

UK IPO underpricing and venture capitalists

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Abstract

We analyse the nature and causes of short run underpricing for a unique sample of 591 IPOs issued on the London Stock Exchange for the period 1985-2003. We find significant differences between the 1998-2000 bubble years and the rest of the sample. Venture capitalists and reputable underwriters played a certification role in the latter period but not during the bubble years. These years featured significant increases in underpricing, money left on the table, and a decline in operating quality. The combination of venture capitalists and prestigious underwriters were increasingly associated with the highest underpricing witnessed during 1998-2000 which provides indirect support for the spinning hypothesis of Loughran and Ritter (2004).

EFM Classification: 230, 320, 810

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1. Introduction

The long established underpricing puzzle refers to abnormally high, short run (typically first day) IPO returns. Recent evidence from USA indicates underpricing has become more extreme over time and particularly so during the recent 1998-2000 bubble period. Average first-day, US IPO returns increased from 7.4% in the 1980s, to 11.2% in the early 1990s, to 18.1% in the mid-1990s and to 65% in the bubble years according to Ritter and Welch (2002).¹ The challenge for financial economists is to explain why issuers are willing to accept the implied foregone revenues and why underpricing or money left on the table attained such high levels during the bubble period.

There are few recent studies of underpricing for major non-US markets and fewer still whose sample period encompasses and goes beyond the bubble years of the late 1990s. One notable exception is Oehler, Rummer and Smith (2005) who highlight the importance of investor sentiment in their study of underpricing of German IPOs, 1997-2001. Much the same can be said about studies of European venture capitalists generally and the UK market specifically despite the fact that the latter is the most developed capital market after the United States.^{2,3} The first contribution of this paper is that it fills this lacuna in the literature by investigating underpricing from a UK perspective. In so doing, it employs a unique, manually assembled data set of 591 venture- and non-venture IPOs on the London Stock Exchange for the 1985-2003 period. The aim is to shed new light on the changing role of

¹Schultz and Zaman (2001) report that 321 Internet companies went public between 1999 and March 2000 with an average first-day return of 91%. Arosio, Giudici and Paleari (2000) estimate an initial average return equal of 77% for a sample of 86 Internet IPOs listed on the EASDAQ and EURO-NM.

²Espenlaub, Garrett and Mun (2000) use a pre-bubble UK sample (1992-1995) and focus primarily on the conflicts of interest affecting venture capitalist affiliates of underwriters and the resulting impact on short-run and long-run IPO performance. Jelic, Saadouni and Wright (2005) focus exclusively on UK management buyouts (MBOs) during 1967–1997 that exited via IPO (reverse MBOs).

³The venture capitalist industry in the UK has been the largest in Europe since the 1980s. Some €9.4bn was invested by UK venture capitalist organisations in 2000 of which 88% was in expansion and buyout deals (see EVCA (2002) for details).

venture capitalists and underwriters in underpricing for a sample period that includes the late 1990s bubble years and their immediate aftermath.

The second contribution of the paper is that it establishes that the bubble years of 1998-2000 differ significantly from the rest of the sample in two important respects. On one hand, there is evidence that venture capitalists and reputable underwriters played a certification role for virtually all of the sample (1985-1997 and 2001-2003) but not during the bubble years. Correspondingly, average money left on the table and underpricing for all IPOs significantly increased during 1998-2000 as compared to the non-bubble years. On the other hand, all IPOs decline in operating quality in the bubble years confirming Ljungqvist, Nanda and Singh's (2006) proposition of a decrease in IPO operating levels during hot markets. The implication is that classical theory applies for most of the sample but not the bubble years. This raises the issue of how to explain underpricing behavior during the bubble years in the UK market.

The paper's third contribution is that it provides one of the first empirical tests of the Loughran and Ritter (2004) spinning hypothesis in relation to venture capitalists. It is found that venture capitalists and underwriters ceased their traditional certification function and took advantage of exuberant investor sentiment during the bubble years of the late 1990s. High-prestige underwriters are identified as the key market participant associated with the sharp drop in IPO operating quality in the late 1990s. Our results suggest that bubble year issues with the highest levels of underpricing tended to involve both venture capitalists and underwriters with high reputations. Following Loughran and Ritter (2004), it is conjectured that this is either because of side payments received by venture capitalists from the underwriters or because large initial returns attracted the attention of lead analysts and increased the likelihood of higher share prices at lock-up expiry. These results are timely given the recent concern expressed by the UK regulatory authorities – the Financial Services

Authority (FSA) – regarding potential conflicts of interest in UK investment banking (FSA 2003a and FSA 2003b).

The remainder of this paper is organised as follows. Section 2 summarises the evidence on underpricing over the course of the sample period. Section 3 presents the results of tests of the certification hypotheses. The bubble year results are analysed in Section 4 while a final section concludes.

2. Underpricing in the UK

2.1 Data and sample selection

A sample of IPOs from January 1985 to December 2003 was collected from the London Stock Exchange Quality of Markets Quarterly Reviews and Primary Market Fact Sheets. IPOs of investment trusts, financial companies, building societies, privatisation issues, foreign-incorporated companies, unit offerings and spin-offs are excluded. The filtering process also excludes share issues at the time of a relisting after a firm was temporarily suspended or transfers from lower tier markets such as the now defunct Unlisted Securities Market or Alternative Investment Market.⁴ The final sample thus consists of IPOs of ordinary shares by domestic operating companies on the Official List of the London Stock Exchange with listing methods comprising placements or offers for sale at a fixed price. The resulting 622 IPOs were reduced to 591 as 31 IPOs had insufficient available data.⁵

⁴ The filtering process is consistent with methodological approaches used in recent IPO research. See for example Espenlaub, Gregory and Tonks (2000), Espenlaub, Goergen and Khurshed (2001) for the UK and Bradley, Jordan, Roten and Yi (2000) for the US.

⁵ The present sample of 591 IPOs is the result of a filter according to well-defined criteria as described above. There were a total of 2,489 IPOs in the period, of which 455 have been provisionally identified as venture-backed IPOs from the BVCA and Venture Economics publications.

Venture-backed IPOs are defined as those IPOs where a venture capitalist is included as a minimum 3% (or 5%) shareholder in the listing prospectus.⁶ Venture capitalists are defined as those investment firms included in the directories of the British Venture Capital Association (BVCA), European Venture Capitalist Association (EVCA) or National Venture Capitalist Association (NVCA – the US venture capitalist association) as well as those listed in the database of Venture Economics Inc., a consulting firm that tracks investments and fundraising by venture capitalist firms. To avoid a survivorship bias, any changes in venture capitalist names or funds managed are recorded using BVCA, EVCA and NVCA directories since 1985, where available. The venture-backed IPOs identified through the above process were compared to those compiled by the UK Venture Capital Journal for 1985–89 and the BVCA between July 1992 and December 2000. The ownership information in the prospectus is always deemed accurate in cases of discrepancies. The 591 IPOs in the sample include 316 venture-backed and 275 non-venture IPOs.⁷

Information on the incorporation date of the company, issue date and price, type of issue, market value, proceeds raised, name of lead underwriter and auditor as well as business sector are taken from the London Stock Exchange Quality of Markets Quarterly Reviews, Primary Market Fact Sheets and Yearbooks. Underwriters and auditors are classified according to the annual ranking in Hambro Companies Guides. Throughout the paper, all pound values have been converted to 2002 purchasing power using the Retail Price Index.

Daily returns for the IPOs and Financial Times All Share stock index are derived from *Datastream*. The venture capitalists' year of incorporation, ownership structure, dates and

⁶ Two different threshold requirements are used to define venture-backed IPOs. In some IPO prospectuses shareholders with holdings larger than 3% are listed and in others those with holdings larger than 5% are listed.

⁷ The discrepancies occurred where IPOs are listed as venture-backed in the UK Venture Capital Journal or by the BVCA but no venture capitalist is listed as a shareholder in the IPO prospectus. This may be because the venture capitalists' stake is too small to be listed in the IPO prospectus, venture capitalists have sold their stake before IPO or hold non-equity claims.

sizes of funds raised are from the BVCA, EVCA and NVCA directories as well as venture capitalists' websites and Venture Economics Inc.

IPO prospectuses were inspected in Companies House, Extel Financial microfiches and Thomson Financial Global Access Database to obtain information on pre-IPO operating performance, ownership, board membership and identities of investors. Specifically, the 'Substantial Shareholders' and 'Placing/Offer Agreement' sections of the prospectus were used to collect venture capitalist pre- and post-IPO equity holdings and sale of ordinary shares. The data on venture capital board participation and those on board tenure period were collected from the 'Board of Directors' section that identifies the top executives and directors of the issuing company. Board members who represent venture capitalists are usually designated as such.

2.2 Underpricing and money left on the table

Table 1 reports the number of IPOs, average amount raised, average amount left on the table and underpricing for IPOs by vintage year.

[Table 1 around here]

Panel A shows that the number of IPOs on the London Stock Exchange fluctuated considerably over time during the sample period 1985–2003. There were lulls in the early 1990s and after 2000 and highs in 1987, the mid-1990s (1994 and 1996) and in 2000. The average amount exceeds £100m for the first time in 1996 and was consistently high from 2001-2003 though the number of sample IPOs declined dramatically after 2000.

What is most interesting is that the average amount of money left on the table and average underpricing both show sustained peaks over the 1998-2000 period. This coincides with the Ofek and Richardson (2002) definition of the bubble period in the US. This suggests dividing the sample throughout into the bubble years and the normal period covering the years

1985-1997 and 2001-2003. While the latter includes individual years in the late 1980s and mid-1990s in which levels of IPO activity or underpricing are high, we regard it as the normal period on the basis of both money left on the table and underpricing.⁸ The results for both indicate significant differences between the 1985-1997/2001-2003 and bubble years at the 1% level.

Whereas only £2.8m was on average left on the table during the non-bubble period for IPOs, this amount jumped to an average of £10.1 during 1998-2000. This amount appears relatively modest compared to the sums of money left on the table in US IPOs as reported by Loughran and Ritter (2004).⁹ Similarly, the total amounts of money left on the table, reaching £1bn (about \$1.6bn) for IPOs in the 1998-2000 period, are a fraction of the \$74bn reported in the US during 1998-2000. The first-day returns for IPOs increased to 16.9% during 1998-2000 which is statistically different at the 1% level from the non-bubble figure. IPOs raised significantly larger proceeds with an average of £79.3m in the bubble years versus £51.3m in 1985-1997/2001-2003. The proceeds differential is marginally significant at the 10% level.

3. Certification hypotheses during normal markets

3.1 Venture capitalists and reputable underwriters

The IPO literature identifies venture capitalists and reputable underwriters as certifying agents since they are both insiders. Certification is valuable when the insiders of an issuing firm have more information about its value than outsiders and can be expected to hide adverse information to maximise the sales price. Insofar as underpricing is a product of asymmetric information in which investors have less information than the issuers and the underwriter, the

⁸ For instance, underpricing displayed local peaks in 1987 and 1993. An alternative not pursued in this paper would be to subdivide the sample into IPO cycles along the lines described by Lowry and Schwert (2002).

⁹ In dollar terms, the average amount left on the table in the UK during 1998-2000 was approximately \$16m, less than a quarter of the \$68.8m left on the table by US IPOs in the late 1990s as reported by Loughran and Ritter (2004).

issuer can reduce underpricing by mitigating the informational asymmetry. One way of accomplishing this is by the appointment of reputable underwriters. They are assumed to restrict themselves to high quality issues during a normal or non-bubble period and are averse to being associated with heavily underpriced issues (Carter and Manaster, 1990).

Similarly, the VC certification hypothesis formulated by Megginson and Weiss (1991) stipulates that VCs act as certifying agents to the issuing firms because they frequently bring companies to the market and thus can credibly stake their reputation. Certification assumes that the agent has reputational capital at stake with an intrinsic value greater than the possible one-off gain obtained from certifying falsely about the value of the issuing firm. It is assumed that it is costly for the issuing firm to get access to the certifying agent and benefit from its reputational capital.

Megginson and Weiss argue that all these criteria are met by VCs who rely on their reputational capital to attract high-quality entrepreneurs, managers for their portfolio companies as well as institutional investors to their funds. VCs require high rates of returns from their investments and thus are a costly source of capital. They exercise strong controls over their portfolio companies due to large block shareholdings and active participation in the board of directors. Gompers (1996) cites industry wisdom that established venture capitalists with long track records can raise large funds quickly and with little effort. Finally, Lerner (1994) argues that syndication among venture capitalists may lead to a superior selection of investments by bringing together more expertise, support and access to capital.

Lin and Smith (1998) examine the agency issues surrounding the sale of shares at IPOs by venture capitalists that need to disclose in advance their decision to sell and deal with the ensuing adverse selection problem. They argue that the informational asymmetry present in IPO settings leads to higher required rates of returns due to the negative market reaction to insider sales which are interpreted by the market as a signal that the offering is overpriced.

Venture capitalist sales would thus result in higher underpricing in order to make the offer attractive to the marketplace.

3.2 Underpricing cross-section regressions

Tests of the hypotheses relating to certification are undertaken using regression analysis with the first-day return as the dependent variable. The following explanatory variables are employed. The UNDERWRITER dummy variable equals 1 if the IPO's lead underwriter is listed in the top-ten of the annual Hambro underwriter rankings. LAGGED FTSE RETURN measures the percentage return on the FTSE All Share index during the 15 trading days prior to the IPO. The VCREP dummy variable equals 1 if the IPO's lead venture capitalist has an established reputation as defined previously (see also Lin and Smith (1998)). Finally, the venture capital selling (VCSELL) dummy variable is used as a binary indicator of lead venture capitalist selling. The TECH dummy captures telecom, IT hardware and software.

Regression results are reported in Table 2.¹⁰

[Table 2 around here]

The results for all IPOs are reported in panel A, column 1a uses the full sample of 591 IPOs, column 2a the 1985-1997/2001-2003 non-bubble sample or normal years and column 3a the 1998-2000 bubble years. Panel B reports results for VC backed IPOs for the same sample periods. Where a variable is significant for the full sample period and just one of the sub-sample periods, we assume that the full sample results are being driven by that those for that particular sub-sample.

The changing role of prestigious underwriters can be clearly seen from the variations of the UNDERWRITER variable coefficient. Using the non-bubble period the coefficient is negative and significant at the 5% significance level for all IPOs (column 2a) but is insignificant for VC-backed IPOs (column 2b). This indicates that prestigious underwriters

¹⁰ We do not report regression results that include several additional variables that are generally insignificant, both economically and statistically.

play a certifying role during the normal sample periods for non-VC backed IPOs but do not add anything in terms of certification for VC backed IPOs. By contrast the coefficient for underwriter certification is positive for the bubble period sample, with an insignificant coefficient for the sample using all IPOs (column 3a) but significant at the 5% level for the VC backed IPOs (column 3b). This shows that the certifying role of prestigious underwriters ceased during the years 1998-2000, with the combination of prestigious underwriters and venture capitalists being associated with substantially larger levels of underpricing.¹¹

The significantly negative coefficient on the VCREP dummy variable is consistent with the VC certification hypothesis for both the full sample and for the non-bubble years. The coefficient on the VCSELL variable is significantly positive suggesting that investors require higher returns to off-set the negative signal conveyed by the venture capitalist selling at issue. In all sub-periods both VC and non-VC IPOs experience higher levels of underpricing when the issue follows a period of high market returns. The coefficient for FTSE RETURN is particularly high during the bubble period for VC-backed IPOs, suggesting VCs were successful at timing their IPOs during this period. Finally, the importance of the IT and telecom sectors to the high first day returns witnessed during the bubble-period is clear with these issues producing 14% higher returns for the whole sample and 19% for VC backed IPOs.

3.3 Venture backed IPOs

Table 3 reports the mean underpricing and money left on the table for venture-backed IPOs categorized by certification and monitoring variables.

[Table 3 around here]

¹¹ In unreported findings the model in column 3a was reproduced allowing for differential coefficients for UNDERWRITER for VC and non-VC IPOs. This result confirmed the positive coefficient for VC IPOs and produced a negative coefficient for non-VC IPOs with a t-statistic of just -0.92.

There is little difference between the categories during the non-bubble years but there are significant differences between the 1985-1997/2001-2003 and the bubble period. The increased underpricing and money left on the table during 1998-2000 are associated with IPOs backed by venture capitalists who are less reputable,¹² younger, have fewer directors on the company's board, lower pre- and post-IPO shareholdings as well as smaller funds under management. These results provide some evidence that less reputable venture capitalists and those with less involvement in their portfolio companies take advantage of investor sentiment during the bubble years.

The largest average amount of money left on the table across all sorts (£16.8m) occurs during the bubble years for issues where venture capitalists sell at IPO. They also feature the second highest underpricing (21.4%). However, if venture capitalists do not sell, the money left on the table more than halves to £6.8m and the average underpricing drops to 15.6%. These findings are consistent with the Lin and Smith (1998) argument that the informational asymmetry present in IPO settings leads to higher required rates of returns if venture capitalists sell at IPO.

4. Explaining bubble year behaviour

4.1 Behavioral explanations

We outline below two attempts to explain the very large increase in underpricing that accompanied the 1990s internet bubble in the US before testing their applicability to the UK.¹³ Loughran and Ritter (2004) offer two explanations for why issuing firms may actually

¹² The methodology used to identify high prestige venture capitalists follows that of Lin and Smith (1998). The index value is calculated as follows: Index of lead venture capitalist reputation = 0.5*(Age of lead venture capitalist – Mean age)/age + 0.5*(Number of deals as lead by lead venture capitalist – Mean number of deals as lead)/deals.

¹³ The underpricing is calculated here as the raw return on the first trading day using a standard methodology as follows: $r_{it} = (P_{i,t} - P_{i,0})/P_{i,0}$ where r_{it} is the raw initial return of IPO i , $P_{i,t}$ is the closing price of IPO i and $P_{i,0}$ is the offer price of company i .

seek out underwriters who have a reputation for being involved with underpriced IPOs.¹⁴ The first of these is the analyst lust hypothesis. This is based on theoretical and empirical evidence that suggests that the issuing firm is more likely to appoint an underwriter that has a reputation for underpricing if the underwriter is reputable and has a highly ranked analyst. Indeed, underpricing may be seen as the cost of obtaining analyst coverage since underwriters do not charge an explicit fee for providing analyst coverage and so money left on the table is effectively an implicit charge. Krigman et al. (1999) report that providing analyst coverage is one of the most important reasons for issuers to switch underwriters. Importantly, Loughran and Ritter (2004) argue that issuing firms' desire for attracting highly ranked analysts increased during the late 1990s since the high P/E ratios of the period implied greater valuations for a given growth forecast.

The Loughran and Ritter (2004) spinning hypothesis involves a conflict of interest between the underwriters and the key decision makers on the one hand and the issuing firm on the other. The most obvious form in which this conflict can arise is where the venture capitalists and executives of issuing firms receive brokerage accounts to which underpriced IPO shares are allocated. Such activities are made possible by the lack of transparency in the allocation of money left on the table in comparison to spread payments charged directly by investment banks for sponsoring IPOs. This conflict of interest increased during the late 1990s because it required the presence of significant underpricing and therefore money left on the table to provide the funds for the side-payments. In this way, "underpricing fed on itself". While the analyst lust hypothesis can explain moderately high levels of underpricing, Loughran and Ritter (2004) argue that only the spinning hypothesis can explain these very high levels.

¹⁴ In an earlier paper they use prospect theory as an analytical tool to explain the puzzle that issuers rarely complain about leaving money on the table (Loughran and Ritter 2002). Loughran and Ritter (2004) acknowledge that while prospect theory may play some role, it has two weaknesses: it does not explain why issuers hire underwriters who will exploit the issuer's psychology and it cannot explain the very high levels of underpricing during the late 1990s.

Although Loughran and Ritter (2004) provide evidence of incidences of conflicts of interest such as spinning that have been documented in the US IPO markets, little or nothing has been reported of such activities in UK markets. The UK regulatory authorities have, however, acknowledged that the same potential exists (FSA 2003a) but has concluded that “although suspicions were raised” they “found no firm evidence” (FSA 2003b, p.35). Central to the potential for a conflict of interest is the ability of the sponsor to determine the allocation of the issue, in particular, for hot IPOs to be allocated in return for commission business. The UK FSA expressed concern for the potential for such a conflict of interest and suggested guidelines to minimise the potential (FSA 2003a). Not surprisingly, many of those guidelines relating to the allocation process were subsequently questioned by the industry in their response to the FSA’s consultation paper (FSA 2003b). Thus this remains an open research issue.

Second, Ljungqvist et al. (2006) develop a model of IPO pricing in bubble markets that yields insights into the relationship between underpricing and long-run underperformance. The basic premise of their model is that there may be irrational exuberance in IPO markets during bubble periods which, in the presence of short sales constraints, would lead to long-term underperformance. Ljungqvist et al. hypothesise that underwriters allocate IPO shares initially to their regular institutional investors who then gradually resell the shares to sentiment investors. Underpricing constitutes fair compensation to the institutional investors for possible inventory losses should sentiment investors’ demand cease unexpectedly.

This model generates a number of predictions that are empirically tested in this paper. First as investor sentiment grows, more companies have an incentive to go public to take advantage of optimistic investors and IPO offer size increases. Second, lower-quality companies are taken public in bubble markets, resulting in a decrease in average issuer

quality. Finally, their model predicts that underpricing increases in underwriter prestige but that this relation depends on the state of the IPO market. A positive relation between underpricing and underwriter prestige is predicted in bubble markets but not in normal markets. The findings of Ofek and Richardson (2003) are consistent with some predictions of this model in the context of the internet bubble of the late 1990s.

4.2 Underpricing and money left on the table

Table 4 reports the mean underpricing and money left on the table for venture-backed and non-venture IPOs using a number of univariate sorts.

[Table 4 around here]

It is apparent that venture capitalists altered their capital market role during the 1998-2000 years. For example, those IPOs in the high-technology sector generated a 23.2% first day return and left £12.2m on the table during the bubble years.¹⁵ These are both significantly different at the 1% level from the corresponding figures for 1985-1997/2001-2003. The corresponding differences for non-venture IPOs are not significant. Venture-backed IPOs sponsored by a high-prestige underwriter during the bubble years feature the highest underpricing of any category with 32.9% and the largest amount of money left on the table of £16.6m. Both are statistically different at the 1% level relative to 1985-1997/2001-2003 when these metrics were only 7.8% and £3.9m, respectively. These results support the spinning hypothesis of Loughran and Ritter (2004) for reputable US underwriters and venture capitalists.

The spinning hypothesis receives further support from Table 2, Panel B. Here the coefficient for UNDERWRITER is insignificant for the full and non-bubble samples but is

¹⁵ High technology is broadly defined and includes electronic and electrical equipment, health and pharmaceuticals, media and photography, Telecom, IT and software. The highest levels of underpricing are found amongst the Telecom, IT and software sector, with average underpricing of 28.4% and 18.5% for VC and non-VC backed IPOs respectively.

significant at the 1% level for the bubble period. This indicates that prestigious underwriters do not provide any additional certifying role over above that provided by venture capitalists during normal markets. However during the bubble years prestigious underwriters involved with VC-backed IPOs are associated with average underpricing that is 20% higher than similar IPOs not underwritten by prestigious underwriters.¹⁶

4.3 Changes in IPO quality over time

The characteristics of IPOs and how they contrast between the two periods are reported in Table 5. Panel A focuses on venture-backed versus non-venture IPOs while Panel B differentiates between high-prestige and low-prestige underwriters.

[Table 5 around here]

Panel A shows that the percentage of high technology companies surged during the bubble years from approximately one-quarter to nearly 65% for both venture-backed and non-venture IPOs. The difference between the two periods is statistically significant at the 1% level for both types of IPO and points to the presence of technology-inspired investor sentiment during the late 1990s. This is consistent with Ljungqvist et al. (2006) who assume that investors may, on occasion, be ‘irrationally exuberant’ about the prospects of IPOs in a particular industry. Ofek and Richardson (2002) provide similarly supportive empirical evidence for the US bubble period.

The evidence reported in Panel A demonstrates a clear decline in operating quality of IPOs in the bubble years relative to 1985-1997/2001-2003 that is most evident for venture-backed IPOs. Median trailing sales of venture-backed IPOs fell by two-thirds during the bubble period while the corresponding decline for non-venture IPOs was one-quarter.

¹⁶ These results are not inconsistent with those reported for the US. Carter and Manaster (1990) and Carter, Dark and Singh (1998) report a significantly negative impact of underwriter reputation on underpricing in the 1980s. Ljungqvist (1999) and Loughran and Ritter (2004), on the other hand, find a significantly positive relationship in the 1990s, and particularly during the late 1990s.

Median trailing EBIT in the 12 months pre-IPO fell from £4.1m to £0.1m in the bubble period for venture-backed IPOs but the decline was much less pronounced for non-venture offerings, falling from £2.6m to £1.5m. These findings illustrate the increased willingness of venture capitalists to bring lower quality companies to the market in the late 1990s. Whereas venture-backed IPOs had relatively stronger sales and earnings compared to non-venture IPOs during 1985-1997/2001-2003, this reverses in the bubble period. The general decline in IPO quality is in line with Ljungqvist et al.'s (2006) prediction that lower-quality companies may go public in bubble periods for opportunistic reasons.

Table 5 illustrates the dramatic change in valuations of IPOs that occurred during the late 1990s. While during 1985-1997/2001-2003 venture-backed IPOs were consistently valued at lower median market cap/sales ratios compared to non-venture IPOs, their valuation increased dramatically in the bubble period. Venture-backed IPOs were valued at 12 times trailing sales in the 1998-2000 period. This represents more than an eight-fold rise in the median valuation of 1.4 times in 1985-1997/2001-2003. By contrast, the valuation multiple increase from 1.6 to 4.3 was much less marked for non-venture IPOs.

Panel B examines separately IPOs sponsored by high- and low-prestige underwriters. All underwriters substantially increase the proportion of technology stocks brought to market during the late 1990s. High-prestige underwriters then sponsored companies with drastically poorer operating results and at highly optimistic valuations. Twelve month sales prior to IPO of venture-backed offerings sponsored by high-prestige underwriters collapse in real terms from £54m in 1985-1997/2001-2003 to £7.8m in the bubble years while the figures are £48.6m and £4.8m for non-venture IPOs with high-prestige underwriters, respectively. The

differences between the two periods are statistically significant at the 1% level for both venture-backed and non-venture IPOs.¹⁷

The decline in trailing EBIT was most dramatic for issues underwritten by prestigious underwriters whose median EBIT was brought into line with the corresponding median for IPOs sponsored by low-prestige underwriters. Finally, the market value at IPO relative to trailing sales soared during 1998-2000 for offerings sponsored by high-prestige underwriters to 28 times for venture-backed IPOs and 16 times for non-venture IPOs. These high average valuations are due in the main to companies managing to float with little existing sales but attracting valuations in excess of £100m. These results indicate that high-prestige underwriters were the key market participant associated with the drop in operating quality of companies coming to the market during the late 1990s. This is consistent with Loughran and Ritter's (2004) finding that prestigious underwriters relaxed their underwriting standards in the bubble period, taking an increasing number of very young, unproven companies public.

4.4 Underpricing and long-term performance

Table 6 reports summary statistics comparing first day prices and returns with the long term performance of the IPO as measured by the 3 year and 5 year CAR (cumulative abnormal returns).

[Table 6 around here]

Long term performance has a modest positive correlation with first day returns, the offer price and the first day price during the non-bubble (1985-1997/2001-2003) period. Five of these correlations turn negative during the 1998-2000 period. These findings are consistent with Ljungqvist et al.'s (2006) market timing hypothesis.

¹⁷ The differences between the non-bubble and bubble periods were far less pronounced or even the opposite for low-prestige underwriters. For instance, trailing sales for non-venture offerings sponsored by less-prestigious IPO underwriters actually increased from £17.2m to £24.1m between the periods.

Finally we compare long-run performance with extreme first day returns. IPOs with first day returns in excess of 30% achieved an average 3 year CAR of 21.6% during the non-bubble period. This undergoes a dramatic reversal for the bubble years when the corresponding CAR is -53.3%. This turnaround supports the view that hot issues were substantially over-priced and probably were a consequence of issuers exploiting investor sentiment during the bubble years.

5. Conclusions

This paper uses a unique sample of 591 IPOs issued on the London Stock Exchange to examine short run underpricing in the UK and the changing role of venture capitalists and underwriters in this respect. The findings support the prediction that venture capitalists and reputable underwriters play a certification role over the course of most of the sample period: 1985-1997 and 2001-2003. However this ceased during the 1998-2000 bubble years as prestigious underwriters and venture capitalists combined to bring to market issues of poorer quality and that produced high average IPO proceeds, money left on the table and underpricing.

Indirect support for the spinning hypothesis is provided by the fact that the highest levels of bubble-period underpricing were associated with issues that involved both prestigious underwriters and venture capitalists. These are precisely those two groups who in Loughran and Ritter's (2004) schema combine to extract side-payments from underpriced issues. There is one major difference from the US findings. Loughran and Ritter (2004) suggest that issuers actively sought out underwriter with a history of underpricing in order to participate in spinning and they show that prestigious underwriters had a history of underpricing that evolved during the 1990s prior to the bubble period. In contrast, our data shows that in the UK those prestigious underwriters who were involved with the highest level

of bubble-period underpricing had no history of underpricing. Indeed, underpricing associated with prestigious underwriters was negligible during the 1991-1997 period.¹⁸

Finally we find evidence consistent with the Ljungqvist et al. (2006) market timing hypothesis. As with Loughran and Ritter, the changing role of the underwriter from certifier to exploiter of investor sentiment is consistent with the market timing hypothesis. The highest levels of underpricing were mostly associated with the telecom and IT sectors. These sectors witnessed a large increase in the number of issues alongside a dramatic decline in pre-IPO operating levels. There is evidence also of a negative relationship between the highest levels of underpricing and long term performance, suggesting that those IPOs were exploiting sentiment trading.

¹⁸ Average underpricing was 5.8% for high prestige underwriters compared to an average of 10.3% for the low prestige counterparts.

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Table 1: Descriptive statistics for IPOs, 1985-2003 (£m of 2002 purchasing power)**Panel A: Descriptive statistics by vintage year**

Year	Number of IPOs	Average amount raised	Average money left on the table	Underpricing
1985	22	20.4	2.6	2.9%
1986	34	30.5	5.7	6.8%
1987	35	12.0	2.5	16.6%
1988	32	19.1	0.8	7.6%
1989	18	27.8	0.5	9.0%
1990	7	33.6	-0.1	1.9%
1991	5	36.3	1.6	0.8%
1992	23	67.8	2.0	4.7%
1993	54	40.7	4.4	13.9%
1994	86	39.6	1.4	6.8%
1995	44	26.6	3.1	11.6%
1996	56	102.9	4.3	10.4%
1997	52	30.9	2.4	9.8%
1998	30	64.5	5.8	14.2%
1999	18	74.3	8.2	25.7%
2000	53	89.4	13.2	15.5%
2001	5	155.6	3.2	10.0%
2002	12	296.5	4.8	5.2%
2003	5	334.3	2.0	6.9%
Total	591	56.0	4.1	10.5%

Panel B: Tests for difference in means between 1985-1997/2001-2003 and 1998-2000 periods

Year	Number of IPOs	Average amount raised	Average money left on the table	Underpricing
1985-97/2001-03	490	51.3	2.8	9.2%
1998-2000	101	79.3	10.1	16.9%
<i>t</i> -statistic		1.839*	4.577***	3.864***

The sample consists of 316 venture backed IPOs and 275 non-venture backed IPOs listed on the Official List of the London Stock Exchange between January 1985 to December 2003. Only IPOs of ordinary shares with listing methods comprising placements or offers for sale at a fixed price are included. IPOs of investment trusts, financial companies, building societies, privatisation issues, foreign-incorporated companies, unit offerings and spin-offs have been excluded. The venture backed IPOs are all new issues within the sample with venture capital participation recorded in the IPO prospectus. Amount raised equals offer price multiplied by number of shares issued. Money left on the table is defined as the difference between the closing price on the first day of trading less the offer price times the number of shares issued (total offering amount, excluding overallotment options). Underpricing is the raw return of the IPO on the first trading day. One, two and three asterisks indicate significance, at the 10%, 5% and 1% level or better, respectively. All pound values are in pounds of 2002 purchasing power using the Retail Price Index.

Table 2: Regression results for the underpricing of IPOs

Panel A: All IPOs			
	1985-2003 (1a)	1985-97 & 2001-03 (2a)	1998-2000 (3a)
UNDERWRITER	-0.0111	-0.0256**	0.0686
	0.75	2.01	1.04
LAGGED FTSE RETURN	0.7009***	0.5868***	1.6997**
	3.32	2.99	2.00
VCREP	-0.0424**	-0.0289**	-0.0713
	2.33	2.06	1.18
VCSELL	0.0713***	0.0450***	0.1834*
	3.01	2.83	1.94
TECH	0.1233***	0.0188	0.1445**
	2.59	0.59	2.48
1998-2000	0.0304		
	1.27		
Intercept	0.0921***	0.1013***	0.0728*
	8.23	9.57	1.76
R ²	0.090	0.039	0.165
N	591	490	101

Panel B: Venture-backed IPOs

	1985-2003 (1b)	1985-97 & 2001-03 (2b)	1998-2000 (3b)
UNDERWRITER	0.0145	-0.0189	0.2043***
	0.70	1.15	2.66
LAGGED FTSE RETURN	0.8766***	0.4460*	4.8300***
	2.71	1.64	3.15
VCREP	-0.0470**	-0.0289*	-0.0680
	1.97	1.64	0.79
VCSELL	0.0653***	0.0459***	0.1661**
	3.11	2.76	2.26
TECH	0.1593**	0.0313	0.1894***
	2.35	0.54	2.84
1998-2000	0.0450		
	1.39		
Intercept	0.0827***	0.0965***	0.0337
	5.27	6.81	0.45
R ²	0.140	0.037	0.317
N	316	259	57

The sample consists of 316 venture backed and 275 non-venture IPOs listed on the Official List of the London Stock Exchange between January 1985 to December 2003. The dependent variable is the first-day return from the offer price to the first-day closing price. The UNDERWRITER dummy variable equals 1 if the IPO's lead underwriter is listed in the top-ten in annual Hambro underwriter rankings. LAGGED FTSE RETURN is the percentage return on the FTSE All Share index during the 15 trading days prior to the IPO. The VCREP dummy variable equals 1 if the IPO's lead venture capitalist has an established reputation as defined previously. VCSELL is a binary indicator of venture capitalists selling. TECH is a dummy variable indicating industry classification Telecom, IT hardware and software. 1998-2000 is a dummy variable for the bubble period. All regressions include industry and year dummy variables. All pound values are in pounds of 2002 purchasing power using the Retail Price Index. One, two and three asterisks indicate significance, at the 10%, 5% and 1% level or better, respectively. The t-statistics (in parentheses) are calculated using White's (1980) heteroskedasticity-consistent method.

Table 3: Mean first-day returns of venture-backed IPOs

Venture-backed IPOs	Condition	Underpricing		<i>t</i> -statistic 1985-97/ 2001-03 versus 1998-2000	Average money left on the table (£m of 2002 purchasing power)		<i>t</i> -statistic 1985-97/ 2001-03 versus 1998-2000
		1985-97/ 2001-03	1998- 2000		1985-97/ 2001-03	1998-2000	
Lead venture capitalist with established reputation	Yes	8.0%	11.8%	1.148	3.3	6.9	4.313***
	No	9.6%	26.6%	3.480***	2.9	13.4	4.304***
Average age of venture capitalists backing IPO, in years (just prior to IPO)	>Median	9.4%	13.3%	1.393	3.2	6.8	2.193**
	<=Median	8.3%	18.3%	3.676***	3.0	11.9	4.178***
Number of venture capitalists backing IPO	>Median	7.1%	12.3%	1.542	3.2	6.5	1.285
	<=Median	10.5%	17.9%	2.936***	3.0	11.3	4.299***
Pre-IPO equity holdings of venture capitalists (% of total)	>Median	8.8%	13.7%	1.604	3.1	4.7	0.666
	<=Median	8.8%	18.2%	3.472***	3.1	12.7	5.678***
IPO with representatives of venture capitalists on board at IPO	Yes	9.6%	13.9%	1.099	4.4	10.8	2.118**
	No	8.4%	17.7%	3.784***	2.3	10.3	4.279***
Post-IPO equity holdings of venture capitalists (% of total)	>Median	9.3%	13.7%	1.906*	3.7	6.5	1.752*
	<=Median	8.3%	18.1%	3.276***	2.5	12.0	4.589***
Venture capitalists sell at the IPO	Yes	10.3%	21.4%	2.946***	3.7	16.8	5.053***
	No	8.0%	15.6%	2.509***	2.7	6.8	1.869*
Average funds managed by venture capitalists backing IPO (just prior to IPO)	>Median	9.0%	11.1%	0.747	3.9	7.2	1.268
	<=Median	8.6%	19.9%	4.099***	2.3	11.8	5.607***

The sample consists of 316 venture backed IPOs listed between January 1985 to December 2003. The venture backed IPOs are all new issues within the sample with venture capital participation recorded in the IPO prospectus. Underpricing is the raw return of the IPO on the first trading day. Money left on the table is defined as the difference between the closing price on the first day of trading less the offer price times the number of shares issued (total offering amount, excluding overallotment options). The lead venture capitalist is the one with the highest equity stake prior to IPO. Venture capitalist reputation is measured by an index based on the venture capitalist's age before the IPO and number of deals involved in as lead over the 16 years of the study. Those venture capitalists with a reputation index value greater than the average are classified as having an established reputation (see Lin & Smith (1998)). Information on venture capitalists and their holdings is from the IPO prospectus, BVCA Directories and venture capitalists' websites. Return data are from Datastream. One, two and three asterisks indicate significance, at the 10%, 5% and 1% level or better, respectively. All pound values are in pounds of 2002 purchasing power using the Retail Price Index.

Table 4: Average first-day returns on IPOs categorized by industry, underwriter prestige, share overhang, sales and age

Variable			Underpricing		<i>t</i> -statistic 1985-97/ 2001-03 versus 1998-2000	Average money left on the table (£m of 2002 purchasing power)		<i>t</i> -statistic 1985-97/ 2001-03 versus 1998-2000
Venture-backed IPOs/Non-venture IPOs	Variable	Condition	1985-97/ 2001-03	1998-2000		1985-97/ 2001-03	1998- 2000	
Venture-backed IPOs	Industry	High-technology	7.2%	23.2%	3.182***	2.8	12.2	3.214***
		Non-high-technology	9.4%	10.7%	0.402	3.2	8.3	2.188***
Non-venture IPOs	Industry	High-technology	10.9%	15.7%	1.012	7.3	12.3	0.814
		Non-high-technology	9.1%	14.9%	1.278	0.9	5.9	1.781*
Venture-backed IPOs	Underwriter prestige	Low-prestige	9.8%	11.8%	0.753	2.3	7.9	3.296***
		High-prestige	7.8%	32.9%	4.878***	3.9	16.6	3.833***
Non-venture IPOs	Underwriter prestige	Low-prestige	10.7%	18.2%	1.826*	2.5	11.7	2.819***
		High-prestige	7.4%	9.0%	0.447	2.4	5.7	0.529
Venture-backed IPOs	Source of shares offered	Only primary	7.9%	6.2%	0.357	2.3	5.1	0.999
		Including secondary	9.0%	22.2%	4.331***	3.2	12.4	4.656***
Non-venture IPOs	Source of shares offered	Only primary	8.2%	11.4%	0.594	1.7	8.6	1.076
		Including secondary	10.0%	17.4%	1.983**	2.7	10.5	2.457***
Venture-backed IPOs	Share overhang	>Median	7.3%	20.3%	1.894**	1.6	11.6	3.227***
		<=Median	9.1%	17.1%	2.728***	3.3	10.0	2.975***
Non-venture IPOs	Share overhang	>Median	19.8%	8.8%	1.752*	1.4	10.1	1.089
		<=Median	9.2%	21.7%	3.022***	2.5	9.7	1.807*
Venture-backed IPOs	Sales	>Median	7.0%	23.5%	3.644***	4.2	13.6	2.626***
		<=Median	10.5%	14.0%	1.474	2.0	8.0	4.733***
Non-venture IPOs	Sales	>Median	9.5%	10.5%	0.371	3.8	9.3	1.099
		<=Median	9.6%	20.7%	1.872*	0.7	10.5	3.469***
Venture-backed IPOs	Age	>Median	8.9%	19.5%	3.048***	3.1	8.1	2.517***
		<=Median	9.3%	18.1%	2.696***	3.4	13.5	4.216***
Non-venture IPOs	Age	>Median	8.8%	15.2%	1.746*	2.0	8.1	2.562***
		<=Median	12.1%	15.7%	0.269	4.1	11.8	0.853

The sample consists of 316 venture backed IPOs and 275 non-venture backed IPOs listed on the Official List of the London Stock Exchange between January 1985 to December 2003. Only IPOs of ordinary shares with listing methods comprising placements or offers for sale at a fixed price are included. Underpricing is the raw return of the IPO on the first trading day. Money left on the table is defined as the difference between the closing price on the first day of trading less the offer price times the number of shares issued (total offering amount, excluding overallotment options). The venture backed IPOs are all new issues within the sample with venture capital participation recorded in the IPO prospectus. Industry classifications are from the London Stock Exchange Yearbooks (see Table 2 for industry codes). High-prestige underwriters are those listed in the top-ten in annual Hambro underwriter rankings. Share overhang is the ratio of retained shares to the public float. Sales are trailing 12 month sales prior to IPO in millions of pound sterling. Market value is computed as the post-issue number of shares outstanding multiplied by the offer price. Age is in months from incorporation to IPO date. Issuer incorporation data are from London Stock Exchange Yearbook. Return data are from Datastream. One, two and three asterisks indicate significance, at the 10%, 5% and 1% level or better, respectively. All pound values are in pounds of 2002 purchasing power using the Retail Price Index.

Table 5: IPO characteristics categorized by venture backing and underwriter prestige**Panel A: Statistics categorized by venture-backed versus non-venture IPOs**

	Variable	1985-97/ 2001-03	1998-2000	<i>t</i> -statistics Non-bubble versus 1998- 2000
Venture-backed IPOs	Percentage technology	25.9%	64.9%	5.974***
Non-venture IPOs		25.1%	63.6%	5.285***
Venture-backed IPOs	Median share overhang	2.5	3.1	3.495***
Non-venture IPOs		2.9	3.5	3.306***
Venture-backed IPOs	Median trailing sales (£ millions)	33.0	11.0	4.579**
Non-venture IPOs		25.3	18.2	1.495
Venture-backed IPOs	Median trailing EBIT (£millions)	4.1	0.1	4.600***
Non-venture IPOs		2.6	1.5	2.326**
Venture-backed IPOs	Median market value/annual sales	1.4	11.9	7.603***
Non-venture IPOs		1.6	4.3	4.001***
Venture-backed IPOs	Median age	3.6	3.3	1.596
Non-venture IPOs		5.3	3.5	1.955**

Panel B: Statistics categorized by underwriter backing

	Variable	Underwriter prestige	1985-97/ 2001-03	1998-2000	<i>t</i> -statistics Non-bubble versus 1998- 2000
Venture-backed IPOs	Percentage technology	Low-prestige	24.1%	63.2%	4.799***
		High-prestige	27.8%	68.4%	2.522***
Non-venture IPOs	Percentage technology	Low-prestige	23.5%	56.7%	3.994***
		High-prestige	28.2%	76.9%	3.606***
Venture-backed IPOs	Median share overhang	Low-prestige	2.5	3.2	2.513**
		High-prestige	2.4	2.9	2.522***
Non-venture IPOs	Median share overhang	Low-prestige	2.8	3.8	3.739***
		High-prestige	3.3	3.1	0.363
Venture-backed IPOs	Median trailing sales (£ millions)	Low-prestige	24.1	11.9	1.917*
		High-prestige	54.0	7.8	4.330***
Non-venture IPOs	Median trailing sales (£ millions)	Low-prestige	17.2	24.1	0.555
		High-prestige	48.6	4.8	2.898***
Venture-backed IPOs	Median trailing EBIT (£millions)	Low-prestige	2.6	0.3	2.249**
		High-prestige	5.7	-0.6	4.062***
Non-venture IPOs	Median trailing EBIT (£millions)	Low-prestige	2.0	1.3	1.089
		High-prestige	4.3	1.3	2.259***
Venture-backed IPOs	Median market value/annual sales	Low-prestige	1.4	8.0	5.146***
		High-prestige	1.3	27.9	5.637***
Non-venture IPOs	Median market value/annual sales	Low-prestige	1.6	2.9	2.358**
		High-prestige	1.6	15.6	3.578***
Venture-backed IPOs	Median age	Low-prestige	4.0	3.1	1.833*
		High-prestige	3.6	3.9	0.152
Non-venture IPOs	Median age	Low-prestige	5.4	4.2	0.589
		High-prestige	5.2	2.5	2.580***

The sample consists of 316 venture backed IPOs and 275 non-venture backed IPOs listed on the Official List of the London Stock Exchange between January 1985 to December 2003. Only IPOs of ordinary shares with listing methods comprising placements or offers for sale at a fixed price are included. The venture backed IPOs are all new issues within the sample with venture capital participation recorded in the IPO prospectus. High-prestige underwriters are those listed in the top-ten in annual Hambro underwriter rankings. Percentage technology is the percentage of IPOs that are classified as high-technology in Table 2. Share overhang is the ratio of retained shares to the public float. Sales and EBIT are trailing 12 month prior to IPO in millions of pound sterling. Market value is computed as the post-issue number of shares outstanding multiplied by the offer price. Age is in months from incorporation to IPO date. Issuer incorporation data are from London Stock Exchange Yearbook. Return data are from Datastream. One, two and three asterisks indicate significance, at the 10%, 5% and 1% level or better, respectively. All pound values are in pounds of 2002 purchasing power using the Retail Price Index.

Table 6: Relationship between long and short term performance**Panel A: Correlation between long and short term performance**

		3 year CAR	5 year CAR
Full sample	Offer price	0.005	0.005
	First day price	-0.013	-0.007
	First day return	-0.041	-0.022
Non-bubble	Offer price	0.052	0.031
	First day price	0.069	0.046
	First day return	0.045	0.020
1998-2000	Offer price	0.007	-0.040
	First day price	-0.054	-0.104
	First day return	-0.142	-0.116

Panel B: Relationship between underpricing and long-term performance

		3 year CAR	5 year CAR
Non-bubble	First day return >30%	21.6%	17.9%
	First day return <30%	2.7%	-5.4%
1998-2000	First day return >30%	-53.3%	-24.7%
	First day return <30%	-19.6%	-1.9%