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Espenlaub, S.; Goergen, M.; Khurshed, A.; Renneboog, L.D.R.

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**LOCK-IN AGREEMENTS IN VENTURE CAPITAL
BACKED UK IPOs**

By Susanne Espenlaub, Marc Goergen, Arif Khurshed and
Luc Renneboog

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Discussion paper

Lock-in agreements in venture capital backed UK IPOs

Susanne Espenlaub
Manchester School of Accounting & Finance,
University of Manchester, UK

Marc Goergen
Manchester School of Management,
University of Manchester Institute of Science & Technology (UMIST), UK

Arif Khurshed
Manchester School of Accounting & Finance,
University of Manchester, UK

Luc Renneboog
Department of Finance and CentER for Economic Research,
Tilburg University, The Netherlands
Email: Luc.Renneboog@kub.nl

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Abstract.

This paper examines the impact of venture-capital backing of UK companies issuing shares at flotation on the characteristics of the lock-in agreements entered into by the existing shareholders, and on the abnormal returns realised around the expiry of the directors' lock-in agreements. The study examines the lock-in agreements of a sample of 186 UK IPOs issued during 1992-98. 103 of these companies had venture-capital backing at the IPO. The sample is also broken down into firms classified by industrial sector: of 103 VC backed companies 48 are high-tech, and among the 83 firms without VC backing 33 are high-tech. We find that lock-in agreements in the UK show much more variety in terms of the contractual detail than US agreements. Lock-in periods are particularly long for venture-backed high-tech companies. By contrast, for firms not in the high-tech sector, venture-capital backing appears to reduce the directors' lock-in periods. This suggests that for UK IPOs venture-capital backing does not serve as a substitute for lock-in agreements. Examining the proportion of locked-in directors' shares, we find it to be significantly higher in VC-backed firms as compared to firms without VC backing in the sample of firms not classified as high tech. This suggests that for firms likely to face only moderate information asymmetries (i.e. those not in high-tech industries), venture-capital backing of the IPO is not used as a substitute for, but rather as a complement to, lock-in agreements. The higher proportion of locked-in directors' shares among VC-backed companies (not in the high-tech sector) may be because the underwriters of VC-backed IPOs expect heavy sales by the VCs in the period after the IPO and decide to lock in the directors' shares and in order to limit the downward pressure of the VC's disposals on stock prices. Alternatively, if VCs do not sell out completely in the IPO, as reported by Barry et al. 1990, they may seek to align the directors' interests with their own by locking the directors in. We also examine the share-price performance of IPOs with and without VC backing around the time of the expiry of the lock-in agreements, and find that the CAARs for the VC-backed stocks are lower for most of the short windows around the expiry date, both for the sample as a whole and separately for each industry sector. For the sample of 28 VC-backed stocks, the CAARs are statistically significantly less than zero at the 1% level for the narrow one- to three-day windows around the expiry date. For the VC-backed stocks, the CAARs range from -1.2% to -1.6% (and even to -2% for the 11-day window, but this result is not statistically significant), while the corresponding CAARs for the stocks without VC backing range only from -0.2% to -0.8.

1. Introduction

It is widely believed that one of the reasons for the impressive success of the American new economy is the availability of venture capital (VC) providing ample funds for innovative firms. There is a growing body of literature on the impact of VC involvement on various aspects of the process and performance of initial public offerings (IPOs) such as the survivor profile, initial and long-term returns, and the operating performance of issuing firms (Jain and Kini 2000, 1999, 1995, Brav and Gompers 1997a and 1997b, Gompers and Lerner 1997, Megginson and Weiss 1991). Recently, some researchers (Bradley et al. 2000, Field and Hanka, 2001) have focused on yet another aspect of VC involvement in the IPO process, i.e. their involvement with so-called lock-in (or in the US, lock-up) agreements contained in IPO prospectuses. These studies have so far exclusively focused on the US capital market. This paper extends the analysis of into lock-in agreements of British VC-backed IPO companies.

A lock-in agreement is a formal contract between the original shareholders of the issuing firm and the underwriter (called sponsor in the UK) whereby the original shareholders undertake not to sell their shares for a given period of time after the listing. The first day on which these shareholders can sell their shares is called the lock-in expiry day.

With the exception of the study by Espenlaub, Goergen and Khurshed (2001), there has been no work on lock-in agreements in the UK. Yet the UK is of particular interest given the different institutional and legal framework. In addition, UK lock-in agreements are much more diverse than the US ones. For instance, while lock-in periods are virtually standardised at 180 days in US IPOs (Bradley et al 2000, Field and Hanka 2001) there is much greater diversity in the UK.

This paper looks at the impact of VC presence on the characteristics of the lock-in contract and also on the abnormal returns realised around the expiry of directors' lock-in agreements using a sample of 186 UK IPOs issued during 1992-98. The lock-in agreements may help to reduce agency problems and information asymmetry that arise in IPOs. With insiders such as management and other major shareholders being restricted from selling their holdings, lock-in agreements ensure that these insiders maintain a significant interest in the firm after the IPO. This helps to align the interests of the old and new shareholders. In addition, the presence of VCs may act as a substitute for or alternatively as a complement to the lock-in agreements imposed on these insiders. We also examine the share-price performance of IPOs with and without VC backing around the time of the expiry of the lock-in agreements, and find significant differences between the two subsamples.

The rest of the paper is organised as follows. In section 2 we review the literature on lock-in agreements. Section 3 presents examples of the lock-in agreements contained in the prospectuses of VC-backed UK IPOs and gives an overview of the regulations in the UK relating to lock-in agreements. In section 4, we describe the data and the sample used in the large-scale studies reported in Section 5, which gives detailed descriptive statistics describing the manifold types of lock-in agreements observed in the UK, and Section 6, which reports the results of an event-study examining the abnormal returns of IPOs with and without VC backing around the expiry of directors' lock-in agreements. Finally, Section 7 presents a summary of four case studies of UK IPOs: two with VC backing, one issued by a firm in an industry classified as high tech, and two firms without VC backing, again one in the high-tech sector. Section 8 concludes the paper.

2. Literature Survey

The venture capital industry is crucial in the creation of new firms. VCs not only provide the necessary capital but their presence also signals quality as they are usually heavily involved with decision making and monitoring the firm (e.g. Barry 1994, Jain and Kini 2000). Barry et al. (1990) examine IPOs of VC-backed companies in the US between 1978 and 1987 and find that VCs perform intensive monitoring. They also report that consistent with this monitoring role, VCs hold substantial shareholdings, and in many cases, VCs retain their investments well beyond the IPO contrary to the commonly held view of IPOs being an exit route. They also find that VCs often serve on the boards of the firms they invest in, typically holding two board seats or one third of the total. Megginson and Weiss (1991) focus on the 'certification hypothesis' formally developed by Booth and Smith (1986) and the role of VCs in 'certifying' the value of issuing firms and the quality of company information reported at the IPO. They find evidence to support their hypothesis that VC backing may reduce the asymmetry of information between the issuing firm and investors and hence lower the costs of going public. In this context, VCs play a similar part as underwriters and auditors, in that, as repeated players in the IPO market, they may be able to commit themselves credibly to the accuracy and completeness of disclosed information as false certification would lead to the loss of valuable reputation. In addition, the services of VC certification are costly to the issuing firm in terms of the very high returns VCs generally expect on their investments and the stringent conditions they impose on portfolio companies, such as the right of the VC to replace the entrepreneur as a manager under certain conditions. The cost, stringency and limited availability of VC backing may act as a screening device as only high-quality firms that expect to gain most from VC involvement seek investment by VCs.

Jain and Kini (2000) argue that the presence of VCs influences the managers' decisions on strategic resources allocation and report evidence that VC backing increases the post-IPO survival time of firms.

Recent studies have examined the lock-in agreements entered into by the existing shareholders of IPO companies. One aspect of interest is the length of the lock-in periods agreed upon by directors and VCs. Obviously, the longer the lock-in period the longer everyone has to wait to sell their holdings. The length of the lock-in is especially important to venture capitalists who frequently seek to use the IPO as an exit route (e.g. Jain and Kini 2000, Khurshed 2000). Brav and Gompers (2000) argue that since adverse-selection problems are less severe in firms with VC backing, the length of the lock-ins for these firms should be smaller. They find empirical evidence to support this conjecture. For a sample of US IPOs issued during 1988-96, they find that the average lock-in period of VC backed firms is 191 days as compared to 264 days for firms without VC backing. Surprisingly, they also find that the percentage of shares locked in is higher for VC backed firms than for other firms. Similarly, Brau et al (2001) and Bradley et al (2000) find that on average the length of the lock-in period is shorter for VC-backed firms than for non-VC backed firms.

Finally, a growing body of literature focuses on the stock-returns performance of IPO firms at the time of the lock-in expiry reporting evidence of abnormal returns around the expiry date. Brav and Gompers (2000) examine a sample of US IPOs and find a statistically significant average abnormal return of -0.59% and a significant average buy-and-hold return of -1.35% on the lock-in expiry date. A cross-sectional study reveals that VC-backed firms suffer a price decline that is almost 5 times higher than that suffered by other firms (-2.55% and -0.57% , respectively). This is a surprising result, and the authors argue that it may be due to the downward pressure on stock prices of large-scale selling by VCs seeking

to exit the company at the time of lock-in expiry. Field and Hanka (2001) find similar results, which show that at the time of lock-in expiry the stock price drops on average by – 2.9% for the VC-backed firms as compared to –0.9% for firms without VC backing. Bradley et al. (2000) also find that the decline in stock prices of VC-backed IPOs at lock-in expiry is much more substantial than for other IPOs. They conduct an in-depth cross-sectional study of VC-backed and other firms, controlling for differences in underwriter reputation, and find that VC-backed firms have consistently lower stock returns than other firms around lock-in expiry.

3. Lock-in Agreements in the UK

When a company offers shares in an IPO, insiders frequently agree to abstain from selling shares for a specified period of time after the IPO date, commonly referred to as the lock-in period. The lock-in agreement is negotiated between the sponsor(s) of the issue and the issuing firm. Lock-in agreements in the UK are typically phrased as follows:

“The directors/selling shareholders have undertaken not to dispose of any ordinary shares without the prior consent of the underwriters at any time prior to the date of publication of the company’s financial results for a specified financial year, except in limited specific circumstances.”

In the U.S., there is a trend towards a standardised lock-in period of 180 days. Brau et al (2001) show that 69% of IPOs in 1998 chose lock-in periods of exactly 180 days compared to only 20% in 1988. Field and Hanka (2001) also find that lock-in periods were standardised at about 180 days during the 1990s.

By contrast, there is wide variation in lock-in agreements in the UK, not only with respect to the length of the lock-in period but also with respect to the other characteristics of the

agreement. To appreciate the complexity of lock-in agreements in the UK, consider the following lock-in agreements of two randomly chosen UK companies with venture-capital backing. One is a high-tech research company, *Vision Group*, set up in 1990 by a university scientist to develop and commercialise highly integrated camera chip technology and floated in 1995. The other is a carpet-retailing company, *Carpetright*, launched in 1988 by MFI and an entrepreneur (Sir Philip Harris) with long experience in running a similar business and floated in June 1993. In *Carpetright*, the involvement of venture-capital backers came about when the company raised capital for expansion from NatWest Ventures and Phildrew Ventures in 1989 and 1990. In the case of *Vision*, no details are given in the prospectus of the origin of the involvement of the venture-capital backer. The lock-in agreements in the prospectus of *Vision Group* are as follows:

“In terms of Letters of Undertaking dated 8th, 27th and 28th March, 3rd and 4th April 1995 respectively granted by each of Mr. A. Macpherson, the University Court of the University of Edinburgh, Q.F. Realisations Limited, Mr. D. Renshaw and Donnelly (‘the “Locked-in Shareholders”’), the Locked-in Shareholders have agreed not to dispose of in aggregate 15,386,072 Ordinary shares until after the publication of the Company’s accounts for the financial period ending 31st July 1996. In terms of the Placing Agreement, the Directors have agreed not to dispose of any Ordinary shares during the above period. The restrictions contained in the letters of undertaking and the Placing Agreement do not apply in certain cases being, inter alia, (i) transfers which Sharps have approved in writing and (ii) transfers in connection with certain offers for the whole or any part of the issued share capital of the Company.”¹

¹ A. Macpherson, and D. Renshaw are [shareholders, but are not directors](#), (Renshaw is predicted to own 5% of the post-IPO equity, while Macpherson is not listed as a substantial shareholder holding 3% or more). Q.F. Realisations Ltd: the venture-capital backer, part of the Quantum Fund. Donnelly

While the lock-in agreements for *Vision* are contained in the placing agreement at the back of the prospectus in Part 4 entitled “Additional Information”, the prospectus of *Carpwright* gives the lock-in agreements in an unusually prominent position, in the first part of the document together with the Details of the Flotation (page 24). The underwriting agreement is dated 8 June 1993, and the lock-in agreements are worded as follows:

*“Each of the Directors has undertaken not to sell further shares until the publication of Carpetright’s preliminary results for the year ending 30 April 1994, other than with the consent of County NatWest. Sir Philip Harris and Harris Ventures Limited have undertaken that they will not, together, other than with the consent of County NatWest, sell more than two and a half per cent. of the ordinary share capital of the Company in the first year following this period or more than five per cent. of the ordinary share capital in total in the two years following this period.”*²

In many lock-in agreements, as in the examples above, there are separate lock-in agreements for different groups of initial shareholders. Directors are typically more likely to agree to lock-in periods than other shareholders, including institutional backers such as venture capitalists (see also Tables 5 and 6 below).

Corporation, a US vehicle components manufacturer, became a minority shareholder in *Vision*’s trading subsidiary, VVL, providing the company with increased funds for investment in vision applications. VVL and Donnelly also entered into an agreement to develop automotive vision products. Sharps: Albert E. Sharp, the sponsor, underwriter and stockbroker to the issue.

² Sir Philip Harris (later Lord Harris), launched *Carpwright* together with the MFI Furniture Group in 1988. After two years as non-executive chairman, Harris took over as chairman and CEO of *Carpwright* in 1990. *Carpwright* was founded after the takeover in 1988 of the former Harris family business, Harris Queensway Plc. Harris took over as chairman and CEO of Harris Queensway in 1964 and expanded the company internally and by acquisition from three shops in 1957 to 93 when it was floated in 1978. When Harris Queensway was taken over in 1988, Harris sold his entire stake. The company failed in 1990. Harris Ventures Ltd: a company controlled by a trust of which Sir Harris is a beneficiary.

Lock-in contracts not only differ in length but also in the way they specify the expiry date of the lock-in agreements. They are either expressed in terms of a specific future calendar date, a certain period after flotation or relative to the occurrence of other announcements or events in the company's financial year (e.g. the publication of the (preliminary) results or the annual-report release date). In the latter case, the precise timing of the lock-in expiry is to some extent under the control of the company's management.

Agreements may also involve a combination of company-event specific ("relative") dates and calendar dates or periods, as in the case of the agreement entered into by the chairman-cum-CEO of Carpetright, Sir Philip Harris. This particular agreement extends the initial lock-in period of the directors, defined as the period until the publication of the preliminary results for the current financial year, by a further one to two calendar years. Agreements may also provide for a gradual release of the retained equity from the lock-in provision by granting the disposal of parts, but not all, of the retained share stakes after one or several initial periods. An example is again the agreement by Harris, which limits his share sales to 2.5% and 5% of the company's shares in the first and second calendar year, respectively, after the expiry of the first lock-in period.

Contrary to the US where there are no rules about lock-in periods (Ofek and Richardson, 2000), in the UK there are rules applying to certain types of companies seeking a listing on the London Stock Exchange (LSE). Companies that are or have been subject to compulsory lock-in periods are of three types: *mineral companies*, *scientific research based companies* and *innovative high growth companies*. Until January 2000, both mineral companies and scientific research based companies, which did not satisfy the minimum age requirement of 3 years, were subject to compulsory lock-in periods. However, since January 2000, these

types of firms only have to display a statement about the existence of lock-in agreements or the absence thereof.

Chapters 19 and 20 of the Listing Rules deal exclusively with mineral companies and scientific research based companies, respectively. Since January 2000, mineral companies that do not satisfy the minimum age of 3 years have had to make a *prominent* statement in their prospectus whether lock-in agreements exist for the directors and substantial shareholders. In the case where there is no lock-in agreement for one or more directors or substantial shareholders, the prospectus must clearly specify the absence of such a contract and state the reasons for its absence. Before January 2000, the directors as well as other senior employees of mineral companies, which did not satisfy the minimum age requirement, were obliged either not to sell shares in the IPO or not to sell shares for a period of 2 years commencing on the first trading day. Major shareholders³ were not allowed to sell shares in the IPO, or alternatively were not allowed to sell during the period of 6 months beginning on the first trading day or the period until the publication of the semi-annual results, whichever was longer. In addition, they could not dispose of more than 40% of their holdings during the 2 years following the first trading day. All shareholders other than directors or major shareholders were not permitted to sell more than 20% of the securities for which the application for listing had been made.

In January 2000, a new chapter – Chapter 25 – was added to the Listing Rules. Chapter 25 relates to so called innovative high growth companies. Although these companies are not required to have any lock-in contracts, they have to publish a statement in their prospectus, if they have a trading record of less than 3 years. The statement must contain the details of

³ A major shareholder is a person who holds at least 10% of [the class of securities that will be listed](#) on the LSE or is a person who has the right to appoint one of the directors of the firm.

existing agreements or if no agreements exist, the statement must specify the reasons for their absence.

Table 1 contains a summary of the rules about lock-in agreements. Since January 2000, there have been no compulsory lock-in periods. However, before this date certain firms with a trading record of less than three years had to have minimum lock-in periods.

[Insert table 1 about here]

4. Data and Large-Scale Sample

The sample used for the large-scale study into UK lock-in agreements consists of 188 IPOs issued by UK-incorporated companies on the LSE during January 1992 to December 1998. IPOs by financial and investment companies were excluded. IPOs were classified as VC backed if they were included in the list of IPOs backed by members of the British Venture Capital Association (BVCA). Sample companies are defined as high tech if they are included in the so called techMARK segment of the London Stock Exchange.⁴ The sample was selected by initially selecting all companies on techMARK that conducted a new issue during 1992-98, excluding new issues other than IPOs (such as rights issues, introductions and transfers from the lower tier, the Unlisted Securities Market, to the upper tier, the Official List). However, this sample would have been biased towards IPOs that survived at least until the opening of techMARK in 1999. Moreover, inclusion into techMARK is not automatic and companies are required to apply for admittance. As a result, the high-tech

⁴ TechMARK is a market within the official market of the London Stock Exchange. It went live on 4 November 1999 with over 190 UK and international companies from a wide range of FTSE industrial sectors, whose success depends on technological innovation. The market is open to innovative technology companies with a primary or dual primary listing in London, irrespective of their size, industry or location. The purpose of techMARK is to create a new way for growing technology companies to access capital to finance expansion.

sample was extended to include any companies that went public during 1992-98 and at the time of the IPO satisfied the techMARK criteria (see footnote), but have since been de-listed or have not joined techMARK for other reasons.

The non-high tech sample was selected by choosing companies randomly from the *KPMG New Issue Statistics*, excluding financial and investment companies and companies on techMARK. Eliminating issues for which prospectuses are not available from Companies House leaves 105 IPOs issued by companies not classified as high tech.

Two high-tech companies were excluded from the analysis because we were unable to identify whether they had VC backing or not, resulting in a final sample of 81 high-tech and 105 other companies (not classified as high-tech).

Data on the lock-in agreements were extracted from the IPO prospectuses, and data on the daily returns of the IPOs and the market index (the FT All Share Index) and were obtained from *Datastream*.

5. Descriptive Statistics on Lock-in Agreements

Panel A of Table 2 provides information about the frequency of ownership by directors and other shareholders as well as information about the frequency of lock-in agreements for these two types of shareholders. The table shows that in virtually all firms directors own substantial equity stakes. This is the case across all the samples. Also, most firms (92%) have lock-in agreements applying to their directors. There are slight differences across the samples in the proportions of firms with locked-in directors. Among VC backed firms, 94% of high-tech firms and 96% of other firms lock in directors. These proportions are somewhat lower for firms not backed by VCs: 91% for high-tech firms and 88% for other firms. While

these differences may be economically significant at least in the case of firms not in the high-tech sector, Panel B of Table 2 shows that these differences are not statistically significant.

[Insert table 2 about here]

Panel A of Table 2 also reports the ownership and frequency of lock-in agreements for other shareholders, i.e. non-managerial shareholders. Only 15 out of 171 firms do not have non-managerial shareholders. Across all the samples, the majority of firms (64%) have lock-in agreements applying to their other shareholders. This indicates that it is much more common for directors than for other shareholders to agree to lock-in periods. Comparing high-tech to other firms, we observe that other shareholders are more likely to be subject to lock-ins in high-tech firms than in other firms.

In the case of firms without VC backing, the proportion of firms that lock in other (non-managerial) shareholders is significantly higher among high-tech than among other firm, with the difference being statistically different from zero at the 5% level. In firms with VC backing, the difference between the proportion of lock-in of other shareholders in high tech and other firms is not significant. This indicates that venture capitalists are relatively less likely to face lock-in agreements than other non-managerial shareholders. This could be due to two separate factors. First, some venture capitalists escape such agreements because of their affiliation to the sponsor/underwriter. The potential conflicts of interest arising in the case of IPOs sponsored and underwritten by financial firms affiliated with a VC backer of the issuing company are examined in Gompers and Lerner (1997) for the US, Hamao et al. (1998) for Japan and Espenlaub et al. (1999) for the UK. In the case of Carpetright examined in section 7, there is such an affiliation between a VC backer and the IPO

sponsor, and the affiliated VC backer indeed manages to avoid being locked in. Second, venture capitalists are repeat investors in private firms, most of which will eventually go public, and venture capitalists have valuable reputation at stake if they act against the interests of the new shareholders acquiring shares in the IPO. Investors may not buy shares in IPOs backed by venture capitalists who were previously involved with issues that reduced the wealth of new shareholders. As a result, such reputational considerations may limit the conflicts of interest between VC backers and IPO investors, reducing the need to lock in venture capitalists.

Table 3 records the average proportions of shares locked-in by the directors and other shareholders. In general, the percentage of locked-in shares in firms without VC backing is higher than in firms with VC financing. However, this may be due to the fact that the figures in Table 3 are calculated as the ratio of the number of locked-in shares over the total number of shares outstanding immediately after the IPO. Therefore, the figures may not reflect the lower level of ownership dispersion in firms without VC backing. For the high-tech firms, there is indeed a statistically significant difference in the percentage of equity sold in the IPO between VC-backed firms and firms without VC backing. On average, the former sell 39% of their equity in the initial offering whereas the latter sell only 31%.

[Insert table 3 about here]

In Table 4, the locked-in shares are reported as a proportion of the shares owned by each type of shareholder. For example, for the directors the percentage is the proportion of shares locked in by the directors out of the total number of shares owned by the directors immediately after the IPO. Table 4 shows that there is no longer a difference between high-tech firms with and without VC backing in terms of the proportion of directors' shares that

are locked in. However, there is now a significantly higher proportion of locked-in directors' shares in VC-backed firms as compared to firms without VC backing in the sample of firms not classified as high tech. This suggests that there is no evidence that venture-capital backing of IPOs acts as a substitute for lock-in agreements. To the contrary, there is some evidence (for firms not operating in high-tech industries) that venture-capital backing of the IPO results in a higher proportion of locked-in directors' shares. There may be two reasons for this. First, the underwriter of a VC-backed IPO may expect heavy sales by the VC in the period after the IPO and decide to lock in the directors' shares and in order to limit the downward pressure of the VC's disposals on stock prices. Second, if VCs do not sell out completely in the IPO, as reported by Barry et al. 1990, they may seek to align the directors' interests with their own by locking the directors in.

[Insert table 4 about here]

Table 5 contains statistics about the frequency of the different types of lock-in agreements for the directors. Some firms may have more than one agreement. As mentioned above, lock-in agreements may contain either an absolute date, i.e. a precise date such as 1 March 2001, or a relative date, such as the date of publication of the annual results. There are three broad categories of lock-in agreements:

- ?? simple agreements, i.e. agreements which specify a single date (Panel A of Table 5);
- ?? staggered agreements which, in addition to a first lock-in period, specify one or more additional periods during which only a given percentage of the shares can be sold or during which sales can only happen with the consent of the sponsor (Panel B);
- ?? and agreements which specify a combination of an absolute date and a relative date and expire on the later of these two dates, e.g. 'until 30 April 2000 or the publication of the interim results, whichever is later' (Panel C).

Table 5 shows that the distribution of the agreements of the three types is approximately the same across the samples. However, about a third of agreements in the high-tech firms – with and without VC-financing – do not allow the directors to sell before the expiry of an absolute date, whereas for the low-tech firms, a third of the agreements specify the relative date of the publication of the annual results (Panel A). To some extent, this result may appear counter-intuitive as one would expect that, given the higher uncertainty about future profits, the directors of high-tech firms should be locked in until a date relative to the publication of new financial information about the company. Conversely, one could argue that absolute expiry dates are binding and legally enforceable whereas relative dates allow the directors to have a certain discretion to fix the actual date. For example, if the lock-in expires on the day of the publication of the company accounts, the directors have considerable discretion over the precise timing of the expiry date. In fact, the actual expiry may occur at any time during a period of several months. Hence, if the intention is to make sure that the directors hold shares in the company until a certain date, lock-in agreements with a relative expiry date should be avoided, as this type of agreement provides too much leeway to the directors.

[Insert tables 5 and 6 about here]

Table 6 is similar to Table 5, but focuses on the agreements entered into by other (non-managerial) shareholders. Likewise, there is a higher incidence of simple agreements specifying an absolute date in the high-tech firms than in the low-tech firms (Panel A). The main difference between VC-backed firms and non-VC backed firms in each industry group seems to be the higher incidence of agreements that expire on the date of the publication of the annual results in firms without VC-financing.

6. Duration of Lock-in Periods and Expiry-Date Event Study

We examine the stock performance of venture-backed and other IPOs around the dates when the directors' lock-in agreements expired using an event study. The sample consists of these stocks with absolute expiry dates for lock-ins (that is, the expiry date defined in terms of calendar dates or periods). The study analyses on the informational content of the expiry of directors' lock-ins and the effect of VC backing on this informational content. This study focuses on directors' expiry dates for two reasons. First, directors are the second most important shareholder type in quoted UK firms after institutional investors. Although, the latter are more important in terms of the accumulated shareholdings, they do not necessarily exercise their voting rights. Hence, in the average UK firm, it is the directors who control the firm and the main agency problem tends to be the potential expropriation of (minority) shareholders by the management of the firm (Goergen and Renneboog, 2001a, 2001b, Franks et al. 2001). Second, especially in younger firms, directors and founders may also assume an important leadership role (Morck, Shleifer and Vishny, 1988). Therefore, directors are more informed than other shareholders, and there tends to be a greater informational asymmetry between directors and outside shareholders than between other existing shareholders and new shareholders.

Hence, if the abnormal returns at lock-in expiry are at least partly due to information asymmetries between insiders (directors) and outsiders, the expiry of directors' lock-ins is likely to have a greater impact on share prices than the expiry of the lock-ins of other shareholders, including venture capitalists. Further, if VC backing of the IPO company reduces these information asymmetries, then *ceteris paribus* the stock returns of VC-backed IPOs should show less adverse performance around the expiry of directors' lock-ins than those of IPOs without VC backing.

IPOs with expiry dates specified relative to other company announcements or events are excluded as it is difficult to disentangle the effects on stock returns of the lock-in expiry from the effects of the simultaneous company announcements or events relative to which the lock-in expiry is defined. In addition, for a significant proportion of those companies it is impossible to identify *ex post* (i.e. after the expiry date) the precise dates of the expiry announcement or the related company announcements or events using the available UK data sources (such as *Sequencer* and the *Financial Times*). The total sample comprises 54 companies with clear-cut expiry dates (specified in terms of simple or staggered lock-in agreements, or both).⁵ In the case of staggered agreements, and consequently multiple lock-in expiry dates, the earliest expiry date was selected for the analysis. Two IPOs were excluded from the analysis due to a lack of share-price data; neither was venture-capital backed and both were issued by firms not classified as high-tech. Of the remaining 52 companies used in the event study, 28 had venture-capital backing before flotation. Of these 28 companies, 19 are classified high-tech, and of the 24 firms without VC backing, 13 are high-tech (see Table 7).

[Insert table 7 about here]

6.1 Descriptive Statistics of Event-Study Sample and Lengths of Lock-in Periods

Brav and Gompers (2000) argue that since adverse-selection problems are less severe in firms with VC backing, the lock-in periods for these firms should be shorter, for which they find empirical support. For a sample of US IPOs during 1988-96, the average length of the

⁵ The discrepancies between the number of firms with absolute expiry dates (54) and the number of agreements by the directors of those firms specifying absolute expiry dates (56) underlying the figures in Table 4 is due to the fact that the directors of two firms entered into two separate agreements both specifying absolute expiry dates, one in terms of a simple lock-in agreement and one staggered.

lock-in period for VC-backed firms is 191 days as compared to 264 days for firms without VC backing. Other US studies report similar results (Brau et al (2001), Bradley et al (2000)).

We examine the length of the lock-in periods for the sample of 52 companies with absolute expiry dates. The results are presented in Table 7. For the 52 companies as a whole, the average lock-in period is 561 days, and the median lock-in period is 730 days. The shortest lock-in period is 158 days, but only four companies in the sample chose lock-in periods of 180 days or less (the fifth shortest period was 345 days). Thus, it appears that the directors of UK companies (or more specifically, those directors who select absolute lock-in expiry dates) typically agree to substantially longer lock-in periods than their US counterparts irrespective of the presence or absence of VC backing. Moreover, contrary to the findings of US studies, we find no evidence that the differences in lock-in periods between UK firms with and without venture-capital backing are statistically significant. In fact, the average lock-in period is exactly the same (561 days) both for firms with and without VC backing. Looking at the sub-samples of high-tech companies and other companies separately, the mean lock-in periods do differ between firms with and without VC backing. However, these differences are not statistically significant.⁶

While it appears not to matter whether a firm has VC backing or not, there is however a difference in lock-in periods between high-tech and other firms. Specifically, there is evidence that, among UK companies with venture-capital backing, the directors of high-tech firms choose longer lock-in periods than those of other firms. A one-tailed *t*-test confirms that the average lock-in period of VC-backed high-tech firms is statistically significantly

⁶ The smallest p-value for the *t*-test of the differences in means between the subsamples with and without VC backing is 0.4; this occurs for the subsample of firms not classified as high-tech.

longer than the one of other VC-backed firms at the 5% level. It could be argued that high-tech companies are more prone to information asymmetries between company insiders and outsiders than other firms. Therefore, this result suggests that the insiders of firms with greater information asymmetries choose longer lock-in periods either to credibly signal favourable private information about the company to uninformed outsiders (Brau et al., 2001; Courteau, 1995) or as a “commitment device” (Brav and Gompers, 2000) to assure uninformed IPO investors that they will refrain from expropriating these investors’ interests. It is interesting to note that a significant difference in lock-in periods between high-tech and other firms only arises in the VC backed sub-sample. This suggests that for UK companies VC backing at best serves to reduce minor informational problems as may be found among firms not classified as high tech. By contrast, for firms facing substantial information asymmetries (such as those in the high-tech sector), VC backing does not serve to reduce information asymmetries, at least not by itself. Instead, it needs to be complemented by other mechanisms, such as e.g. locking in directors for longer periods.

6.2 Event-study Methodology

The abnormal returns surrounding the lock-in expiry are estimated according to the standard event-study methodology (e.g. Brown and Warner, 1980, 1985).⁷ The returns measure used is daily discrete total returns (in percentages), including dividend payments, based on daily returns indices (data type RI)⁸ from Datastream:

$$R_t = \frac{RI_t - RI_{t-1}}{RI_{t-1}} * 100 .$$

The abnormal return (AR) is the market-adjusted return:

$$AR_{it} = R_{it} - R_{mt}$$

where R_{mt} is the daily discrete total return on the market portfolio proxied by the FTSE All Share Index, and R_{it} is the discrete total return on the stock of firm i on day t . The average abnormal return (AAR) is calculated as:

$$AAR_t = \frac{1}{n_t} \sum_{i=1}^{n_t} AR_{it}$$

where n_t represents the number of stocks or firms in the sample on day t .

The lock-in expiry day is Day 0, and average abnormal returns are cumulated over several periods: first, for the period from 40 trading days before to 40 trading days after Day 0, and second, for periods immediately around Day 0. The cumulative abnormal return (CAAR) from start day t_s to the end day t_e is calculated as:

$$CAAR_{i(t_s, t_e)} = \sum_{t=t_s}^{t_e} AAR_{it} .$$

⁷ For many helpful comments and suggestions on event-study methodology, we are grateful to Norman Strong.

⁸ RI effectively includes dividend flows in returns calculations.

To determine the statistical significance of the CAARs over the 81-day window around the lock-in expiry, we use both cross-sectional t -statistics with standard errors calculated from cross-sectional data of the sample firms' cumulative abnormal returns, and Brown and Warner's (1980) Crude Dependence Adjustment Test:

$$\frac{CAAR_{i(t_e, t_s)}}{se(AAR_t) \sqrt{t_e - t_s + 1}}$$

where the standard errors are calculated from time-series data:

$$se(AAR) = \sqrt{\frac{\sum_{t=t_s}^{t_e} (AAR_t - \bar{A})^2}{80}} \quad \text{and} \quad \bar{A} = \frac{1}{81} \sum_{t=t_s}^{t_e} AAR_t$$

In Tables 9 and 10, the start day t_s is Day -40 and the end day t_e ranges from -40 to +40.

6.3 Results on Lock-In Expiry Abnormal Returns

The findings of the event study are reported in Tables 8 to 10 and illustrated in Figures 1 and 2. Table 8 reports the market-adjusted (cumulative) abnormal returns for alternative, relatively narrow, test windows of one, two, three and eleven days immediately around the expiry of the directors' lock-in agreements. The statistical significance of the (cumulative) abnormal returns is assessed using cross-sectional t -statistics (not reported).

Tables 9 and 10 show the returns performance over a wider 81-day window around the expiry date (Day 0). Table 9 reports the daily average abnormal returns (AARs), median abnormal returns, and cumulative average abnormal returns (CAARs) for the entire event-study sample of 52 stocks over the period from Day -40 to Day +40 around the expiry day, Day 0. The statistical significance of the cumulative average abnormal returns is assessed using both standard cross-sectional t -statistics and Brown and Warner's (1980) Crude-Dependence Adjustment Test. Table 10 reports CAARs separately for IPOs with and without

venture-capital backing and by industry sector (high-tech and other firms). The results reported in Tables 9 and 10 are also shown in Figures 1 and 2. In addition to the *CAARs* for the entire event-study sample, Figure 1 also illustrates separately the *CAARs* for stocks with and without venture-capital involvement and for high-tech and other firms.

As shown in Table 8, there is some evidence of negative abnormal stock-returns in the days around the expiry day in the sense that almost all the returns measured are negative. However, most of these abnormal returns are statistically not significantly different from zero. While the magnitudes of the *CAARs* for the event-study sample as a whole range from -0.7 to -1.4% depending on the specific test window, only one of these returns, the two-day return for Days 0 to 1, turns out to be statistically different from zero (and only at the 10% level).

[Insert table 8 about here]

It appears, however, that there is a significant difference between IPOs with and without venture-capital backing, pooling the two industrial categories. Specifically, the *CAARs* for the VC-backed stocks are lower for all windows for the entire sample and separately for each industry sector (except for the two-day return), and for the sample of 28 VC-backed stocks, the *CAARs* are statistically significantly less than zero at the 1% level for the narrow one- to three-day windows around the expiry date. For the VC-backed stocks, the *CAARs* range from -1.2% to -1.6% (and even to -2% for the 11-day window, but this result is not statistically significant), while the corresponding *CAARs* for the stocks without VC backing range only from -0.2% to -0.8%. An examination of the median cumulative abnormal returns (not reported) shows similar results: the medians of stocks with VC backing are always lower than those of stocks without VC backing, but the magnitudes of the median

returns and of the differences between the two sub samples are smaller than the (differences in the) average returns. The lack of statistical significance of the *CAARs* of VC-backed stocks for the two industry sectors (high-tech and other firms) separately may be due to the small size of the sub-samples.

The findings of significantly lower abnormal returns for VC-backed IPOs compared to others is consistent with the results reported by US studies. As outlined in the literature review above, Brav and Gompers (2000) report that the price decline around the lock-in expiry of VC-backed firms is almost 5 times higher than that of firms without VC backing (-2.55% and -0.57% , respectively). Field and Hanka (2001) find similar results and report an average return of -2.9% at the lock-in expiry for VC-backed firms as compared to only -0.9% for non-VC backed firms. Bradley et al. (2000) also find that, controlling for differences in underwriter reputation, VC-backed firms show consistently worse stock returns around the lock-in expiry than firms without VC backing.

Brav and Gompers suggest that this may be due to downward pressure on the share prices as a result of large share disposals by venture capitalists exiting the company after the expiry of their lock-ins. However, this argument does not (fully) explain our findings. As shown in Tables 2-6, in the UK, the lock-in agreements of directors and other shareholders, such as VCs, differ considerably both in frequency and in the details of the agreement. This event study focuses on the expiry of directors' lock-in agreements, and the expiry dates for directors is very likely to differ from that of VCs (if in fact they agree to lock-ins). As a result, the difference in the abnormal returns around the lock-in expiry date between stocks with and without VC backing is unlikely to be due to price-pressure from VC selling. Instead they may be indicative of differences in the informational contents of the expiry of

directors' lock-in and also of other announcements or events occurring at that time, such as announcements of share trading by directors and others.

Examining the wider 81-day window around lock-in expiry (40 days on either side of Day 0) in Table 10 indicates that it is high-tech firms without VC backing that underperform in the run-up to the expiry date from Day -40 to -4. The performance of both other stocks without VC backing and of venture-capital backed stocks in either industry sector are substantially better prior to the expiry date. However, while for high-tech firms without VC backing, there is no further deterioration in the *CAARs* after the expiry date, the *CAARs* of the other three subsamples in Table 10 and Figure 2 all decline after Day 0. The most striking deterioration in *CAARs* in the period after expiry occurs for venture-capital backed firms not classified as high-tech. This is also the sub sample with the worst performance in the window from Day -5 to Day +5 (see also Table 8).

[Insert tables 8 and 9 about here]

[Insert figures 1 and 2 about here]

The reasons for these differences in pre-expiry *CAARs* are not clear. One possible explanation for the differential pre-expiry performance high-tech firms with no VC backing is that these firms have a relatively lower credibility with investors due to high information asymmetries and due to the absence of VC certification. Hence, they may choose to disclose information about prospective post-expiry directors' sales at an earlier stage, i.e. before the expiry, to spread the adverse impact on stock prices over a longer period.

7. Case studies

This section details lock-in agreements of four companies that conducted IPOs during 1992-95. Our focus on a small number of companies intends to shed further light on the structure and rationale underlying the lock-in agreements. The sample comprises one company of each type; that is, it comprises two firms with and two firms without venture-capital backing, and in each category one company was classified as high-tech (see the section on sample selection) and one “other” firm (not classified as high-tech).

Cases 1 and 2 refer to companies without venture-capital backing; Case 1 is a non high-tech company whereas Case 2 a high-tech. The lock-in agreements of the venture-capital backed IPOs: Cases 3 (not high-tech) and 4 (high-tech), were also cited above in the section on Lock-in Agreements in the UK. The performance of the return indices of the case-study IPO stocks are shown in figure 3. Further background details of the case studies and the full wording of the lock-in agreements are given in the Appendix.

[Insert figure 3 about here]

Case 1: Ryland

The business was founded in 1951 by the Whale family, and it remained family owned until its flotation in 1994. It is a distributor of motor vehicles (i.e. not high-tech) based in the English Midlands. The company had no venture-capital backing, and sought a flotation to reduce its gearing and obtain access to external equity capital to increase its range of franchises. Following the IPO in 1994, the family stake was reduced from 65% to 39%.

The first part of the lock-in agreement (which is part of the placing agreement on the penultimate page of the prospectus under Additional Information) states that

“Each of the Vendors, other than MPE, has undertaken not to dispose of any further Ordinary shares (without the prior written consent of Sharps), until publication of the Company’s audited accounts for the year ending 30 April 1995 and until publication of the Company’s audited accounts for the year ending 30 April 1996 to dispose of shares through Sharps.”⁹

This part of the lock-in agreement refers to the vendors. The prospectus states that “certain existing shareholders” will sell shares in the IPO. The disposals amount to a trifling 0.1% of the enlarged share capital raising £0.75m for the vendors. However, from the prospectus it is impossible to determine exactly who the “vendor shareholders” are, and specifically whether the directors are among them. In fact, the prospectus predicts the numbers of ordinary shares owned by the three share-owning directors (including the two Whales) to increase after flotation. Part of this increase may be due to a reorganisation of the company’s share capital just before the IPO (and conditional on admission to the stock market). Besides the interest of MPE, an institutional investor owned by HSBC, and predicted to hold 11% of the enlarged equity share capital after flotation (plus a number of deferred shares), there are no other substantial shareholdings of 3% or more either before or immediately after the IPO.

MPE entered into a separate lock-in agreement:

MPE has undertaken not to dispose of any further Ordinary shares (without the prior written consent of Sharps) during the period of six months from Admission and for a period of 12 months from Admission to dispose of Ordinary shares only through Sharps (other than in certain specified circumstances).”

⁹ MPE: an institutional investor. Sharps: Albert E. Sharp, the sponsor and underwriter to the issue.

If one concludes that the lock-in agreements actually apply to the directors and the founding family, one could argue that these agreements are motivated by a concern over the large retained stakes of the founding family (who retain 39% of the equity after the IPO) and the institutional investor MPE (11%). These share retentions may be interpreted by the market as a favourable signal of insiders' information about the value of the firms (Leland and Pyle, 1977). The lock-in agreements render the signal credible by making it costly to imitate for lower-quality types (see e.g. Courteau, 1995). The lock-in agreements may also be intended to allay fears in the market of pressures on the company's stock price resulting from large share disposals by existing shareholders after the IPO.

However, the interesting feature in this case is that the lock-in agreements and the further details given in the prospectus are so opaque as to make it impossible to conclude whether the directors and the founding family are in fact locked in or not.

Case 2: Videologic

Videologic's was founded in 1985 by Anthony (Tony) Maclaren as a division of Teletape Video Limited. VideoLogic's main business is the development of multimedia technology for PCs. Avesco Plc (according to its website, a provider of specialist services to the corporate, presentation, entertainment and broadcast markets) acquired Videologic in 1989. Derek Maclaren, the father of Tony Maclaren, joined Videologic in 1986 and at the time of the flotation in July 1994 was the chairman. The two Maclarens were re-appointed as directors in March 1994. Videologic had no venture-capital or other institutional backers apart from Avesco at the time of flotation.

VideoLogic was floated on the Official List of the London Stock Exchange on 6 July 1994 as a result of a demerger from Avesco. The IPO consisted of a placing of share and a priority subscription offer to Avesco shareholders.

Part 10 of the prospectus, entitled “Additional Information”, gives the lock-in agreements as part of the offer and underwriting agreement (p. 75):

“The Underwriting Agreement also contains restrictions on sales by any of D.A.E. Maclaren, A.E. Maclaren or Mr Murray of any of their shares in the Company in the 12 month period following the date of Admission (or, in the case of D.A.E. Maclaren, until the date of cessation of his employment by the Group if earlier) and on A.E. Maclaren in respect of half of his shares in the Company in the 12 months thereafter.”

Mr Murray is the chairman of Avesco, but does not sit on the board of Videologic, and he, along with “certain other directors and employees of Avesco”, sold shares in VideoLogic through the IPO. The prospectus states that Derek and Tony Maclaren have declared that they would subscribe to shares in Videologic and immediately after flotation their shareholdings are predicted to hold 0.6% and 1.18%, respectively, of the share capital. Derek Maclaren states his intention to retire as a director (see p. 23 of the prospectus) as soon as a successor is found, but agrees to act as chairman until at least 31 March 1995 (the end of the next financial year).

It is not clear why the lock-in agreement attaches so much importance to the holdings of the Maclarens, given their small size. Tony Maclaren is subject to a longer, staggered lock-in agreement given his key role as chief executive (and founder). A possible reason for the lock-in agreement is the pre-IPO performance of the company: the prospectus reports that

during the three financial years before the IPO, Videologic made operating losses. The lock-ins may have been intended as signals of favourable inside information. However, the company continued to make a loss in 1995.

Case 3: Carpetright

Carpetright was launched in 1988 by MFI, a UK chain of furniture stores, and an entrepreneur (Philip Harris) with long experience in running a similar business. The company was floated in June 1993. In *Carpetright*, the involvement of venture-capital backers came about when the company raised capital for expansion from NatWest Ventures and Phildrew Ventures in 1989 and 1990. The IPO was a placing and offer for sale sponsored and fully underwritten by County NatWest. The reasons for flotation given in the prospectus (page 24) were to allow some existing shareholders (specifically MFI, which sold its entire interest in the flotation) to realise their investment, to enable wider employee share ownership and to redeem existing preference shares.

The lock-in agreements (which are given on page 24 of the prospectus along with the reasons for the flotation) affect only the directors of the company:

“Each of the Directors has undertaken not to sell further shares until the publication of Carpetright’s preliminary results for the year ending 30 April 1994, other than with the consent of County NatWest. Sir Philip Harris and Harris Ventures Limited have undertaken that they will not, together, other than with the consent of County NatWest, sell more than two and a half per cent. of the ordinary share capital of the Company in the first year following this period or more than five per cent. of the ordinary share capital in total in the two years following this period.”

Notably the venture backers' holdings were not locked in, and based on the first annual report published after the IPO (in June 1994), it appears that both venture capitalists liquidated their holdings during the first year of trading. An interesting feature arises from the association between one of the venture capitalists, NatWest Ventures, and the sponsor/underwriter, which may have resulted in conflicts of interest (as argued in Section 3).

Philip Harris is clearly the crucial shareholder in Carpetright, which is reflected in the lock-in agreements. The experience with his previous business, Harris Queensway, may explain both the extensive lock-in of his shareholding and the prominent position of the lock-in agreement. Harris sold his entire holding in Harris Queensway in the takeover, and shareholders who did likewise benefited from the acquisition. By contrast, those shareholders who held on to their stakes lost their money when the company failed in 1990. As a result, it may have seemed necessary to the company and its advisers to draw investors' attention to Harris's share stake and lock-in agreement. His retention of a substantial stake together with his lengthy lock-in must have been intended and understood by the market as a positive signal.

Case 4: Vision Group

The company was set up in 1990 by a university scientist to develop and commercialise highly integrated camera chip technology. It went public on 12 April 1995 via a placing raising about £5 million. None of the existing shareholders, including the venture-capital backer, Q.F. Realisations, sold any of their shares in the IPO. The proceeds from the placing were intended to reduce the level of debt and to buy out a royalty agreement with the

University of Edinburgh. VVL, the trading subsidiary, of Vision Group¹⁰ was set up at the beginning of 1990 by Professor Peter Denyer, the managing director, and Roy Warrender, the commercial director, with institutional support to develop and commercialise specialist electronic cameras ('highly integrated camera chip technology'). The technology used by VVL was developed by Peter Denyer during the 1980s, and in 1992, Denyer's research team from the University of Edinburgh joined VVL.

According to the prospectus the largest shareholder immediately after flotation was Donnelly Corporation, a US vehicle components manufacturer, who became a minority shareholder of VVL in 1993, providing the company with increased funds for investment in vision applications. Two out of the three non-executive directors were directors of Donnelly Corporation. The second largest shareholder was Q.F. Realisations Limited, part of the Quantum Fund, a venture capital firm. Peter Denyer's held the largest directors' share stake (6.76%). Other directors' shareholdings were Roy Warrender's (5.08%) and the non-executive chairman's (James Millar; 0.05%). Two further individuals are given as substantial shareholders: David Renshaw (5.10%) and Michael Underwood (3.55%). A. Macpherson, who is listed in a lock-in agreement, is not given either as a director or a substantial shareholder.

The lock-in agreements are found in the section on 'placing arrangements' in Part 4 (Additional Information), Section 10(b) (p. 50) of the IPO prospectus (there is also a brief mention in the 'placing' section of Part 1 of the prospectus):

¹⁰ Vision Group itself has never traded, but it holds all of VVL and the firm holding the Employees Trust.

“In terms of Letters of Undertaking dated 8th, 27th and 28th March, 3rd and 4th April 1995 respectively granted by each of Mr. A. Macpherson, the University Court of the University of Edinburgh, Q.F. Realisations Limited, Mr. D. Renshaw and Donnelly (‘the Locked-in Shareholders’), the Locked-in Shareholders have agreed not to dispose of in aggregate 15,386,072 Ordinary shares until after the publication of the Company’s accounts for the financial period ending 31st July 1996. In terms of the Placing Agreement, the Directors have agreed not to dispose of any Ordinary shares during the above period. The restrictions contained in the letters of undertaking and the Placing Agreement do not apply in certain cases being, inter alia, (i) transfers which Sharps have approved in writing and (ii) transfers in connection with certain offers for the whole or any part of the issued share capital of the Company.”

All the shares of directors are locked in, as well as almost all the shares held by other pre-IPO shareholders with stakes in excess of 5%, and the lock-in period is the same for the directors and the other shareholders. The total number of locked-in shares represents about 62% of the equity outstanding immediately after the IPO.

Given that the lock-in expiry date is defined relative to a company event, the publication of the company report for the year ending on 31 July 1996, this raises the question as to how accurately outsiders can predict this date. There is no information as to the precise date in the IPO prospectus. However, the expiry period will obviously exceed a calendar year. One reason why the lock-in agreement is specified relative to the publication of the 1996 company accounts may be similar as in the case of VideoLogic: in each of the previous three years before the IPO the company had made losses. However, Professor Denyer stated

(Financial Times of 13 March 1995, p.20) that he expected the firm to break even by the end of the 1996 financial year.¹¹

The annual report for 1995 reveals that the stakes of some of the other shareholders (Q.F. Realisations and the University of Edinburgh) that were locked in had decreased. All other stakes, including the ones of the directors, were unchanged. The directors' holdings also remained unchanged over the following year. On 19 November 1996, along with a profit announcement, the company also announced a rights issue to raise expansion finance. Most of the new shares were taken up by institutional investors. Interestingly, none of the locked-in shareholders took up their rights. As a result, institutional ownership increased by more than 10% to more than 50% in total, while directors' holdings decreased.

8. Conclusion

This paper has examined the impact of venture-capital backing of UK companies issuing shares at flotation on the characteristics of the lock-in agreements entered into by the existing shareholders, and on the abnormal returns realised around the expiry of the directors' lock-in agreements. The study examines the lock-in agreements of a sample of 186 UK IPOs issued during 1992-98. 103 of these companies had venture-capital backing at the IPO. The sample is also broken down into firms classified by industrial sector: of 103 VC backed companies 48 are high-tech, and among the 83 firms without VC backing 33 are high-tech.

¹¹ However, the IPO prospectus only mentions under 'Current trading and prospects' that '[...] revenues from the Group's standard products continue to grow [...]']'.

We find that lock-in agreements in the UK show much more variety in terms of the contractual detail than US agreements. For instance, unlike in the US, where lock-in periods are usually defined in terms of “absolute” calendar dates or periods (following admission or a calendar date), UK agreements more commonly define expiry relative to another company announcement or event. The lock-in periods agreed upon by the directors of IPO companies are also on average substantially longer in the UK than in the US, where lock-in periods have tended to become standardised at around 180 days. By contrast, the average period in the UK is 561 days (for the subsample of directors’ agreements that define the lock-in expiry in terms of an “absolute” calendar date). Lock-in periods are particularly long for venture-backed high-tech companies. By contrast, for firms not in the high-tech sector, venture-capital backing appears to reduce the directors’ lock-in periods. This suggests that for UK IPOs venture-capital backing does not serve as a substitute for lock-in agreements.

Examining the proportion of locked-in directors’ shares, we find it to be significantly higher in VC-backed firms as compared to firms without VC backing in the sample of firms not classified as high tech. Again, this suggests that for firms likely to face only moderate information asymmetries (i.e. those not in high-tech industries), venture-capital backing of the IPO is not used as a substitute for, but rather as a complement to, lock-in agreements. The higher proportion of locked-in directors’ shares among VC-backed companies (not in the high-tech sector) may be because the underwriters of VC-backed IPOs expect heavy sales by the VCs in the period after the IPO and decide to lock in the directors’ shares and in order to limit the downward pressure of the VC’s disposals on stock prices. Alternatively, if VCs do not sell out completely in the IPO, as reported by Barry et al. 1990, they may seek to align the directors’ interests with their own by locking the directors in.

We also examine the share-price performance of IPOs with and without VC backing around the time of the expiry of the lock-in agreements, and find significant differences between the

two subsamples. The *CAARs* for the VC-backed stocks are lower for most of the short windows around the expiry date we examine, both for the sample as a whole and separately for each industry sector. For the sample of 28 VC-backed stocks, the *CAARs* are statistically significantly less than zero at the 1% level for the narrow one- to three-day windows around the expiry date. For the VC-backed stocks, the *CAARs* range from -1.2% to -1.6% (and even to -2% for the 11-day window, but this result is not statistically significant), while the corresponding *CAARs* for the stocks without VC backing range only from -0.2% to -0.8% . The findings of significantly lower abnormal returns for VC-backed IPOs compared to others is consistent with the results reported by US studies (Brav and Gompers, 2000; Field and Hanka, 2001; Bradley et al., 2000). However, while Brav and Gompers suggest that this may be due to downward pressure on the share prices as a result of large share disposals by venture capitalists exiting the company after the expiry of their lock-ins, this argument cannot (fully) explain our findings because our event-study focuses on the expiry of directors' lock-in agreements, as opposed to those of VCs. Our analysis shows that the lock-in agreements of directors and other shareholders, such as VCs, differ considerably both in frequency and in the details of the agreement. Hence, the expiry dates for directors is very likely to differ from that of VCs (if in fact they agree to lock-ins). As a result, the difference in the abnormal returns around the lock-in expiry date between stocks with and without VC backing is unlikely to be due to price-pressure from VC selling. Instead they may be indicative of differences in the informational contents of the expiry of directors' lock-in and also of other announcements or events occurring at that time, such as announcements of share trading by directors and others.

Finally, we examine four UK companies in details: two with VC backing (one issued by a firm in an industry classified as high tech), and two firms without VC backing (again one in

the high-tech sector). A number of interesting aspects of the lock-in agreements are observed and interpreted. In one case, the agreements are phrased so opaquely as to make it impossible to determine exactly who is locked in. In another case, the lock-in agreement may have been used to show the founder's commitment not to exit the company as he did in an earlier venture which subsequently failed. Finally, poor pre-IPO earnings performance may motivate companies, particularly growth companies in the high-tech sector, to lock-in existing shareholders in order to signal favourable inside information.

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Table 1

Lock-up agreements imposed by the London Stock Exchange on certain types of firms with a trading record of less than 3 years for the period of 1993 to 1999

Type of company	Type of shareholder		
	A. Directors, senior employees and their associates	B. Shareholders holding more than 10%	C. Other shareholders
<i>Mineral company</i>	<p>Either: no shares to be sold in the IPO</p> <p>Or: no shares to be sold during the 2 years after the first day of trading</p>	<p>1. Either: no shares to be sold in the IPO</p> <p>Or: no shares to be sold during the 6 months after the first day of trading or the publication of the first semi-annual or annual results.</p> <p>2. Not more than 40% of their stake within the 2 years of first day of trading</p>	<p>Sales must not exceed 20% of the total number of shares.</p>
<i>Scientific research based company</i>	idem	idem	idem

Table 2**Ownership and lock-in agreements for directors and other shareholders**

Figures shown in panel A are the number of firms satisfying a certain criterion. The tests in panel B and panel C are based on the assumption of a binomial distribution.

Panel A: Frequency of ownership and lock-in agreements					
Firms ...	81 high-tech firms		105 other firms		Total for 186 firms
	48 VC-backed firms	33 non-VC backed firms	55 VC-backed firms	50 non-VC backed firms	
Without ownership by the directors	0	1	0	1	2
With ownership by the directors	48	32	55	49	184
Thereof with locked-in directors' shares	45	29	53	43	170
Without other shareholders	2	10	0	3	15
With other shareholders	46	23	55	47	171
Thereof with locked-in other shareholders	31	19	32	27	109

Panel B: Z-test for the equality between the proportion of firms with locked-in directors/other shareholders for the VC-backed firms and the proportion for the non-VC backed firms		
	High-tech sample	Low-tech sample
Directors	0.537	1.480
Other shareholders	-1.525	0.083

Panel C: Z-test for the equality between the proportion of firms with locked-in directors/other shareholders for the high-tech firms and the proportion for the low-tech firms		
	VC-backed sample	Non-VC backed sample
Directors	-0.615	0.398
Other shareholders	0.962	2.397**

Table 3**Shares locked in by the directors and by other shareholders as a proportion of shares outstanding**

Proportions are calculated as a percentage of the total number of shares outstanding immediately after the IPO.

¹ *For one non-high tech/non-VC firm (Cox Insurance Holdings) we are unsure about the percentages locked in by directors and other shareholders, as the prospectus only specifies the total amount of shares locked in.*

Panel A:					
Average proportion	81 high-tech firms		105 low-tech firms		Average for the 186 firms
	48 VC-backed firms	33 non-VC backed firms	55 VC-backed firms	50 non-VC backed firms¹	
Shares locked in by the directors	16%	35%	22%	28%	24%
Shares locked in by the other shareholders	23%	21%	17%	20%	20%

Panel B: t-statistics for differences in means between VC-backed and non-VC backed		
	High-tech firms	Low-tech firms
Shares locked in by the directors	-3.680***	-1.359
Shares locked in by the other shareholders	0.365	-0.710

Panel C: t-statistics for differences in means between high-tech firms and low-tech firms		
	VC-backed firms	Non-VC backed firms
Shares locked in by the directors	-2.015**	1.222
Shares locked in by the other shareholders	1.112	0.151

Table 4**Shares locked in by the directors and shares locked in by other shareholders as a proportion of their ownership**

Proportions are calculated as a percentage of the total number of shares owned by the category of shareholders.

¹ *For one non-high tech/non-VC firm (Cox Insurance Holdings) we are unsure about the percentages locked in by directors and other shareholders, as the prospectus only specifies the total amount of shares locked in.*

Panel A:					
Average proportion	81 high-tech firms		105 low-tech firms		Average for the 186 firms
	48 VC-backed firms	33 non-VC backed firms	55 VC-backed firms	50 non-VC backed firms¹	
Shares locked in by the directors	79%	84%	96%	85%	90%
Shares locked in by the other shareholders	51%	69%	46%	40%	55%

Panel B: t-statistics for differences in means between VC-backed and non-VC backed		
	High-tech firms	Low-tech firms
Shares locked in by the directors	-0.609	1.932***
Shares locked in by the other shareholders	-1.572	0.548

Panel C: t-statistics for differences in means between high-tech firms and low-tech firms		
	VC-backed firms	Non-VC backed firms
Shares locked in by the directors	-2.773*	-0.101
Shares locked in by the other shareholders	0.500	2.402**

Table 5**Types of lock-in agreements for directors of all the firms**

This table shows the types of lock-in agreements. As one firm can have more than one type of lock-in agreement and as one firm may have no ownership by directors, the number of agreements may differ from the number of firms. In some firms some directors are subject to lock-in agreements whereas other directors are not bound by such an agreement. All percentages are expressed as percentages of the total number of contracts.

Type of lock-in agreement	81 high-tech firms		105 other firms	
	48 VC-backed firms	33 non-VC backed firms	55 VC-backed firms	50 non-VC backed firms
Panel A: Simple lock-in agreements				
Publication of half yearly results	9.3%	2.8%	3.6%	6.1%
Publication of preliminary results	9.3%	5.6%	16.4%	10.2%
Publication of annual results	11.1%	16.7%	27.3%	30.6%
One month after publication of preliminary results	0.0%	2.8%	0.0%	0.0%
One month after publication of annual results	7.4%	5.6%	0%	0.0%
Absolute date	31.5%	33.3%	12.7%	22.4%
Until an absolute date, the publication of the half yearly results or the publication of the annual results, whichever is longer	0.0%	0.0%	0.0%	0.0%
Total	68.6%	66.8%	60.0%	69.3%
Panel B: Staggered lock-in agreements (in addition to a first lock-in period during which sales are prohibited, these agreements include one additional period during which only a given percentage of the shares can be sold or during which sales can only happen with the consent of the sponsor)				
Publication of half yearly results	0%	2.8%	1.8%	2.0%
Publication of preliminary results	11.1%	0.0%	9.1%	4.1%
Publication of annual results	3.7%	5.6%	7.3%	4.1%
One month after publication of pre-preliminary results	0.0%	0.0%	0.0%	0.0%
One month after publication of annual results	0.0%	5.6%	0.0%	0.0%
Absolute date	1.9%	2.8%	5.5%	4.1%
Total	16.7%	16.8%	23.7%	14.3%
Panel C: Combination of one absolute date and one relative date (e.g. 'until 30 January 1994 or the publication of the preliminary results, whichever is later')				
Publication of interim / half yearly results	0%	2.8%	1.8%	0.0%
Publication of preliminary results	1.9%	2.8%	0.0%	0.0%
Publication of annual results	0.0%	0.0%	5.5%	0.0%
One month after publication of pre-preliminary results	0.0%	0.0%	0.0%	0.0%
One month after publication of annual results	0.0%	0.0%	0.0%	0.0%
Total	1.9%	5.6%	7.3%	0.0%
Panel D: Other types				
No lock-in	5.6%	8.3%	3.6%	6.1%
Not clear	1.9%	0.0%	0.0%	2.0%
Other	5.6%	2.8%	5.5%	8.2%
Total	13.1%	11.1%	9.1%	16.3%
Total number of agreements	54	36	55	49

Table 6**Types of lock-in agreements for other shareholders for all the firms**

This table shows the types of lock-in agreements. As one firm can have more than one type of lock-in agreement and as one firm may have no ownership by other shareholders, the number of agreements may differ from the number of firms. In some firms some shareholders are subject to lock-in agreements whereas other shareholders are not bound by such an agreement. All percentages are expressed as percentages of the total number of contracts.

Type of lock-in agreement	81 high-tech firms		105 other firms	
	48 VC-backed firms	33 non-VC backed firms	55 VC-backed firms	50 non-VC backed firms
Panel A: Simple lock-in agreements				
Publication of half yearly results	7.3%	3.6%	14.3%	3.1%
Publication of preliminary results	5.5%	0.0%	9.5%	6.3%
Publication of annual results	3.6%	14.3%	19.0%	28.1%
One month after publication of preliminary results	0.0%	0.0%	0.0%	0.0%
One month after publication of annual results	0.0%	0.0%	0.0%	0.0%
Absolute date	25.5%	28.6%	16.7%	28.1%
Until an absolute date, the publication of the half yearly results or the publication of the annual results, whichever is longer	9.1%	7.1%	0.0%	0.0%
Total	51.0%	53.6%	59.5%	65.6%
Panel B: Staggered lock-in agreements (in addition to a first lock-in period during which sales are prohibited, these agreements include one additional period during which only a given percentage of the shares can be sold or during which sales can only happen with the consent of the sponsor)				
Publication of half yearly results	0.0%	0.0%	4.8%	3.1%
Publication of preliminary results	0.0%	0.0%	21.4%	0.0%
Publication of annual results	0.0%	0.0%	0.0%	6.3%
One month after publication of preliminary results	0.0%	0.0%	0.0%	0.0%
One month after publication of annual results	0.0%	7.1%	0.0%	0.0%
Absolute date	5.5%	3.6%	2.4%	3.1%
Total	5.5%	10.7%	28.6%	12.5%
Panel C: Combination of one absolute date and one relative date (e.g. 'until 30 January 1994 or the publication of the preliminary results, whichever is later')				
Publication of interim / half yearly results	9.1%	0.0%	2.4%	3.1%
Publication of preliminary results	3.6%	0.0%	0.0%	0.0%
Publication of annual results	1.8%	0.0%	2.4%	0.0%
One month after publication of preliminary results	0.0%	0.0%	0.0%	0.0%
One month after publication of annual results	0.0%	0.0%	0.0%	0.0%
Total	14.5%	0.0%	4.8%	3.1%
Panel D: Other types				
No lock-in	27.3%	28.6%	4.8%	9.4%
Not clear	1.8%	0.0%	0.0%	3.1%
Other	0.0%	7.1%	2.4%	6.3%
Total	29.1%	35.7%	7.2%	18.8%
Total number of agreements	55	28	42	32

Table 7**Descriptive Statistics of Event-Study Sub-sample**

The sub sample comprises the 52 companies with absolute expiry dates used in the event study. Two IPOs were dropped from the sub sample due to lack of share-price data; both are “other firms” issued in 1992 and 1993, respectively, with directors’ lock-in expiry dates in 1995.

***Difference in means between VC-backed high-tech and VC-backed other firms is statistically different from zero at the 5% level*

Lock-in periods (duration in calendar days)			
Industrial Sector	Firms without VC backing	VC-backed firms	All firms
High-tech firms:			
Obs.	13	19	32
Mean	594	613**	605
Standard Error	76	43	40
Median	730	730	730
Min/Max	180/1095	158/731	158/1095
Other firms (not high-tech):			
Obs.	11	9	20
Mean	522	449**	489
Standard Error	63	57	43
Median	481	365	366
Min/Max	169/730	350/767	169/767
All Firms:			
Obs.	24	28	52
Mean	561	561	561
Standard Error	50	37	30
Median	730	727	730
Min/Max	169/1095	158/767	158/1095

Table 8**Returns Performance Immediately Around Lock-In Expiry Date (Day 0)**

The table shows the abnormal returns on IPOs with and without venture-capital backing of either industry sector (high-tech and other firms) immediately around the lock-in expiry date for three narrow windows (day zero only, days -1 to zero, days -1 to +1) and one wider window (days -5 to +5). The calculations of the average and cumulative abnormal returns and the cross-sectional *t*-statistics shown in this table are explained in Section Four on Research Design.

*statistically significantly different from zero at the 10% level (two-tailed *t*-test)

***statistically significantly different from zero at the 1% level (two-tailed *t*-test)

Pre-IPO backing Industrial Sector	Firms without VC backing	VC-backed firms	All firms
Other firms (not high-tech):			
<i>One-day (Day 0) return</i>	-0.028	-0.967	-0.451
<i>Two-day (0, +1) return</i>	-0.677	-0.571	-0.630
<i>Three-day (-1, +1) return</i>	-0.273	-1.122	-0.655
<i>11-day (-5, +5) return</i>	-1.945	-3.017	-2.427
High-tech firms:			
<i>One-day (Day 0) return</i>	-0.251	-1.307	-0.878
<i>Two-day (0, +1) return</i>	-0.314	-1.753	-1.168
<i>Three-day (-1, +1) return</i>	-1.232	-1.773	-1.553
<i>11-day (-5, +5) return</i>	0.322	-1.532	-0.779
All Firms:			
<i>One-day (Day 0) return</i>	-0.149	-1.198***	-0.714
<i>Two-day (0, +1) return</i>	-0.481	-1.373***	-0.961*
<i>Three-day (-1, +1) return</i>	-0.792	-1.564***	-1.207
<i>11-day (-5, +5) return</i>	-0.717	-2.010	-1.413

Table 9**Returns Performance Around Lock-In Expiry Date**

This table gives the results of an event study using all sample IPOs with clear-cut, absolute expiry dates, excluding two stocks with missing data. The final event-study sample comprises 52 stocks. Returns data are available for all these firms for the entire 81-day period around the expiry of the directors' lock-in agreement. Average and cumulative abnormal returns and t-statistics are calculated as detailed in the section on Research Design.

<i>Day relative to lock-in expiry</i>	<i>Average abnormal return (AAR) in percentage</i>	<i>Median abnormal return (percentage)</i>	<i>Cumulative average abnormal return (CAAR; %)</i>	<i>Cross-sectional t-statistic for CAAR</i>	<i>Crude-dependence adjusted t-statistic for CAAR</i>
-40	0.543	-0.043	0.543	1.418	1.190
-39	0.268	0.262	0.811	1.568	1.257
-38	-0.089	0.022	0.722	1.101	0.914
-37	-0.088	-0.013	0.633	0.624	0.694
-36	0.166	-0.126	0.799	0.555	0.783
-35	0.275	-0.100	1.074	0.678	0.961
-34	-0.186	-0.128	0.888	0.570	0.736
-33	-0.022	-0.375	0.866	0.529	0.671
-32	0.814	0.155	1.680	0.923	1.228
-31	-0.175	-0.217	1.505	0.816	1.043
-30	0.610	0.014	2.115	1.055	1.398
-29	0.200	0.025	2.314	1.042	1.465
-28	-0.417	-0.079	1.897	0.822	1.154
-27	-0.359	0.177	1.538	0.581	0.901
-26	-0.138	-0.001	1.400	0.530	0.792
-25	1.270	-0.142	2.669	0.896	1.463
-24	-0.629	-0.204	2.040	0.723	1.085
-23	-0.826	-0.517	1.214	0.435	0.627
-22	-0.366	-0.373	0.848	0.305	0.427
-21	0.434	0.231	1.282	0.454	0.629
-20	-0.101	-0.037	1.182	0.422	0.565
-19	-0.212	-0.335	0.969	0.376	0.453
-18	-0.956	-0.617	0.013	0.005	0.006
-17	-0.411	-0.115	-0.398	-0.133	-0.178
-16	-0.202	-0.211	-0.600	-0.198	-0.263
-15	-0.087	-0.104	-0.687	-0.222	-0.296
-14	-0.242	-0.300	-0.929	-0.294	-0.392
-13	-0.579	-0.345	-1.508	-0.467	-0.625
-12	-0.632	-0.140	-2.141	-0.641	-0.872
-11	-0.223	-0.133	-2.364	-0.729	-0.946
-10	-1.102	-0.302	-3.466	-1.009	-1.365
-9	-0.394	-0.176	-3.860	-1.125	-1.496
-8	-0.044	0.074	-3.904	-1.139	-1.490
-7	0.401	0.019	-3.503	-1.033	-1.317
-6	0.501	-0.050	-3.001	-0.907	-1.112
-5	-0.460	-0.244	-3.462	-1.053	-1.265
-4	-0.426	-0.078	-3.888	-1.150	-1.401
-3	1.043	0.013	-2.846	-0.866	-1.012
-2	0.429	0.271	-2.417	-0.732	-0.849
-1	-0.246	-0.289	-2.664	-0.780	-0.923
0	-0.714	-0.086	-3.377	-0.961	-1.156
1	-0.248	-0.219	-3.625	-1.015	-1.226
2	-0.446	-0.161	-4.070	-1.150	-1.361
3	-0.600	-0.002	-4.670	-1.290	-1.543

<i>Day relative to lock-in expiry</i>	<i>Average abnormal return (AAR) in percentage</i>	<i>Median abnormal return (percentage)</i>	<i>Cumulative average abnormal return (CAAR; %)</i>	<i>Cross-sectional t-statistic for CAAR</i>	<i>Crude-dependence adjusted t-statistic for CAAR</i>
4	0.025	-0.121	-4.645	-1.230	-1.518
5	0.231	-0.059	-4.414	-1.161	-1.427
6	-0.045	-0.041	-4.459	-1.165	-1.426
7	-0.028	-0.045	-4.488	-1.158	-1.420
8	-0.072	0.034	-4.560	-1.156	-1.428
9	0.058	-0.082	-4.502	-1.149	-1.396
10	0.277	-0.090	-4.226	-1.086	-1.297
11	0.708	0.179	-3.517	-0.900	-1.069
12	0.138	0.004	-3.379	-0.852	-1.018
13	0.114	0.018	-3.265	-0.829	-0.974
14	0.291	0.047	-2.974	-0.755	-0.879
15	0.044	-0.117	-2.930	-0.747	-0.858
16	-0.091	-0.101	-3.020	-0.759	-0.877
17	-0.372	0.078	-3.393	-0.833	-0.977
18	0.281	-0.312	-3.111	-0.745	-0.888
19	-0.474	-0.296	-3.585	-0.855	-1.015
20	-0.896	-0.325	-4.481	-1.046	-1.258
21	-0.618	-0.245	-5.100	-1.192	-1.420
22	-0.351	-0.296	-5.451	-1.257	-1.505
23	-0.725	-0.336	-6.175	-1.370	-1.692
24	-0.403	-0.253	-6.579	-1.462	-1.789
25	-0.317	-0.207	-6.896	-1.481	-1.861
26	-0.408	-0.271	-7.304	-1.547	-1.956
27	0.059	0.111	-7.245	-1.515	-1.926
28	-0.117	-0.132	-7.362	-1.501	-1.943
29	0.579	-0.053	-6.783	-1.381	-1.777
30	-0.362	-0.240	-7.145	-1.436	-1.859
31	0.118	-0.133	-7.027	-1.397	-1.816
32	0.634	-0.043	-6.393	-1.338	-1.640
33	0.218	-0.031	-6.175	-1.271	-1.574
34	-0.193	0.161	-6.368	-1.280	-1.612
35	-0.795	-0.368	-7.163	-1.411	-1.801
36	0.221	0.076	-6.942	-1.385	-1.734
37	-0.243	-0.310	-7.185	-1.414	-1.783
38	0.205	0.014	-6.979	-1.347	-1.721
39	0.533	-0.027	-6.446	-1.274	-1.580
40	0.011	-0.032	-6.436	-1.263	-1.568

Table 10**Cumulative Average Abnormal Returns (in Percentage) Around Lock-In Expiry Date: Firms with(out) venture-capital backing by industrial sector**

The table breaks down the results of the event study using all sample IPOs with clear-cut, absolute expiry dates for firms with and without IPO venture-capital backing by industrial sector. Excluding two stocks with missing data leaves a final event-study sample comprising 52 stocks: 28 IPOs with and 24 without venture-capital backing. Of the venture-capital backed IPOs, 19 were issued by high-tech firms, and of the IPOs without venture-capital backing, 13 were issued by high-tech firms. Returns data are available for all these firms for the entire 81-day period around the expiry of the directors' lock-in agreement. Average and cumulative abnormal returns and t-statistics are calculated as detailed in the section on Research Design.

Day relative to lock-in expiry	Firms without venture-capital backing		Venture-capital backed firms	
	High-tech firms	Other firms	High-tech firms	Other firms
-40	-0.567	0.282	0.486	2.584
-39	-0.683	0.389	0.922	3.250
-38	-1.720	1.723	0.404	3.698
-37	-3.477	1.638	0.746	5.105
-36	-6.264	2.327	2.146	6.290
-35	-6.450	2.220	2.851	6.790
-34	-6.882	1.529	3.123	6.609
-33	-7.251	1.253	3.631	6.283
-32	-5.956	1.392	4.818	6.440
-31	-4.822	1.047	4.176	5.565
-30	-3.747	1.949	4.372	6.019
-29	-5.479	2.860	4.842	7.569
-28	-6.744	3.110	4.750	6.876
-27	-9.157	3.434	5.477	6.353
-26	-9.051	3.427	5.062	6.284
-25	-8.425	4.106	7.844	6.014
-24	-8.881	3.927	6.159	6.814
-23	-10.077	2.800	4.931	7.739
-22	-10.235	2.221	4.538	7.389
-21	-9.089	2.195	4.840	7.637
-20	-9.331	1.982	4.756	7.841
-19	-8.285	2.082	3.980	6.621
-18	-11.117	1.608	3.664	6.433
-17	-13.581	1.553	3.529	7.969
-16	-14.209	0.950	4.006	7.438
-15	-14.622	0.912	4.299	6.959
-14	-15.434	0.962	4.365	6.534
-13	-16.568	1.769	3.179	6.343
-12	-17.584	2.245	1.904	6.266
-11	-16.944	1.304	1.609	5.827
-10	-17.675	-1.908	1.115	5.482
-9	-17.805	-2.220	0.292	5.516
-8	-17.805	-2.578	0.176	5.941
-7	-17.197	-2.011	0.982	4.986
-6	-16.810	-1.948	1.980	5.140
-5	-17.087	-2.173	0.651	5.960
-4	-19.126	-3.059	1.170	6.430
-3	-16.417	-2.533	2.220	5.680
-2	-15.668	-1.743	2.291	5.960
-1	-16.586	-1.339	2.271	5.410
0	-16.836	-1.367	0.964	4.443
1	-16.900	-2.016	0.518	4.839
2	-18.509	-1.904	0.081	5.375
3	-18.958	-3.263	-0.315	5.056

<i>Day relative to lock-in expiry</i>	Firms without venture-capital backing		Venture-capital backed firms	
	High-tech firms	Other firms	High-tech firms	Other firms
4	-17.160	-3.148	-0.209	2.235
5	-16.488	-3.894	0.448	2.123
6	-15.891	-3.609	-0.079	1.768
7	-15.750	-3.847	-0.299	2.154
8	-15.366	-3.249	-1.505	2.998
9	-14.942	-2.917	-1.477	2.253
10	-13.778	-3.502	-1.254	2.415
11	-14.213	-3.513	0.955	2.485
12	-13.314	-3.425	0.827	2.148
13	-12.201	-4.049	0.613	2.414
14	-12.532	-3.599	1.244	2.691
15	-11.180	-3.500	0.447	2.556
16	-10.576	-3.306	-0.154	2.192
17	-10.236	-3.206	-1.089	1.402
18	-9.378	-2.427	-1.311	1.304
19	-9.769	-1.359	-1.456	-1.868
20	-9.898	-1.432	-2.265	-5.064
21	-9.425	-1.885	-2.795	-7.647
22	-10.938	-1.553	-2.364	-8.804
23	-12.582	-1.291	-3.168	-9.240
24	-13.186	-1.120	-3.890	-9.382
25	-14.835	-0.965	-3.983	-8.826
26	-15.473	-1.280	-4.580	-8.616
27	-15.492	-0.582	-4.726	-8.794
28	-15.655	-0.704	-4.754	-9.027
29	-14.123	-0.944	-4.819	-7.463
30	-16.306	-1.119	-4.580	-6.695
31	-16.666	-1.473	-4.206	-5.849
32	-13.993	-1.286	-4.360	-5.949
33	-13.351	-1.048	-4.463	-5.691
34	-14.494	-0.455	-4.743	-5.290
35	-15.505	-1.293	-5.560	-5.674
36	-15.132	-0.980	-5.481	-5.485
37	-15.543	-0.830	-5.990	-5.401
38	-15.557	0.466	-5.889	-5.990
39	-14.646	2.193	-5.852	-6.417
40	-15.065	3.290	-6.116	-6.535

Figure 1.

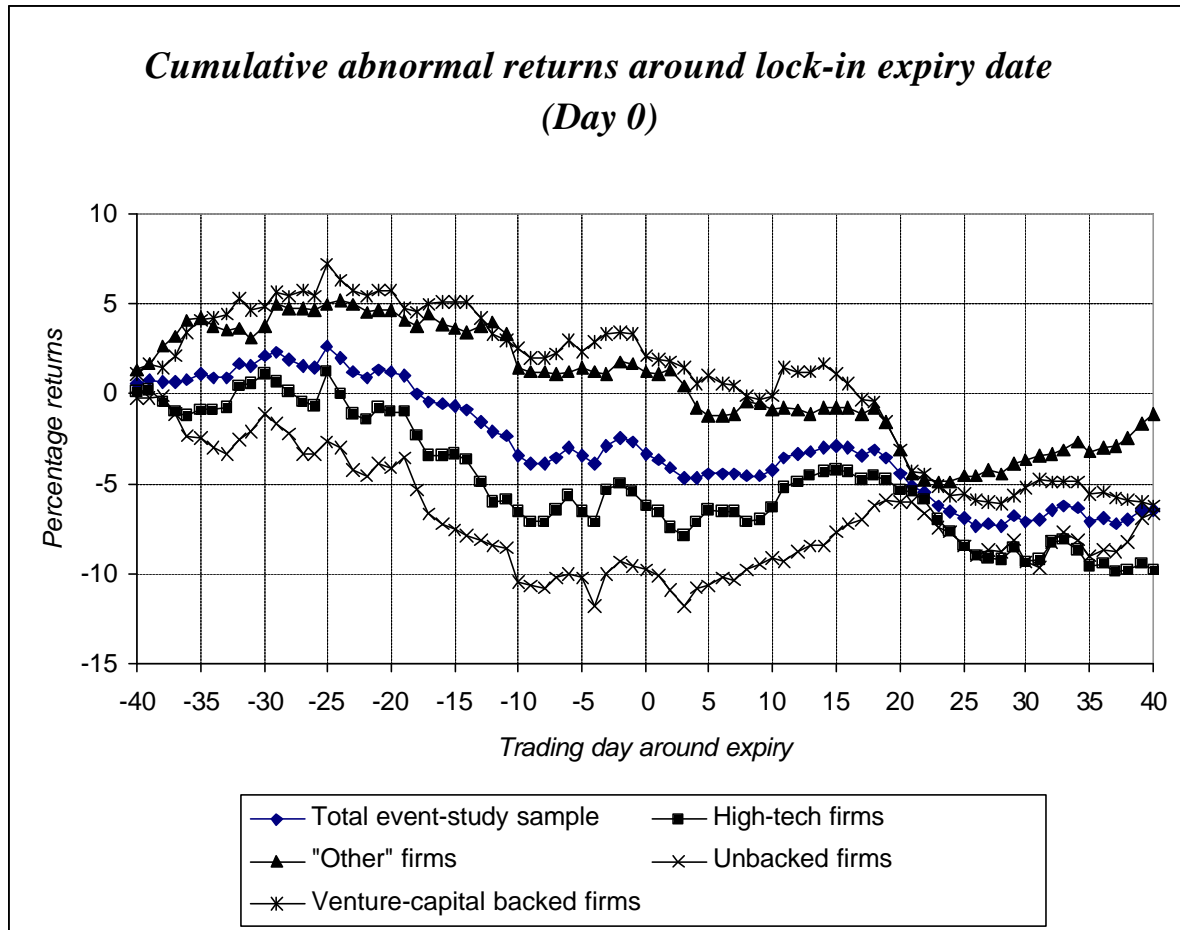


Figure 2.

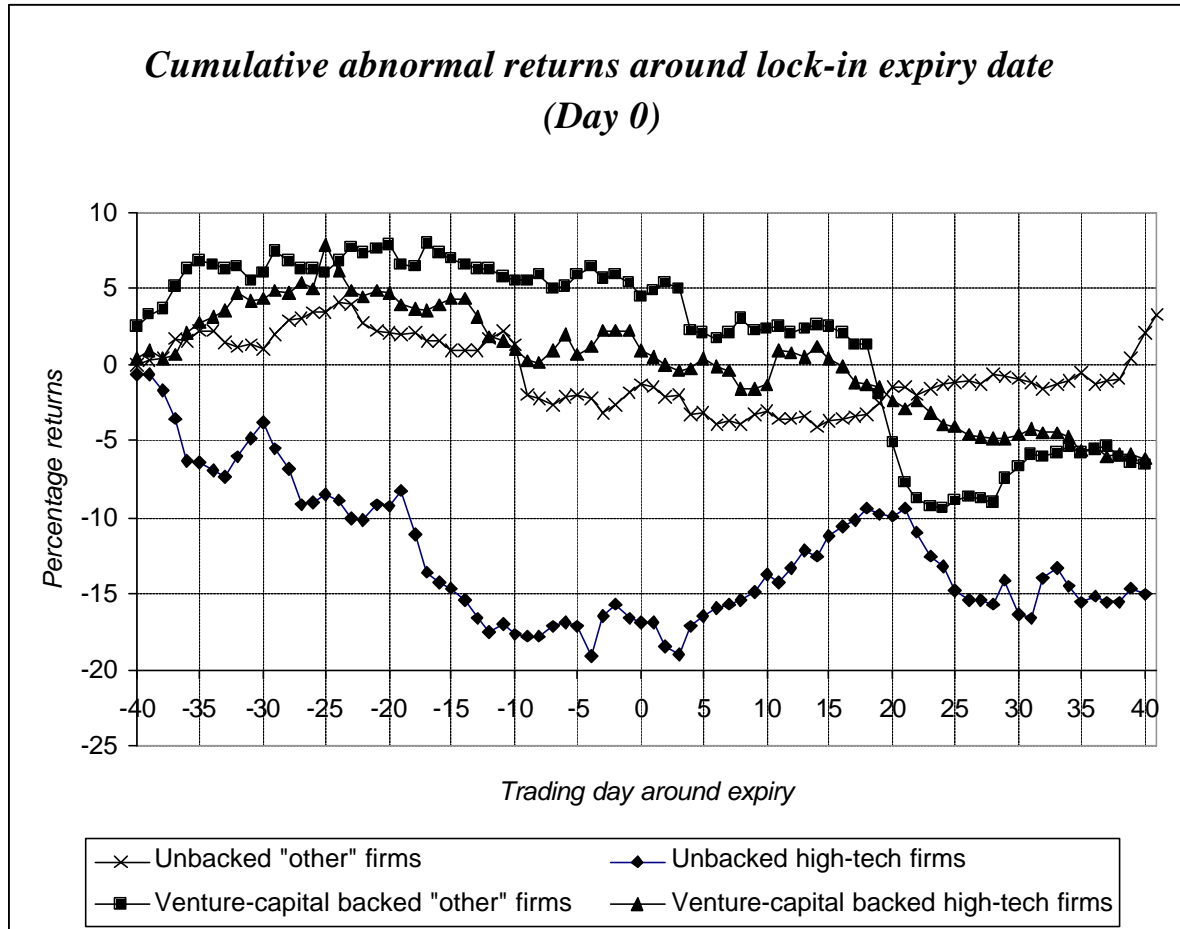
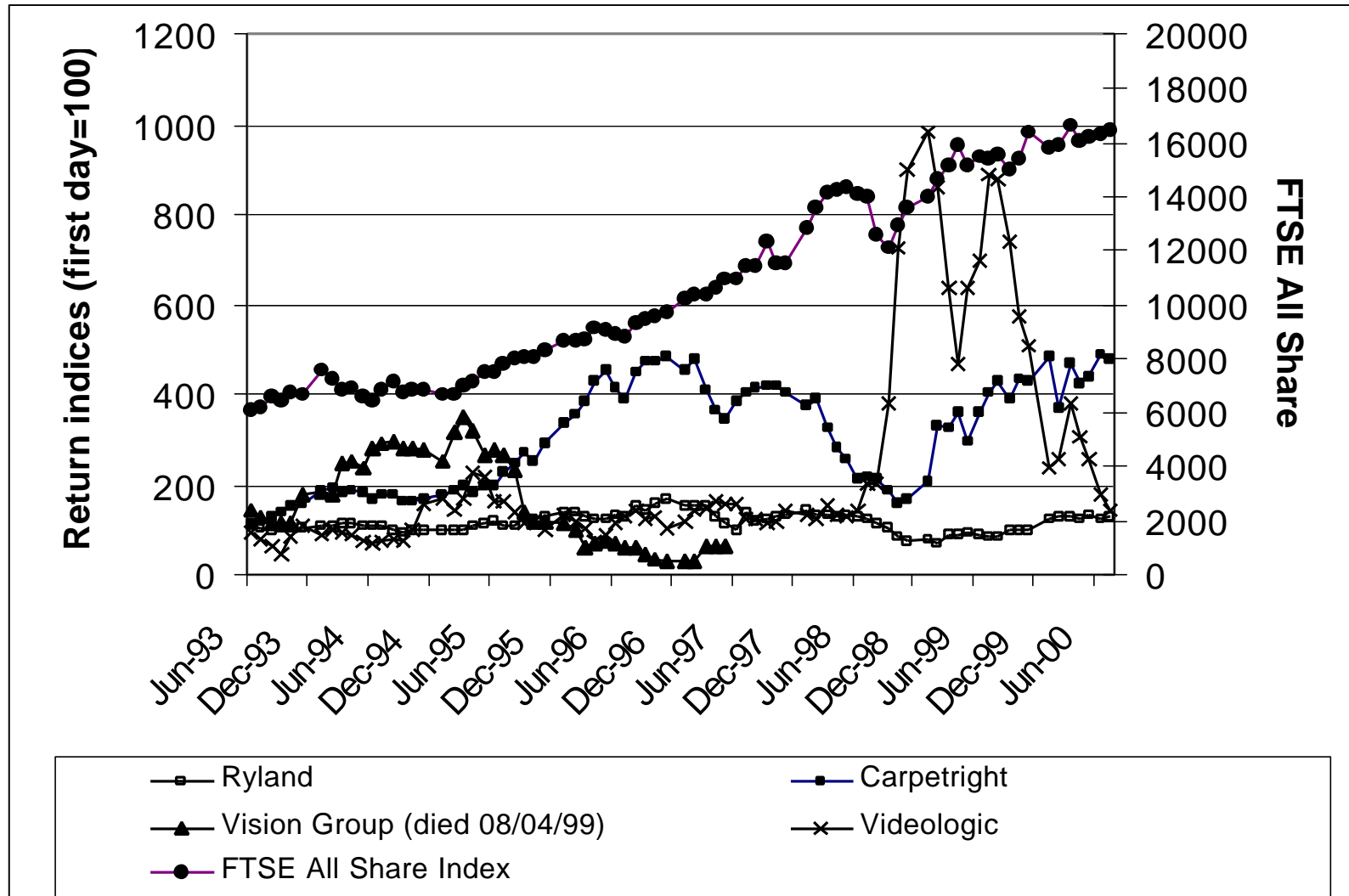


Figure 3. Performance of the Return Indices of the Case-Study IPO Stocks and of the FT All Share Index (June 1993-2001)



APPENDIX 1: CASE STUDIES

Carpentright

Subsample: not high tech, with VC backing.

The company published its annual report for the 52 weeks up to 1 May 1993 around 24 May 1993 (date of Chairman's Statement) and a pathfinder prospectus on 25 May 1993. The IPO was a placing and offer for sale sponsored and fully underwritten by County NatWest (SG Warburg acted as the stockbroker). Shares were offered at a price of 148p per ordinary share. The IPO consisted of a placing of over 39m ordinary shares of which 13.7m were offered to the public. Up to 1.37m (10% of post-IPO shares) were reserved to meet applications by directors and company employees. Of the 39.2m shares marketed, 32.4m were sold on behalf of existing shareholders, and 6.8m to raise funds for the firm.

Although the offer price had been set at the top end of expectations, the flotation was predicted to go well (FT 9 June 1993). The offer closed on 16 June 1993, and share dealing commenced on the Official List on 23 June 1993 (as predicted in the prospectus) with the share price closing at 165.5p. Turnover on that day was noted to be heavy at 22.7m (FT, 24 June 1993). The reason given for this in the FT (17 and 24 June 1993) was that some institutions may have been buying in the aftermarket because the share allocation (detailed in an article in the FT on 23 June 1993) had favoured smaller investors, and the placing of shares with institutions had left some institutional investors with fewer shares than they had wanted, so that there were some large institutional applications in the public offer.

The reasons for flotation given in the prospectus (page 24) are “to allow the Vendors to realise part of their investment and wider participation by Carpetright’s employees in the future ownership of the Company”, and the net proceeds of the issue of approx. £8.9m are also to be used to redeem the existing redeemable preference shares.

There were comments on the fact that investors in an earlier business floated by the Carpetright Chairman-cum-CEO had lost money. This was the Harris family business, Harris Queensway, which was taken over in 1988 (when Harris sold out after a failed MBO) and eventually failed in 1990.

Soon after the takeover of Harris Queensway, Harris went on to launch Carpetright together with MFI in 1988. Harris promised that unlike with his previous venture Harris Queensway, which expanded rapidly through acquisitions and outside carpet retailing, Carpetright would not attempt to diversify outside the carpet business (FT 24 April 1993).

The prospectus gives a detailed list of the numbers of shares being sold by each vendor (page 61). MFI, which together with P. Harris launched the company in 1988, is predicted to sell its entire interest in the flotation.

Following completion of the IPO, the prospectus predicts that the Chairman-cum-CEO, Sir Philip Harris, will control 20.8% of the enlarged share capital (directly and through Harris Ventures Ltd), and the venture capital backers, NatWest Ventures and Phildrew Ventures, who contributed expansion capital in 1989 and 1990, will retain holdings of 5.0% and 4.4%. The prospectus notes that Phildrew Ventures’ remaining holding is non-beneficial and re-registered in the names of the underlying investors.

The lock-in agreements (page 24) affect only the directors of the company:

“Each of the Directors has undertaken not to sell further shares until the publication of Carpetright’s preliminary results for the year ending 30 April 1994, other than with the consent of County NatWest. Sir Philip Harris and Harris Ventures Limited have undertaken that they will not, together, other than with the consent of County NatWest, sell more than two and a half per cent. of the ordinary share capital of the Company in the first year following this period or more than five per cent. of the ordinary share capital in total in the two years following this period.”

Sir (later Lord) Philip Harris is clearly the crucial shareholder in Carpetright, which is reflected in the lock-in agreements. He has continued to hold a substantial share stake until the present day. Investors in the IPO and thereafter may have been particularly nervous about large share sales by Harris given the experience with his previous business, Harris Queensway, where investors who sold shares during the takeover as Harris did, made money, but those who held on to their stakes lost out when the company failed in 1990.

Notably, the venture backers’ holdings were not locked in, and based on the first annual report published after the IPO (in June 1994), it appears that both venture capitalists liquidated their holdings during the first year of trading (the only substantial shareholdings besides directors’ are Provident Mutual Life Assurance Association with 4.04% and Laurentian Financial Group Plc with 3.37%). In the case of Phildrew Ventures, it is possible that the underlying investors had retained their holdings but were not substantial shareholders. The fact that one of the venture capitalists, NatWest Ventures, is an associate of the sponsor/underwriter creates the potential for conflicts of interest.

To examine the incidence of directors' trading in the stocks of the companies they run, both before and after the expiry of the directors' lock-in agreements, we used a database called *Directus*. Our version of the database covers all share dealings from the early 1990s to the end of 1998. The database collects data based on the notifications by directors of their share dealings to the London Stock Exchange.

If a director sells shares before the expiry of their lock-in agreements, this can mean either that the agreement was lifted with the agreement of the sponsor/underwriter, or that the director broke the agreement.

In the case of Carpetright, the first share transaction by a director recorded on *Directus* took place on 11 July 1994, which is clearly after the publication of the preliminary results for the year ending 30 April 1994 (the annual report was signed on 21 June 1994), and hence after the expiry of the directors' lock-in agreement. The first transaction by P. Harris was a purchase in January 1995, and his first share sale occurred at the end of March April 1995 consisting of 8000 shares (0.01% of the issued shares at flotation). The next two transactions by Harris are recorded in 1996: one is the exercise of executive options and this is followed by the sale of same number of shares (that is, reducing Harris's shareholding to the pre-exercise level). The first major share disposal by Harris (of 4m shares) occurs in January 1997, approx. six months after the expiry of his lock-in. In conclusion, all the lock-in agreements were adhered to.

Ryland Group Plc

Subsample: not high tech, no VC backing.

Ryland Group Plc was floated on the London Stock Exchange via a placing on 22 September 1994. At the time of listing, the Ryland Group was one of the four largest privately owned groups of companies in the UK motor distribution industry, by turnover. At the time of the listing, the reason given for placing was to reduce the company's gearing, to make further investment and to consider acquisition opportunities as they arise, to increase the company profile, and to encourage employee share ownership.

The business was founded over 50 years earlier by the grandfather (the late H W Whale in Birmingham) of the chairman at the time of flotation (Peter Whale). In 1966 the founder's son, W J Whale, took over and commenced expansion of the Group's activities, converting the business into a broadly based motor group. In May 1990, following the death of W J Whale, his eldest son Peter Whale became Chairman and Chief Executive.

Immediately following the placing, Peter Whale and Nick Whale (P. Whale's younger brother) owned 39% of the outstanding shares of the company. The third executive director, K Hampson, owned only 0.5% of the outstanding shares. There was one other investor; MPE (an institutional investor owned by HSBC), holding 11% of the issued equity share capital after flotation.

The lock-in agreements state:

Each of the Vendors, other than MPE, has undertaken not to dispose of any further Ordinary shares (without the prior written consent of Sharps), until publication of the Company's audited accounts for the year ending 30 April 1995 and until publication of the Company's audited accounts for the year ending 30 April 1996 to dispose of shares through Sharps. MPE has

undertaken not to dispose of any further Ordinary shares (without the prior written consent of Sharps) during the period of six months from Admission and for a period of 12 months from Admission to dispose of Ordinary shares only through Sharps (other than in certain specified circumstances).

The prospectus reports that during the last three financial years of 1992, 1993 and 1994, the company made profits of £0.27m, £0.77m and £2.04m respectively. These results were impressive despite the length and breadth of the UK economic recession at that period of time. The firm continued to perform well until 1999 when it made a profit of £12.6m. Lately it has been experiencing problems with losses of £5.9m in 2000. The finance director, Keith Hampson, put this down to the confusion created by the Competition Commission's inquiry into new car pricing. "The general public want and deserve price cuts. They weren't forthcoming and so people stayed away" (The Times, 5 October 2000, p. 67). He added that the September fuel crisis had an impact on both sales and the service and parts business. The latest interim figures show a modest profit of £1.12m.

The audited accounts for the year ending 30 April 1995 were published shortly after 24 July 1995 (the date of signing of chairman's report). The directors' interests' from the annual report of 1995 show that none of the directors had sold any shares during the vendors' lock-in period. The institutional investor MPE also held on to its shares much beyond the lock-in expiry date. The annual report further tells that there were no changes in the director's interests between 30 April 1995 and 21 July 1995.

The first transaction recorded on *Directus* is a share sale by P. Whale at the end of July 1995, which is after expiry of the vendors' lock-in (i.e. the publication of the accounts for the year ending 30 April 1995; the report was signed on 24 July 1995).

VideoLogic Group Plc

Subsample: high tech, no VC backing.

VideoLogic was floated on the Official List of the London Stock Exchange on 6 July 1994 as a result of a demerger from Avesco. VideoLogic's main business is the development of multimedia technology for PCs. The official reason for the demerger was that it was felt that VideoLogic's activities were very different from the ones of the other divisions of Avesco and that therefore a demerger would make sense. The real reason seems to have been that Avesco was making huge losses before the demerger and that they hoped reduce these losses by selling off Videologic. However, Avesco's losses after the demerger were even more substantial (see Financial Times of 30 November 1994, p.50).

Videologic's origins go back to 1985, when Tony Maclaren started the business as a division of Teletape Video Limited. Avesco acquired VideoLogic in 1989. Derek Maclaren, the father of Tony Maclaren, joined VideoLogic in 1986. At the time of the demerger, Derek Maclaren was the chairman, and Tony Maclaren the chief executive of VideolLogic.

Derek and Tony Maclaren were expected to subscribe to the offer, and immediately after the demerger, they were predicted to hold 0.6% and 1.18%, respectively, of Videologic's ordinary shares. The offer agreement specifies the following:

“The Underwriting Agreement also contains restrictions on sales by any of D.A.E. Maclaren, A.E. Maclaren or Mr Murray of any of their shares in the Company in the 12 month period following the date of Admission (or, in the case of D.A.E. Maclaren, until the date of cessation of his employment by the

Group if earlier) and on A.E. Maclaren in respect of half of his shares in the Company in the 12 months thereafter.”

At the time of the demerger, Mr Murray was the chairman of Avesco, but he had no seat on the board of VideoLogic. Along with certain other directors and employees of Avesco, he was expected to sell shares pursuant to the IPO.

Derek Maclaren stated his intention to retire as a director (see p.23 of the prospectus) as soon as a successor could be found. He agreed to act as chairman until at least 31 March 1995 (the end of the subsequent financial year). Although, the Maclarens' share stakes after flotation were small, the lock-in agreement attached a lot of importance to them. Tony Maclaren is subject to a longer, staggered lock-in agreement given his key role as chief executive (and founder). The lock-in agreement specified an absolute expiry date (6 July 1995), although Derek Maclaren had the possibility to sell as early as 31 March 1995 if he retired.

The prospectus reports that during the last three financial years of 1992, 1993 and 1994, VideoLogic made operating losses of £1.0 m, £0.6 and £5.3 m, respectively. In the Financial Times of 15 December 1994 (p.29), Derek Maclaren was quoted as saying that 'the company had considered whether to go for short-term profits or to continue investing in the research needed for the multimedia breakthrough'. Mr Maclaren said that the latter was the right option as otherwise the company would jeopardise a deal with NEC.

The two Maclarens had been re-appointed as directors in March 1994. The company continued to make a loss even in the financial year after the IPO (1995). Derek Maclaren finally resigned on 27 March 1996, and Geoff Shingles was appointed as the new chairman.

The database of directors' dealings, *Directus*, does not record any transactions for the directors from flotation until the summer of 1998, that is, around two years after the expiry of the longest lock-in period.

Vision Group Plc

Subsample: high tech with VC backing.

Vision Group went public on 12 April 1995 via a placing raising about £5 million. None of the existing shareholders sold any of their shares in the IPO. The proceeds from the placing were intended to reduce the level of debt and to buy out a royalty agreement with the University of Edinburgh. VVL, the trading subsidiary, of the Vision Group¹² was set up at the beginning of 1990 by Professor Peter Denyer, the managing director, and Roy Warrender, the commercial director, with institutional support to develop and commercialise specialist electronic cameras ('highly integrated camera chip technology'). Applications include among others video conferencing, toys, machine vision and surveillance. The technology used by VVL was developed by Peter Denyer during the 1980s. In 1992, Peter Denyer's research team from the University of Edinburgh joined VVL.

In terms of directors' share stakes post-IPO, Peter Denyer held the largest stake with 6.76%. The other directors' shareholdings were by Roy Warrender (5.08%) and James Millar (0.05%), the non-executive chairman. The holdings of the other shareholders are reported in the following table:

¹² Vision Group itself has never traded, but it holds all of VVL and the firm holding the Employees Trust.

Shareholder	% of shares immediately after the IPO	Lock-in agreement
Donnelly Corporation	31.95%	Yes
Q.F. Realisations Limited	8.12%	Yes
The University Court of the University of Edinburgh	6.01%	Yes
David Renshaw	5.10%	Yes
The Equitable Life Assurance Society	4.05%	No
Michael Underwood	3.55%	No

The second largest shareholder in the firm is Q.F. Realisations Limited, part of the Quantum Fund, a venture capital firm. The Vision Group Employees Trust holds about 2% of the shares after the placing. The trustees are the non-executive chairman and the three non-executive directors.

Two out of the three non-executive directors were directors of the largest shareholder, i.e. Donnelly Corporation, a US vehicle components manufacturer. Donnelly became a minority shareholder of VVL in 1993. Donnelly's main interest is in the development of a camera that would replace or supplement the rear view mirrors in cars. With respect to the representation of Donnelly on the board of directors, there is a material contract that requires:

“[...] R.D. Warrender and P.B. Denyer to support the continuing representation of Donnelly on the Board such that, while Donnelly continues to hold more than 25 per cent of the issued Ordinary shares they will vote for the re-election of two directors nominated by Donnelly and while Donnelly continues to hold more than

15 per cent of the issued Ordinary shares they will vote for the re-election of one director nominated by Donnelly.”

Although Donnelly is the controlling shareholder, the relationship between the firm and Donnelly is at arm's length.

The lock-in agreement can be found in section b of the 'placing arrangements' section of the IPO prospectus (there is also a brief mention in the 'placing' section of Part 1 of the prospectus):

“In terms of Letters of Undertaking dated 8th, 27th and 28th March, 3rd and 4th April 1995 respectively granted by each of Mr. A. Macpherson, the University Court of the University of Edinburgh, Q.F. Realisations Limited, Mr. D. Renshaw and Donnelly (‘the “Locked-in Shareholders”’), the Locked-in Shareholders have agreed not to dispose of in aggregate 15,386,072 Ordinary shares until after the publication of the Company’s accounts for the financial period ending 31st July 1996. In terms of the Placing Agreement, the Directors have agreed not to dispose of any Ordinary shares during the above period. The restrictions contained in the letters of undertaking and the Placing Agreement do not apply in certain cases being, inter alia, (i) transfers which Sharps have approved in writing and (ii) transfers in connection with certain offers for the whole or any part of the issued share capital of the Company.”

The total number of shares owned by the directors is therefore locked in, as well as almost all the shares held by other pre-IPO shareholders with stakes in excess of 5%. In the case of Vision Group, the lock-in period is the same for the directors and the other shareholders. The total number of locked-in shares represents about 62% of the equity outstanding immediately after the IPO.

Given that the lock-in expiry date is relative to a company event, i.e. the publication of the company report for the year ending on 31 July 1996, this raises the question as to how accurately outsiders can predict this date. As the company went public more than 3 months before its financial-year end (the prospectus contains accounting information up to 31 January 1995), it is difficult to have a clear idea of the expiry date after studying the IPO prospectus. However, the expiry period will obviously exceed a calendar year. The reason why the lock-in agreement is relative to the publication of the 1996 company accounts is probably that in each of the previous years (1993, 1994 and until 31 January 1995) Vision had made losses on ordinary activities. In this line of thought, Professor Denyer stated (Financial Times of 13 March 1995, p.20) that he expected the firm to break even by the end of the 1996 financial year.¹³

Surprisingly, the annual report for 1995 reveals that the stakes of some of the other shareholders that were locked in had decreased: on 15 September 1995 Q.F. Realisations holds 7.31% (8.12%) and the University of Edinburgh held 5.41% (6.01%). All other stakes, including the ones of the directors, were unchanged. The 1995 accounts were signed by the Company Secretary and the auditors on 27 September 1995. There was a profit announcement by Peter Denyer a day later, which was published in the Financial Times on 29 September. Interim figures for 1996 were announced on 19 April. There was also an article in the Sunday Times of 17 November 1996 (p.7), which reports that an analyst had stated that the balance sheet was 'cash positive'.

¹³ However, the IPO prospectus only mentions under 'Current trading and prospects' that '[...] revenues from the Group's standard products continue to grow [...]']

The 1996 company report was approved by the auditors on 19 November 1996. This time it took much longer from the end of the financial year to the publication of the report than in the previous year. The reason may be that in the previous year the IPO prospectus already contained the audited accounts up to 31 January 1995. The directors' holdings remained unchanged. On 31 October 1996, the holdings of the other locked-in shareholders were slightly lower with 30.43% for Donnelly, 6.50% for QF Realisations, 5.15% for the University of Edinburgh and 4.86% for David Renshaw. The Independent (p.26) and Financial Times (p.24) of 20 November 1996 (p.26) mentioned the profit announcement for the year 1996. On 19 November 1996, along with the profit announcement the company also announced a 3-for-19 rights issue to raise £11.5 million to expand its production facilities in response to the high demand for its electronic camera. Most of the new shares were taken up by institutional investors. As a result, institutional ownership increased by more than 10% to more than 50% in total.

In terms of directors' trading, there were no sell transactions before or at the expiry of the lock-in period.¹⁴ The only transactions recorded by *Directus* for Vision Group from floatation until the end of 1998 were buy transactions.

As none of the locked-in shareholders took up their rights, their percentage stakes decreased as a result of the rights issue. The Financial Times mentions that after the rights issue Donnelly's stake was 25.6%. In the Sunday Times of 24 November 1996, Peter Denyer is quoted as saying that:

“Strategically, we have reached a watershed. At the time of our flotation in April 1995, we forecast that we would be hitting breakeven on a monthly basis

for the first time by our year-end this July. In fact, we came very close to that and have gone modestly into the black in the first quarter of the current year to end October.”

¹⁴ All of the directors were still in their posts around the lock-in expiry.