Oxera

The London markets and private equity-backed IPOs

Report prepared for British Venture Capital Association and London Stock Exchange

March 2006

Executive summary

Private equity (PE) firms have a number of routes available to exit from their investments, one of which is to float the company on a stock market via an initial public offering (IPO). The British Venture Capital Association (BVCA) and the London Stock Exchange (LSE) commissioned Oxera to conduct research into certain aspects relevant to assessing the attractiveness of the London markets for PE-backed IPOs.

The research findings contained in this report can be summarised as follows.

IPOs as an exit route for PE firms

– Over the period 1998–2004, approximately one-half of UK companies (excluding collective investment vehicles) that floated on the LSE's Main Market were backed by PE firms.

– PE-backed companies floating on the Alternative Investment Market (AIM) constitute a smaller proportion (around one-tenth) of total IPOs. However, the relative importance of AIM has been increasing in recent years, and in 2004 about half of all PE-backed IPOs were on AIM.

– When measured at original cost, divestments by PE firms at IPO, or by subsequent sale of quoted equity, average around 20% of the total amount divested over the 1998–2004 period. Trade sales are the most important exit route, constituting around 35% of divestments. Since the public equity markets tend to be used for the most successful portfolio companies, the relative share of IPOs and subsequent sale of quoted equity would be higher if measured at market value.

After-market return performance of PE-backed IPOs in London

– The report also analyses the after-market performance of PE-backed IPOs by considering the initial and longer-term returns for a sample of 32 PE-backed IPOs and 30 other IPOs that occurred on London's Main Market in the years 1998 and 2001–04 (excluding the bubble years).

– On the first day of trading, the PE-backed IPOs saw risk-adjusted returns of 12.4% (equally weighted average) and 8.1% (market-value weighted average), consistent with findings on initial returns obtained in the literature. The comparable initial returns for the IPOs without PE backing were 9.8% and 6.4%, respectively.

– Over the course of one year following flotation, the PE-backed IPOs tended to outperform other IPOs. PE-backed returns were 15.2% (unweighted) and 13.8% (weighted). In comparison, the one-year returns of the other IPOs were 6.1% and –1.9%, respectively. This suggests that higher returns are earned by PE-backed IPOs, although a larger sample size would be required to establish the statistical significance of the results.

Turnover on the London markets

– The liquidity of secondary markets is important to private equity investors when, after any lock-ups, they come to sell their stakes in companies. Aggregate statistics on turnover, as measured by the ratio of the value of shares traded to total market capitalisation, show that annual turnover on the Main Market was 139% in 2005 compared with 74% on AIM.

– The new empirical results presented in this report are based on disaggregated company-specific data for constituents of the Main Market and AIM. This allows a comparison of company turnover across different firm size categories, focusing on the market-value segments most relevant to PE investors.

– Turnover increases with company size. In 2004, the average monthly turnover for companies with market value of less than £100m was 2.7% on the Main Market; for companies with a market value of between £250m and £500m, the respective average turnover was 6.9%.

– Turnover on AIM is on average below 3%; however, there was significant improvement in 2004 compared with 2003, with average monthly turnover increasing by 59% for companies with a market value of less than £100m, and by more than four times for those with a market value between £100m and £250m. Turnover on AIM has continued to rise since 2004.

– The turnover averages mask the considerable variation in the liquidity of similarly sized companies on both markets. It was beyond the scope of this study to examine other stock characteristics that may explain these differences.

Contents

List of tables

List of figures

1 Introduction

Private equity (PE) firms have a number of routes available to divest or to exit from their investment in a company, one of which is to float the company on a stock market via an initial public offering (IPO). However, since IPOs typically involve lock-in agreements, requiring PE firms to retain a significant investment in order to inspire confidence in institutional investors, they do not usually represent a complete exit.

There is little existing evidence on the relative costs and benefits of exiting via flotation and subsequent sale of shares on the London stock markets. The British Venture Capital Association (BVCA) and the London Stock Exchange (LSE) therefore commissioned Oxera to conduct research into certain aspects relevant to assessing the attractiveness of the London markets as an exit route for PE-backed IPOs. Specifically, Oxera was asked to address the following research questions.

– **IPOs as an exit route for PE investors**—how important are IPOs as an exit route for PE investors in the UK in terms of frequency and volume, and, if the IPO route is chosen, what is the market of choice for the initial listing?

– **After-market return performance of PE-backed IPOs in London**—how do PE-backed IPOs perform in terms of returns in the London markets following flotation, and how does the return performance compare with UK IPOs that are not backed by PE investors?

– **After-market liquidity in London**—what is the turnover of shares on the London markets? In particular, on average, how long does it take to turn over equity stakes on London's Main Market and the Alternative Investment Market (AIM)?

This report summarises the research findings. Section 2 provides statistics on the importance of IPOs as an exit route in the UK; section 3 presents the results of the empirical analysis of the after-market return performance of UK PE-backed companies following IPO in London; and section 4 compares the after-market liquidity between the Main Market and AIM.

2 IPOs as an exit route for PE investors

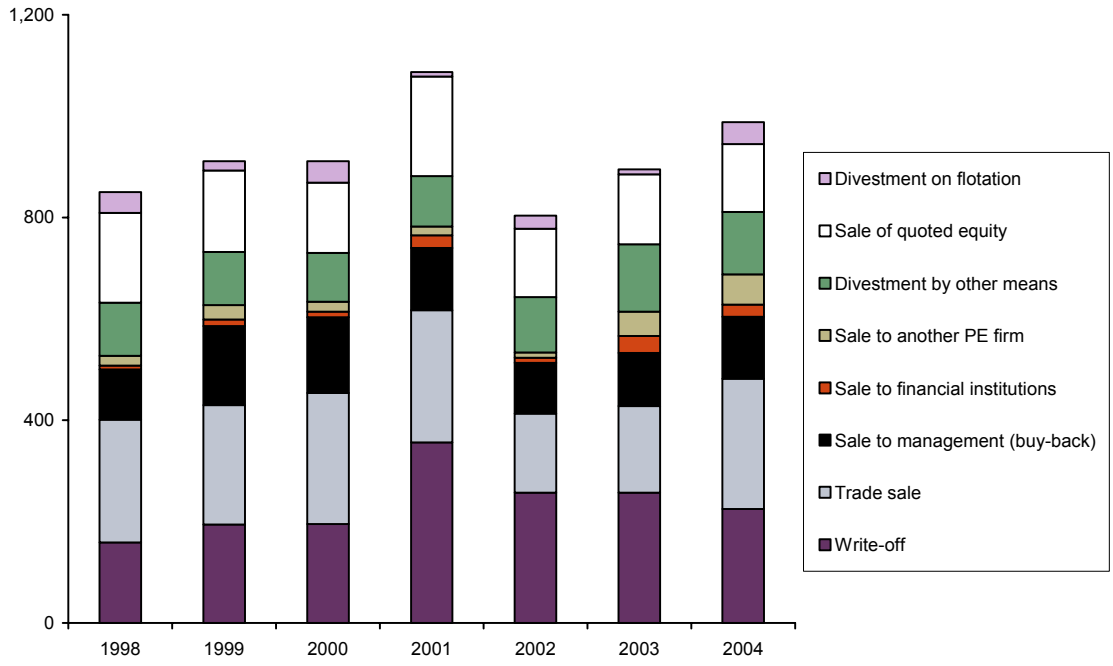
This section presents aggregate statistics to assess the importance of IPOs as an exit route for PE firms in recent years (section 2.1). It then examines PE-backed IPOs in the context of overall UK IPO activity (section 2.2).

2.1 Private equity divestments by type

PE investors have several options when exiting from their investments: they may sell their stakes to other companies ('trade sale') or to another PE firm or financial institution, float the company on the stock market, or write it off if the investment has not been successful.

Figures 2.1 and 2.2 below present the relative importance of different types of exit route during the period 1998–2004, first by number of companies divested from and then by total amount divested.[1] As shown in Figure 2.1, apart from a peak in 2001, the number of PE exits has remained relatively stable over time, at around 800–1,000 companies per year. The large number of recorded exits in 2001 is largely explained by a significant increase in write-offs.

Figure 2.1 PE exit routes by number of companies, 1998–2004



Source: BVCA (2004, 2005), 'Report on Investment Activity'.

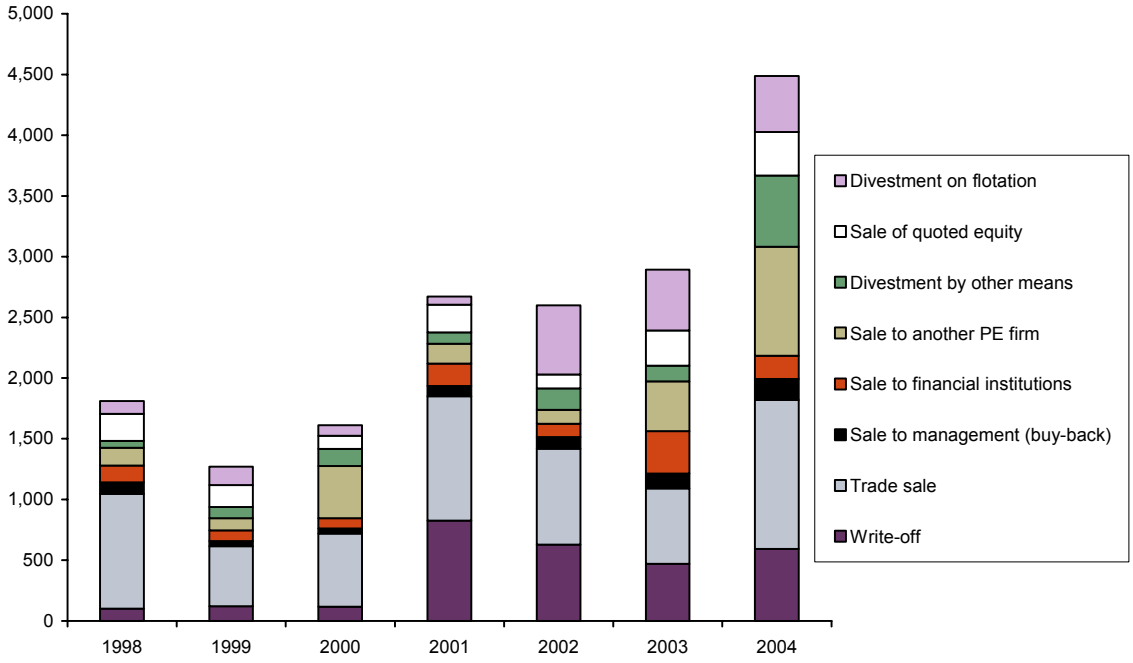
The IPO route forms only a relatively small proportion of exits for PE houses. The share of companies using IPOs relative to the total has ranged between 1% and 5% during the period. However, if the sale of equity stakes in already publicly quoted companies is included, the recorded share of divestments via the sale of new or existing quoted equity

[1] Detailed figures are presented in Appendix A1.1.

increases to 18% in 2004 (20% if averaged during the period). In comparison, the number of companies using trade sales was 26% of the total in 2004 (24% on average during the period).[2]

Figure 2.2 shows data over the same period, but breaks down divestments by the amount divested.[3] These figures are at original cost, since the sale prices will often not be revealed (except in the case of exit at IPO or subsequent sales of quoted equity). By measuring exits at cost, however, it is possible to formulate a broad picture of the extent to which original investments are written off, and the use of various exit routes. Nonetheless, the proportion of total exit value realised via these different routes may be quite different. In particular, since IPOs tend to be used for the most successful investments, the share of IPOs may be higher.

Figure 2.2 PE exit routes by amount divested, 1998–2004 (£m)



Source: BVCA (2004, 2005), 'Report on Investment Activity'.

The figure shows a significant increase in the value of divestments from 1998 to 2004, with a particularly sharp increase observed in 2004, when divestments reached a peak of £4.4 billion. This includes the total book value of investments written off, which was highest in 2001.

Importantly, in the later years, the rise in total value has also been due to the increase in the amounts divested through flotation of portfolio companies. The IPO exit route tends to be used mainly for larger companies, explaining why IPOs form a higher proportion of all exits when measured in terms of amount divested than by number of companies. In 2004, around 10% of the amount divested (£463m) flowed through the IPO route, compared with 1% when measured in terms of number of companies. Combined with the subsequent sale of quoted equity, about 18% of the total amount of PE divestments (£819m) went through the quoted equity markets in 2004. In comparison, trade sales accounted for 27% (£1,227) of total

[2] The recorded numbers include partial and full divestments. There may also be a small degree of double-counting, for example where more than one PE firm has divested from the same portfolio company.
[3] Detailed figures are presented in Appendix A1.1.

divestments. Averaged over the period 1998–2004, 20% of divestments were via the sale of new or existing public equity, compared with 35% of divestments via trade sales. No data is available on the relative importance of exits via the public equity markets if measured at market value rather than cost, but since IPOs are reserved for the more successful companies, the importance of the public equity markets as an exit route would be considerably higher if measured in terms of market value at exit.

2.2 UK IPOs backed by private equity

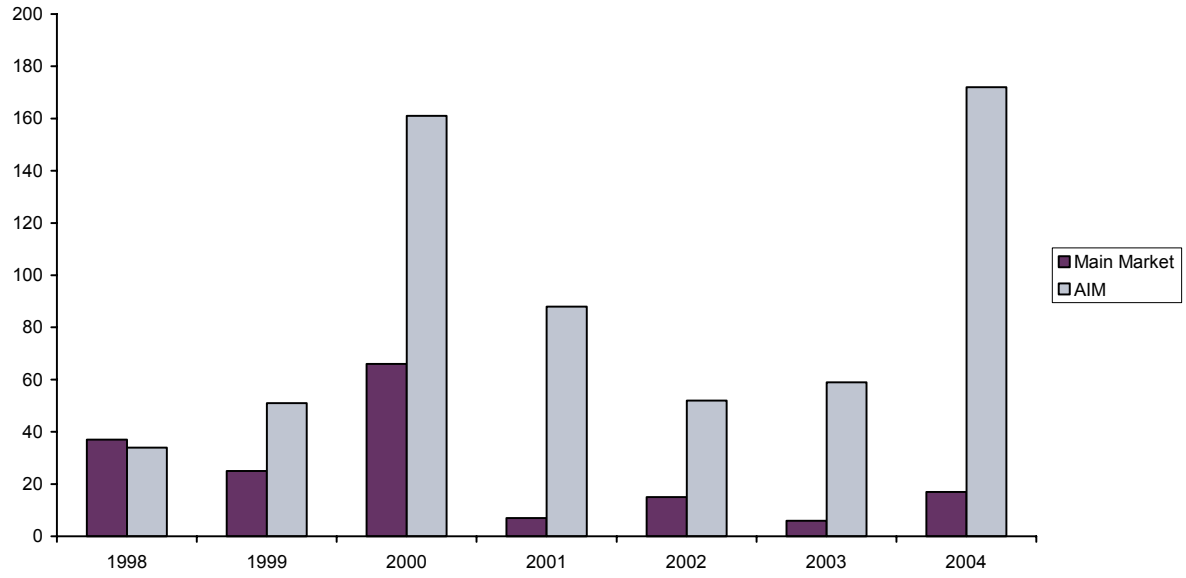
When considering PE-backed IPO activity in the UK, two questions arise:

– how important are PE-backed IPOs in relation to overall UK IPO activity?
– what are the preferred markets for the flotation of PE-backed companies?

Figure 2.3 presents a breakdown of all UK IPOs on the London markets for the years 1998–2004, distinguishing between the Main Market and AIM. The total number of IPOs is reported after excluding foreign companies, investment trusts and other types of collective investment vehicle.[4]

The data in Figure 2.3 confirms the success of AIM in attracting listings from new companies. With the exception of 1998, the number of IPOs on AIM has been significantly higher than that on the Main Market. 2004 stands out as a particularly successful year for AIM in terms of attracting IPOs.

Figure 2.3 Number of IPOs on the Main Market and AIM, 1998–2004



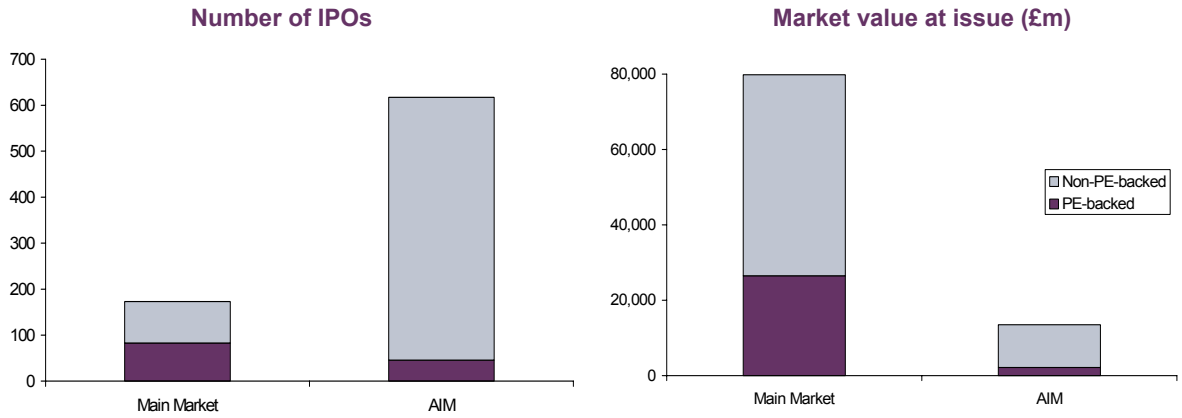
Note: The number of IPOs excludes foreign companies, investment trusts and other types of collective investment vehicle.
Source: LSE and Oxera calculations.

Figure 2.4 below counts the aggregate number of IPOs during the period 1998–2004, and, for each market, compares the number of IPOs that were PE-backed with those that were

[4] In addition to excluding foreign companies, companies with the following industry classification were excluded from the analysis: investment trusts, investment companies, investment entities, split capital investment trusts, UK investment trusts, and venture capital investment trusts. The list of IPOs was obtained from the LSE.

not. It also reports the aggregate market value of the issuing companies at IPO date. PE-backed IPOs were identified using two data sources: Initiative Europe, a specialist PE research and information house, which collects information on European PE markets, including IPOs backed by PE firms; and statistics on PE-backed IPOs collected separately by the BVCA and provided to Oxera. These two sets of data were combined and matched with the full LSE IPO list to identify those IPOs with PE backing.

Figure 2.4 PE-backed and other IPOs on the Main Market and AIM, 1998–2004



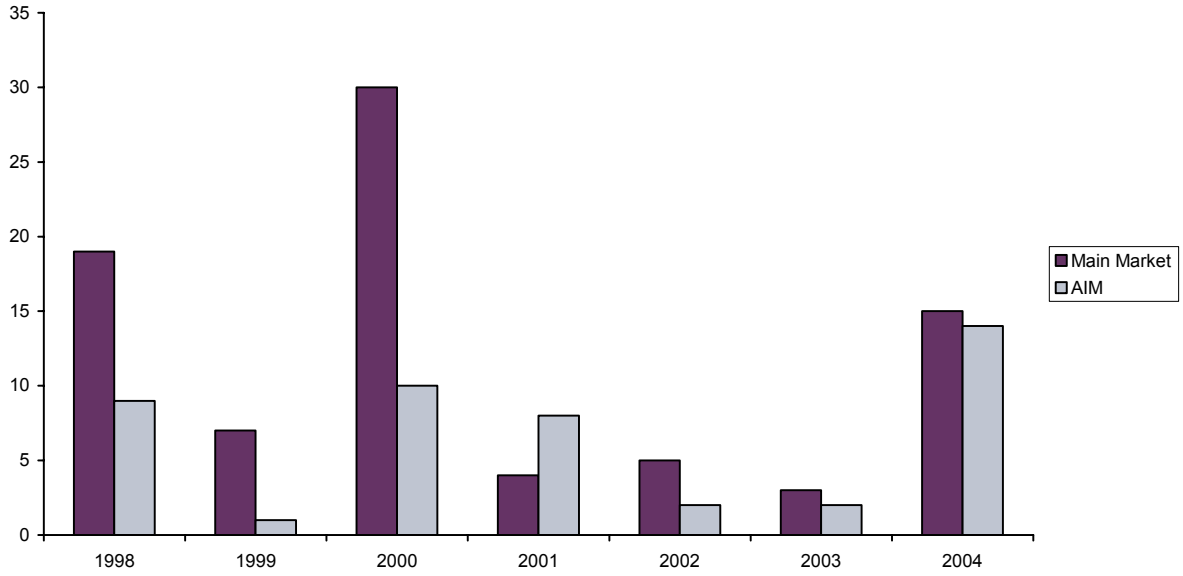
Note: IPOs exclude foreign companies, investment trusts and other types of collective investment vehicle.
Source: LSE, Initiative Europe, BVCA and Oxera calculations.

Figure 2.4 shows that although significantly more IPOs of UK companies occurred on AIM (ie, a total of 617 IPOs on AIM compared with 173 IPOs on the Main Market), PE-backed IPOs are more frequent on the Main Market. Indeed, nearly one-half of all IPOs on the Main Market were PE-backed. In comparison, PE backing applied to just under 8% of IPOs on AIM. This is consistent with the previous observation that flotations tend to be used as an exit route mainly for the larger PE-backed companies, which are more likely to seek a listing on the Main Market.

IPOs on the Main Market are significantly larger than those on AIM. As shown in Figure 2.4, the total market value of companies admitted to the Main Market exceeds that of companies on AIM by a factor of six (ie, £79.8 billion on the Main Market compared with £13.5 billion on AIM), despite the lower number of Main Market IPOs. PE-backing on AIM is more significant when measured in terms of the market value of the floated companies rather than absolute IPO numbers. While fewer than 8% of IPOs on AIM were PE-backed, the relative market value of those IPOs amounted to more than 16%. On average, PE-backed IPOs on AIM were more than twice as large other IPOs.

The importance of AIM for PE exits does seem to be growing, as is evident in Figure 2.5 below, which presents an annual breakdown of PE-backed IPOs by market during 1998–2004. Although the number of PE-backed IPOs on the Main Market exceeds those on AIM in each year (with the exception of 2001), there has been noticeable convergence in recent years. Nonetheless, the average Main Market IPO will be considerably larger than those taken to AIM; thus, the distinction between the markets in terms of exit value will remain significant.

Figure 2.5 Number of PE-backed IPOs on the Main Market and AIM, 1998–2004



Note: The number of IPOs excludes foreign companies, investment trusts and other types of collective investment vehicle.
Source: LSE, Initiative Europe, BVCA and Oxera calculations.

2.3 Summary

The IPO route of PE divestment is chosen for only a relatively small number of portfolio companies. However, in terms of total amounts divested—both at IPO and via subsequent sales of equity—public equity markets are a much more significant exit route for PE firms, indicating that IPOs are mainly observed for the larger PE-backed companies.

Around one-half of all Main Market IPOs of UK companies on the LSE were PE-backed, over the period 1998–2004. More PE-backed IPOs were taken public on the Main Market than AIM during this period, although the use of AIM has been growing in recent years.

3 The after-market performance of PE-backed IPOs

There is a large body of literature on the impact of PE involvement on various aspects of the process and performance of IPOs, such as survivor profile, initial and long-term returns, and the operating performance of issuing firms. However, much of the evidence is US-based. A survey of the literature is provided in Appendix 2. This section provides new empirical evidence on PE-backed IPOs of UK companies in the London markets. The analysis focuses on after-market return performance and two specific research questions that have also been addressed in the largely US-based literature:

– what are the initial returns (ie, underpricing) of PE-backed companies compared with other UK IPOs?
– what is the longer-term after-market return performance of these companies, as measured by returns over a one-year period from IPO date.[5]

3.1 Data and sample selection

The dataset of IPOs constructed to provide the descriptive statistics in section 2.2 was used as the starting point for collecting the data for this exercise. This comprised all IPOs in the London markets during 1998–2004, excluding foreign companies, investment trusts and other types of collective investment vehicle. Due to the comparatively low proportion of IPOs on AIM that were PE-backed, the performance analysis was restricted to IPOs on London's Main Market. In total, after excluding the large number of collective investment vehicles, 173 UK IPOs were identified as having taken place on the Main Market during the period, 83 of which were backed by a PE firm.

Studying the performance of all IPOs during 1998–2004 is problematic due to the stock market bubble that occurred during that period. This makes it difficult to draw inferences about market behaviour, whether statistical or qualitative. During this period, the after-market performance might not have been based fully on company fundamentals, and returns tended to be highly volatile, complicating any statistical analysis. A further complexity arises due to the problem of 'market timing' of IPOs: according to this argument, issuers exploit periods of positive market sentiment to take companies public. Therefore, in such times, on average poorer-quality firms may be taken public, which is likely to result in future underperformance.[6] To avoid the bubble influencing the new results, it was decided that this study should exclude all IPOs that took place during the years 1999 and 2000; instead, the analysis focuses on IPOs in 1998 and 2001–04.

A minimum of one year of post-IPO return data was required for the empirical analysis, which was sourced from Thomson Financial Datastream. The companies for which insufficient data was available were excluded from the sample—in particular, those that were taken public in the second half of 2004, or companies for which Thomson Financial Datastream data was missing. After applying this restriction, the final sample consists of 62 companies, 32 of which had PE backing. Table 3.1 below shows the number of IPOs in each year.

[5] The literature review also suggested that there may be abnormal price movements during the period due to lock-in expiry. An analysis of returns around lock-in is beyond the scope of this study.

[6] Coakley et al found evidence of the impact of such market timing on post-IPO performance. See Coakley, J., Hadass, L. and Wood, A. (2004), 'Post-IPO Operating Performance, Venture Capitalists and Market Timing', working paper, Department of Accounting, Finance and Management, University of Essex, November.

Given that the aim of the analysis is to compare the performance of two sets of companies, it is necessary to ensure that any potential differences in performance cannot be explained by characteristics other than PE backing.

Table 3.1 compares the PE- and non-PE-backed companies in terms of the number of IPOs in each group, the distribution of IPOs over time, and the average size of companies measured by market value at IPO date.[7]

Table 3.1 Sample description for after-market performance analysis

	PE backing		No PE backing	
	Number of companies	Average market value at IPO (£m)	Number of companies	Average market value at IPO (£m)
1998	17	129.3	14	112.1
2001	4	150.3	3	656.3
2002	5	183.2	10	619.7
2003	3	213.7	3	739.2
2004	3	240.4	0	–
Total	**32**		**30**	

Source: LSE, BVCA, Initiative Europe, Thomson Financial Datastream and Oxera calculations.

In total, the sample comprises 32 PE-backed companies and 30 companies without PE backing. In addition to being reasonably balanced in terms of number of companies, the samples are similar in terms of the distribution of IPOs over the years of analysis. The two groups of firms were similar in average size in 1998, but in the other years PE-backed IPOs were on average smaller. Inspection of the companies revealed no significant biases in terms of industry sectors in the two groups. It is not possible to ensure complete comparability between the groups of companies—eg, the sample size is too small to select companies using matching techniques. The methodology adopted seeks to further control for any differences between companies by adjusting for the companies' risk characteristics, as explained below.

3.2 Results of empirical analysis

The empirical analysis was undertaken based on two imaginary portfolios: one investing in every PE-backed IPO, and the other investing in all other IPOs, holding each stock for one year from the IPO date. In this way, a direct comparison can be made of the returns that investors would have earned, if they had been following such investment strategies. These buy-and-hold returns for the portfolios were then calculated on the following basis:

- **average total returns**—the actual returns earned on average on the PE-backed company portfolio and the non-PE-backed portfolio;
- **average abnormal returns**—for each portfolio, an average of the companies' returns over and above the return on a benchmark index, to adjust for companies' market risk;
- **weighted average abnormal returns**—average risk-adjusted returns weighted by the market value of each stock in the portfolio at IPO date.

The average total returns represent the actual returns that each investment strategy would be earning. However, when comparing companies' actual returns, appropriate adjustments

[7] Market value data on IPO date, like the return data, is taken from Financial Thomson Datastream.

should be made to allow for potentially different levels of risk—higher actual returns may merely reflect higher riskiness of the shares in the portfolio. This is why the analysis and results presented below focus on risk-adjusted abnormal returns. Appendix A1.2 describes the methodology and data used to obtain the risk-adjusted returns; Appendix A1.3 presents the results obtained for unadjusted returns.

Figures 3.1 and 3.2 track the returns that a buy-and-hold strategy would have earned for the portfolios on a daily basis, and show the average abnormal return time-series for the two portfolios, constructed on an equally weighted and market value-weighted basis, respectively.

Figure 3.1 Comparison of first-year abnormal returns of PE- and non-PE-backed IPOs, unweighted average returns (%)

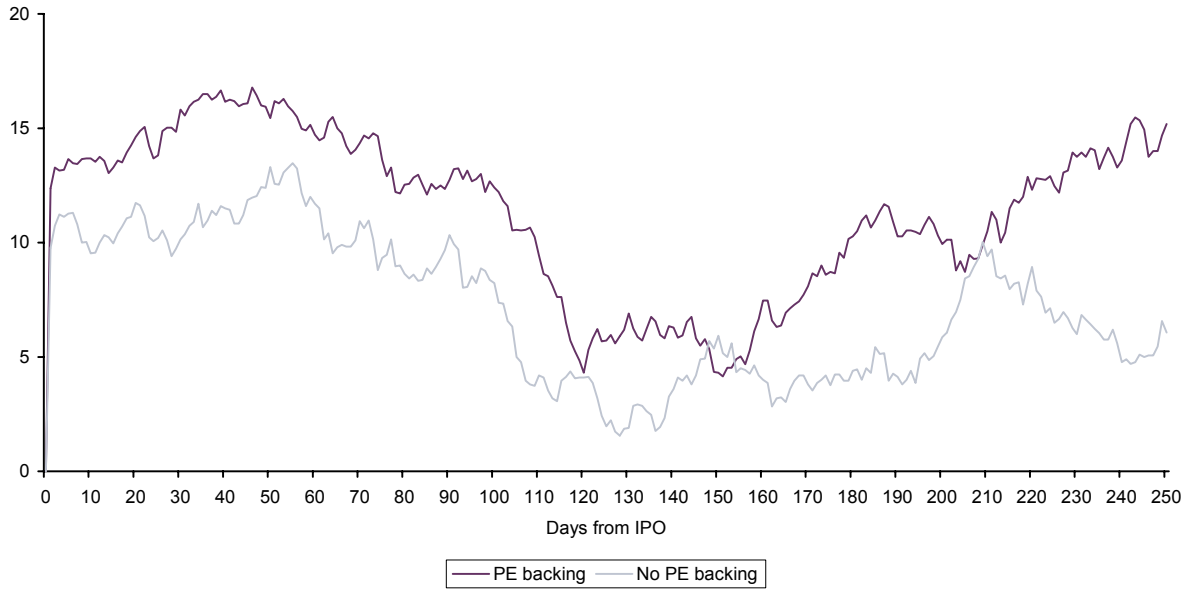
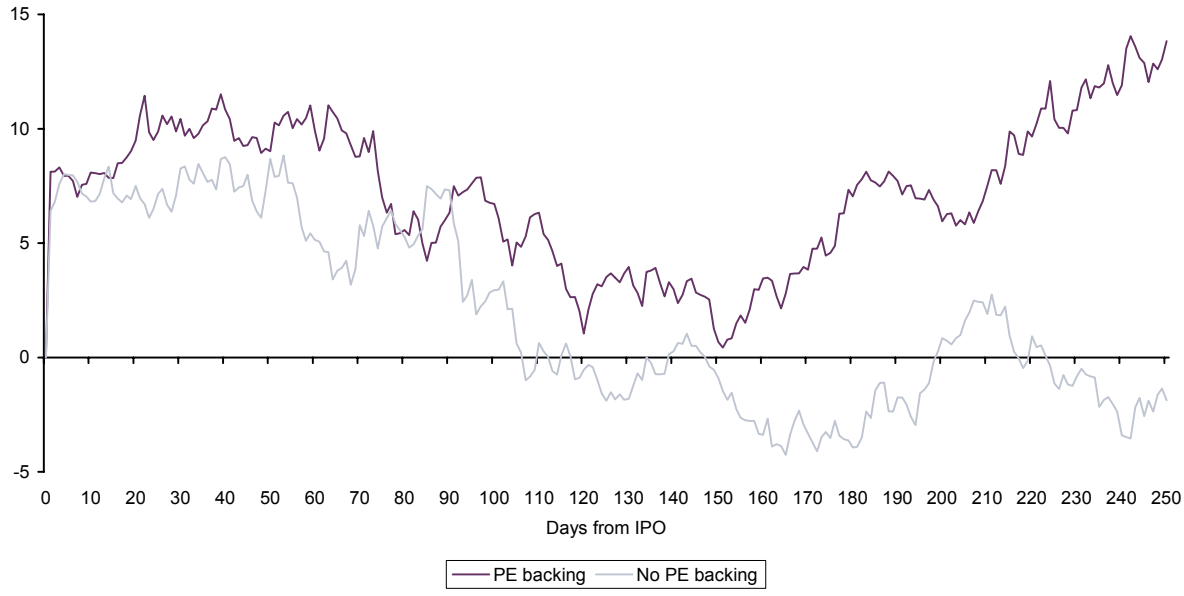


Figure 3.2 Comparison of first-year abnormal returns of PE- and non-PE-backed IPOs, average returns weighted by market value (%)



Source: LSE, BVCA, Initiative Europe, Thomson Financial Datastream and Oxera calculations.

Some qualitative observations can be made from Figures 3.1 and 3.2. First, the return series appears volatile over time. After a significant jump on the first day, there is a distinctive dip after six months. After this dip, the returns again tend to increase to levels achieved on the first day of trading. The second observation is that the PE-backed IPO portfolio appears to earn consistently higher returns to investors during the first year of trading. In particular, when the returns are weighted by market value as at IPO date (Figure 3.2), the performance of the portfolios seems to diverge significantly towards the end of the period.

Another observation from the figures relates to the high initial returns, which confirm the existence of IPO underpricing, as noted by numerous studies in the literature. On an unweighted basis, the average first-day returns on the portfolios are 12.4% for PE-backed IPOs and 9.8% for other IPOs. The weighted average returns on the two portfolios are 8.1% and 6.4%, respectively. The size of the abnormal initial returns is roughly in line with estimates presented in the existing IPO literature. As noted in the literature review, there could be reasons to expect the IPO underpricing to be less pronounced for companies with PE backing,[8] and several US studies have found evidence in this respect. The underpricing estimates obtained here suggest the opposite—underpricing is greater for PE-backed IPOs. As discussed below, however, the difference in the first-day return for the two portfolios is not statistically significant.

Table 3.2 summarises the results in tabular form, giving the average return for each portfolio at several intervals during the one-year period, and showing the difference between the two.

Table 3.2 Comparison of post-IPO performance of PE- and non-PE-backed companies, average abnormal returns (%)

	Unweighted average			Market value-weighted average		
	PE backing	No PE backing	Difference	PE backing	No PE backing	Difference
First day	12.4	9.8	2.6	8.1	6.4	1.7
First week	13.7	11.3	2.4	7.9	8.0	0.0
First month	14.9	11.6	0.0	10.6	7.0	3.6
Six months	5.7	2.0	3.8	3.5	–1.9	5.4
First year	15.2	6.1	9.1	13.8	–1.9	15.7

Note: The returns reported are average buy-and-hold returns, calculated on the days specified in the table. Statistical tests suggest that the difference between the means at a given date is not statistically significant.
Source: Thomson Financial Datastream, LSE, BVCA, Initiative Europe and Oxera calculations.

The table shows, as indicated in Figures 3.1 and 3.2, that the average return on the PE-backed portfolio has been consistently higher than that on the non-PE-backed portfolio. The unweighted average return on the PE-backed portfolio is 12.4% on the first day. After this high first-day return, investors would earn another 3% on the portfolio during the first year, with a dip in returns at around six months. Over the one-year period, this compares favourably with the unweighted average returns on the portfolio of non-PE-backed shares. The first-day return of this portfolio is somewhat lower, at 9.8%, falling to 6.1% at the end of first year. The absolute difference in the one-year buy-and-hold returns for the two portfolios is 9.1 percentage points.

When the averages are weighted by market value, lower returns are observed for both portfolios. The PE-backed portfolio return is approximately 8.1% on the first day, and

[8] For example, due to the role that PE firms may play in 'certifying' IPO quality and reducing the information problem, as noted by Megginson, W.L. and Weiss, K.A. (1991), 'Venture Capitalist Certification in Initial Public Offerings', *Journal of Finance*, **46**, 879–903.

increases to 13.8% over one year. The portfolio of the non-PE-backed firms fares worse: the 6.4% first-day return was eradicated in the course of the first year, and investors would have made a risk-adjusted abnormal return of –1.9% had they followed this investment strategy.

Tests were conducted to assess the statistical significance of the difference in after-market return performance between PE- and non-PE-backed IPOs on the different dates during the period of analysis. Although the average return for the PE-backed portfolio is consistently higher than that for the other portfolio, this difference is not statistically significant (at conventional significance levels) at any point in time. This is because the sample size is relatively small, and the within-sample standard deviation around the mean is high.

3.3 Summary and conclusions

The empirical results presented above provide an interesting picture of the first-year market performance of PE-backed companies after their IPO on London's Main Market. In particular, PE-backed firms have, on average, produced higher returns for investors in their first year of trading than IPOs that were not backed by a PE firm. Further research using a larger sample would be required to establish whether the results are statistically significant.

4 The liquidity of the London markets

An assessment of after-market liquidity is important as it determines the costs incurred when a PE firm liquidates its holdings in an already publicly quoted company. This type of transaction typically involves the sale of a large stake—indeed, as shown in Figure 2.2, for PE-backed firms, the aggregate amount divested in secondary sales is larger than the aggregate equity divested through IPOs. The sale of quoted equity may be achieved as a block trade, or over time in a series of smaller trades.

The multitude of costs incurred in this process presents difficulties when seeking to provide a single, well-articulated measure of liquidity. Liquidity measures fall broadly into two categories:

– measures by volume, such as turnover;
– measures by transaction cost, such as effective spread.

The focus of the empirical analysis here is on the turnover measure of liquidity, which provides evidence on the number of trading days that it would take PE investors to sell their stakes in the after-market following a company's flotation on London's Main Market and AIM.

While section 4.1 presents aggregate measures of market turnover based on LSE statistics, section 4.2 contains the results of primary research into the liquidity of quoted companies in different size categories, looking in particular at company sizes that are most relevant for PE firms.

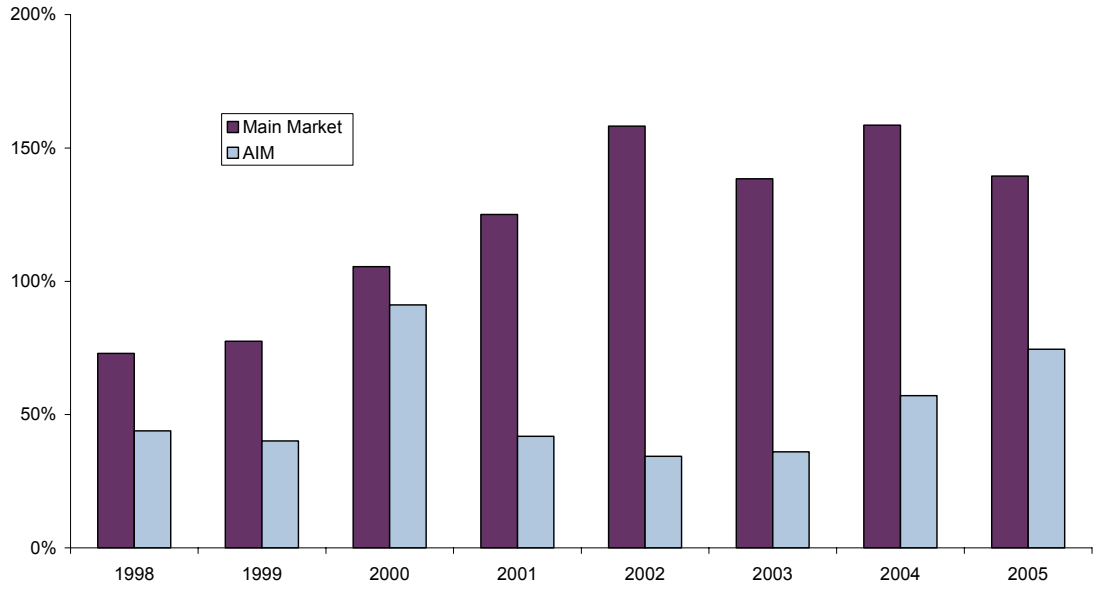
4.1 Existing evidence: aggregate statistics on turnover

Data to calculate turnover for both the Main Market and AIM at an aggregate level is readily available and published by the LSE.[9] Figure 4.1 below presents the aggregate measures of turnover, measured as the ratio of the total value of shares traded to total market capitalisation, calculated over the period 1998–2005.

The figure shows an upward trend in liquidity of the Main Market as a whole, with annual turnover equal to 139% in 2005. Aggregate Main Market turnover is consistently higher than turnover on AIM—twice as high or more in most years. Leaving aside the peak in relative trading activity in 2001, aggregate turnover on AIM has also increased, especially in 2004 and 2005, reaching 74% in 2005.

[9] http://www.londonstockexchange.com/en-gb/pricesnews/statistics/factsheets/

Figure 4.1 Annual aggregate turnover, 1998–2005



Note: Annual turnover is the ratio between the total value of trades in the year to the total market capitalisation at year end. The Main Market turnover refers to shares of UK companies only, whereas the turnover on AIM includes both UK and international companies.
Source: LSE data and Oxera calculations.

4.2 New evidence: turnover by firm size

While the aggregate statistics provide a useful overall picture of the liquidity of the markets, the information is not necessarily of direct relevance for PE firms wishing to exit from their investments via the sale of quoted equity. The aggregate statistics are market value-weighted, which means that greater weight is placed on the turnover of the very large companies. PE firms, however, generally operate at the smaller end of the market of quoted equity—the majority of floated PE-backed companies have a market value of less than £500m.

For this reason, the liquidity of companies of direct relevance for PE firms should be analysed. This section presents the results of new analysis, conducted to establish differences in turnover across markets, while distinguishing between companies of different size.

4.2.1 Sample, data description and methodology

The first step in the analysis was to create a dataset of companies quoted in the two markets. This was undertaken by identifying the constituents of the most comprehensive stock market indices available for the markets, using data from Thomson Financial Datastream. All data was downloaded in January 2005; thus, the market constituents are the quoted companies included in the indices at the time.

- **AIM**—the FTSE AIM Index was used to identify companies quoted on AIM. In January 2005, 978 companies were included in the FTSE AIM Index and downloaded.
- **LSE Main Market**—the Main Market companies were identified using two indices:
  - **FTSE All-share Index**, which aims to represent 98% of all companies listed on the LSE by market value. In January 2005, 706 companies were included in the FTSE All-share Index and downloaded from Thomson Financial Datastream;

– **FTSE Fledgling Index**, which covers companies in the Main Market that are not included in the All-share. In January 2005, 370 companies were included in the FTSE Fledgling Index and downloaded.

Two indices were used to identify the Main Market companies owing to the criteria that companies need to meet in order to be included in the FTSE All-share Index. Apart from excluding the smallest companies, the All-share Index requires companies to fulfil a liquidity criterion of a share turnover of least 0.5% of share capital per month. Therefore, the FTSE All-share Index excludes both the smallest and the least liquid companies, and would not be comparable with the FTSE AIM, which does not impose such requirements. The companies comprising the smallest 2% of the Main Market can be identified by also including the FTSE Fledgling Index companies in the sample. Importantly, the Fledgling companies do not have to fulfil any liquidity criteria and therefore the less liquid companies are also identified.[10]

These indices contain a large number of investment trusts, real estate investment trusts, and other quoted collective investment vehicles, which excluded from the sample for the purpose of analysis. The final criterion for inclusion in the sample was the availability of at least one observation of monthly turnover data during the estimation period. Table 4.1 presents the number of companies in the final dataset.

Table 4.1 Number of companies for turnover analysis

	Main Market	AIM
2003	812	690
2004	833	940
Total	834	950

Note: Data was downloaded for the index constituents as at January 2005, explaining the differences in sample companies in the two years of analysis.
Source: Thomson Financial Datastream and Oxera calculations.

Table 4.2 examines differences in company size in the two markets, as measured by market value, and presents the frequency distributions.

Table 4.2 Frequency distribution of sample by market value (%)

	< £10m	£10m–£100m	£100m–£1 billion	£1 billion–£10 billion	> £10 billion
AIM	54.0	41.8	4.2	0.0	0.0
Main Market	7.0	34.8	39.6	15.7	2.8

Note: The market value for each company in the sample was measured as at January 2004.
Source: Thomson Financial Datastream and Oxera calculations.

As expected, the distribution of companies on the Main Market is very different from that on AIM. While for the Main Market, close to half of companies have a market value of less than £100m, 96% of AIM companies fall into this size category.

For the purposes of this analysis, liquidity is measured by the monthly share turnover, obtained by dividing the trading volume of a company's stock in each month by the number

[10] A small number of companies that would qualify for the FTSE All-share by size, but fail the liquidity criterion, are not included in any FTSE index. According to the FTSE, 47 companies at the end of 2003, and 17 at the end of 2004 fell into this category. This means that the Main Market sample excludes a number of illiquid companies that would be included in AIM.

of shares in issue.[11] The relevant data for the identified companies was obtained from Thomson Financial Datastream. Data was downloaded at monthly intervals for the two years from January 2003 to December 2004. The monthly turnover observations per company were then averaged to obtain annual estimates of turnover across the samples of companies.

4.2.2 Empirical findings

The results of the turnover analysis are presented below, focusing on companies with a market value of up to £500m, which is considered to be the most relevant size range for PE backing (Figures 4.2 and 4.3), and up to £1 billion, to capture the potential size of very large PE-backed companies (Table 4.3). The turnover comparison for the entire sample, including companies of all size, is presented in Appendix A1.4.

Figures 4.2 and 4.3 report the average turnover for companies with a market value up to £500m for the two years 2004 and 2003. The sample companies were further divided into market-value categories at £30m intervals. For example, the first category contains companies with a market value between £0 and £30m. In this way, the changes in turnover velocity can be tracked and compared across companies of different size.

The figures show how turnover increases with company size. For example, on the Main Market, turnover for companies with a market value of about £100m is 4%, rising to more than 8% for companies with a market value of about £500m.

The second observation is that companies listed on the Main Market have on average consistently higher liquidity than AIM companies. This is in line with the conclusions derived from the aggregate market statistics reported in section 4.1. Average turnover on AIM remains below 3% for all size categories. Similar trends are present in both 2004 and 2003, although liquidity on AIM is shown to have improved since 2003.

[11] The results presented in Table 4.3 and those that follow were calculated using the market value and number of shares based on all shares in issue. An alternative measure would have been to use free-float-adjusted data, which would exclude significant shareholdings of strategic investors such as directors, founder families, governments and employee share schemes. Oxera also produced results based on Thomson Financial Datastream estimates of companies' free floats. This free-float adjustment did not change the conclusions reported here. As there were concerns about the definition of free float, the results are not reported.

Figure 4.2 Average monthly turnover by firm size, 2004

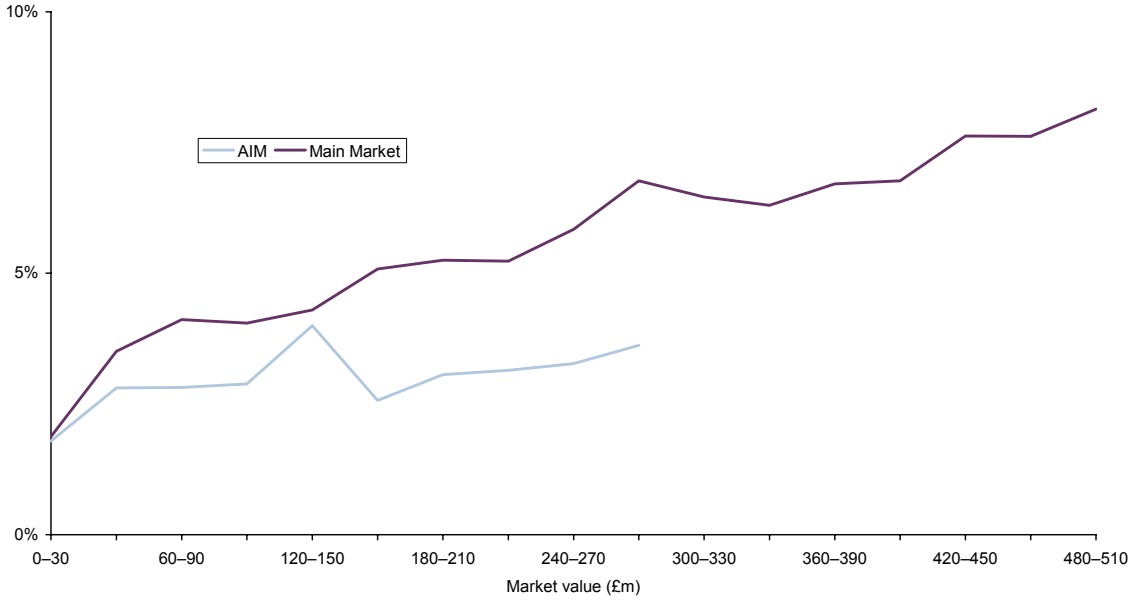
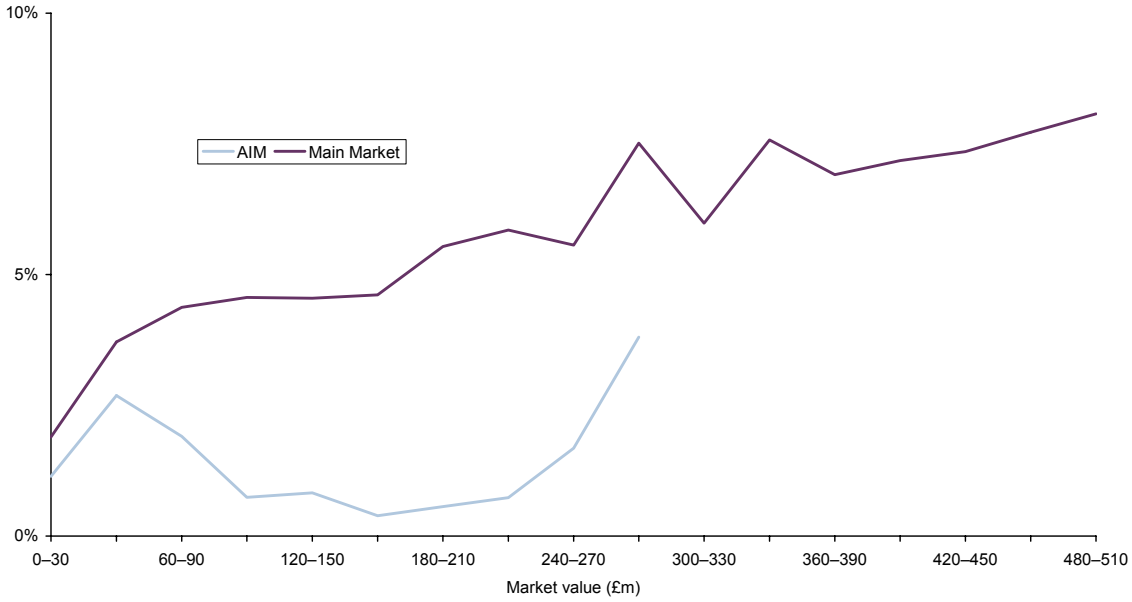


Figure 4.3 Average monthly turnover by firm size, 2003



Note: Monthly turnover calculated as ratio of total monthly trading volume to the number of shares in issue. The reported figures are medians. The series for AIM stops at a market value of £300m since no or only a few companies are observed in the larger size categories.
Source: Thomson Financial Datastream and Oxera calculations.

Table 4.3 presents the turnover results for London's Main Market and AIM in tabular form, dividing the sample companies into broader size categories to reflect four types of venture capital (VE) and PE investments: small VC-/PE-backed companies (market value up to

£100m); average-size PE-backed companies (£100m–£250m);[12] medium/large PE-backed companies (£250m–£500m); and very large PE-backed companies (£500m–£1 billion).[13]

Table 4.3 Comparison of average monthly turnover by broad market-value category, (%)

	Small VC-/ PE-backed (£0–£100m)	Average PE-backed (£100m–£250m)	Medium/large PE-backed (£250m–£500m)	Very large PE-backed (£500m–£1 billion)
2004				
Main Market	2.74	4.90	6.88	9.70
AIM	1.96	2.99	–	–
2003				
Main Market	2.90	5.14	7.03	9.76
AIM	1.23	0.55	–	–

Note: Monthly turnover is calculated as the ratio of the total monthly trading volume to the number of shares in issue. The reported turnover figures are medians. Turnover figures on AIM in the larger market value categories are omitted due to the small number of observations in these categories.
Source: Thomson Financial Datastream and Oxera calculations.

The figures reported in the table show again that the turnover of Main Market companies is higher than that for AIM companies, even when considering companies in the same size range. For example, in 2004, the average turnover for companies with market value of less than £100m (ie, smaller VC-backed companies) was 2.7% on the Main Market, rising to 4.9% for average-sized PE-backed companies (ie, market value of £100m–£250m). In comparison, turnover on AIM in 2004 is less than 3% on average for companies in the relevant market value categories. However, average turnover on AIM has improved considerably since 2003.

The turnover averages mask the considerable variation in turnover between firms in the same size category. Figures 4.3 and 4.4 present evidence of this variation for both the Main Market and AIM, by reporting the range between the first and third quartiles of the estimated turnover in 2004.

In both markets, there are companies with a significantly higher (and lower) turnover than the average. For example, while turnover for the average Main Market company with a market value of about £100m was 4%, a quarter of companies of that size had a turnover of more than 7%. Similarly, considering companies with £100m market value on AIM, turnover for a quarter of companies was 6.3%, which is more than twice as high as the 2.9% average, and more than six times as high as the 1% turnover estimated for the quarter of companies with the lowest turnover.

Comparison of Figures 4.3 and 4.4 also suggests that turnover differences between the Main Market and AIM for similarly sized companies are less pronounced when considering the range rather than the average. Although shares of the average Main Market company turn over considerably more frequently than those of an AIM company of similar size, a significant number of AIM companies have turnover equal to, or exceeding, the Main Market average in the relevant size category.

[12] See Table 3.1, which shows the average market value of a sample of PE-backed IPOs of UK companies.

[13] Average turnover for companies with market value above £1 billion are presented in Appendix A1.3.

Figure 4.4 Inter-quartile range of monthly turnover by firm size for Main Market companies, 2004

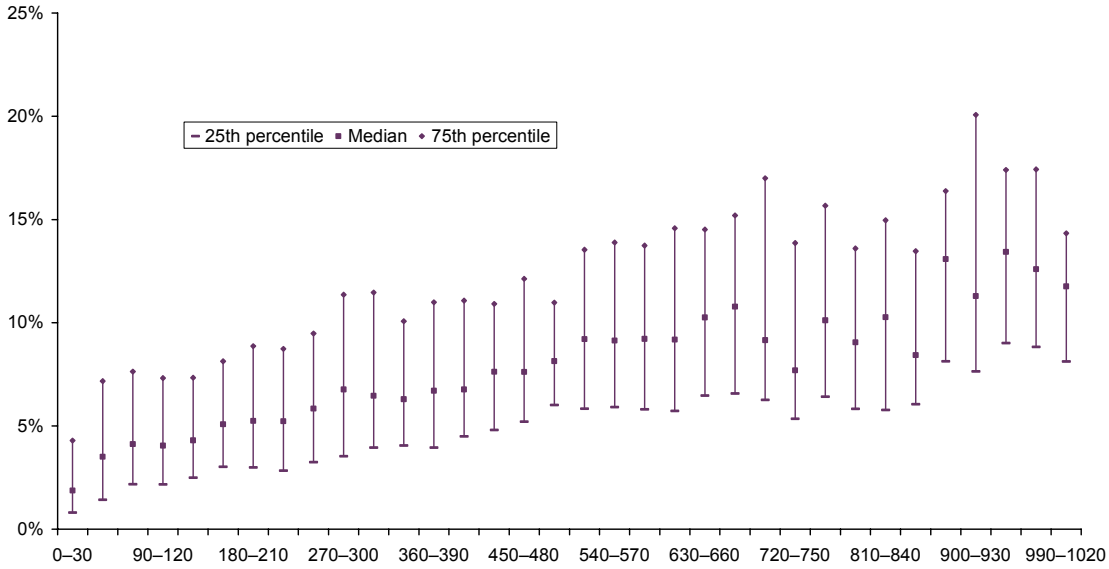
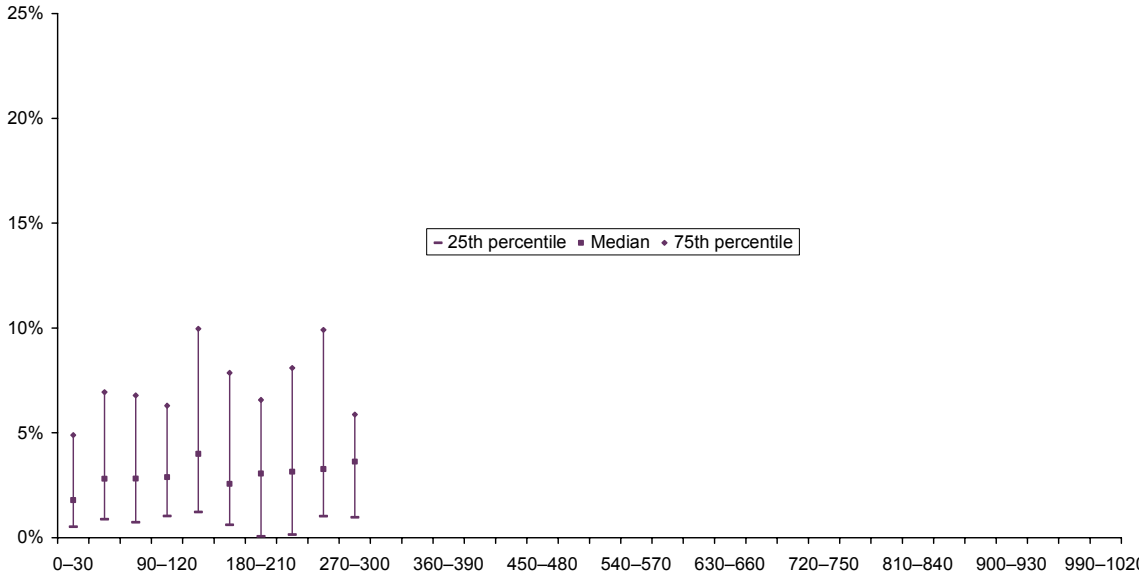


Figure 4.5 Inter-quartile range of monthly turnover by firm size for AIM companies, 2004



Note: Monthly turnover calculated as ratio of monthly trading volume to the number of shares in issue. The report values show the interquartile range, with the medians as reported in Figures 4.1. The series for AIM stops at a market value of £300m since no companies, or only a few, are observed in the larger size categories.
Source: Thomson Financial Datastream and Oxera calculations.

4.3 Summary and conclusions

An assessment of after-market liquidity is important as it determines the costs incurred when a PE firm liquidates its holdings in a portfolio company following flotation. The analysis in this section has focused on turnover measures of liquidity, reporting turnover estimates for both the Main Market and AIM. On average, turnover on the Main Market is higher than on AIM,

even when controlling for size differences between companies on the two markets. However, turnover on AIM has increased considerably over time. Moreover, there is considerable variation in turnover between similarly sized companies on both markets, and while shares in some AIM companies are traded infrequently, the turnover of other companies matches or exceeds that of the average company on the Main Market.

Appendix 1 Data and further empirical results

A1.1 Data on IPOs and other divestments of PE firms

Tables A1.1 and A1.2 present the underlying data used in constructing Figures 2.1 and 2.2. Table A.1.3 shows the data on UK IPOs, used to generate Figures 2.3, 2.4 and 2.5.

Table A1.1 Type of divestment by number of firms, 1998–2004

	1998	1999	2000	2001	2002	2003	2004
Write-off	159	194	195	356	257	257	225
Trade sale	242	236	259	261	156	171	257
Sale to management (buy-back)	99	156	149	123	100	105	122
Sale to financial institutions	8	13	11	25	10	33	24
Sale to another PE firm	19	28	20	17	11	48	60
Divestment by other means	105	105	96	100	109	133	123
Sale of quoted equity	177	161	139	196	135	138	134
Divestment on flotation	41	18	42	9	26	10	43
Total	**850**	**911**	**911**	**1,087**	**804**	**895**	**988**

Source: BVCA (2004, 2005), 'Report on Investment Activity'.

Table A1.2 Type of divestment by amount divested, 1998–2004 (£m)

	1998	1999	2000	2001	2002	2003	2004
Write-off	100	120	116	826	628	471	593
Trade sale	947	495	604	1,024	791	619	1,227
Sale to management (buy-back)	95	41	41	85	96	123	173
Sale to financial institutions	138	90	85	185	108	349	190
Sale to another PE firm	147	100	430	163	114	410	899
Divestment by other means	55	92	141	94	177	130	587
Sale of quoted equity	224	180	108	226	114	290	356
Divestment on flotation	103	151	86	68	571	501	463
Total	**1,809**	**1,269**	**1,611**	**2,671**	**2,599**	**2,893**	**4,488**

Source: BVCA (2004, 2005), 'Report on Investment Activity'.

Table A1.3 Breakdown of UK IPO activity by market and PE involvement, 1998–2004

	Main Market			AIM		
	No PE backing	PE backing	Total	No PE backing	PE backing	Total
1998	18	19	37	25	9	34
1999	18	7	25	50	1	51
2000	36	30	66	151	10	161
2001	3	4	7	80	8	88
2002	10	5	15	50	2	52
2003	3	3	6	57	2	59
2004	2	15	17	158	14	172

Source: LSE, Initiative Europe, BVCA and Oxera calculations.

A1.2 Methodology of after-market return performance analysis

The following sets out the methodology used to obtain the risk-adjusted abnormal returns for the IPO after-market performance analysis presented in section 3.

When comparing companies' actual returns, appropriate adjustments should be made regarding the potentially different levels of risk—higher actual returns may merely reflect a greater level of risk of the shares in the portfolio. This is why the analysis focuses on risk-adjusted abnormal returns (AR), which in this context can be defined as the return that a company earns over and above the beta-adjusted return on a suitable market benchmark index:[14]

$$AR_i = R_i - \beta_i * R_m,$$

where:

R_i actual return for company i;
β_i beta coefficient from the capital asset pricing model (CAPM);
R_m return on a suitable market index.

While return data is readily available, one methodological issue relates to the measurement of the beta coefficient. Betas could be estimated from the return data that is also used in the analysis. However, this could be distortive—the main interest of this analysis is the perception of risk before the IPO (ie, the ex ante risk) rather than the ex post risk, which is only revealed after the IPO. Betas estimated from the return data would reflect ex post rather than ex ante risk.

This study therefore used an alternative methodology for estimating the companies' market risk. Each company was assigned a beta according to its FTSE Industry Sub Sector classification.[15] The sectoral betas were taken from the London Business School Risk Measurement Service, and corresponded to the average beta for the sector during the year the IPO took place. Effectively, betas of companies in the same sector at the time of the IPO were taken to proxy investors' expectations of the IPO companies' market risk. While ignoring company-specific factors, this methodology produces a reasonable measure of the

[14] For a discussion of methods for calculating returns, see Ritter, J.R. (1998), 'Event Study Methodology Since 1969', *Review of Quantitative Finance and Accounting*, **11**:111–37.

[15] This industry classification has been available since spring 1999. For IPOs prior to this, the most detailed industry categorisation available for a company was used.

companies' ex ante betas. The FTSE 100 index was used as the market benchmark for the risk adjustment.

Both the average total returns and average abnormal returns were calculated on an equally weighted basis—ie, assuming that an equal amount was invested in each IPO. In addition to these measures, weighted average abnormal returns were calculated, where investment was taken to be proportional to the market value of each stock at the IPO date. In this calculation, the returns of larger firms have a proportionately larger impact on the calculated average returns.

The financial data employed in all calculations uses Thomson Financial Datastream's total return index for each company, which accounts for dividends as well as capital gains.[16] The total return of each stock was tracked on a daily basis for the first year of trading, and the individual returns of the stocks were then combined into the two portfolios based on whether they were PE-backed or not. Average returns were then calculated for each portfolio on each day, and statistical significant tests were undertaken to determine the significance of any differences between PE-backed and other IPOs.

A1.3 Further results of after-market return performance analysis

Table A1.4 shows further results for the after-market performance analysis in section 3. Average actual returns, average abnormal returns and weighted average abnormal returns are reported separately for PE- and non-PE-backed IPOs of UK companies. The return differences are generally not statistically significant.

Table A1.4 Comparison of first-year market returns of PE- and non-PE-backed UK IPOs (%)

	PE-backed firms			Non-PE-backed firms		
	Actual return	Abnormal return	Weighted abnormal return	Actual return	Abnormal return	Weighted abnormal return
First day	12.3	12.4	8.1	9.7	9.8	6.4
First week	13.9	13.7	7.9	10.8	11.3	8.0
First month	15.3	14.9	10.6	10.0	11.6	7.0
Six months	0.0	5.7	3.5	–3.2	2.0	–1.9
First year	22.2	15.2	13.8	8.4	6.1	–1.9

Note: The returns reported are mean buy-and-hold returns following flotation, calculated on the days specified in the table. Actual returns are the total unadjusted returns, while abnormal returns are beta-adjusted to capture differences in risk. Weighted returns are market value-weighted averages, with the market value measured as of the IPO date.
Source: Thomson Financial Datastream and Oxera calculations.

A1.4 Further results of comparative turnover analysis

Table A1.5 shows more results of the turnover analysis described in section 4.2. While section 4.2 focused on companies with a market value of less than £500m, Table A1.5 considers the entire sample of companies, and presents average turnover for companies in different size categories.

[16] The return index shows a theoretical growth in value of a shareholding over a specified period, assuming that dividends are reinvested to purchase additional units of an equity at the closing price applicable on the ex-dividend date.

Table A1.5 Average monthly turnover by firm size (%)

	2004		2003	
Market value	AIM	Main Market	AIM	Main Market
£0m–£100m	1.96	2.74	1.23	2.90
£100m–£250m	2.99	4.90	0.55	5.14
£250m–£500m	2.11	6.88	1.68	7.03
£500m–£1 billion	0.06	9.76	0.22	9.70
£1 billion–£2 billion	–	13.19	–	13.12
£2 billion–£3 billion	–	16.81	–	16.53
£3 billion–£4 billion	–	14.72	–	16.75
£4 billion–£5 billion	–	13.94	–	15.58
£5 billion–£6 billion	–	15.09	–	15.28
£6 billion–£7 billion	–	16.22	–	15.29
£7 billion–£8 billion	–	13.19	–	14.10
£8 billion–£9 billion	–	11.82	–	14.08
£9 billion–£10 billion	–	12.63	–	12.83
£10 billion–£100 billion	–	10.31	–	10.51
£100 billion–£200 billion	–	9.25	–	6.41

Note: Monthly turnover calculated as ratio of total monthly trading volume to the number of shares in issue. The reported figures are medians. The series for AIM stops because no or only a few companies are observed in the larger size categories.
Source: Thomson Financial Datastream and Oxera calculations.

Appendix 2 Literature review

Numerous research studies have evaluated the impact of VC involvement on various aspects of the process and performance of IPOs, such as survivor profile, initial and long-term returns, and the operating performance of issuing firms. However, much of the evidence is US-based.

Megginson and Weiss (1991) focused on the role of venture capitalists in 'certifying' the value of issuing firms and the quality of company information reported at the IPO.[17] Using a sample of US IPOs between 1983 and 1987, they found that VC backing results in significantly lower underpricing. Underpricing refers to initial returns and is measured as the first-day closing price and the initial offer price. The average initial returns for VC-backed IPOs was 7.1% compared with 11.9% for a matched sample of non-VC-backed IPOs.[18] The evidence supported the authors' hypothesis that VC backing reduces the asymmetry of information between the issuing firm and investors. Megginson and Weiss also examined the average compensation, or gross spread, as a percentage of the offer price paid to underwriters. They reported significantly lower spreads for VC-backed IPOs than for non-VC-backed IPOs. This is consistent with the view that the presence of venture capitalists lowers underwriter compensation, for example, by reducing the underwriters' costs of due diligence. Overall, the study concluded that VC-backed firms may be able to issue public equity at a lower total cost than non-VC-backed firms.

Barry et al (1990) examined IPOs of VC-backed companies in the USA between 1978 and 1987, and also concluded that venture capitalists perform intensive monitoring, reducing the level of IPO underpricing relative to non-VC-backed IPOs.[19] Consistent with a monitoring role that continues for some time after the IPO, the authors found that venture capitalists hold substantial shareholdings and, in many cases, venture capitalists retain their investments well beyond the IPO.

Contrary evidence to lower underpricing for VC-backed companies was presented in Francis and Hasan (2001).[20] For a sample of US IPOs during 1990–93, the authors reported that initial-day returns of VC-backed IPOs were higher on average than those in the non-VC-backed group—average underpricing was 13.5% for VC-backed firms compared with 10% for the non-VC-backed group. They also observed a significantly higher degree of pre-market pricing inefficiency in the initial offer price of VC-backed IPOs, with a significant portion of initial-day returns being due to deliberate underpricing in the pre-market.

Jain and Kini (1995) examined the operating performance of VC-backed firms following IPO.[21] They found declines in operating performance for both VC- and non-VC-backed IPOs relative to their pre-IPO levels, with the decline being significantly deeper for the latter group.

[17] Megginson and Weiss (1991), op. cit.

[18] There is a large body of literature examining IPO underpricing in general. The literature ascribes underpricing to the existence of pre-market information asymmetry and views abnormal initial returns as an effort to compensate investors. For a review, see, for example, Jenkinson, T. and Ljungqvist, A. (2001), *Going Public: The Theory and Evidence on How Companies Go Public,* second edition, Oxford: Oxford University Press.

[19] Barry, C.B, Muscarella C.J., Peavey, J.W, and Versuypens, M.R. (1990), 'The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-public Process', *Journal of Financial Economics,* **27**, 447–71.

[20] Francis, B.B. and Hasan, I. (2001), 'The Underpricing of Venture and Non-venture Capital IPOs: An Empirical Investigation', *Journal of Financial Services Research*, **19**, 99–113.

[21] Jain, B. and Kini, O. (1995), 'Venture Capitalist Participation and the Post-issue Operating Performance of IPO Firms', *Managerial and Decision Economics*, **16**, 593–606.

Similarly, the VC-backed group demonstrated relatively superior performance in terms of the operating return on assets in each post-issue year relative to the pre-IPO year. In addition, Jain and Kini showed that the capital market recognises the value of VC monitoring, which is reflected in the higher levels of market to book and price to earnings (p/e) ratios at the time of the offering. The results were interpreted as supporting the view that venture capitalists are able to take issuers public at higher p/e ratios.

The findings may also be interpreted in line with Lerner's (1994) argument that venture capitalists appear to be particularly proficient at timing the IPO market.[22] Lerner found that venture capitalists take firms public at market peaks and rely on private financing when the market valuation of equity is low. He further noted that the more experienced the VC, the more proficient it is in the timing of taking firms public, thereby reducing the level of underpricing.

In subsequent research, Jain and Kini (2000) examined whether venture capitalists add value to the going-public process by improving the survival profile of IPO issuers.[23] They established that the involvement of venture capitalists improves the survival profile of IPO firms, and that several other variables are potentially influenced by VC involvement—such as R&D allocations, analyst following, investment banker prestige, and success on roadshows—which, in turn, were also positively related to the survival time of IPO issuers.

Gompers and Lerner (2001) compared the buy-and-hold returns of VC- and non-VC-backed IPOs in the USA between 1976 and 1999 and found that VC-backed IPOs had significantly higher returns, especially during the mid- to late 1990s.[24] Brav and Gompers (1997) also found a superior stock price performance of VC-backed IPOs during the 1972–92 period, but only when returns are weighted equally (ie, disregarding size).[25] The underperformance in non-VC-backed IPOs was driven primarily by smaller issuers, and the performance difference between VC- and non-VC-backed IPOs largely disappeared when weighting the returns by the size of the offering. Brav and Gompers (2004) related long-run stock performance to the degree of VC involvement in a sample of US IPOs.[26] While they did not find significant differences in performance between VC- and non-VC backed firms, there was a positive relation between the degree of VC involvement (measured by VC board membership) and performance.

Although the literature comparing the performance of VC-backed and other IPOs is largely US-based, recent evidence is also available for the UK. Coakley et al (2004) analysed the post-issue operating performance of IPOs on the Official List of the LSE during 1985 and 2000.[27] Similar to previous US studies, they found a significant decline in the operating performance compared with the pre-IPO year. However, it emerged that this overall decline was driven by particularly sharp underperformance during the 1998–2000 bubble period, while IPOs issued over the longer 1985–97 period do not underperform. Moreover, contrary to the Jain and Kini (1995) findings, the performance differential between VC-backed and

[22] Lerner, J. (1994), 'Venture Capitalists and the Decision to Go Public', *Journal of Financial Economics*, **35**, 293–316.

[23] Jain, B. and Kini, O. (2000), 'Does the Presence of Venture Capitalists Improve the Survival Profile of IPO Firms', *Journal of Business, Finance and Accounting*, **27**, 1139–76.

[24] Gompers, P. and Lerner, J. (2001), *The Money of Invention: How Venture Capital Creates New Wealth,* Harvard Business School Press, Boston, MA.

[25] Brav, A. and Gompers, P.A. (1997), 'Myth or Reality? The Long-run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-backed Companies', *Journal of Finance,* **52**, 1791–821.

[26] Brav, A. and Gompers, P.A. (2004), 'Venture Capitalist Involvement and the Long-run Performance of IPOs', paper available at http://207.36.165.114/NewOrleans/Papers/2001771.pdf.

[27] Coakley, Hadass and Wood (2004), op. cit.

non-VC-backed IPOs was never significant in the sample of UK companies, except for a few individual years.[28]

In a separate branch of the literature, researchers have focused on the issue of lock-in agreements contained in IPO prospectuses. One area of interest has been the length of the lock-in periods agreed by directors and venture capitalists—the longer the lock-in period, the longer these have to wait to sell their holdings. The length of the lock-in is especially important to venture capitalists who frequently seek to use IPOs as an exit route.

Brav and Gompers (2000) argued 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.[29] They found empirical evidence to support this conjecture. For a sample of US IPOs issued during 1988–96, the authors determined that the average lock-in period of VC-backed firms was 191 days, compared with 264 days for firms without VC backing. They also found that the percentage of shares locked in is higher for VC-backed firms than for other firms. Similarly, Brau et al (2001) found that, on average, the length of the lock-in period is shorter for VC-backed firms than for non-VC-backed firms.[30]

The literature has also examined the trading volume and 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) examined a sample of US IPOs and found 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.[31] This study revealed that VC-backed firms suffer a price decline almost five times higher than that suffered by other firms (–2.55% and –0.57%, respectively).

Field and Hanka (2001) considered a sample of 1,948 IPO lock-in agreements in the USA between 1988 and 1997.[32] When lock-ins expire, the authors reported a permanent 40% increase in average trading volume, and a statistically significant three-day abnormal return of –1.5%. Both these effects were determined to be roughly three times larger in VC-backed firms than in non-VC-backed firms, with this VC effect growing stronger over the sample period. Evidence of a stronger price effect around lock-in expiry for VC-backed IPOs is also reported in Jordan et al (2000).[33] For the VC-backed group which experiences more significant abnormal returns around lock-in expiry, the largest losses occur for 'high-tech' firms and firms with the greatest post-IPO stock price increases, the largest relative trading volume in the period surrounding expiry and the highest quality underwriters.

The above studies have focused exclusively on the US capital markets. With the exception of the studies by Espenlaub et al (2001 and 2003),[34] there appears to have been no or limited work on lock-in agreements in the UK. Espenlaub et al (2003) considered a sample of 188 IPOs issued by UK-incorporated companies on the LSE during January 1992 to December 1998, of which just over half were VC-backed. For these companies, the authors classified the nature and duration of lock-in agreements and provided statistics on the proportion of locked-up shares by directors and other shareholders. For a sub-sample of 52 companies,

[28] Jain and Kini (1995), op. cit.

[29] Brav, A. and Gompers, P.A. (2000), 'Insider Trading Subsequent to Initial Public Offerings: Evidence from Expirations of Lock-in Provisions', working paper, Duke University.

[30] Brau, J.C., Lambson, V.E., and McQueen, G. (2001), 'Why Lockups?', working paper, Brigham Young University.

[31] Brav, A. and Gompers, P.A. (2000), op, cit.

[32] Field, L.C., and Hanka, G. (2001), 'The Expiration of IPO Share Lockups', *Journal of Finance*, **56**, 471–500.

[33] Jordan, B.D., Bradley, D.J., Roten, I.C. and Yi, H.-C. (2000), 'Venture Capital and IPO Lockup Expiration: An Empirical Analysis', *Journal of Financial Research*, http://ssrn.com/abstract=238714

[34] Espenlaub, S., Goergen, M. and Khurshed, A. (2001), 'IPO Lock-in Agreements in the UK', *Journal of Business Finance and Accounting*, **28**, 1235–78; and Espenlaub, S., Goergen, M., Khurshed, A. and Renneboog, L. (2003), 'Lock-in Agreements in Venture Capital-backed UK IPOs', ECGI Working Paper Series in Finance, 26/2003, European Corporate Governance Institute.

the authors then examined the stock performance around the lock-in expiry date. There is some evidence of negative abnormal stock returns in the days around expiry, which is particularly strong for VC-backed companies.

Oxera
Park Central
40/41 Park End Street
Oxford OX1 1JD
United Kingdom

Tel: +44 (0) 1865 253 000
Fax: +44 (0) 1865 251 172

www.oxera.com