be different from zero. For example, there may be limits to arbitrage, which may arise from the agency problems of investment managers. This is the case where noise trader risk gets worse in the short run and force fund managers, who cannot convince their investors they are skilled, to liquidate at a time when expected returns are the highest (Shleifer and Vishny (1997)). Pontiff (1996) discusses costly arbitrage, which might prevent investors from undertaking investments that would correct the temporary mispricing, even if they know how many shares were coming to the market. Investors may not want to gamble against the stock by selling it short, particularly if the stock is volatile. Finally, the expiry dates abnormal returns may be different from zero if the transaction costs are higher than the price drops, making any trading not profitable. Brav and Gompers (2003) estimate average transaction costs, as measured by the bid-ask spread, to be 6.3%, much higher than our reported abnormal returns.

E   Cross-sectional Differences in Lockup Expiry Dates Abnormal Returns

In this section, we provide further evidence on the drivers of the lockup expiry dates abnormal returns, and assess, in particular, the impact of the early buy and sell trades. We also follow previous evidence and test whether cross-sectional differences

in abnormal returns around the expiry dates can shed light on the competing hypothesis that can explain lockups. We follow Brav and Gompers (2003) and to Field and Hanka (2001) and regress the $CAR_{-2, +2}$ around the lockup expiry dates on a set of explanatory variables.[16] In particular, in line with Brav and Gompers (2003), we use a set of dummy variables equal to one if (i) the abnormal return between IPO and the lockup expiration is above the median; (ii) insider sell occur before lockup expiration; (iii) the firm is financed by a venture capitalist; and (iv) the underwriter is prestigious. In addition, we include a set of control variables to capture lockup characteristics and firms' fundamentals, including, the percentage of post-IPO insider shares locked, shares issued at IPO relative to shares outstanding, stock price volatility, cash flow margin, market-to-book ratio, and size as proxied by the log of market value of equity in 2008 constant Pound Sterling. However, we do not include SEO dummy before lockup expiry dates because none of our sample firms raised additional capital. Instead, we focus more on the impact of insider trading before and on the lockup expiry date and the UK institutional framework. We, therefore, add a set of dummy variables equal to one if (i) insiders buy stocks before the lockup expiry dates; (ii) insiders sell on the lockup expiry dates, (iii) institutions hold large stakes; and (iv) if the IPO is a high-tech company. The inclusion of insider sell dummy before lockup expiration controls for a reduced desire of insiders to sell after the lockup expiration. We present the results for the sample as a whole and for the main market and AIM separately to assess further the impact of the institutional differences between the two markets.

The results, reported in Table VII, indicate that the incidence of the sell trades before the lockup expiry dates has no effect on the event dates abnormal returns for the full sample as well as when the two markets are separated. The coefficient of the

sell dummy is positive but not significant. These results are consistent with Brav and Gompers (2003) and suggest that IPOs where insiders had early sell trades are less likely to engage in significant selling activity after the lockup expiry dates, thus mitigating the expiry dates' information asymmetry. In contrast, the coefficient of the buy dummy is negative and significant, suggesting that companies where insiders increase their holdings underperform significantly on the expiry dates, probably reflecting the increase in the level of information asymmetry about the likelihood of large sell trades of the original shares locked up and the additional shares acquired before the lockup expiry date. However, these results hold even when we include a dummy for actual sell trades on the lockup expiry dates, which is negative and significant. These results, thus, imply that while the early buy trade strategy may result in positive returns on the transaction dates, its impact in the post-trade period is limited, as shown above, and becomes negative at the lockup expiry dates. We checked for robustness by including each of these variables at a time and by excluding the other explanatory variables. We obtain same qualitative results.

Some of the remaining results are consistent with Brav and Gompers (2003), and provide support to the commitment and the signalling quality hypotheses. For example, the proportion of shares locked relative to shares outstanding is negative and significant. At the same time, the proportion of shares issued at IPO is positive and significant. These results suggest that the higher the number of shares locked, the higher the probability of selling after the lockup expiry dates, and, therefore, the higher the price drop, but the higher the proportion of shares sold at IPO, the lower the expected number of shares to be sold after the lockup expiry dates. Stock price volatility is negative and significant, suggesting that costly arbitrage limits the ability of the arbitrageurs to short sell before the lockup expiration dates, as volatility proxies

for information asymmetry. Furthermore, cash flow margins, prestigious underwriters, growth as measured by market to book, and size, are not significant, and therefore, they do not appear to exert any impact on the lockup expiry dates abnormal returns.

However, in contrast to Brav and Gompers (2003), our results show that the pre-lockup expiry date performance is positive and significant, suggesting that companies that did well in the past are associated with lower price declines during the event date abnormal returns. We checked whether the early sell trades of insiders or their actual sells on the lockup expiry dates drive these results. We find that the coefficient of performance is positive and significant even if we exclude the remaining explanatory variables. We also find that the presence of venture capitalist does not explain the expiry dates abnormal returns, as its coefficient is negative but not significant. We also follow Brav and Gompers (2003) and test whether venture capitalist is significant in a reduced form regression. We find, but not report, that the coefficient is negative but significant at 0.10 level only in the main market. These results are driven by the relatively higher proportion of IPOs backed by venture capitalists on the Main market (45 IPOs, representing 32%) relative to AIM (71 IPOs, accounting for 10%). Finally, the presence of institutional investors does not appear to affect the expiry date abnormal returns. Overall, our results provide support to Brav and Gompers (2003) and indicate that IPOs that have less information asymmetries have smaller price declines on the lockup expiry dates than other IPOs.

[Insert Table VII here]

IV. Conclusion

We analyse insider trading within lockup options using a unique sample of 831 UK IPOs from 1999 to 2006. We find that, compared to the US, lockups are relatively longer in the UK, but significant insider buy and sell trades occur before the expiry dates. We document that the probability of both these early trades is higher in IPOs with prestigious underwriters and longer lockups. However, we show that insiders are more likely to be released early from the lockup agreements if their IPOs are doing exceptionally well, while they increase their holdings in IPOs that underperformed about 40 days before their trades. In addition, we find that insiders are more likely to sell in large, and low institutional holding IPOs, but they buy in IPOs with lower underpricing and proportion of shares locked. On the lockup expiry dates, there is significant price drop for early buy but not for early sell IPOs. Overall, these results suggest that the early trading activity by corporate insiders is consistent with commitment as well as signalling quality hypothesis.

However, our results highlight the relative discretion of underwriters in setting up and enforcing the relatively longer lockups in the UK, reflecting the power they are likely to exercise on insiders of newly released IPOs. Chambers and Dimson (2009) argue that in the post world war II, the increase in underpricing is likely to reflect the reduction in the levels of trust between managers and underwriters, and the increase in the power of investment banks relative to the IPO's managers and shareholders. Our results are likely to provide support for these propositions. First, our results suggest that investment banks play a significant role in the setting up of the observed relatively longer lockups in the UK, which, consistent with US evidence, serve as a commitment device to overcome potential adverse selection at the offering as well as signal firms' quality. We find that IPOs with prestigious underwriters do

not necessary have substantially lower lockup lengths. Although consistent with US evidence (e.g., Brav and Gompers (2003)), the variable prestigious underwriters is negatively related to lockup length, the median lockup of 365 days is independent of the quality of underwriters and it is significantly higher than the 180 days observed in the US. The average lockup length of 338 days is also not too far from the overall average of 391 days.

Second, our results highlight the underwriters' involvement in the lockup enforcements. They suggest that the early trades are likely to be pre-arranged with the underwriters rather than decided unilaterally by insiders. We find strong evidence that IPOs with early buy/sell trades are more likely to have prestigious underwriters. In addition, since the buy (sell) trades occur in under- (over-) performing IPOs, the results indicate that the underwriters appear to release insiders of over-performing IPOs from the lockup constraints but force those of under-performing ones to increase their holdings. This asymmetric impact on the lockup suggests that although lockups are relatively longer than in the US, underwriters enforce them and have the ability to amend them when necessary.

The impact of underwriters through their effect on early trades expands to the lockup expiry dates. We find that early sell IPOs carry on performing better and their stock price drop on the lockup expiry date is relatively small. In contrast, IPOs subject to buy trades continue underperforming and decrease substantially on the lockup expiry dates. We show that, surprisingly, insiders of these early buy/sell trades IPOs do not actually sell their shares on the lockup expiry dates. The question remains as to whether underwriters prevent insiders, particularly those of early buy IPOs, to sell on the lockup expiry dates and whether this impact extends to the post-lockup-expiry dates. These issues are subject of further research.

References

Allen, Franklin, and Andrew Postlewaite, 1984, Rational expectations and the measurement of stocks elasticity of demand, *Journal of Finance* 39, 1119-1125.

Ben Dor, Arik 2003, The performance of the initial public offerings and the cross section of institutional ownership, Northwestern University Working Paper.

Bhattacharya, Utpal, and Hazem Daouk, 2002, The world price of insider trading, *Journal of Finance* 57, 75-108.

Bradley, Daniel. J., Bradford D. Jordan, Ivan C. Roten, and Ha-Chin Yi, 2001. Venture capital and IPO lockup expiration: An empirical analysis, *Journal of Financial Research* 24, 465-492.

Brau, James C., David A. Carter, Stephen E. Christophe, and Kimberley G Key, 2004, Market reaction to the expiration of IPO lockup provisions, *Managerial Finance*, 30(1), 75-91.

Brau, James C., Val Lambson, and Grant McQueen, 2005, Lockups revisited, *Journal of Financial and Quantitative Analysis* 40 (3), 519-530.

Brau, James C., and Stanley E. Fawcett, 2006, Initial public offerings: An analysis of theory and practice, *Journal of Finance*, 61(1), 399-436.

Brav, Alon, and Paul A. Gompers, 2000, Insider trading subsequent to initial public offerings: Evidence from the expiration of lock-up provisions, Harvard University Working Paper.

Brav, Alon, and Paul A. Gompers, 2003, The role of lockups in initial public offerings, *Review of Financial Studies* 16, 1-29.

Brennan, Michael J., and Henry H. Cao, 1996, Information, trade, and derivative securities, *Review of Financial Studies* 9, 163-208.

Carter, Richard and Steven Manaster, 1990, Initial public offerings and underwriter reputation, *Journal of Finance* 45, 1045-1067.

Chambers, David, and Elroy Dimson, 2009, IPO underpricing over the very long run, *Journal of Finance* 64, 1407-1444.

Chen, Hsiu-Lang, Narashimhan Jegadeesh, and Russ Wermers, 2000, The value of active mutual fund management: An examination of the stockholdings and trades of fund managers, *Journal of Financial and Quantitative Analysis,* 343-365.

Chen, Joseph, Harrison Hong, and Jeremy Stein, 2002, Breadth of ownership and stock returns, *Journal of Financial Economics* 66, 171—205

Derrien, Francois, and Ambrus Kecskes, 2007, The initial public offering of listed firms, *Journal of Finance* 62 (1), 447-479.

Espenlaub, Susane, Mark Goergen. and Arif Khurshed, 2001, IPO lock-in agreements in the UK, *Journal of Business Finance and Accounting*, 28(9) 1235-1278.

Espenlaub, Susane, Mark Goergen, Arif Khurshed, and Mark Remenar, 2002, Trading by directors around the expiry of lock-in agreements in the UK IPOs, Working paper, Manchester Business School.

Faccio, Mara and Meziane Lasfer, 2000, Do occupational pension funds monitor companies in which they hold large stakes, *Journal of Corporate Finance*, 671-110.

Fidrmuc, Jana, Marc Goergen, and Luc Renneboog, 2006, Directors' share trading, news release and ownership concentration, *Journal of Finance* 61, 2931-2973.

Field, Laura C. and Gordon Hanka, 2001, The Expiration of IPO share lockups, *Journal of Finance*, 56(2), 471-500.

Franks, Julian R., Colin P. Mayer and Luc Renneboog, 2001, Who disciplines management in poorly performing companies? *Journal of Financial Intermediation* 10, 209-248.

FSA, 2007, *Listing Rules Handbook*, London, UK

Grinblatt, Mark and Chuan Hwang, 1989, Signaling and the pricing of new issues, *Journal of Finance* 44, 383-420.

Hillier, David, and Andrew P. Marshall, 2002, The market evaluation of information in directors' trades, *Journal of Business Finance and Accounting* 29, 77-110.

Ibbotson, Roger G. and Jay R. Ritter, 1995, Initial Public Offerings, Chapter 30. *Handbook in Operations Management Research and Management Science.* 9: 993-1016.

Korczak, Adriana, and Meziane Lasfer, 2009, Does cross-listing mitigates insider trading, Cass Business School Working Paper.

Korczak, Adriana, and Meziane Lasfer, 2007, Foreign shareholder activism and insider trading before material news announcements, Cass Business School Working Paper

Levis, Mario, 2008, Private equity backed IPOs in UK, Cass Business School Working paper.

Megginson,William, and Kathleen Weiss, 1991, Venture capitalist certification in initial public offerings, *Journal of Finance* 46, 879-903.

Myers, Stewart, and Nicolas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics*13, 187-221

Ofek, Eli, and Matthew Richardson, 2000, The IPO lock-up period: Implications for market efficiency and downward sloping demand curves, New York University Working Paper.

Pontiff, Jeffrey, 1996, Costly arbitrage: Evidence from closed-end funds, *Quarterly Journal of Economics*, 111, 1135-1152.

Seyhun, Nejat H., 1986, Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics* 16, 189-212.

Seyhun, Nejat H., 1988, The information content of aggregate insider trading, *Journal of Business* 61,1-24.

Shleifer, Andre, and Robert Vishny, 1997, The limits of arbitrage, *Journal of Finance* 52, 35-55.

Welch, Ivo, 1989, Seasoned offerings, imitation costs, and the underpricing of initial public offerings, *Journal of Finance* 44, 421-449.

Table I
Descriptive Statistics

Panel A. Descriptive statistics of the lockup and fundamental characteristics

	10th Percentile	Median	Mean	90th Percentile
Days locked	306	365	391	548
Shares locked (%)	1.50	24.00	29.40	68.00
Percent of offering as primary shares	12.6	32.90	38.60	78.00
Underpricing (%)	-1.50	9.90	22.50	51.30
Market value of equity(2008 £m)	3.20	21.60	140.20	204.10
Market-to-book	0.88	3.01	3.88	11.15
Return on Assets	-52.6	-2.60	-34.6	11.10

Panel B. Annual distribution of the sample IPOs

Year	1999	2000	2001	2002	2003	2004	2005	2006
IPOs	39	144	59	44	39	159	201	146
Average money raised (£m)	187.2	253.5	106.8	84.1	100.0	51.6	73.6	138.4
Days Locked	427	374	410	437	404	392	388	375
Early sell (%)	3	9	6	6	3	12	21	41
Early buy (%)	0	2	3	2	7	15	26	44

Panel C. Lockup ranges

Lockup days	<89	90-180	181-364	365	366-550	551-720	721-1096
Observations	7	25	80	560	79	19	61
Percent of observations	0.84	3.00	9.63	67.38	9.50	2.28	7.34
Early sell (%)	0	5	19	38	15	10	13
Early buy (%)	0	4	7	56	13	2	18

Panel D. Means [Medians] of lockup days, shares locked up and underpricing

Sample	N	Days Locked	Shares locked (%)	Underpricing (%)
Market value>median	416	387[365]	26.0[18][***]	26.4[10.7][***]
Market value<median	415	395[365]	32.8[30]	18.6[9.0]
p-values for differences in means		0.23	0.00	0.00
Prestigious underwriter	166	338[365][***]	25.2[18][***]	9.1[6.7][***]
Other underwriter	665	403[365]	30.4[25]	26.0[10.5]
p-values for differences in means		0.00	0.00	0.00
Venture-backed	116	357[365][***]	19.7[15][***]	28.8[9.0]
Non-venture-backed	715	396[365]	30.6[25]	21.5[10.0]
p-values for differences in means		0.00	0.00	0.13
Main Market	141	334[365][***]	23.3[16][***]	18.6[7.7]
AIM	690	402[365]	30.6[25]	23.5[10.0]
p-values for differences in means		0.00	0.00	0.21
Institutional holding	504	379[365][***]	25.4[20][***]	22.8[9.2]
No Institution holding	327	411[365]	36.0[31]	22.1[10.5]
p-values for differences in means		0.00	0.00	0.28
Bubble period	183	380[365]	35.2[33][***]	32.1[9.7][***]
Non-bubble period	648	388[365]	27.0[21]	16.4[10.0]
p-values for differences in means		0.20	0.00	0.00
Hot market	676	412[365][***]	28.5[23][***]	27.1[10.0]
Cold market	155	381[365]	33.7[29]	18.9[7.1]
p-values for differences in means		0.00	0.00	0.12

The sample includes 831 IPOs from January, 1 1999 to 31 December 2006, for which we could find lockup information. *Days locked* is the length of lockup period, *Shares locked* is the ratio of shares locked to shares outstanding. *Percentage of offering as primary shares* is the fraction of offering that is new shares. *Underpricing* is the percent return on the first day from the offering price to the closing price. *Market value* is the offering price times shares outstanding in 2008 millions of Pound Sterling constant terms. *Market-to-book* is the ratio of market capitalization at the IPO divided by the book value of the equity in the first reporting period after IPO. *Return on assets* is the net income divided by total assets in the first reporting period after the IPO. *Average Money Raised* is the ratio of money raised in 2008 £bn over the number of IPOs. *Early sells (buys)* are trades that occurred prior to the lockup expiration dates. *Prestigious underwriters* are the global underwriters defined in Derrien and Kecskes (2007). *Venture-backed* is dummy equal to one if the IPO is backed by venture capitalists. *AIM* is for Alternative Investment Market and *Main market* is the Official List. *Institutional holding* refers to any institutional investors who hold more than 3% share at the time of IPO. *Bubble period* is defined as 1999-2000 period following Levis (2008). *Hot market* is when the IPO volume increases significantly and includes two periods January 1999 to March 2001 and January 2004 to end of 2006. *Cold market* is the remaining sample period. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Table II

Determinants of the Length of the Lockup

	Full Sample	Full Sample	Main Market	AIM
Constant	13.04***	23.7***	6.54***	6.02***
	[12.44]	[12.28]	[9.7]	[4.45]
Venture-backed	-0.07***	-0.06**	-0.19**	-0.03**
	[-2.01]	[-1.98]	[-2.14]	[-1.99]
Prestigious underwriter	-0.16***	-0.13***	-0.04***	-0.11***
	[-4.28]	[-3.43]	[-3.38]	[-2.71]
Institutional holding	-0.03***	-0.03***	-0.02**	-0.03**
	[-2.26]	[-2.15]	[-2.02]	[-1.86]
Size	-0.02***		-0.17***	-0.01
	[-2.49]		[-5.64]	[-1.34]
Market-to-book	0.0007	0.001	0.001	0.005
	[0.45]	[0.95]	[0.55]	[0.93]
Shares locked	0.001**	0.001	0.005***	0.0001
	[1.71]	[1.13]	[3.11]	[0.19]
Shares issued at IPO	-0.002	-0.002	-0.001	-0.002
	[-0.46]	[-0.26]	[-0.25]	[-0.31]
Cash flow margin	-0.007	-0.002	-0.07*	-0.007
	[-0.93]	[-0.43]	[-1.71]	[-1.40]
Hot Market Dummy	0.05**	0.05***	0.12	0.07***
	[1.72]	[2.01]	[0.11]	[2.43]
High-tech Dummy	-0.05	-0.04	-0.03	-0.03
	[-1.35]	[-1.15]	[0.28]	[-0.68]
AIM Dummy		0.17***		
		[3.70]		
Adjusted R^2	10.9	12.1	7.2	9.8
Number of Observations	831	831	141	690

The sample includes 831 IPOs from January 1 1999 to 31 December 2006, for which we could find lockup information and other market data. The dependent variable is the log of the lockup days. *Venture-backed* is dummy equal to one if the IPO is backed by venture capitalists. *Prestigious underwriter* is dummy variable equal to one if global underwriter is the underwriter for the float. *Institutional Holding* is a dummy variable equal to one if institutional investors hold more than 3% share at the time of IPO. *Size* is the log of market value of equity in 2008 constant terms. *Market-to*-book is the ratio of market capitalization at the IPO divided by the book value of the equity in the first reporting period after IPO. *Shares locked* is the fraction of insider shares

that are subject to lockup restrictions. *Shares issued at IPO* is the ratio of shares issued and fully traded over number of shares outstanding. *Cash Flow Margin* is the ratio of operating cash flows over sales. *Hot market* is a dummy equal to one if the IPO is during the period when the IPO volume increases significantly and includes two periods January 1999 to March 2001 and January 2004 to end of 2006. *High-tech Dummy* is equal to one if the IPO is in the following industries: computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. *AIM Dummy* is equal to one if the IPO is listed on the Alternative Investment Market. To eliminate the possible effect of outliers, for each variable, we replace observations whose values are either lower than the 1st or higher than 99th percentiles by the sample median. *t* statistics are in the brackets. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Table III
Summary Statistics of Insider Trading prior to Lockup Expiration Dates

	10th percentile	Median	Mean	90th Percentile
Panel A. Early sell trades				
Number of trades	1	2	2	4
Days Locked	184	365	423	730
Sell time as fraction of lockup length (%)	15	62	58	95
Shares locked relative to shares outstanding	7	30	33	73
Shares locked relative to insider shares	70	100	95	100
Shares sold early relative to shares locked	0.06	0.51	5.63	10.25
Shares sold early relative to shares outstanding	0.02	0.23	2.54	6.78
$CAR_{-42,-2}$	-6.15	8.15	9.72	25.48
Panel B. Early buy trades				
Number of trades	1	2	3	5
Days Lockup	360	365	438	731
Buy time as fraction of lockup length (%)	9	43	61	93
Shares locked relative to shares outstanding	10	26	30	65
Shares locked relative to insider shares	66	100	93	100
Shares bought early relative to shares locked	0.035	0.27	0.91	1.69
Shares bought early relative to shares outstanding	0.005	0.045	0.213	0.345
$CAR_{-42,-2}$	-38.5	-4.64	-8.47	13.38

We obtained insider holdings data for the period January 1999 to December 2007 from the Directors Deals and match it with our constructed lockup dataset. The early sells (buys) are trades that occurred prior to the lockup expiration dates. The sample includes 186 sell trades by 116 IPOs (Panel A) and 694 buy trades by 254 IPOs (Panel B). *Sell (buy) time as a fraction of lockup length* is the ratio of the number of days from the IPO date to the trade date over the lockup length. $CAR_{-42,-2}$, the cumulative abnormal return 40 day pre-event window. We use the standard event study methodology to compute the abnormal returns with α and β based on regression of stock returns on the FTSE All Share Price Index for main market companies and AIM All Share Price Index for AIM companies.

Table IV
Characteristics of IPOs with and without Early Insider Trades

Insider trading prior to lockup expiration	Yes	No	p-value of differences in mean
Panel A. Early sell trades			
Number of IPOs	116	715	
AIM companies (%)	85	15	
Number of trades	186	–	
Average Lockup (days)	423***	389	0.00
% Shares locked relative to shares outstanding	33***	29	0.00
% Shares locked relative to insider shares	95**	90	0.05
CAR $_{-42,-2}$	9.72***	0.52	0.00
CAR $_{-1,+1}$	-1.78***		
CAR $_{+2,+42}$	-5.96***		
Underpricing	9.53***	23.09	0.00
Size	274***	125	0.05
Prestigious underwriter (%)	23.2	19.6	0.18
Venture-backed (%)	19.22**	11.49	0.05
Institutional Holding (%)	48.38***	62.63	0.00
High-tech (%)	3.7***	10.6	0.00
Panel B. Early buy trades			
Number of IPOs	254	577	
AIM companies (%)	94	6	
Number of trades	694	–	
Average Lockup (days)	438***	388	0.00
% Shares locked relative to shares outstanding	30	31	0.11
Shares locked relative to insider shares	93***	97	0.05
CAR $_{-42,-2}$	-8.47***	-3.01	0.00
CAR $_{-1,+1}$	2.43***		
CAR $_{+2,+42}$	1.02		
Underpricing	18.87	22.99	0.23
Size	169.45	151.16	0.26
Prestigious underwriter (%)	20.74	20.81	0.85
Venture-backed (%)	15.85**	10.72	0.04
Institutional Holding (%)	64.69	61.48	0.13
High-tech (%)	10.66	10.27	0.25

CARs are the cumulative abnormal return over various windows. For the no trade sample, we measure the 40-day abnormal return as the abnormal return over the whole lockup period standardised to 40 days. *Underpricing* is the percent return on the first day from the offering price to the closing price. *Size* is the market value of equity in 2008 constant terms. *Prestigious underwriter* is defined if the global investment bank has underwritten the issue. *Venture-backed* is the proportion of IPOs backed by venture capitalist. *Institutional Holding* is the proportion of companies where institutions hold more than 3%. *High-tech Dummy* is equal to one if the IPO is in computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. We report *p*-values for the mean difference test between early trade and no trade. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Table V

Logit analysis of early trades by insiders

	Estimate	Standard Error	p-value
Panel A. Early sell trades			
Intercept	-1.561**	0.730	0.032
$CAR_{-42,-2}$	5.127***	0.867	0.000
Underpricing (%)	-0.004	0.003	0.139
Venture backed	-0.590	0.435	0.175
Prestigious Underwriter	1.970***	0.390	0.000
Institutional Holding	-0.982***	0.212	0.000
Days Locked	0.0016***	0.0005	0.006
Size	0.0002*	0.0001	0.066
Shares locked	0.003	0.006	0.668
High-tech Dummy	-0.784*	0.426	0.065
Year Dummies		YES	
Pseudo R^2		19.29	
Panel B. Early buy trades			
Intercept	-0.176	0.414	0.673
$CAR_{-42,-2}$	-2.006***	0.335	0.000
Underpricing (%)	-0.004***	0.001	0.005
Venture backed	0.298*	0.165	0.071
Prestigious Underwriter	0.294*	0.152	0.054
Institutional Holding	0.065	0.081	0.419
Days Locked	0.003***	0.0004	0.000
Size	0.0001	0.0001	0.154
Shares locked	-0.007*	0.004	0.082
High-tech Dummy	-0.0002	0.185	0.999
Year Dummies		YES	
Pseudo R^2		17.43	

The dependent variable is a dummy equal to one for early insider sell (buy) trades. Insider sell sample includes 186 events by 116 IPOs and 715 IPOs with no sell trades. Insider buy sample includes 694 trades by 254 IPOs and 577 IPOs with no buy trades. $CAR_{-42,-2}$, the cumulative abnormal return 40 day pre-event window. For the no trade sample, we measure the 40-day abnormal return as the abnormal return over the whole lockup period standardised to 40 days. *Underpricing* is the percent return on the first day from the offering price to the closing price. *Venture backed* is dummy variable equal to one venture capitalist is present. *Prestigious underwriter* is defined if the global investment bank has underwritten the issue. *Institutional Holding* is a

dummy variable equal to one if institutions hold more than 3% share at IPO date. *Days locked* is the log of the lockup period. *Size* is the log of market value of equity in 2008 constant terms. *Shares locked* is the number of shares locked over the holdings of insiders. *High-tech Dummy* is equal to one if the IPO is in computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. Year dummies are included in both regressions to control for time effects. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Table VI
Cumulative Abnormal Returns around Lockup Expiration Dates

	All			Early Sell			Early Buy			Mean difference
	CAR	t-stat	Percent Negative	CAR	t-stat	Percent Negative	CAR	t-stat	Percent Negative	p-value
$CAR_{-10,-3}$	-0.09	-0.45	55	4.13***	8.27	41	-0.01	-0.04	56	0.00
$CAR_{-2,+2}$	-1.85***	-3.70	57	-1.00***	-2.00	42	-0.46***	-2.32	49	0.03
$CAR_{+3,+10}$	-0.95**	-1.90	52	-0.70	-1.41	42	-1.68***	-3.37	52	0.00
AR_0	-0.50	-1.25	49	0.16	0.32	44	-1.22***	-2.43	57	0.00

Panel B. Abnormal Returns of IPOs with and without Actual Sells on Expiry Dates							
	IPOs without actual sells			IPOs with actual sells			Mean difference
	CAR	t-stat	Percent Negative	CAR	t-stat	Percent Negative	p-value
$CAR_{-10,-3}$	-0.09	-0.43	55	-0.10	-0.49	70	0.28
$CAR_{-2,+2}$	-1.84	-3.32	57	-2.50	-3.55	70	0.02
$CAR_{+3,+10}$	-0.85	-1.86	52	-1.50	-2.96	80	0.04
AR_0	-0.50	-1.24	49	-0.56	-1.26	80	0.20

The sample includes 831 IPOs over the period 1999-2006. We use the standard event study methodology to compute the abnormal returns with α and β based on regression of stock returns on the FTSE All Share Price Index for main market companies and AIM All Share Price Index for AIM companies. *Early sell* are IPOs where insiders sell before lockup expiration (116 companies with 186 trades). *Early buy* are IPOs where insiders buy before lockup expiration (254 companies with 694 trades). Panel B reports the differences in the cumulative abnormal returns over various event widows between IPOs with and without actual sell trades on the expiry dates. We do not divide the sample in this panel into early buy and early sell trades as none of these actual sells are from these two subsamples. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Table VII
Regression Results of CAR$_{-2, +2}$ around the Lockup Expiration Dates

	Full Sample	Main Market	AIM
Constant	-0.02	-0.01	-0.01
	[-0.42]	[-0.21]	[-0.18]
Insider early sell	0.96	0.20	0.71
	[1.02]	[1.26]	[0.37]
Insider early buy	-2.15***	-1.76***	-1.79*
	[-2.62]	[-2.23]	[-1.74]
Actual sell trade on expiry date	-0.45	-0.51	-0.53
	[-3.00]***	[-2.96]***	[-1.98]**
Shares locked	-0.03***	-0.02***	-0.01***
	[-2.51]	[-2.40]	[-2.76]
Performance	1.71***	1.60**	1.85**
	[2.20]	[2.02]	[1.97]
Size	0.01	0.01	0.02
	[1.36]	[1.56]	[0.58]
Market-to-book	0.02	0.003	0.001
	[0.03]	[1.13]	[0.64]
Venture-backed	-1.07	-0.96	-0.03
	[-0.69]	[-1.54]	[-0.85]
Prestigious underwriter	-0.05	-0.008	-0.005
	[-0.60]	[-0.42]	[-0.31]
Institutional holding	-0.96	-0.18	-0.15
	[-0.99]	[-0.90]	[-1.50]
Shares issued at IPO	0.03***	0.01**	0.01***
	[2.59]	[2.25]	[2.82]
Cash flow margin	-0.01	-0.01	-0.01
	[-1.15]	[-0.31]	[-0.27]
Stock price volatility	-0.53***	-0.44**	-0.67**
	[-2.74]	[-1.96]	[-2.56]
High-tech Dummy	-0.50	-0.20	-0.20
	[-0.30]	[-0.23]	[-0.88]
Year Dummies	Yes	Yes	Yes
Adjusted R^2	1.75	1.97	2.10
N	831	141	690

The dependent variable is Cumulative abnormal return from -2 to +2 days around the lockup expiration date. *Insider early Sell* is a dummy variable taking the value of one if insiders sell prior to lockup expiration. *Insider early buy* is a dummy variable taking the value of one if insiders buy before lockup expiration. *Actual sell trade on expiry date* is a dummy equal to one if insiders actually sell on the lockup expiry date. *Shares locked* is the fraction of insider shares that are subject to lockup restrictions. *Performance* is a dummy variable equal to one if the cumulative abnormal return

since the offering is higher than median. *Size* is the log of market value of equity in 2008 constant terms. *Market-to*-book is the ratio of market capitalization at the IPO divided by the book value of the equity in the first reporting period after IPO. *Venture-backed* is dummy equal to one if the IPO is backed by venture capitalists. *Prestigious underwriter* is dummy variable equal to one if global underwriter is the underwriter for the float. *Institutional Holding* is a dummy variable equal to one if institutional investors hold more than 3% share at the time of IPO. *Shares issued at IPO* is the ratio of shares issued and fully traded over number of shares outstanding. *Cash Flow Margin* is the ratio of operating cash flows over sales. *Stock price volatility* is the standard deviation of the daily returns of the firm's abnormal return in the period beginning one day after IPO and ending 11 days before lockup expiration. *High-tech Dummy* is equal to one if the IPO is in the following industries: computer manufacturing, electronic equipment, computer and data processing services, and optical, medical and scientific equipment. To eliminate the possible effect of outliers, for each variable, we replace observations whose values are either lower than the first or higher than 99th percentiles by the sample median. *t* statistics are in the brackets. ***, **, * significant at 0.01, 0.05, and 0.1 levels, respectively.

Figure 1
Cumulative Abnormal Returns around Lockup Expiration Dates
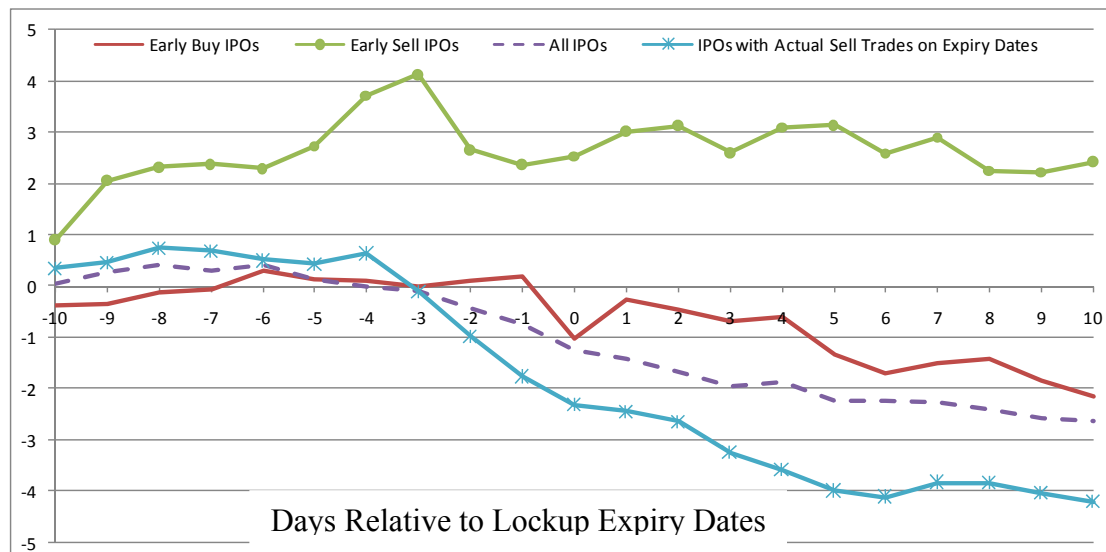
The sample includes 831 UK IPOs over the period 1999-2006. We compute the abnormal returns using the standard event study methodology with α and β based on regression of stock returns on the FTSE All Share Price Index for main market companies and AIM All Share Price Index for AIM companies. We obtain the daily share price and indices data from DataStream. *Early Sell IPOs* are IPOs where insiders sell before lockup expiration (116 IPOs with 186 trades). *Early Buy IPOs* are IPOs where insiders buy before lockup expiration (254 IPOs with 694 trades). *IPOs with Actual Sell Trades on Expiry Dates* represent the 10 firms where insiders have actually sold stakes on the expiry date.

Figure 2
Abnormal Volume around Lockup Expiration Dates
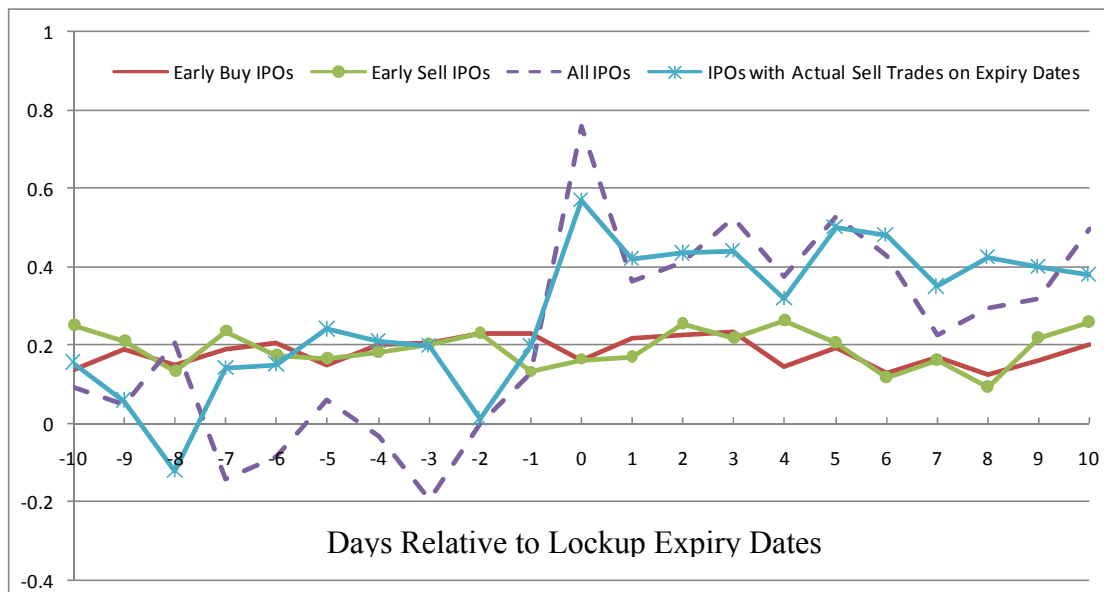
The sample includes 831 UK IPOs over the period 1999-2006. The abnormal volume is the daily volume divided by the mean daily volume over t-71 to t-11 days relative to the lockup expiry date, minus 1. We obtain the daily volume from DataStream. To eliminate the effect of outliers in our analysis we set observation less than 1st or greater than 99th percentile in each event day equal to the median observation. *Early Sell IPOs* are IPOs where insiders sell before lockup expiration (116 IPOs with 186 trades). *Early Buy IPOs* are IPOs where insiders buy before lockup expiration (254 IPOs with 694 trades). *IPOs with Actual Sell Trades on Expiry Dates* represent the 10 firms where insiders have actually sold stakes on the expiry date.

[1] The analysis of the prospectuses shows that this agreement is not binding only in limited circumstances. These include the event of an intervening court order, a takeover offer relating to the company's shares becoming or being declared unconditional, the death of the insider, transfers to relatives and family trusts and to beneficiaries of such trusts, and transfers to companies in the same group as the shareholder. In this case, the consent of the underwriter should not be unreasonably withheld or delayed. We were not able to identify these specific events.

[2] See Ofek and Richardson (2000) for a review.

[3] Although there are two studies on the issue of IPO lockup in UK, their evidence is not strong partly because of the relatively smaller sample size and data unavailability. For example, Espenlaub *et al*. (2001) study 188 IPOs from the London stock market and focus on the characteristics of the lockup agreements in the UK. Their sample is relatively small and they were not able to identify the actual lockup expiry dates for IPOs with relative lockup dates (dates relative to other corporate events like publication of annual reports). They find that 54 out of total 188 IPOs (29%) in their sample set lockup in terms of calendar date. In another study, Espenlaub *et al*. (2002) analyse the trading by directors around the lockup expiry date. Both studies report statistically insignificant abnormal returns around the lockup expiry dates.

[4] All UK listed companies retain a corporate broker, usually the underwriter of the IPO, as a pre-requisite for their listing on the London Stock Exchange. The corporate broker acts as a long-term retained adviser and is specifically responsible for managing the day-to-day relationship with the corporate client and provides equity market-related advice, and new issues, co-ordinates institutional investor relations services, and liaises with the London Stock Exchange and UK Listing Authority on

regulatory issues facing listed companies. In addition to primary equity issuance, corporate brokers execute equity related transactions, including insider trades, share buybacks, stake building in target companies. See, for example Financial Times 28 April 2009 p. 21 and Wall Street Journal Europe 4 May 2009 p. 23 for a listing and concentration of major corporate brokers.

[5] However, in June 2009, this number decreased to 998, following a number of delisting as a result of the financial crisis.

[6] The UK Model Code prescribes much faster reporting of directors' dealings. The directors must inform their company as soon as possible after the transaction and no later than the fifth business day after a transaction for their own account or on behalf of their spouses and children (Hillier and Marshall (2002)). In turn, a company must inform the LSE without delay and no later than the end of the business day following receipt of the information. This implies that the information about insider transaction reach market as late as 6 days after transaction. In contrast, in the US, during the pre-Sarbanes-Oxley period, insiders have to report their trades on the 10th of the month following the transaction, resulting in a maximum delay of between 10 and 42 days, depending on the trading date. As a result, most previous studies could not analyse insider-trading event on or before the lockup expiry date.

[7] As an alternative to AIM all share price index, we used the Hoare Govett Smaller Companies (HGSC) Index as the market index. Our results are qualitatively similar.

[8] Espenlaub et al (2001) find mean lockup of 561 days and median of 730 days. The lockup contracts were compulsory during their sample period (1992-2000) for mineral and scientific research based companies with trading records of less than three years.

[9] We use Chambers and Dimson (2009), Table III, column 1 Number of IPOs, and column 2 EW (equally weighted) mean return, to estimate their average underpricing.

We find that in 1988 to 1996, while Brav and Gompers (2003) report average US underpricing of 14.7%, but Chambers and Dimson (2009) UK data implies 10.78%.

[10] Espenlaub et al. (2001) find that only 54 out of their 188 IPOs (29%) have a fixed expiry date. In addition, the directors set expiry dates in `absolute' terms, i.e. by specifying (a period after) a calendar date. The remaining firms set expiry dates relative to other, more or less predictable, events in the company calendar such as the publication of preliminary or (audited) annual results.

[11] We define bubble period as 1999-2000 period following Levis (2008).

[12] We follow Derrien and Kecskes (2007) and include in prestigious underwriters global investment banks such as ABN AMRO (including Hoare Govett), Cazenove & Co., Credit Lynnais Securities, Dresdner Kleinwort Wassertein, HSBC Securities, Credit Suisse, Investec Hendersen Crosthwaite securities, KBC Securities, Peel Hunt, Lehman brothers, Nomura International, Schroder Salomon Smith Barney, SG securities, UBS, West LB, Merrill Lynch International, Goldman Sachs.

[13] For the no insider trade sample, we measure the 40-day abnormal return as the abnormal return over the whole lockup period standardised to 40 days.

[14] As above, the results based on the Hoare Govett Smaller Companies (HGSC) Index are qualitatively similar.

[15] Trading on insider information is normally restricted in the UK, as insiders are not allowed to trade up to two months before earnings announcements and one before any other news releases. However, Korczak and Lasfer (2007) report that insiders do trade strategically on news announcements during these restricted periods. Bhattacharya and Daouk (2002) find that the insider trading rules across the world are not enforced.

[16] Brav and Gompers (2003) use buy-and-hold abnormal return from two days before to two days after lockup expiration as the dependent variable.