

“Hot Issue” IPO Markets and its Consequences for Issuing Firms and Investors: The UK Market of 2000

João Batista Amorim Toniato*

*Lancaster University - UK
Department of Accounting & Finance*

ABSTRACT: Managers make use of the fact that initial public offerings (IPOs) are discretionary events to select the time for going public, causing cycles in the new issues markets. This paper provides evidence from five clinical studies during the 2000 IPO market in the UK suggesting that the, so called, “hot issue” markets intensify two other well documented anomalies in finance; the initial underpricing and the long run underperformance of new issues. Several behavioural explanations for the return performance of the studied IPOs are explored. In this investigation, the Rock model which relates the level of short run underpricing of IPOs with the information asymmetry between investors seems to work in its precise opposite due to the intense level of speculation over the issues. This behavioural analysis also provides support for the divergence of opinions model since the observed long run underperformance can be associated with the availability of previous information about the firm. Earnings management through discretionary accruals prior to the floatation is also found to be present influencing the performance of the companies where this analysis could be carried out. The results add to the challenge that the behaviour of IPOs pose to the market efficiency hypothesis.

Key words: IPO, investors, firms.

Received in 10/15/2006; revised in 12/03/2006; accept in 10/12/2007.

Corresponding authors:

* j.toniato@Lancaster.ac.uk

Accounting & Finance

Lancaster Management School

LA1 4YW

+44 (0) 1524 65201

Editor's note: *This paper was accepted by Alessandro Broedel Lopes.*

1. INTRODUCTION

The academic literature has long recognized the existence and the recurrence of periods in the initial public offerings market in which the short run performance of IPOs is abnormally high (Ibbotson and Jaffe, 1975). So far no consensus has been achieved, however, regarding the reasons and the consequences of such “hot issue” markets. This research sheds further light on the subject by providing evidence from a series of 5 clinical studies carried out using an event study methodology on IPOs performed during a hot issue market. Results confirm the expectations by suggesting hot issue markets intensify two other phenomena related to IPOs; the short run underpricing and the long run underperformance of new issues. The clinical study approach adopted allows for a closer analysis of the outcomes for issuing firms and investors and the possible reasons for it. This investigation supports that companies manipulate accruals in the period surrounding the IPO (Teoh, Welch and Wong, 1998) and leads to the conclusion that the divergence of opinion (Miller, 1977) hypothesis provides support for accurate predictions of the observed long run performance. Moreover, the short run performance appears to be driven by speculation over the issues which, by its turn, seems to cause the analysed companies to follow the precise opposite rationale of that from the ‘winner’s course’ model (Rock, 1986).

In addition to the phenomenon of hot issue markets, researchers have identified two other anomalies related to IPOs. The first consists of the recurrence of underpricing of IPOs. Researchers examining almost every capital market in the world indicated the occurrence of high average abnormal returns in the first day or even weeks of trading of new issues. The second phenomenon is the long run underperformance of IPO shares in the years following the issue. There is less agreement about this second abnormality and the evidence supporting it is less extensive than that of the initial underpricing but the phenomenon has been documented by numerous researchers in several markets. When these two phenomena are analysed in the context of hot issue markets it is usually assumed that these periods not only boost the initial performance of IPOs but also aggravate their long run underperformance. Hence, this paper investigates the short-term as well as the long-term performance of each of the selected companies. Furthermore, I intend to provide explanations for the documented results and for this purpose each of the cases is analysed against the theoretical background which attempts to explain IPO stock behaviour.

The hot issue market of the year 2000 in the UK was selected for this investigation. This was the best year of the last decade in terms of total amount raised in British IPOs. Five IPOs were selected from that period; Oxygen Holdings, Scipher, Totally, Actif and New Capital Invest. The companies were chosen in view of the usual type of firm going public during that period. Moreover, all companies selected floated between the last days of January and the first 10 days of February 2000; a period which was the apex of the 2000 hot issue market. These characteristics should guarantee a fair insight into the behaviour of ‘star’ IPOs during that hot issue market.

The empirical investigation uses buy-and-hold abnormal returns (*BHARs*) to measure long run performance and market adjusted abnormal returns (*MAARs*) for short run

performance. Furthermore, returns are always adjusted by four different benchmarks. I find statistically significant and abnormally high first day returns for all studied firms independent of the choice of benchmark. Results ranged from 63% by Actif to an amazing 2877% by Oxygen in the first day of trading. Also, when the short run measurement window was extended beyond the first day, the returns and their statistical significance decreased indicating that the haste in the initial increase in price appears to be mirrored in the subsequent fall. The aftermarket performance proved less uniform than the short run performance. The *BHARs* were generally negative; however, Scipher over-performed two of the benchmarks in the first year post-IPO. The remaining companies, in contrast, underperformed all benchmark choices over all periods. However, the results for the long run underperformance were not always statistically significant and should be interpreted with caution. Finally, when the reason for the performance is analysed, positive discretionary accruals are observed in the period surrounding the IPOs supporting Teoh, Welch and Wong (1998) suggestion that issuing firms manipulate earnings during the floating period. Moreover, in tune with (Miller, 1977) the results show that firms where the initial divergence of opinions about their prices is more severe underperform further in the long run. Finally, an interesting result of the research is that speculation which appears to drive short run performance is larger the less information about a company is available. This is the reverse of the rationale of Rock (1986), one of the most widely accepted theories of IPO underpricing.

The remaining of this paper is organised as follows. Section 2 sets the background for the studied firms. Section 3 reviews the academic literature on IPO behaviour. Section 4 describes the data and methodology used in the empirical investigation. Section 5 presents the results for the short run analysis and the examination of its reasons. Section 6 presents the long run performance results and the analysis of its reasons. Section 7 discusses this research's limitations and provides suggestions for future research. Section 8 summarizes the results and concludes the paper.

2. BACKGROUND TO THE CLINICAL STUDIES

This section briefly describes the background for the companies under consideration. The first, Actif Group PLC, designs and sells licensed branded products. The company secured the position of 42nd fastest-growing firm in Britain on the 1999 Sunday Times Fast Track 100 reporting turnover growth from £1.3 to £10.2 million from 1995 to 1999. Yet, the firm failed to produce similar results in earnings and experienced a drastic fall of 92% in profits before tax in 1999. Moreover, Actif was exceptionally dependent on its main brand, ELLE, which accounted for roughly 80% of the company's income. Hence, the company was seen as risky but there was belief in the market on the capacity of the management team and Martin Lent, the company CEO.

The second firm, New Capital Invest PLC, was a technology investment fund which floated on the Alternative Investment Market (AIM) on 3 February 2000.¹ The purpose, according to the company's prospectus, was to raise £2 million to acquire a significant stake in a single company, particularly in the new media environment. The company's biggest resources were its directors and their names brought wide speculation to the IPO. New

¹ The AIM exchange is directed at small, young and growing firms and therefore often viewed as one of a more risky nature; however, Burrowes and Jones (2004) show that AIM IPOs are only conservatively underpriced on average.

Capital’s chairman, Nigel Whittaker, had been a top manager in Kingfisher as well as chairman of B&Q and was considered a retail guru. New Capital, differently from the other firms under investigation, will only be analysed in the short run. This is due to the company’s conclusion in 19 July 2000 of the reverse takeover of Eagle Eye Telematics and the temporary suspension of its share trading. The shares resumed trading in 13 October under the name Eagle Eye Telematics. Therefore, the firm after this process was a different one, with different assets and businesses and not anymore the company of interest which went public during the hot issue market. Oxygen Holdings, the third firm, was an internet incubator fund and “the latest brainchild of Mike Edelson” (Lea, 2000). The level of speculation over the company’s floatation was also very intense, especially after Rupert Murdoch, head of News Corporation, got involved with the firm. This made of Oxygen’s shares the best performing first day amongst all companies going public in 2000. Oxygen’s chairman, Michael Edelson, – also a director of Manchester United football club – appointed his daughter, Emma Edelson, fund manager and called Elisabeth Murdoch, BSkyB senior executive and Murdoch’s daughter, to join the company’s advisory panel. Additionally, the company had no operation prior to its listing.

Scipher PLC was a technology development company. The firm’s prospectus stated that its business was based upon the exploitation of its large portfolio of patents by its highly skilled staff. The company’s profits dove in the years prior to the IPO, including a loss before taxation of £2.69m in 1999. The company admitted in writing on its prospectus that there could be no certainty that it would ever achieve profitability. This insecurity was attributed to the dependency on the company’s successful development of new technologies and to increasing competition. Finally, Totally PLC is an internet start-up company founded by Steve Burns, chief executive at the time of the IPO. The company had no revenue prior to its listing and directors anticipated in the prospectus that revenue would be generated by a preferred partner scheme which would deliver advertising and e-commerce related revenue. The company planed to raise £1.8 million net of expenses in the issue to develop totallyjewish.com; a web site for the Jewish community.

3. LITERATURE REVIEW

3.1. Evidence and theories of short run underpricing

Stoll and Curley (1970) were the pioneers in documenting the systematically abnormal first-day returns of IPOs. In the following years the same phenomenon was observed in the UK (Buckland, Herbert and Yeomans, 1981) and later in virtually every capital market in world. Furthermore, contrary to the idea that the market would learn and rectify this anomaly with time, Ritter and Welch (2002) document a significant trend of increase in this pattern of underpricing over time. Table 1 provides a summary of the international evidence on IPO underpricing which demonstrates the great extent of the phenomenon across different markets.

Table 1: International Evidence of Short-Run Underpricing

Country	Reference(s)	Sample size	Time period	Average initial return
Australia	Lee, Taylor and Walter (1996)	266	1976-89	11.90%
Austria	Aussenegg (1997)	67	1964-96	6.50%
Brazil	Aggarwal, Leal and Hernandez (1993)	62	1979-90	78.50%
Canada	Jog and Srivastava (1994)	258	1971-92	5.40%
Chile	Aggarwal, Leal and Hernandez (1993)	19	1982-90	16.30%
Finland	Keloharju (1993)	85	1984-92	9.60%
Germany	Ljungqvist (1997)	170	1978-92	10.90%
Japan	Hebner and Hiraki (1993); Hamao, Packer and Ritter (1998)	975	1970-96	24.00%
Korea	Dhatt, Kim and Lim (1993)	347	1980-90	78.10%
New Zealand	Vos and Cheung (1993)	149	1979-91	28.80%
Sweden	Ridder (1986); Rydqvist (1993)	213	1970-91	39.00%
United Kingdom	Levis (1993)	2,133	1959-90	12.00%
United States	Ibbotson, Sindelar and Ritter (1994)	13,308	1960-96	15.80%

Sources: Loughran, Ritter, Rydqvist (1994), Ritter (1998) as well as the listed authors for each study.

The returns in these studies consist of equally weighted percentage price changes between the offer price and the closing price on a subsequent day. In most countries the reported number is a one-day return, however, in some the closing price used is later in the future due to restricted price movements or trading not starting immediately. When more than one set of authors is listed the return refers to the combined sample constructed by Loughran, Ritter and Rydqvist (1994).

Some researchers explain IPO underpricing by proposing it is a signalling mechanism. This theory is based on an asymmetry of information between issuers and investors; which generates a lemons problem since only low quality issuers will be willing to sell their shares at the average price. The model, therefore, predicts that high quality issuers will signal their superiority by selling shares at a price lower than the market believes they are worth. These high quality issuers are believed to be compensated for their sacrifice in the future when “a higher price at the seasoned offering eventually compensates firms for the intentionally low IPO price” Welch (1989). However, further research contested this theory and found no evidence of underpriced IPOs consistently returning to the market for seasoned offerings (Michaely and Shaw, 1994). Another theory based on asymmetry of information and one of the most compelling models in explaining IPO performance is the one created by Rock (1986). The model applies the concept of a winner’s curse to the IPO market. According to this theory, investors can be classified as ‘informed’ or ‘uninformed’. The former are investors who are willing to incur the costs to assess the future performance of new issues and the latter are investors who do not spend resources on the analysis of IPOs and indiscriminately invest in all new issues. Since informed investors will only apply for underpriced IPOs and uninformed investors apply to all; underpriced issues will be oversubscribed while the overpriced issues will be relatively undersubscribed. Consequently, the investor who applies

for all new issues finds himself in the long run holding a much larger amount of overpriced IPOs. Hence, if all IPOs are priced at the underlying value, uninformed investors make systematic losses and leave the market. Rock's model, therefore, anticipates that underwriters will systematically underprice all issues fearing that otherwise the uninformed investor might leave the IPO market ensuing shorter liquidity and a decrease in profitability for investment banks. The model found support in empirical studies including Keloharju (1993), Koh and Walter (1989) and recently in the UK Khurshed and Mudambi (2002) who find no significant underpricing in investment trusts IPOs and conclude that this partially due to the smaller differential of information between uninformed and informed investors about this type of firm.

Baron (1982) offers an explanation which focuses on the asymmetry of information not between investors and underwriters but between issuing firms and underwriters. The model assumes that investment bankers have more information about the demand for IPO shares in the market and therefore the issuer could only monitor the work of the underwriter for a cost. This makes it optimal for the issuer to allow a certain degree of underpricing. This model found some empirical support in the work of Khurshed and Mudambi (2002). However, Muscarella and Vetsuypens (1989) found that when investment banks themselves go public the underpricing is as large as on other types of firms, casting doubt on the validity of the theory.

Models which do not rely on the asymmetry of information include the theory that investment bankers possess a monopsony power over small issuing firms, which can be used to lower the risk of losses for investment banks. This model also infers that underwriters can use this power to distribute underpriced IPOs to favoured clients. In tune with this prediction Cornelli and Goldreich (2001) in the UK and Aggarwal, Prabhala and Puri (2002) in the US conclude that underwriters favor institutional investors on the allocation of shares. However, other recent research contested this idea and found that “underpricing has little or no effect on outside block ownership” (Field and Sheehan, 2002).

Finally, Tinic (1988) provides a further model not dependent on the asymmetry of information. The author develops a litigation theory which predicts that issuers and underwriters use underpricing as form of insurance against legal action. The model assumes an implied agreement between all parts involved in an IPO, where investors are rewarded with excess returns in the short run in exchange for neglecting small errors related to disclosure requirement for issuing firms. Drake and Vetsuypens (1993) challenged the model finding that on average sued IPOs actually had higher underpricing than those not sued.

3.2. Evidence and theories of long run underperformance

The long run performance of IPOs presents a further puzzle for researchers. New issues perform on average very differently in the long run than in the short run. Ritter and Welch (2002) with a sample of US firms find that “the three-year average market-adjusted return on IPOs is -23.4%, whereas the average style-adjusted return is -5.1%.” However, there is far less agreement about this long run underperformance than about the short run performance. Firstly, studies in some countries found that IPOs over-perform the market in the long run as well as in the short run. In addition, recent research cast doubt on the appropriateness of the statistical tests used by many studies to measure long run returns (Barber and Lyon, 1997 and Brav, 2000). Brav and Gompers (1997), for instance, find that

comparing IPO returns to control firms matched by size and book-to-market value eliminates the underperformance reported in Loughran and Ritter (1995). The evidence of long run underperformance is, nevertheless, considerably large as Table 2 reviews.

Theoretical models explaining the long run behaviour of IPOs are less plentiful than the ones relating to the short run behaviour. Khurshed, Mudambi and Goergen (1999) separates these theories in three groups; one which provides behaviour and expectations-based explanations for the phenomenon, one which bases its explanations in the agency theory and a final group which deem the observed underperformance a result of mis-measurement. The first group, which attempts to provide expectation-based reasons for the underperformance of new issues, includes Miller (1977). Miller's model develops a divergence of opinion hypotheses and suggests that the most optimistic investors are the ones who subscribe to the IPO or buy the shares shortly after the issue leaving investors who are more pessimistic about the IPO out of the initial price adjustment.

Table 2: International Evidence of Long-Run Performance of IPOs

Country	Reference	Sample	Time	Average
		size	period	initial return
Australia	Lee, Taylor and Walter (1996)	266	1976-89	-46.50%
Austria	Aussenegg (1997)	67	1964-96	-27.30%
Brazil	Aggarwal et al. (1993)	62	1979-90	-47.00%
Canada	Kooli and Suret (2004)	445	1991-98	-16.86%
Chile	Aggarwal et al. (1993)	19	1982-90	-23.70%
Finland	Keloharju (1993)	85	1984-92	-21.10%
Germany	Ljungqvist (1997)	170	1978-92	-12.10%
Japan	Cai and Wei (1997)	975	1970-96	-27.00%
Korea	Dhatt, Kim and Lim (1993)	347	1980-90	2.00%
New Zealand	Firth (1997)	143	1979-87	-10.00%
Sweden	Loughran, Ritter and Rydqvist (1994)	162	1980-90	1.20%
United Kingdom	Levis (1993)	712	1980-88	-8.10%
United States	Loughran and Ritter (1995)	4,753	1970-90	-20.00%

Sources: Kooli and Suret (2004), Loughran, Ritter and Rydqvist (1994), Ritter (1998) as well as the listed authors of each study.

The aftermarket performance is measured as $100 \times \{[(1 + R_{ipo,t}) / (1 + R_{m,t})] - 1\}$, where $R_{ipo,t}$ is the average total returns from the market price shortly after trading commences (usually, the closing price of the first day of trading) until the earlier of delisting or 3 years of trading. $R_{m,t}$ is the average of either market returns or a matching firm return over the same period.

With time, however, the level of information about the company increases and the divergence of opinion decreases; adjusting prices downwards. As a result, the level of long run underpricing becomes dependent on the extent of the divergence of opinions in the market. This implies that firms with little operational history which generate less consensus about their value suffer larger downwards adjustments in the long run. In the same line of thought, Ritter (1991) argues that firms look for issuing during 'windows of opportunity' when the market is perceived as over-optimistic. This sentiment is subsequently adjusted when more information becomes available and prices drop together with investors' optimism. A corollary of this theory is that greater initial returns lead to greater correction of the initial pricing when further information becomes available.

Jain and Kini (1994) research provides an agency costs-based explanation for underperformance. Their study relates the long run performance of IPOs to the level of inside ownership and finds a significant positive relation between the post-IPO operating performance and equity retention by original entrepreneurs. Mikkelsen, Partch and Shah (1997), however, challenge their results and find no significant relationship between ownership structure and long-run operating performance. Although contradictory, these two studies have in common the fact that they both identify that the long run underperformance of IPO shares is usually accompanied by underperformance of financial accounting numbers. This is consistent with the work of Teoh, Welch and Wong (1998). These authors find that management consistently biases performance upwards through positive discretionary accruals in the years leading to the IPO to inflate the market’s optimism about the firm. Since accounting accruals would have to reverse themselves in the later periods, poor financial accounting performance ensues, contributing to the returns underperformance.

The third group of theories assumes that problems with long run returns measurement are responsible for the underperformance of IPOs. One of the most widely debated of these problems is the choice of benchmark. Barber and Lyon (1997), Brav (2000) and Loughran and Ritter (2000) amongst others explore the effects of the choice of benchmark on long run event studies. The general conclusion from these studies leans towards the use of control firms or reference portfolios matched by size and book-to-market value to the analyzed firms. Barber and Lyon (1997) shows that “the control firm approach yields well specified test statistics in virtually all sampling situations”. However, specifically in the case of IPOs results indicating smaller underperformance using control firms and reference portfolios might simply mean that “seasoned firms matched by capitalization and book-to-market underperform the broader market by almost as much as IPOs do” Ritter and Welch (2002). Another debated problem with returns measurement is the choice of method. The methods used by most researchers, cumulative abnormal returns (*CARs*) and buy-and-hold abnormal returns, yield considerably different and in some cases even conflicting results. An example is found in Barber and Lyon (1996b) when the authors reconcile the somewhat contradictory results of Barber and Lyon (1996a) and Kothari and Warner (1996) and show that returns measured as *BHARs* and *CARs* can be at the same time positively biased by one measure and negatively biased by the other measure, depending on the period and the type of firms in the analysis and the requirement or not of pre-event data.

4. DATA, METHODOLOGY AND HYPOTHESIS DEVELOPMENT

4.1. Data

The primary source of data for the study is the *Datastream* on-line service. Daily returns for the companies under consideration in the clinical studies, their respective control firms and reference portfolios were obtained from this database. Daily returns were also obtained for the FTSE AIM index, which includes all companies listed on AIM, and the FTSE All-Share Index, which aggregates 98-99% of the UK market capitalisation. Another source of data used in this study is the *Thomson One Banker* for financial information as well as for the analysed companies’ annual reports and prospectuses. The London Stock Exchange statistical

fact sheets² were also used for additional information on the offer price, the underwriters and the amount raised on the issues. The data comprised a total of 53.448 companies' daily returns, being 786 of these for each of the studied companies, for each of the market indexes, for each of the control firms as well as for the components of each reference portfolio. The only data which required any amendments was the offer price of Oxygen Holdings obtained from *Datastream*. This offer price differed from those in the company prospectus, in the LSE statistical fact sheets and in the press releases about the firm and therefore the offer price used in the calculations was that of the latter three sources.

4.2. Selection of benchmarks

The returns in all tests will be adjusted by four different benchmarks. Since the events under consideration are IPOs, the main market index used will be the same as in most UK studies on IPOs, the FTSE All-Share Index, in opposite to the FTSE 100 Index since this includes only the 100 largest companies listed on the LSE main market. A second market index will also be used; the FTSE AIM Index, for it includes in general small capitalization, young and growing firms; which are the case of the average IPO firm. Furthermore, the companies' returns will be adjusted by two additional benchmarks; a control firm and a reference portfolio both matched by size and book-to-market value. These control firms and reference portfolios were selected from the companies listed in the same market as the firm under consideration. In other words, Actif, New Capital, Oxygen and Totally which were listed on AIM had their respective control firms and portfolios composed only by companies listed on AIM. Scipher, on the other hand, was listed on the main market and therefore its control firms and portfolios were selected from the LSE main market. For this selection the AIM and All-Share indexes had to be reconstructed with the according composition of the period when the IPOs occurred; i.e. the indexes were rebuilt including all companies which were part of the index in the day prior to the IPO under consideration and excluding all those which had not yet floated at that day. For this purpose, indexes' composition data was obtained from *Datastream*. Furthermore, in order to match the control firms and portfolios with the companies under analysis, data on the market capitalisation and the book-to-market value were extracted from the *Datastream* for each of the firms composing both indexes. As in Fama and French (1993), the last closing price of June is used to match firms by market capitalization. Finally, since the analysed companies are IPOs, which have no market value prior to its listing, the book-to-market value used was measured as the book value of common equity in the last annual report published before the end of June of each year divided by the market value of common equity calculated using, again, the closing price of June.

Moreover, data on the indexes' composition was only available on the database as early as the last day of the year 2000. As a consequence firms which issued before the companies under consideration went public and delisted before the end of 2000 were not given the chance of being selected as a matching firm or as part of the reference portfolio. However, this matter is not expected to affect the essence of the results since there is a relatively small chance of one of these companies being matched with the firms under analysis. Furthermore, even this being the case, the fact that the company delisted in 2000 means that a substitute return would still have to be selected as a benchmark to continue the performance measurement after the delisting date.

² Downloadable from <http://>

www.londonstockexchange.com.

The sample from the FTSE AIM Index included 324 companies of which 19 had to be excluded due to unavailability either of market capitalisation or book-to-market data. The FTSE All-Share Index sample is composed of 716 companies of which 9 had to be excluded due to unavailability of the same data. For the construction of the reference portfolios the companies in each of these rebuilt indexes are first ranked by market capitalization. Next, deciles of equal number of companies are created with the first decile being the tenth of companies which exhibit the lowest capitalisation of the index, the second decile being the next tenth number of companies with the lowest capitalization and so on. Subsequently, each of these size deciles are ranked separately by book-to-market value and quartiles (in the case of the All-Share index) and thirds (in the case of the AIM index) of equal number of companies are constructed. This generates 30 size and book-to-market portfolios for the AIM index and 40 for the All-Share index. From these, the portfolio which suits the clinical study company is selected as the reference portfolio for it. Control firms, by their turns, are selected by grouping all firms which market value differs from the company under consideration by no more than 10%. Next, the firm belonging to this group which exhibits the closest book-to-market value to that of the company of interest is selected as the control firm.

The method of constructing portfolios based on a fixed amount of market capitalisation and book-to-market value, allowing for a different number of companies in each portfolio, was attempted but later abandoned. The reason being that constructing deciles by dividing the maximum market value by ten and using this value to separate companies above it and below it produced an enormously disproportionate distribution in the AIM Index portfolios. Since most companies listed on AIM are small, this method left 83% of all companies in the index in the lowest decile, 11% on the second lowest decile and only 6% of all companies on deciles 3 to 10.

Finally, in the long run performance analysis, matching firms as well as the composition of reference portfolios are allowed to change once every year. In other words, at the trading day exactly one year from the IPO, new reference portfolios and new control firms are selected using the same technique as initially, however, this time with the closing share price of June 2001 and the book value of equity of the last balance sheet before June 2001. The same procedure is repeated for the third year of analysis when the portfolios are reconstructed based on the closing share prices of June 2002 and the last book values before June 2002. Additionally, there was no case in which the control firm or one of the companies in the reference portfolio delisted prior to the end of the relevant year, generating no need for a substitute benchmark in any of the cases.

4.3. Short run performance measurement

The initial post-IPO abnormal returns will be computed as in Aggarwal *et al.* (1993). For this purpose firstly, the total return on each of the studied companies' stock (Rs_t) and on their benchmarks (Rb_t) are estimated for the period from the offer price until the t th day of trading as:

$$Rs_t = (Ps_t / Ps_0) - 1 ; Rb_t = (Pb_t / Pb_0) - 1$$

Where Ps_t and Pb_t are the closing market price of each of the companies' stock and of the benchmarks on the t th day of trading. Ps_0 and Pb_0 are the offer price at which the company's shares floated in the market and the opening market price of the benchmark on the day of the

IPO respectively. From these two returns the market adjusted abnormal return from the opening price until the end of the t th day of trading is computed, for all clinical study companies, as:

$$MAAR_t = 100 \times \{[(1 + R_{s_t}) / (1 + R_{b_t})] - 1\}$$

Khurshed and Mudambi (2002) draw attention to the fact that the use of *MAAR* as an abnormal return measure assumes that the systematic risk of the IPO company is the same as that of the benchmark. Therefore, upward-biased *MAARs* might be generated when the assumption is not satisfied. Nonetheless, Khurshed and Mudambi (2002) also indicate that this matter is unlikely to affect the essence of the performance results.

4.4. Long run performance measurement

The Fama and French (1993) model has lately been used to measure returns in many event studies. However, this model was more recently criticized and studies showed that “IPO returns are consistent with a characteristic-based pricing model, whereas the Fama and French (1993) three-factor model is inconsistent with the observed long-horizon price performance of these firms” (Brav, 2000). Ritter and Welch (2002) test Brav’s analysis and conclude that indeed the Fama and French three factors are contaminated, especially in periods of high IPO issuing, and therefore bias the intercept, i.e. the Jensen’s Alpha, towards zero. To avoid these problems and to take into account the 2000 hot issue market and the economic conditions which led to it, the Fama and French three-factor model will not be used in the analysis and instead the long-run event study tests will be carried out in the light of Barber and Lyon (1997). The method involves, in addition to the range of different benchmarks already listed, the use of buy-and-hold abnormal returns. These returns are computed as the return on a buy-and-hold investment strategy in the firm under analysis subtracted by the return on a buy-and-hold investment on the benchmark:

$$BHAR_{s_\tau} = \prod_{t=1}^{\tau} (1 + R_{s_t}) - \prod_{t=1}^{\tau} (1 + R_{b_t})$$

Where, $BHAR_{s_\tau}$ is the buy-and-hold abnormal return for each of the companies’ shares over the period (τ). The reason for the use of this measurement technique in contrast to the cumulative abnormal returns used by a large literature of event studies is the following. Ritter (1991) was one of the first to draw attention to the fact that *CARs* and *BHARs* can be used to answer different questions about the company’s performance. The *CAR* over a period divided by the number of time intervals of that period yields a mean abnormal return for each time interval.³ Therefore, “a test of the null hypothesis that the 12-month *CAR* is zero is equivalent to a test of the null hypothesis that the mean monthly abnormal return of sample firms during the event year is equal to zero” (Barber and Lyon, 1997). Ergo, to test if the abnormal return over the whole period is zero, which is the hypothesis intended to be tested in this study, the *BHAR* needs to be used. Furthermore, the use of *CARs* implies that the investors close and reopen their positions on the investment at the end of every period, which would be very costly and does not correspond to the usual investor behaviour. Finally, Conrad and Kaul (1993) showed that *CARs* suffer from an upwards bias induced by errors in measurement while *BHARs* do not suffer from the same bias.

³ The *CAR* over a period τ is defined as: $CAR_\tau = \sum_{t=1}^{\tau} AR_{s_t}$; where $AR_{s_t} = R_{s_t} - R_{b_t}$.

4.5. Hypothesis development

In this research I investigate a series of hypothesis in order to provide a thorough analysis of the behaviour of each studied company. First, since the international evidence indicates that IPOs are, on average, underpriced and the hot issue market when the companies floated is expected to exacerbate this abnormal behaviour; I test whether each of the companies perform significantly above the benchmarks in the initial periods of one day, one week and up to one month after the issue.⁴ Therefore, the null *Hypothesis 1* is that all companies under analysis will not exhibit returns in excess of the benchmarks, measured at the end of the 1st, 5th and 21st day of trading.

$$H1_0 : MAAR_{\tau} \leq 0; \text{ for all companies and for } \tau = 1,5,21 \text{ days}$$

$$H1_1 : MAAR_{\tau} > 0; \text{ for all companies and for } \tau = 1,5,21 \text{ days}$$

Second, based on the analysis of the international evidence of long run underperformance carried out in section 3 and on the burst of the dot.com bubble which precipitated the end of the hot issue market months after the issues; I test whether the analysed firms underperform the benchmarks from the closing price of the first day to the closing price of the first, second and up to the third year of trading. In other words, this test assess whether investing in the IPOs under analysis in the 1, 2 or 3-year periods following the closing of the first day would be a good investment strategy. Hence, null *Hypothesis 2* is that the *BHARs* of each of the firms under analysis will not underperform the benchmarks in the 1, 2 and 3 years of trading from the first day's closing price.

$$H2_0 : BHAR_{\tau} \geq 0; \text{ for all companies and for } \tau = 12,24,36 \text{ months}$$

$$H2_1 : BHAR_{\tau} < 0; \text{ for all companies and for } \tau = 12,24,36 \text{ months}$$

Finally, the behaviour of each IPO is analysed against the theoretical background relating to the performance of new issues. A number of investigations are performed for this purpose. For example, I expect that, according to the expectation-based explanations for the behaviour of new issues, the level of underpricing will be directly related to the level of long run underperformance of each firm. In addition, I predict, according to Rock (1986) model, that the companies which exhibit the highest level of underpricing will be those which also have the highest level of information differential between informed and uninformed investors. Furthermore, according to Teoh, Welch and Wong (1998) I expect to find positive discretionary accruals (DAs) in the year prior to as well as the year of the IPO and a trend of negative DAs starting from the year after the IPO. However, the simple comparison between these five companies and their post-IPO performances does not allow for a satisfactory statistical test of these behavioural-explanation hypotheses or for the generalization of the results. Thus, this is simply an investigation of how well the theories apply to these particular cases during a hot issue market.

4.6. Test statistics

To test the null hypotheses that the short run *MAARs* are equal to zero for each of the companies under consideration, the test statistics employed are the time series daily crude

⁴ This follows a number of studies in the UK which found that the abnormal initial performance lasts in some cases until the end of the first trading month (e.g. Khurshed and Mudambi, 2002).

dependency adjusted t-statistics of Brown and Warner (1980). These are calculated for each day t using the data over the first month, i.e. the first 21 trading days, to estimate standard deviations:

$$t_{MAAR,t} = \frac{ARs_t}{\sqrt{\frac{1}{20} \sum_{\tau=1}^{21} \left(ARs_{\tau} - \sum_{\tau=1}^{21} \frac{ARs_{\tau}}{21} \right)^2}}$$

Subsequently, the daily test statistics for the period over which returns are measured (τ) are added and the sum divided by the square root of the number of days in the period.

$$t_{MAAR,\tau} = \frac{\sum_{t=1}^{\tau} t_{MAAR,t}}{\sqrt{\tau}}$$

The test statistics used in the long term analysis of the *BHARs* were that of Barber and Lyon (1997); i.e. the parametric test statistics drawn on the cross-sectional standard deviation of abnormal returns for the firms under analysis. This figure is calculated as:

$$t_{BHAR,\tau} = \frac{BHARs_{\tau}}{\left(\frac{1}{3} \sum_{j=1}^4 (BHAR_{j\tau} - ABHAR_{\tau})^2 \right)^{\frac{1}{2}} \times \left(\frac{1}{4} \right)^{\frac{1}{2}}}$$

The use of time-series test statistics for *BHAR* was also considered but later abandoned. This is due to the lack of independence of daily *BHARs* over time, which generates overlapping test statistics when these are cumulated over a period. Barber and Lyon (1997) are clear on this issue by stating that “time-series standard deviations cannot be used to calculate a test statistic for *BHARs*.” Nevertheless, the use of cross-sectional standard errors with such a small number of companies also generates problems and I discourage any generalisation of the results found in the long run analysis based simply on the test statistics.

5. SHORT RUN RESULTS

Table 3 summarizes the results for the short run analysis of the companies under consideration. As predicted, all companies over-perform all benchmarks in the first day of trading and results are significant at the 1% confidence level. However, the performance on the first week and first month of trading differs for some of the companies under analysis.

Table 3: Short run performance results

Benchmark Choice	Actif Group	New Capital	Oxygen Holdings	Scipher	Totally
<i>Control Firm Benchmark</i>					
1st Day MAAR (%)	63.30 (4.28)***	270.00 (4.49)***	2775.00 (4.58)***	71.76 (3.72)***	176.20 (4.43)***
1st Week MAAR (%)	30.00 (1.26)	226.00 (1.92)*	1644.25 (2.02)**	95.50 (1.98)**	140.08 (1.84)*
1st Month MAAR (%)	2.82 (0.27)	290.00 (1.05)	1203.30 (0.97)	15.89 (0.28)	218.35 (1.10)
<i>Reference Portfolio Benchmark</i>					
1st Day MAAR (%)	65.87 (4.26)***	271.65 (4.50)***	2625.30 (4.57)***	79.55 (4.28)***	176.51 (4.42)***
1st Week MAAR (%)	27.55 (0.99)	226.42 (1.91)*	1655.13 (2.01)**	98.10 (2.13)**	145.96 (1.83)*
1st Month MAAR (%)	-7.62 (-0.27)	355.78 (1.09)	1013.06 (0.96)	95.04 (1.03)	181.64 (0.99)
<i>FTSE AIM Index Benchmark</i>					
1st Day MAAR (%)	64.73 (4.23)***	260.67 (4.46)***	2670.67 (4.57)***	79.66 (4.28)***	178.63 (4.39)***
1st Week MAAR (%)	21.34 (1.02)	209.45 (1.89)*	1551.18 (2.01)**	86.59 (2.04)**	114.67 (1.69)*
1st Month MAAR (%)	-8.91 (-0.09)	212.20 (0.97)	876.40 (0.96)	74.01 (0.95)	97.75 (0.83)
<i>FTSE All-Share Index Benchmark</i>					
1st Day MAAR (%)	65.92 (4.37)***	268.56 (4.49)***	2827.66 (4.58)***	80.09 (4.26)***	180.63 (4.40)***
1st Week MAAR (%)	33.61 (1.33)	235.05 (1.92)*	1672.86 (2.01)**	105.47 (2.25)**	136.38 (1.80)*
1st Month MAAR (%)	12.97 (0.41)	300.52 (1.04)	1158.04 (0.97)	97.52 (1.10)	145.24 (0.94)

The first week and first month MAARs correspond to the return from the offer price to the closing price of the 5th day and the 21st day of trading respectively.

The numbers in brackets correspond to t-statistics.

* Significant at the two-tailed 10% confidence level.

** Significant at the two-tailed 5% confidence level.

*** Significant at the two-tailed 1% confidence level.

5.1. Analysis of the short run results

Actif reveals first day returns above 60% against all benchmarks and the t-statistics indicate these results are significant at the 1% confidence level. Although abnormally high, Actif's first day returns proved to be the lowest of all companies under consideration. More importantly, Actif's performance at the end of the first week and first month of trading demonstrates that the initial underpricing was corrected very rapidly. The first week performance still exceeded that of all benchmarks; however, this result was statistically insignificant. More importantly, the first month performance was poorer than that of the AIM index and the reference portfolio and only slightly superior to the remaining benchmarks. This implies that, contrary to the expectations, the 'end' of the short run underpricing happened in less than a month for the Actif Group's shares.

New Capital produced remarkable returns of over 200% adjusted by all benchmarks in all measurement windows applied. Moreover, these results are all significant at the 1% confidence level in the first day and at the 10% level in the first week. Moreover, the company over-performed all benchmarks apart from the AIM index by a higher amount to the end of the first month than to the end of the first trading day. Oxygen, by its turn, exhibits the most extraordinary first day returns of all firms under consideration. From an offer price of £0.02 the shares closed the first day of trading at £0.575 significantly over-performing all benchmarks by more than 2600%. However, in the same haste that Oxygen's share price risen it started falling again ending the first month down 56% from the closing price of the first day. This behaviour rendered the returns at the end of the first month statistically insignificant against all benchmarks, even though the closing price of the first month was still extremely high in comparison to the offer price.

The results for Scipher indicate that the companies' shares over-performed all benchmarks by more than 70% in all three short run periods except at the first month adjusted by its control firm. However, this particular exception is most likely a consequence of the atypical sharp rise in price of the control firm, Axon Group PLC, in the end of February and first days of March 2000. Furthermore, the observed underprice was statistically significant whenever returns were not measured until the end of the first month of trading. The short run performance of Totally, by its turn, proved abnormally high and statistically significant against all benchmarks in the first day and first week of trading. Results showed returns generally higher than 100% and significant at the 1% confidence level in the first day. Moreover, the results were higher in the first month than in the first day against the portfolio of peer companies and the control firm; however the first month results carried no statistical significance.

5.2. General analysis and possible explanations for the short run results

The results confirm the prediction of large short run underpricing and hypothesis $H1_0$ is rejected for all firms. However, the duration, so to speak, of the initial abnormal performance is somewhat shorter than usually observed in the literature. Even when companies, such as New Capital, performed better in the first month than in the first day of trading, results proved statistically insignificant. In particular, Actif underperformed the reference portfolio and the AIM index in the first month of trading. These results confirm the general consensus that the investment in IPO shares during a hot issue market yields

extremely high returns in the first trading day, however, they also indicate that, at times, the haste in the initial rise in price is mirrored in a comparable haste in the subsequent price fall after the first day. Hence, when buying IPO shares during a hot issue market investors should be prepared, in some cases, to dispose of them in a very short time or otherwise lose anything from a considerable stake to the entirety of their initial returns.

The analysis of the results against the theoretical background provides several insights and raises a few questions. Contrary to Rock (1986), the level of information differential between informed and uninformed investors failed to help predict the observed short run behaviour. It was expected that, as reported for a large sample of UK companies by Khurshed and Mudambi (2002), the underpricing in the companies under analysis would be smaller for investment trusts such as New Capital and Oxygen. However, the result is quite the opposite with these two companies yielding the larger initial returns adjusted by all benchmarks. At the same time, companies such as Actif and Scipher with significant operational histories and the potential for an informed investor to acquire considerably more information than an uninformed investor, showed less impressive and shorter initial over-performance. Additionally, the signalling theory provided mixed support for accurate predictions of the short run behaviour of the firms under consideration. The company which was more severely underpriced, Oxygen, had very poor financial and share price performances after the IPO, suffered two takeovers and subsequently delisted in May 2003 and therefore could hardly be described as a 'high quality' firm. However, other extremely underpriced IPOs such as New Capital and Totally had rather successful following years with the former achieving its goal of acquiring and running a technology firm, Eagle Eye Telematics, and the latter also successfully completing its project and recently upgrading to the LSE main market.

The studied firms' behaviour, therefore, seems to be more closely associated with the level of speculation over the issues. The most underpriced issues, New Capital, Totally and Oxygen, were also the ones with the lowest amount of information over the company and the highest level of speculation in the press prior to the floatation. This also generates an interesting finding that, in the issues analysed here during a hot issue market, Rock (1986) model appears to work in reverse; i.e. the companies with the least existing history and therefore the lesser information differential between informed and uninformed investors also generated the greater uncertainty and the highest level of speculation, which in turn lead to greater underpricing.

6. LONG RUN RESULTS

The long run results summarised in Table 4 show nearly only negative *BHARs* for all companies. Nonetheless, the results should be interpreted cautiously since returns are often statistically insignificant and also deserve prudence due to the statistical test issues discussed on section 4.6. The results are analysed below, separately for each of the firms.

6.1. Analysis of the long run results

Actif Group presented *BHARs* performance below all benchmarks in all time periods. This underperformance is statistically significant against the matching firm benchmark in all periods; however, when other benchmarks are used the underperformance is far less significant and concentrated in the first year of trading. Moreover, Oxygen Holdings which yielded the highest initial returns also presented generally the highest degree of

underperformance amongst the firms under analysis. The company's *BHARs* underperformed all benchmarks across all time periods with results ranging from -19.10% to -100.97%. The *BHARs* were statistically significant across all periods against all benchmarks except the control firm; this benchmark was only significantly underperformed in the first two years of trading.

Scipher presents an underperformance concentrated after the first year of trading. The firm over-performs the AIM index and its matching firm and only underperforms the All-Share index and the reference portfolio on the first 12 months after the IPO. Nonetheless, the first year returns are statistically insignificant. From the second year of trading, Scipher returns indicated generally statistically significant underperformances of up to -71.79% across all benchmarks. Finally, the long run performance of Totally was generally in agreement with the predictions. Its *BHARs* underperformed all benchmarks across all time periods; ranging from -1.4% to -93.25% and were generally statistically significant, apart from the returns adjusted by the control firm benchmark which were only significant in the first 12-months of trading.

Table 4: Long run buy-and-hold abnormal returns

Benchmark	Actif Group	Oxygen Holdings	Scipher	Totally
<i>Control Firm Benchmark</i>				
12-month BHAR (%)	-43.86 (-1.97)**	-19.10 (-0.86)	17.01 (0.76)	-38.61 (-1.73)*
24-month BHAR (%)	-21.14 (-1.93)*	-26.27 (-2.40)**	-14.10 (-1.29)	-1.40 (-0.13)
36-month BHAR (%)	-123.01 (-3.19)***	-42.26 (-1.10)	-02.99 (-0.08)	-1.56 (-0.04)
<i>Reference Portfolio Benchmark</i>				
12-month BHAR (%)	-27.89 (-1.23)	-62.60 (-2.75)***	-24.40 (-1.07)	-38.11 (-1.67)*
24-month BHAR (%)	-7.43 (-0.35)	-60.89 (-2.90)***	-36.78 (-1.75)*	-34.09 (-1.62)*
36-month BHAR (%)	-7.09 (-0.27)	-79.84 (-3.03)**	-24.54 (-0.93)	-21.74 (-0.82)
<i>FTSE AIM Index Benchmark</i>				
12-month BHAR (%)	-43.59 (-1.86)*	-55.45 (-2.37)**	23.83 (1.02)	-54.16 (-2.31)**
24-month BHAR (%)	-14.71 (-1.18)	-35.44 (-2.84)***	-20.81 (-1.67)*	-37.40 (-3.00)***
36-month BHAR (%)	-1.50 (-0.15)	-24.16 (-2.38)**	-20.63 (-2.03)**	-25.26 (-2.49)**
<i>FTSE All-Share Index Benchmark</i>				
12-month BHAR (%)	-82.68 (-2.19)**	-100.97 (-2.67)***	-17.64 (-0.47)	-93.25 (-2.47)**
24-month BHAR (%)	-63.42 (-1.60)	-86.92 (-2.20)**	-71.79 (-1.81)*	-86.10 (-2.18)**
36-month BHAR (%)	-37.54 (-1.20)	-63.55 (-2.03)**	-60.04 (-1.92)*	-61.30 (-1.96)**

The numbers in brackets correspond to t-statistics.

* Significant at the two-tailed 10% confidence level.

** Significant at the two-tailed 5% confidence level.

*** Significant at the two-tailed 1% confidence level.

6.2. General analysis and possible explanations for the long run results

The results generally confirm the prediction of long run underperformance. Scipher provides two exceptions by insignificantly over-performing two of the benchmarks in the first year of trading. However, the statistical significance of the underperformance is modest and therefore the rejection of the null hypothesis of no underperformance should be made cautiously. Moreover, the results signal their dependence on the choice of benchmark through the variation of returns in the same period adjusted by different benchmarks. This corroborates that researches on the long run performance of IPOs should apply great care to the choice of benchmark.

The theoretical background on the long run behaviour of IPOs provides further insights. The expectation-based theory of long run performance that the companies with shorter operational histories will generate larger divergence of opinions and higher underperformance (Miller, 1977) is supported by the results. Both Oxygen and Totally, which had no operational histories prior to the IPO, exhibited the larger underperformances. On the other hand, Ritter (1991) ‘windows of opportunity’ hypothesis provides only mixed support for the prediction of the observed behaviour of the IPOs. The level of short run underpricing appears to be mirrored in the degree of long underperformance in the case of Oxygen and Totally, however, the same cannot be said about Actif. Furthermore, the analysis of the level of earnings management was carried out for the firms which available data to permitted the investigation. These proved to be only Totally and Actif, since the remaining companies either had no financial information available on the *Thomson One Banker* or, when the financial information was available, essential depreciation and amortization data did not exist. Results summarized in Table 6 are in tune with the prediction of earnings manipulation in the year prior to as well as the IPO year. The IPO year is expected to exhibit positive discretionary accruals since “incentives to manage earnings are likely to persist in the months immediately after the offering” (Teoh, Welch and Wong, 1998). Actif exhibits positive DAs in the year prior and the year of the IPO. Also in tune with the prediction, the DAs appear to reverse and the company experiences three years of negative DAs after the IPO year. The results for Totally lead to similar conclusions. Although the company had no operation prior to the issue, its DAs were positive in the IPO year and later followed by two years of negative DAs.

Table 6: Earnings management analysis results

The earnings management regression used is that of Jones (1991), as described in Appendix A:

$$\frac{TA_{it}}{A_{it-1}} = \alpha_i \left[\frac{1}{A_{it-1}} \right] + \beta_{1i} \left[\frac{\Delta REV_{it}}{A_{it-1}} \right] + \beta_{2i} \left[\frac{GPPE_{it}}{A_{it-1}} \right] + u_{it}$$

	Yearly Discretionary Accruals						$\hat{\alpha}_i$	$\hat{\beta}_{1i}$	$\hat{\beta}_{2i}$	Adj.R ²
	1998	1999	2000	2001	2002	2003				
Actif	-0.25	0.36	0.31	-0.06	-0.31	-0.33	0.01	0.13	-0.04	0.10
<i>t-stats</i>							(0.05)	(1.23)	(-0.33)	
Totally			0.04	-0.06	-0.04	0.17	0.05	-0.08	-0.27	0.32
<i>t-stats</i>							(0.81)	(-0.23)	(-0.32)	

Discretionary accruals are computed as the ordinary least square (OLS) regression residuals, \hat{u}_{it} .

7. LIMITATIONS AND FURTHER RESEARCH

Although the results for the short run analysis can be interpreted with a reasonable degree of confidence, the long run analysis results should be interpreted more cautiously. The predicted underperformance is present in the cases under consideration, however, the results are not always statistically significant and a few results contradict the predictions. Furthermore, although the study attempted to provide reasons for the observed results these reasons do not carry statistical significance and were simply an investigation exercise of how much the theoretical background would help an investor predict the post-IPO performance of new issues during the hot issue market under analysis. Moreover, it was not possible to

investigate whether the theories based on the allocation of shares could have provided explanations for the behaviour of the IPOs under analysis since data on share ownership for the companies was not available. These theories seem very fruitful and future research should try to take them into account. Additionally, the initial intent of this research was to perform the earnings management analysis using the Kang-Sivaramakrishnan (KS) model (Kang and Sivaramakrishnan, 1995). This would be in tune with the recent literature touching on the topic such as Kothari (2001) and Thomas and Zhang (1999) which indicate that “only the Kang-Sivaramakrishnan model, which is coincidentally the least popular model, performs moderately well” in measuring the level of manipulation in earnings. Nevertheless, the short time interval of existence of the companies and the small availability of financial accounts data did not allow for the use of an instrumental variable regression, necessary for the application of the KS model. Therefore, the Jones (1991) model had to be chosen.

Finally, a rather promising research topic to come out of this study relates to the finding that, across the analysed companies, the Rock (1986) model seems to work in reverse due to the level of speculation over the period. This test could be expanded to a large sample of IPO firms which floated in different hot issue markets to assess whether this behaviour is common to all hot issue markets or if it was a characteristic only of the firms analysed in this paper.

8. CONCLUSION

In this study I empirically investigate the behaviour of new issues during a period of hot issue market through five clinical studies of UK IPOs in the year 2000. The analysis involved the examination of the short and the long run performances as well as testing how accurately one could have predicted the observed behaviour by applying some of the theories explaining IPO performance to the companies under consideration. The results confirm that the first day returns of all companies in the study largely exceed those of a variety of benchmarks. Returns in the first trading day, adjusted by the relevant market indexes or by similar size and book-to-market firms, ranged from 63.30% to 2827.66%, indicating a level of underpricing radically larger than the average found in the literature. Moreover, the long run buy-and-hold abnormal returns indicate that the aftermarket performance was generally very poor and the shares of all the companies in this study, if held by the investor for the first two or three years of trading, underperformed the market as well as the investment in similar size and book-to-market firms. However, these results should be interpreted cautiously as they are at times statistically insignificant and the statistical tests applied should not be used as basis for the generalization of the results.

When the theories explaining post-IPO stock behaviour are applied to the cases in the clinical studies, the short run performance, in tune with the dot.com bubble during which the firms went public, only fits the rationale of an speculative bubble where speculation surrounding the issues pushes their value much beyond their worth. Moreover, possibly due to this speculation, the model of Rock (1986), considered one of the most convincing models in explaining IPO underpricing, appears to work in reverse for the companies in the study. In other words, the larger speculation and therefore the larger underpricing are observed in the IPOs with the shorter operational histories and consequently the lesser degree of information differential between informed and uninformed investors. The long run performance of the IPOs under analysis, by its turn, provided support for the rationale of the divergence of

opinions hypotheses (Miller, 1977). Furthermore, the level of earnings management was analysed in the cases where financial accounting information was available. This investigation supports Teoh, Welch and Wong (1998) prediction that firms manipulate earnings in the period surrounding the IPO.

The findings imply that the short run abnormal performance was due to an excessive level of speculation over the issues which can not be rationally justified. The long run performance by its turn, although not always significant, indicates that IPO shares underperformed not only the broad market but also similar small companies. These results add to the challenge that the behaviour of IPOs poses to the market efficiency hypothesis, suggesting that periods of hot issue markets aggravate the anomalous behaviour of IPO shares documented by the literature and can dispute even some of the most widely accepted theories justifying the performance of new issues.

REFERENCES

- Aggarwal, R., Leal, R., Hernandez, F., 1993. The aftermarket performance of initial public offerings in Latin America. *Financial Management* 22, 42-53.
- Aggarwal, R., Prabhala, N., Puri, M., 2002. Institutional allocation in initial public offerings: empirical evidence. *Journal of Finance* 57, 1421-1442.
- Aussenegg, W., 1997. Short and Long-run performance of Initial Public Offerings in the Austrian Stock Market. Working Paper No 24, Austrian Working Group on Banking and Finance, August.
- Barber, B.M. and Lyon, J.D., 1996a. Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. Working paper, UC-Davis.
- Barber, B.M. and Lyon, J.D., 1996b. How can long-run abnormal stock returns be both positively and negatively biased? Working paper, UC-Davis.
- Barber, B.M. and Lyon, J.D., 1997. Detecting long-run abnormal stock returns: The empirical power and specification of test statistics. *Journal of Financial Economics* 43, 341-372.
- Baron, D.P., 1982. A model of the demand for investment banking advising and distribution services for new issues. *Journal of Finance* 37, 955-976.
- Brav, A., 2000. Inference in long-horizon event studies: a Bayesian approach with applications to initial public offerings. *Journal of Finance* 55, 1979-2016.
- Brav, A., Gompers, P., 1997. Myth or reality? The long-run underperformance of initial public offerings: evidence from venture and non-venture capital-backed companies. *Journal of Finance* 52, 1791–1821.
- Brown, S., Warner, J.B., 1980. Measuring security price performance. *Journal of Financial Economics* 8, 205-258.
- Buckland, R., Herbert, P.J., Yeomans, K.A., 1981. Price discount on new equity issues in the UK and their relationship to investor subscription in the period 1965-75. *Journal of Business Finance and Accounting* 8, 79-95.
- Burrowes, A., Jones, K., 2004. Initial public offerings: evidence from the UK. *Managerial Finance* 30, 46-62.
- Cai, J., Wei, K., 1997. The investment and operating performance of Japanese IPO. *Pacific-Basin Finance Journal* 5, 389–417.
- Conrad, J., Kaul, G., 1993. Long-term market overreaction or biases in computed returns? *Journal of Finance* 48, 39-63.

- Cornelli, F., Goldreich, D. 2001. Bookbuilding and strategic allocation. *Journal of Finance* 56, 2337-2369.
- Dhatt, M., Kim, Y., Lim, U., 1993. The short-run and long-run performance of Korean IPOs: 1980-90. Working Paper, University of Cincinnati and Yonsei University.
- Drake, P.D., Vetsuypens, M.R., 1993. IPO underpricing and insurance against legal liability. *Financial Management* 22, 64-73.
- Fama, E.F., French, K.R., 1993. Common risk factors in the returns on bonds and stocks. *Journal of Financial Economics* 33, 3-56.
- Field, L.C., Sheehan, D.P., 2002. IPO underpricing and outside blockholdings. Working Paper, Penn State University. (Available at www.ssrn.com)
- Firth, M., 1997. An analysis of the stock market performance of new issues in New Zealand. *Pacific-Basin Finance Journal* 5, 63-85.
- Hebner, K.J., Hiraki, T., 1993. Japanese initial public offerings. *Restructuring Japan's Financial Markets*. Chapter in Walter, I. and Hiraki, T., 79-113. Business One/Irwin.
- Hamao, Y., Packer, F., Ritter, J.R., 1998. Institutional affiliation and the role of venture capital: evidence from Initial Public Offerings in Japan. Working paper, Columbia University.
- Ibbotson, R.G., Jaffe, J.F., 1975. "Hot Issue" Markets. *Journal of Finance* 30, 1027-1042.
- Ibbotson, R.G., Sindelar, J., Ritter, J., 1994. The market's problems with the pricing of initial public offerings. *Journal of Applied Corporate Finance* 7, 66-74.
- Jain, B.A., Kini, O., 1994. The post-issue operating performance of IPO firms. *Journal of Finance* 49, 1699-1726.
- Jog, V.M., Srivastava A., 1994. Underpricing of Canadian initial public offerings 1971-1992: an update. *FINECO* 4(1), 81-89.
- Jones, J., 1991. Earnings management during import relief investigation. *Journal of Accounting Research* 29, 193-228.
- Kang, S., Sivaramakrishnan, K., 1995. Issues in testing earnings management and an instrumental variable approach. *Journal of Accounting Research* 33, 353-367.
- Keloharju, M., 1993. The winner's curse, legal liability, and the long-run price performance of initial public offerings in the Finland. *Journal of Financial Economics* 34, 251-277.
- Koh, F., Walter, T., 1989. A direct test of Rock's model of the pricing of unseasoned issues. *Journal of Financial Economics* 23, 251-272.

- Kooli, M., Suret, J.M., 2004. The aftermarket performance of initial public offerings in Canada. *Journal of Multinational Financial Management* 14, 47-66.
- Kothari, S.P., 2001. Capital Markets Research in Accounting. *Journal of Accounting and Economics* 31, 105–231.
- Kothari, S.P., Warner, J.B., 1996. Measuring long-horizon security price performance. Working paper, University of Rochester.
- Khurshed, A., Mudambi, R., 2002. The short-run price performance of investment trust IPOs on the UK main market. *Applied Financial Economics* 12, 697-706.
- Khurshed, A., Mudambi, R., Goergen, M., 1999. On the long-run performance of IPO: The Effect of Pre-IPO Management Decisions. Discussion Paper No. XII-401, University of Reading (Available at www.ssrn.com)
- Lea, R., 2000. Hot Air; City Diary. *The Times*. January 26, 33.
- Lee, P., Taylor, S., Walter, T., 1996. Australian IPO underpricing in the short and long run, *Journal of Banking and Finance* 20, 1189-1210.
- Levis, M., 1993. The long-run performance of initial public offerings: the UK experience 1980-1988. *Financial Management* 22, 28-41.
- Ljungqvist, A.P., 1997. Pricing initial public offerings: further evidence from Germany. *European Economic Review* 41,1309-1320.
- Loughran, T., Ritter, J., 1995. The new issues puzzle. *Journal of Finance* 50, 23–51.
- Loughran, T., Ritter, J., 2000. Uniformly least powerful tests of market efficiency. *Journal of Financial Economics* 53, 361-389.
- Loughran, T., Ritter, J., Rydqvist, K., 1994. Initial public offerings: international insights. *Pacific-Basin Finance Journal* 2, 165–199.
- Michaely, R., Shaw, W.H., 1994. The Pricing of Initial Public Offerings: Tests of Adverse-Selection and Signaling Theories. *Review of Financial Studies* 7, 279-319.
- Mikkelson, W.H., Partch, M.M., Shah, K., 1997. Ownership and operating performance of companies that go public. *Journal of Financial Economics* 44, 281-307.
- Miller, E., 1977. Risk, uncertainty and divergence of opinion. *Journal of Finance* 32, 1151-1168.
- Muscarella, C.J., Vetsuypens, M.R., 1989. A simple test of Baron's model of IPO underpricing. *Journal of Financial Economics* 24, 125-136.

- Ridder, A., 1986. Access to the stock market - an empirical study on the efficiency of the British and the Swedish primary markets. Casion Press, Stockholm.
- Ritter, J., 1991. The long-run performance of initial public offerings. *Journal of Finance* 46, 3-27.
- Ritter, J., 1998. Initial Public Offerings. *Contemporary Financial Digest* 2, 5-30.
- Ritter, J., Welch, I., 2002. A review of IPO activity, pricing and allocations. Working Paper, Yale ICF. (Available at www.ssrn.com)
- Rock, K., 1986. Why new issues are underpriced. *Journal of Financial Economics* 15, 187-212.
- Rydqvist, K., 1993. Compensation, participation, restrictions, and the underpricing of initial public offerings: Evidence from Sweden. Working paper, Stockholm School of Economics.
- Stoll, H.R., Curley, A.J., 1970. Small Business and the New Issues Market for Equities. *Journal of Financial and Quantitative Analysis* 5, 309-322.
- Teoh, S., Welch, I., Wong, T., 1998. Earnings management and the long-run underperformance of initial public offerings. *Journal of Finance* 53, 1935-1974.
- Thomas, J., Zhang, X., 1999. Identifying unexpected accruals: a comparison of current approaches. Working paper, Columbia University. (Available at www.ssrn.com)
- Tinic, S.M., 1988. Anatomy of initial public offerings of common stock. *Journal of Finance* 43, 789-822.
- Vos, E.A., Cheung, J., 1993. New Zealand IPO underpricing: a reputation based model. *Small Enterprise Research* 1, 13-22.
- Welch, I., 1989. Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings. *Journal of Finance* 44, 421-450.

Appendix A

The earnings management examination was performed using the Jones (1991) model. This model firstly assumes that the total accruals for a company i in a year t (TA_{it}) can be divided in its non-discretionary (NDA_{it}) and discretionary (DA_{it}) portions and defines total accruals as:

$$TA_{it} = [\Delta CurrentAssets_t - \Delta Cash_t] - [\Delta CurrentLiabilities_t] - Depreciation\ and\ Amortisation\ Expense_t.$$

This value is next used in the following regression to separate the total accruals in their discretionary and non-discretionary portions.

$$\frac{TA_{it}}{A_{it-1}} = \alpha_i \left[\frac{1}{A_{it-1}} \right] + \beta_{1i} \left[\frac{\Delta REV_{it}}{A_{it-1}} \right] + \beta_{2i} \left[\frac{GPPE_{it}}{A_{it-1}} \right] + u_{it}$$

Where, ΔREV_{it} = change in revenue from year $t-1$ to year t ; $GPPE_{it}$ = gross property plant and equipment in year t for company i ; A_{it-1} = total assets in year $t-1$ from firm i and u_{it} = residual term in year t for company i . Subsequently, the level of NDA_{it} accruals in year t is calculated with the use of the ordinary least squares estimates from the regression above as:

$$\frac{NDA_{it}}{A_{it-1}} = \hat{\alpha}_i \left[\frac{1}{A_{it-1}} \right] + \hat{\beta}_{1i} \left[\frac{\Delta REV_{it}}{A_{it-1}} \right] + \hat{\beta}_{2i} \left[\frac{GPPE_{it}}{A_{it-1}} \right]$$

Since $TA_{it} = NDA_{it} + DA_{it}$, the residual term \hat{u}_{it} from the OLS regression represents the level of discretionary accruals for the company. This level, by its turn, is used as a proxy for the level of earnings management the company engaged in during the period.