An Empirical Analysis of European IPO Markets

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Abstract

This analysis provides evidence regarding the performance of Initial Public Offerings (IPOs) in Europe during a time of dramatic change. For the sample of 973 IPOs taken from the six major Continental European markets and Sweden during 1988-98, there is significant underpricing and autocorrelation in IPO underpricing and activity. Privatization programs account for most of the "money left on the table". For the sample as a whole, we do not find long-run underperformance. Over shorter measurement horizons, IPOs outperform the market. The favourable performance is driven by New Economy IPOs, which account for 28 percent of the sample. The pervasiveness of these results across various methodological choices is puzzling and shows one of the forces behind the dramatic shift in industry composition of IPOs in favour of New Economy IPOs during the "Internet Bubble" of 1999 and 2000. Underpricing extends across all countries studied, with IPO activity being partially influenced by changes in tax regimes or in the regulatory framework. There is also a strong link between IPO performance and the national exchanges' ability to attract New Economy IPOs. This fundamentally explains why stock exchanges have attempted to establish "New Market" segments during the 1990s. Tests for performance differences between countries confirm the homogeneity of the European IPO market. In order to shed more light on the results, we study the relationship between management behaviour towards earnings management and the subsequent market response for the German IPO market. When applying two forms of earnings management, issuers that overperform in the long-run tend to manage earnings less aggressively. Over shorter measurement horizons, however, the performance is sensitive to the starting date of the measurement period. The market takes a considerable amount of time to respond to the fundamental message conveyed by management behaviour towards earnings management. Within the first four months, IPO returns are essentially driven by factors other than fundamentals. Apart from casting doubt on the efficiency of the IPO aftermarket, this can explain the observed negative relationship between short- and long-run IPO returns and the rationale behind investing in IPOs.

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Chapter I

Introduction

DURING THE ELEVEN-YEAR PERIOD between 1988-1998, almost 1,000 companies raised a total of €126.6 billion on the seven major European markets, excluding the UK. This figure, when compared to the number of already listed companies in Europe as well as to the US, is considerably large and shows the growing significance of the European marketplace for issuers, investors and underwriters.[1] It also demonstrates the declining cultural aversion of entrepreneurs and investors to the stock market. The large number of firms "going public" include well-known companies in a variety of industries such as Adidas AG, a sportswear company famous for its three-stripe logo, France Telecom SA, a leading telecommunications company, or SAP AG, the world's third largest software company measured by market capitalization. This development has allowed us to investigate the phenomena associated with Initial Public Offerings (IPOs) from the perspective of other, non Anglo-Saxon countries, where stock markets play an increasingly crucial role in company financing.

In the US, a large body of empirical and theoretical research has focused on phenomena associated with IPOs. Such phenomena concern, for example, abnormal initial returns, whereby the first market price is on average significantly higher than the offering price. This adjustment is typically interpreted as evidence of "underpricing" of IPOs (e.g., Ibbotson (1975), Ibbotson, Sindelar, and Ritter (1988) or Ritter and Welch (2002)). Another observed anomaly associated with IPOs is the "hot issue"

[1] Ritter and Welch (2002) report that during the same period 3,872 firms raised a total of $237.9 billion in the US.

phenomenon, whereby the observed issuing activity exhibits significant, recurring, and to some extent predictable variations over time (Ibbotson and Jaffe (1975), Ritter (1984) or Lowry and Schwert (2002)). The facet that has attracted most academic interest is the aftermarket performance of IPOs. IPOs seem, on average, to perform poorly in the long-run (Stoll and Curley (1970), Ritter (1991) or Brav and Gompers (1997)). Their poor stock price performance is reportedly also accompanied by poor operating performance, post-IPO relative to pre-IPO (Jain and Kini (1994)), and by an overly aggressive management of earnings during the IPO year (Teoh, Welch and Wong (1998)).

One key question that is the starting point for a number of further considerations is how these phenomena relate to companies going public in Continental Europe and Sweden during 1988 and 1998. We address this question in three independent, yet complimentary, research projects from three different geographical perspectives taking into account various methodological choices. These research projects form the core of the following empirical analysis of European IPO markets.

In Chapter II, "*The Cross-Section of European IPO Returns*", our motivation is to study the phenomena associated with IPOs from a pan-European perspective. Here, we pool the data from a set of 973 European IPOs between 1988 and 1998. By taking a pan-European perspective, we are able to investigate a large enough sample of IPOs that stretch beyond the rising markets of the late 1990s. The sample is interesting because European IPOs, unlike IPOs in the US, come from a broad mix of industries with a potentially different rational behind the going public decision.[2]

In this chapter, we first review the theoretical literature on the IPO phenomena. We then present the data and empirical methodology that is needed to shed light on how

[2] Helwege and Liang (2001) find that US IPOs from 1982-93 are largely concentrated in the same narrow set of high-tech industries. Interestingly, Ritter (2001) reports that the median age of US IPOs in 2001 was 12 years, the highest in any year since 1980. Because this starts to resemble our sample mix, this analysis may provide a useful guide for US practitioners.

some of those phenomena relate to European IPOs. In the first part of the empirical analysis, we study the underpricing phenomenon. Second, we show how European IPOs have performed in the aftermarket. Because we are particularly interested in the dynamics of aftermarket performance, we report absolute and relative returns over a variety of methodological choices and also for IPOs issued in "hot" and "cold" markets. Finally, we study how the sample of European IPOs perform based on a set of issuing characteristics over various measurement horizons and market conditions.

For the sample of European IPOs, we find considerable underpricing which is time-varying and related to company characteristics. IPOs offered in "hot" markets are substantially more underpriced than IPOs offered in "cold" markets. There is also significant autocorrelation in IPO underpricing and activity. This is higher for firms in the New Economy. Much of the large "amounts of money left on the table" can be explained by the influence of privatization issues with an arguably different rationale for underpricing. For the sample as whole, we find that IPOs did not underperform in the long-run. This underlines the more recent US evidence which argues that poor long-run IPO performance is a time-varying phenomenon. Over short measurement horizons we find significant absolute and relative overperformance. IPOs offered in "hot" markets have the best relative and absolute performance whereas IPOs offered in "cold" markets fare worst. These results are pervasive and extend across sampling periods and measurement horizons. Our findings also underline significant differences in IPO performance in sub-groups of the sample. There is particularly strong support for signaling theories that postulate a negative relationship between the size of the public float and aftermarket performance. A notion, which runs through the whole analysis and is reflective of global equity markets in the 1990s, concerns the influence of the New Economy. We find that the favourable performance of the sample as a whole is driven

by New Economy IPOs, which account for 28 percent of the sample as a whole. The pervasiveness of this performance across time and measurement horizons sheds some light on the drivers behind the dramatic shift in industry composition of IPOs in favor of New Economy IPOs during the "Internet Bubble" of 1999 and part of 2000.

In Chapter III, "*Initial Public Offerings: Insights from seven European countries*", we extend the evidence by studying European IPOs from the perspective of seven individual countries: Germany, France, Italy, The Netherlands, Spain, Sweden and Switzerland. The major purpose of this chapter is to study the robustness of the phenomena associated with IPOs by applying a common empirical framework to each European country. By extending our analysis to the individual countries, we improve our understanding about the potential drivers of the IPO performance patterns as well as the homogeneity of the European IPO market.

We first provide a detailed overview of the institutional arrangements in the individual European IPO markets under study, describe the data and review the existing empirical literature from the individual countries. By using a variety of empirical measurement techniques, we then present the evidence on underpricing and long-run performance. We also study time-series and cross-sectional performance patterns in individual European countries and perform a number of robustness checks for the significance of country-by-country differences.

The findings show that the underpricing phenomenon, while time-varying, is a consistent feature across all the countries under study. Our results also underline the effect of changes in tax regimes (in the case of France and Sweden) or the regulatory framework (in the case of Spain) on pricing and IPO activity. Evidence on long-run performance of IPOs in the individual European countries suggests that underperformance is a time-varying phenomenon and sensitive to benchmark

adjustment and measurement period. When performing significance tests of performance differences between the individual countries, we can generally confirm the similarity of the patterns for the sample as a whole as well as in the cross-section of the returns. This evidence underlines the homogeneity of the European IPO market. Finally, we find a pervasive link between the performance of IPOs and the exchanges' ability to attract IPOs from the New Economy. This helps to shed some light on the rationale behind the big efforts made by stock exchanges across Europe to establish "New Market" segments during the 1990s.

Further, this study underlines the general impression that long-horizon return studies can yield bizarre results. This is reinforced in our work which demonstrates that results can be interpreted differently depending on the experimental setting, therefore underlining recent simulation results in the academic literature.

Chapter IV, "*Management Behaviour and Market Response*", joint with Jinhui Luo, studies a set of 126 companies going public between 1988 and 1997 in Germany, with the aim of broadening our understanding of several unexplored issues relating to IPOs. Here, we examine the relationship between management behaviour towards earnings management and aftermarket performance in the German market.

By applying a similar measuring specification as found in the US literature, we first test the relationship between management behaviour, proxied by the aggressiveness of using discretionary current accruals and income smoothing, and aftermarket IPO performance. We then deviate from this benchmark measuring specification to test whether the IPO market is informationally efficient in the sense that management behaviour can be efficiently inferred by the market. We also go beyond the prior work in the literature to examine further the relationship between the two forms of earnings management and test how the market responds to their interaction. Finally, we combine

the typical empirical IPO methodology of Ritter (1991) and the framework of discretionary current accruals and income smoothing to examine the driving sources of the dynamics of aftermarket IPO performance.

The results show that managers of IPO firms tend to use discretionary current accruals to buoy up earnings during the IPO year and, to some extent, manage a firms' income. The long-run performance of German IPOs is related to such earnings management behaviour. The firms that use discretionary accruals more conservatively during the IPO year and the firms that smooth their reported income more, outperform their counterparts in the long-run. Moreover, we find that the two commonly identified earnings management strategies in IPOs are not deterministic, yet complementary. In the long-run, firms that use discretionary current accruals during the IPO year more conservatively also tend to smooth their reported income more. The firms undertaking both strategies outperform the market and other IPOs that only apply any one of the two strategies. We also find that the relationship between IPO aftermarket performance and the strategic earnings reporting behaviour documented in the literature is sensitive to both measurement horizon and starting date. Ironically, firms managing their earnings more opportunistically perform better than those managing their earnings more conservatively when performance is measured from a date closer to the IPO and when measured over short horizons. This sheds some light on the pervasive influence of the New Economy. Finally, we show that the market takes a considerable time to incorporate fundamentals into IPO prices. During this period, fundamental information about the IPO has weak explanatory power for long-run performance suggesting that the returns in the immediate IPO aftermarket are dominated by factors other than fundamentals. After a period of learning, the market starts to respond and the power of

fundamentals to explain long-run IPO returns increases substantially. This sheds light on the negative relationship between the short- and long-run dynamics in IPO returns.

Chapter II

The Cross-Section of European IPO Returns

1 Introduction

The academic literature on Initial Public Offering (IPOs) has grown rapidly over the past decade. Much of this literature has focused on documenting and explaining empirical patterns associated with the phenomena surrounding IPOs: underpricing, "hot issue" markets, and long-run underperformance. The patterns and models that try to explain them are mostly from an American perspective whereas the European marketplace has received considerably less attention.

In this chapter, we seek to close this gap by extending the international evidence on IPOs to include 973 companies which went public on the six largest Continental European markets and Sweden between 1988 and 1998. The extension of empirical IPO work to a pan-European scale responds to a number of fundamental developments during the past decade which have shaped European stock markets. First, throughout the 1990s, the European IPO market has developed as one of the cornerstones of the worldwide IPO market. This has been fostered either by privatization programs introducing "equity culture" to the Continental European marketplace, by initially highly successful stock exchange segments catering to companies in high-growth industries, or by the convergence of listing requirements, reporting rules and pricing mechanisms across Europe. Within this setting, European IPO activity has overtaken US IPO activity. During the late 1990s, more companies went public and more funds were raised by companies on the European market segments than in the US.[3] Second,

[3] Jenkinson and Ljungqvist (2001) provide a comprehensive coverage of the theory, empirical evidence, international patterns and institutional practices.

European integration has been at work for some time now, and the changes brought about by the introduction of the European single currency and the adoption of a common monetary policy have resulted in a dramatic change in portfolio allocation decisions. As the barriers to cross-border investing have declined, it has become increasingly important for issuers and investors alike to evaluate the European market from the perspective of a full set of available opportunities across countries. One of those consequences has been the rise of pan-European sector analysis at the expense of individual country analysis.

By taking a pan-European perspective, we are able to investigate the performance patterns of a large enough sample of IPOs over a period that stretches beyond the rising markets of the late 1990s. This allows us to shed more light on the generality of the empirical patterns and theoretical foundations associated with IPOs. In this respect, some issues are of particular interest.

Our first objective is to study the underpricing phenomenon for European IPOs. Here, we are interested in whether initial returns are time-varying and related to company characteristics. We are also interested in studying the relation between short-run and long-run IPO returns because institutional arrangements in the IPO aftermarket that are unrelated to fundamentals seem to affect IPO price dynamics. These institutional arrangements include short-selling restrictions (Geczy, Musto and Reed (2002)), the "quiet period" (Bradley, Jordan and Ritter (2002)), aftermarket stabilization through price support (Aggarwal (2002)) and the expiration of the "lock-up" period (Bradley, Jordan, Roten, and Yi, (2001)). Recent studies show that IPO underperformance is a time-varying phenomenon (Gompers and Lerner (2001)) or disappears in sub-sample analysis (Brav and Gompers (1997)). We study how European IPO returns relate to this evidence. Finally, the sample period has also been

characterized by unprecedented changes in global economies caused by the increasing role of technology, the effects of which are still subject to intense debate (Gordon (2000)). This has had a dramatic impact on the composition of equity indices in general, and the nature of companies seeking an IPO in particular. We are interested in finding out whether the performance patterns of European IPOs mirror this change.

In this respect we make a number of interesting observations that appear robust across various methodological choices:

(1) For the sample of 973 European IPOs offered between 1988 and 1998, we find considerable underpricing which is time-varying and related to proxies of uncertainty, such as age or sector. There is a large discrepancy between the mean and median amount of "money left on the table" which is due to the impact of large privatizations.

(2) For the sample as a whole we do not find long-run underperformance. This is consistent with Gompers and Lerner's (2001) conjecture that long-run IPO underperformance is a time-varying phenomenon. Over the short-run, there is significant absolute and relative overperformance. This result supports the growing literature that addresses the effect of institutional practices on the IPO return dynamics (Duffie, Gârleanu and Pedersen (2002)).

(3) IPOs offered in "hot" markets, during which the general market is generally rising and which have the highest initial return, are associated with the best absolute and relative IPO performance. IPOs offered in "cold" markets, where underpricing is lower and stock markets are either stable or falling, experience poorer absolute and relative aftermarket performance. For the sample as a whole, this does not necessarily indicate that European IPOs

issued in "hot" markets were aggressively priced in order to take advantage of "windows of opportunity".

(4) The study emphasizes the significant difference in IPO performance of sub-groups of IPOs (Brav and Gompers (1997)). There is strong evidence to support the fact that aftermarket performance is positively related to underpricing and negatively related to the size of the public float. Moreover, the relatively favourable aftermarket performance throughout the sample period is driven by New Economy IPOs, which account for 28 percent of the sample on average. This can help to explain the dramatic shift in industry composition of IPOs towards New Economy IPOs during the "Internet Bubble" of 1999 and 2000.

The rest of this chapter is organized as follows: Section 2 discusses the empirical anomalies associated with IPOs and surveys some of the main theories that try to explain them. The data, sample and methodology are described in Section 3. In Section 4, we turn to the examination of initial and aftermarket performance. Here, we also study aftermarket performance when categorized according to issuing characteristics. Regression results are presented in Section 5. Section 6 concludes the chapter and discusses the significance of our findings in order to help to explain recent events.

2 Patterns in IPOs

2.1 Initial Pricing

One observed pattern in IPOs concerns the existence of abnormal initial returns, whereby the first market price is on average significantly higher than the offering price. This adjustment is usually interpreted as evidence of IPO underpricing. Over the years, a large body of literature has documented the underpricing phenomenon (Logue (1973),

Ibbotson (1975), Ritter (1984), Ibbotson, Sindelar and Ritter (1988)). In a recent study, Ritter and Welch (2002) find an average first-day return of 18.8 percent when looking at 6,240 US IPOs issued between 1980 and 2001. The underpricing phenomenon has also been documented internationally (Loughran and Ritter (1995)).

A number of papers reviewing the theoretical literature classify the theories of underpricing based on whether the information between issuer, underwriter and different groups of investors is assumed to be symmetric or not. The underwriter plays a particularly crucial role. It performs three main functions: underwriting, advising and distribution. Owing to the potentially conflicting incentives offered by these functions, underwriters may face a trade-off between the costs and benefits of underpricing. On the one hand, for instance, underpricing may lower both the risk that the issue fails as well as the efforts in marketing. On the other hand, since underwriting fees are typically proportional to gross floatation proceeds, and thus negatively related to the degree of underpricing, investment banks should have an incentive to minimize underpricing. Because of the important role of an investment bank in practice, we divide the theories related to underpricing into two sections on the premise that explanations related to the underpricing phenomenon assume a more passive or active role of the underwriter.[4] It must be noted that many of the underpricing theories are not mutually exclusive.

2.1.1 Theories assuming a passive role of the underwriter

Winner's Curse

One model, in which underwriters act primarily as passive agents for the issuing firm, has been developed by Rock (1986). His winner's curse hypothesis explains the

[4] The recent literature on IPO underpricing focuses on the institutional aspects of underpricing and the role of the underwriter. In particular, the theory and evidence concerning the allocation of shares has stimulated a large number of papers. See Ritter and Welch (2002) for a literature survey.

underpricing phenomenon in terms of information asymmetry among the different groups of investors, the issuing firm and the underwriter. The information asymmetry arises because an issuer faces an unknown demand for its shares from two types of investors. The first group consists of outside or informed investors who have better knowledge about the prospective cash flow than does the issuing firm and its underwriter for which it incurred a cost. These informed investors will only submit purchase orders if the offering price is less than the true value of the IPO. The second type, uninformed investors, lack special knowledge about firm value. They may participate in the market even though they did not purchase information. Consequently, informed investors will bid for more shares of the more successful firms, which will leave the uninformed investors with a disproportionate amount of the less successful IPOs. In addition, since the allocation is not made on a pro rata basis and over subscription and rationing can occur, the bias against uninformed investors can be even larger if the underwriters favor the informed investors. This information asymmetry may lead to Akerlof's (1970) 'lemons problem', where the uninformed investor ends up primarily with the less successful issues. Underpricing the issue results in compensating uninformed investors for the bias in the allocation mechanism. The model generates a number of empirical predictions. For example, underpricing will be directly proportionate to the ex-ante uncertainty surrounding the issue.

The empirical literature is supportive of the model's predictions in countries where underwriters play a relatively passive role in bringing new issues to market. Koh and Walter (1989), using information on rationing, find that an uninformed strategy in Singapore just about broke even. Keloharju (1993) also finds evidence of a winner's curse in Finland. Ritter (1984) verifies some predictions and finds a monotonous link between underpricing and empirical proxies for uncertainty, such as sales and the daily

aftermarket standard deviation of stock returns for the first month in aftermarket trading.

Information Cascades

In the information cascades or "herding" hypothesis, developed by Welch (1992), it is assumed that, in aggregate, investors hold perfectly accurate information about the issuing firm. However, information concerning the value of the shares is highly uncertain for investors. Furthermore, it is assumed that it takes investment bankers time to approach interested investors because of their limited distribution channels. The hypothesis draws from the notion that potential investors base their investment decisions not only on their own information about the issue, but also on whether or not other investors, who were approached earlier, are purchasing. Thus, subsequent investors will view the actions of previous investors as an indication of what information they hold privately. Thus, they will imitate the purchasing decisions of their predecessors. Consequently, an issuer may want to underprice an offering to induce the first few potential investors to buy and induce a cascade in which all subsequent investors want to buy irrespective of their own information. When combining the cascades hypothesis within a setting of a pricing process in which the underwriter dynamically adjusts the IPO price, positively sloped demand curves can result.[5]

Empirical support for the cascades hypothesis is mixed. Barry and Jennings (1992) reject the cascades model in favor of the dynamic information acquisition argument, while in a recent work, Amihud, Hauser and Kirsh (2002) test the theory on a

[5] Similar dynamics can be applied when a cut in the offer price may actually scare away potential investors. See Financial Times (June 26, 2002) for the dynamics leading to the postponement and eventual cancellation of the IPO of Prada SpA, and CBS Marketwatch.com (July 2, 2002), describing the circumstances surrounding the IPO of CIT Group Inc., an insurance company and Tyco International Inc. spin-off, which offered shares at $23 against an expected range of $25 to $29 and closed at $22 after the first day of trading in an adverse company and market environment.

sample of 284 IPOs in the Tel Aviv Stock Exchange between 1989 and 1993 and find evidence consistent with herding. More specifically, they found that investors either subscribed overwhelmingly to new issues, which resulted in very small allocations, or largely abstained from subscribing so that the issue was undersubscribed and subscribers received full allocations, with very few cases in-between.

Signaling

Another line of theoretical literature reverses Rock's assumption regarding informational asymmetry and assumes that the issuer is better informed than investors. Here, underpricing is a means for high quality firms to distinguish themselves from low quality issuers. These studies are motivated by Ibbotson's (1975) conjecture that the issuer may want to "leave a good taste in investors' mouths." In the signaling models, banks are simply assumed to be passive distributors of shares to the general public.

In Allen and Faulhaber (1989), bad managers, who are more likely to run bad firms, are deterred from mimicking good managers who underprice, because subsequent cash flows partially reveal the firm's type. Consequently, their model implies that firms that underprice more are likelier to have higher dividends, and that the market reacts more favourably to dividend announcements by firms that underprice more. In Welch's (1989) model, risk-neutral entrepreneurs sell a fraction of their firm in an unseasoned offering and the remainder in a subsequent seasoned offering. Low-quality firms that mimic high quality firms must pay an exogenously specified operation cost, which the high-quality firms do not incur. In some cases, this cost may be insufficient to deter mimicking, and underpricing becomes the additional wedge that deters low-quality firms in the separating equilibrium. In Grinblatt and Hwang (1989), a firm employs two signals to convey the mean and variance of its future cash flow: the degree of

underpricing and the fraction of shares held by insiders. To overcome the asymmetric information problem, the issuer signals the true value of the firm by offering shares at a discount and by retaining some of the shares. In the model's separating equilibrium, a firm's intrinsic value is positively related to underpricing. This model is a generalization of Leland and Pyle's (1977) signaling hypothesis which suggests that, by retaining a significant ownership stake in the firm, entrepreneurs can signal project quality as false representation can be costly. The hypothesis therefore predicts relatively superior performance of IPO firms with high entrepreneurial ownership.

The empirical support for the signaling models of underpricing is mixed. Michaely and Shaw (1994) find no support for signaling. They find no evidence of either a higher propensity to pay dividends for IPOs that were more underpriced or of a higher propensity to return to the market for a seasoned equity offering. The insider holding variable has no significant power to explain initial returns and there is no evidence to suggest that insider holdings provide a credible signal of firm quality that reduces uncertainty and, therefore, initial underpricing. Neither the initial-day return nor the fraction held by insiders seems to explain the value of the firm two years after going public. Jegadeesh, Weinstein and Welch (1993) find that returns after the first day are just as effective in inducing future issuing activity as the first-day returns are. While providing evidence suggesting a positive relation between managerial ownership retention and post-IPO operating performance, Jain and Kini (1994) find no support that firms that underprice more produce superior operating performance after the IPO.

Legal Liability

A further line of research does not rely on asymmetric information that is resolved on the first day of trading. Ibbotson (1975) and Tinic (1988) have suggested

that the issuing firm may underprice to reduce the legal liability arising from any false or inadequate information in the prospectuses.

Drake and Vetsuypens (1992), however, call such a conclusion into question. By examining a sample of 93 US firms from 1969 to 1990 that are sued after their IPO, they find that the average initial return for the sample firms is approximately the same as that for a control group of IPOs of similar size. They also present evidence that litigation typically results from some unfavourable company-specific news in the aftermarket and not from IPO overpricing on the first trading day. Keloharju (1993) argues that, given the paucity of legal liabilities associated with the process of going public in Finland, it is unlikely that potential legal liability has much to do with the observed initial returns.[6]

2.1.1 Theories assuming an active role of the underwriter

Underwriter Reputation

While their focus was on signaling firm quality through underpricing, Allen and Faulhaber (1989) and Welch (1989) had already noted that signaling could also be accomplished through the choice of underwriter.

Carter and Manaster (1990) uncovered that high-quality underwriters are typically associated with less underpricing. Findings in Beatty and Welch (1996) and Cooney, Singh, Carter and Dark (2001) document, however, that the relationship between underwriter reputation and underpricing has changed over time, casting doubt on the theory. Loughran and Ritter (2001) report that unlike the 1980s, IPOs that are

[6] Chalmers, Dann and Harford (2002) analyze a sample of 72 US IPOs between 1992 and 1996 and investigate the amount and cost of D&O liability insurance. They find a significant negative relation between the three-year post-IPO stock price performance and the insurance coverage purchased in conjunction with the IPO.

managed by high-prestige underwriters during the internet boom in the late 1990s are associated with more underpricing than IPOs managed by less prestigious underwriters.

Underwriter Price support

Ruud (1993) challenges the conventional view that positive average initial IPO returns result from deliberate underpricing. By investigating the distribution of initial returns of 469 IPOs in 1982 and 1983, she shows that positive mean initial returns result from a partially censored left (negative) tail. She argues that underwriter price support or stabilization can account for this censoring of the distribution of initial returns because in the US regulatory framework, the practice is not considered manipulative as long as it is disclosed in the offering prospectus. The theory predicts that a large percentage of stocks should experience positive initial and short-run abnormal aftermarket returns. More specifically, because underwriters remove price support over time, prices of fully priced or just-underpriced IPOs are more likely to fall than to rise over the short-term.[7]

Miller and Reilly (1987) examine the returns and spread behaviour of IPOs over the first five days of trading and find that the relation of the spread and its determinants differs between overpriced and underpriced issues only on the first trading day. For a sample of 1,523 NASDAQ IPOs issued between 1982 and 1987, Hanley, Kumar and Seguin (1993) find evidence suggesting that stabilization significantly affects quoted spreads. Moreover, significant negative returns are documented after the termination of stabilization.

[7] Aggarwal (2000) provides a detailed account of the mechanics of stabilization in the aftermarket.

Dynamic Information Acquisition

The dynamic information acquisition argument - also referred to as bookbuilding theory or information-gathering theory (Beneviste and Spindt (1989), Beneviste and Wilhelm (1990) and Spatt and Srivastava (1991)) - studies the process whereby the offer price is set and its effect on underpricing. The assumed pricing mechanism is the bookbuilding process, whereby, after setting a preliminary offer price range, the underwriter and issuer solicit "indications of interest" from prospective investors during the "road show", where the company is marketed to selected, typically institutional investors. Through bookbuilding, investment banks extract information about the true value from investors.[8] The investors natural inclination to bid lower during the marketing phase entails a trade-off: while it increases the potential profit from selling the IPO in the immediate aftermarket, assuming shares have been allocated at the offering price, it also jeopardizes the probability and size of their allocations. In order to induce investors to reveal that they want to purchase shares at a high price, the investment banker must offer them a combination of underpricing and share allocations in return.

There is strong empirical support for the bookbuilding theory of underpricing. Hanley (1993) documents that the relation of the final offer price to the range of anticipated offer prices disclosed in the preliminary prospectus, is a good predictor of initial returns. Having documented evidence for the partial adjustment phenomenon for a sample of 1,430 US IPOs from January through September 1987, she finds that issuers that have final offer prices exceeding the limits of the offer range have greater underpricing than all other IPOs, and are also more likely to increase the number of shares issued. The final offer price only "partially adjusts" to new information. Using a

[8] In a more general context, Jenkinson, Ljungqvist, and Wilhelm (2000) use a dataset of 2,051 IPOs in 61 non-US markets during the period 1992-1999 and find that bookbuilding – while costing around twice as much as the fixed costs offering - leads to substantially less underpricing.

unique dataset from 39 international equity issues that used bookbuilding between 1995 and 1997, Cornelli and Goldreich (2001) find that the investment banker awards more shares to bidders who provide information in their bids or to those who bid regularly.

Investment Banker's Monopsony Power

Baron (1982) offers an agency-based explanation for underpricing. His theory assumes that the value of a new issue is affected by market demand and by the investment banker's selling effort. In the model, the investment banker is better informed about market demand than the issuer, but his distribution effort is unobservable. To address this moral hazard, the optimal contract sets the issue's offering price below its "true value", defined as the equilibrium offering price when the investment banker expends his best effort.

Some empirical evidence of self-underwritten IPOs refutes this theory. Muscarella and Vetsuypens (1989) find that when underwriters themselves go public, their shares are just as underpriced, even though there is no monitoring problem.

Loughran and Ritter (2002) argue that agency problems between underwriters and issuing firms, largely latent in the 1980s, have become increasingly important and are partly responsible for the high initial returns of Internet stocks during the late 1990s. They postulate that higher valuations have resulted in issuers being more complacent about "leaving money on the table". In this context, they apply Prospect Theory, developed by Kahneman and Tversky (1979), to the IPO market. Here, individuals often violate Bayes' Rule and rational choice theories when making decisions under uncertainty in experimental settings. Loughran and Ritter (2002) predict that in most situations issuers will sum the wealth loss from underpricing with the larger wealth gain on the retained shares from a price jump, producing a net increase in wealth for pre-

issue shareholders. They empirically show that most of the money left on the table comes from a minority of IPOs. In the cross-section, the IPOs that were underpriced most were those where the offer price was revised upwards from what had been anticipated at the time of filing the initial price range. This observation is consistent with the dynamic information acquisition theory of Beneviste and Spindt (1989) and the empirical documentation of the partial adjustment phenomenon by Hanley (1993). It is also in line with Habib and Ljungqvist (2001) who argue that the opportunity cost of underpricing is less if the relative float is small. The complacency about underpricing, combined with the desire of underwriters to leave money on the table so as to receive indirect compensation from buy-side clients that were favoured in IPO allocations, resulted in even greater underpricing during the boom in Internet stocks during the late 1990s.[9]

This conjecture is similar to Shiller's (1990) "Impresario" hypothesis of underpricing, whereby underwriters choose a lower offering price because they know that the cumulative profit of underpricing (through less transparent forms of revenue streams such as brokerage commissions) will be higher than maximizing revenue for the single event (compensation in the form of the gross underwriter spread).[10]

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[9] For a related article see, Wall Street Journal Europe (Mai 05, 2002): eToys Sues Goldman Sachs Over Management of Its IPO. "...The relatively low price set for the IPO, the suit alleges, robbed eToys of hundreds of millions of dollars of cash that could have helped the company to stave off bankruptcy. The shares nearly quadrupled in the price on their first day of trading. The suit charged Goldman induced some investors to agree to give the firm a portion of the profits they later made on eToys shares in exchange for getting IPO stock allocation ..."

[10] On January 22, 2002, Credit Suisse First Boston (CSFB), an investment bank, agreed to settle a $100 million with the Securities and Exchange Commission (SEC), the US regulatory agency, based on the following allegations: "... From at least April 1999 through June 2000, CSFB employees allocated shares of IPOs to over 100 customers who were willing to funnel between 33 and 65 percent of their IPO profits to CSFB. The profits were channeled to CSFB in the form of excessive brokerage commissions generated by the customers in unrelated securities trades that the customers effected solely to satisfy CSFB's demands for a share of the IPO profits..." (Source: SEC Litigation Release No. 17327). Ritter and Welch (2002) calculate that the practice of funneling back IPO profits through excessive trading may have accounted for up to 250 million shares per trading day during 1999 to 2000.

2.2 Cycles in IPO activity

Another anomaly associated with IPOs is the "hot issue" phenomenon, whereby the observed issuing activity exhibits significant, recurrent, and to some extent predictable variations over time. Ibbotson and Jaffe (1975) were among the first to identify significant autocorrelation in both the monthly number of IPOs and the monthly average underpricing of IPOs. Ritter (1984) studies initial returns for US IPOs between 1960 and 1982 and finds highly significant autocorrelation in monthly average initial returns and in monthly IPO volume. He also observes that periods of high volume tend to follow periods of high average initial returns. In the cross-section of the data, he identifies a 15-month period during which the average initial return was 48.4 percent, as contrasted with an average initial return of 16.3 percent for the rest of the period. This "hot" IPO market is also concentrated in a certain class of industries and a certain group of underwriters.

In a recent study, Lowry and Schwert (2002) find an autocorrelation coefficient of monthly average first-day returns of 0.60 between 1960 and 1997, which increased during the Internet boom in the late 1990s. They confirm a significant positive relation between initial returns and future IPO volume and note that, "increased numbers of companies go public after observing that IPOs are being underpriced by the greatest amount." They associate the cycles in initial returns with the investment bankers' learning process. Because the registration periods of many IPOs overlap, the information that underwriters learn during one firm's registration period will contribute to the first-day returns of many IPOs.

The prospect theory explanation of the partial adjustment phenomenon addresses the phenomenon of "hot issue" markets in a similar fashion (Loughran and Ritter (2001)). It predicts that all IPOs that are in the "road show" stage of going public when

there is an overall market rally, will have higher expected underpricing because offer prices are not raised as much as they could be. Because of the length of the bookbuilding period, which can take from four weeks to four months, the first day returns of these IPOs will be correlated.

Shiller's (1990) "Impresario" hypothesis can also explain the positive autocorrelation in IPO activity and initial returns reported in the literature. "Hot" markets appear when underwriters exploit a segment sought to be ripe for a "fad". Even though many investors may be unwilling to follow a "fad", they may find it profitable to follow positive feedback investment strategies (Rajan and Servaes (1993)). Acting this way, they may actually have caused the positive autocorrelation themselves. In the more general setting of "fads" described by Aggarwal and Rivoli (1990), "fads" occur in "hot issue" periods when investors are especially overoptimistic about the growth potential of the firms that go public, induced by the "Impresario", the investment bank taking the company public. Firms time their IPOs in precisely these periods in order to take advantage of "windows of opportunity". It follows that "hot" markets for IPOs should be concentrated in certain industry classes, dominated by specific underwriters and that IPO activity should come from those companies for which issuing equity is always the least favoured choice of financing. Moreover, companies with the largest initial returns should have the lowest subsequent aftermarket returns.

2.3 Return Dynamics in Aftermarket Trading

Most of the literature on aftermarket performance concentrates on how IPO shares perform over three- to five years. Over those time horizons, IPO shares seem, on average, to perform poorly when measured against various benchmarks. Ritter (1991) finds that every dollar invested in a portfolio of IPOs purchased at the closing market

price on the end of the first day of trading results in a terminal wealth of $1.3447 over three years, while every dollar in the matching firm results in $1.6168, a ratio of only 0.841 during the same period. He performs the study for a total sample of 1,526 US IPOs of common stock in 1975-84. The international evidence also supports the notion of poor long-run performance. Álvarez and Gonzáles (2001), Espenlaub, Gregory and Tonks (1998), Giudici and Paleari (1999), Leleux and Muzyka (1998) or Schuster (1996) all highlight low market-adjusted long-run returns for various European IPO markets. Jain and Kini (1994) extend this evidence to show that long-run performance is also accompanied by poor financial accounting performance post-IPO relative to pre-IPO performance. However, because there has been a sustained effort to extend empirical evidence on IPO performance beyond the past two decades, it has become apparent that the results on long-run performance are sensitive to the time-period chosen. In a large out-of-sample test, Gompers and Lerner (2001) study the five-year aftermarket performance of a sample of 3,661 US IPOs from 1935 to 1972 and find that the long-run performance of IPOs depends considerably on the method used for calculating returns and performance. The authors conclude that "...While the results do not rule out the possibility of more broad-based sentiment-driven mispricing, they provide little support of a distinct IPO effect."

Another facet that has attracted much academic interest addresses the relation between short- and long-run IPO returns. One of the first to document the dynamics in aftermarket trading was Stoll and Curley (1970). They found that investors in new small issues floated under Regulation A in 1957, 1959, and 1963, experienced lower long-run rates of return than if they had invested in a portfolio of large stocks represented by the Standard & Poor's 425 Industrial Average. However, short-run price appreciation of the 643 companies in the sample was considerably greater than the appreciation of large-

cap stocks. Considerable short-run overperformance is also reported in Ritter (1991) and Schuster (1996).

It is difficult to explain these price dynamics in the IPO aftermarket within a semi-rational setting. Miller (1977) proposes a theory that is consistent with the empirical findings. Assuming the presence of short-selling constraints and heterogeneous investors' expectations, he argues that the prices of new issues are set not by the appraisal of the typical investor, but by the small minority who think highly enough of the investment merits of the new issue to include it in their portfolio. This "divergence of opinion" about a new issue is greatest when the stock is issued, either because the company has not yet started operations, or because there is uncertainty about the success of new products or the profitability of a major business expansion. As a result, short-sale constraints lead to upward biases in stock prices, as pessimistic investors are restricted from short-selling. Over time, as the variance of opinion decreases and the company acquires a history of earnings, the marginal investor's valuation will converge towards the mean valuation and IPOs will start to underperform. Duffie, Gârleanu and Pedersen (2002) present a dynamic model of the determination of prices, lending fees and short interest that is consistent with this theory. They show that, if lendable securities are difficult to locate, then the price of the security is initially elevated and expected to decline over time. This decline increases in the degree of heterogeneity of beliefs of investors about the future value of the security. Harrison and Kreps (1978), Morris (1996) and Scheinkman and Xiong (2002) show that short-selling constraints can lead to prices higher than the valuations of all investors. Empirically, Gecy, Musto and Reed (2001) find an extra cost to shorting hotter IPOs.

A number of other institutional arrangements in the short-run aftermarket, unrelated to fundamentals, have an effect on prices. For example, some recent studies

examine the expiration of IPO lockup agreements. Lockup agreements are a feature of US and IPOs in international markets and prohibit insider sales before a pre-specified date, usually 180 calendar days after the IPO. Since insiders often own a majority of the firm, the potential for an increase in the supply of tradable shares following lockup expiration could have a significant effect on the value of the stock. Bradley, Jordan, Roten, and Yi (2001), Brav and Gompers (2002) and Field and Hanka (2001) document significant negative abnormal returns of approximately two percent around lockup expiration. Moreover, Bradley, Jordan and Ritter (2002) investigate the performance of IPOs around the expiration of the "quiet period" – typically the first 25 calendar days in aftermarket trading when a company is still "in registration" and subject to a number of regulatory restrictions that prohibit certain activities, such as analyst coverage. Using a sample of 1,611 firms going public over the period 1996 to 2000, they find that firms, for which coverage is initiated, experience a significantly positive abnormal return of 4.1 percent in a five-day period surrounding the end of the "quiet period". This compares to an insignificant 0.1 percent for firms that do not have coverage initiated. Most of these abnormal returns experienced by firms with coverage occur in the days before the quiet period expires. Furthermore, Aggarwal (2000) pays attention to the stabilization activities of underwriters in the aftermarket and their influence on prices by studying a sample of 137 US IPOs going public during May and July 1997. She finds that direct intervention or "pure" stabilization, in which an identified stabilizing bid is posted, is never done, and that aftermarket short-covering, which has the same result as pure stabilization, but has no disclosure requirements, is the principal form of stabilization. Stabilization by short-covering can occur because the underwriter initially sells shares in excess of the original amount offered, which is then covered by exercising the overalottment option and/or by short covering in the aftermarket during

30 calendar days after the offering. She also finds that stabilization seems to have a permanent rather than a temporary effect on prices, a similar observation made by Schultz and Zaman (1994).

Several behavioural explanations have also been advanced for the empirical findings. Teoh, Welch and Wong (1998) relate the analysis of IPO performance to earnings management and find that investors do not fully take into consideration that financial accounts of companies going public are managed before the IPO, and therefore base their valuation on a naïve extrapolation of the past. They use discretionary current accruals as a proxy for earnings management and show that companies, which boost their earnings most in the IPO year, also have the worst long- run performance. Ritter (1991), Lerner (1994), Loughran and Ritter (1995, 2001) or Baker and Wurgler (2000) discuss another set of behavioural explanations for poor long-run performance. They suggest that stock prices periodically diverge from fundamental values, and that managers and investment bankers take advantage of overpricing by selling stock to overly optimistic investors. This in line with De Bondt and Thaler's (1985) conjecture that, at least for low-capitalization stocks, there is a negative relation between past and subsequent abnormal returns on individual securities using holding periods of one year or more which they interpret as evidence of market overreaction.

3 Data, Sample and Methodology

3.1 Data

In order to be included in the sample, the relevant companies pursuing an IPO had to meet the following criteria: (1) the company's main headquarter is registered in Germany, France, Italy, The Netherlands, Spain, Sweden or Switzerland with the

obligation to publish consolidated and/or parent company accounts, (2) the company is listed on one of the three tiers of the main stock exchange in the respective country: the Official Market, the Official Parallel Market or the New Market, and meets the relevant listing requirements,[11] (3) each share is given an offer price of 5.00 units of national currency or more, (4) gross proceeds, measured in terms of end-1998 purchasing power, of the equivalent of Euro (€) 2.0 million or more, and (5) the offering being unseasoned and involved common and/or preferred stock.[12] While the sample includes Privatizations (13), spin-offs and equity-carve outs (26), we have excluded foreign listings, Real Estate Investment Trusts (REITs), investment trust and certificates, demutualizations and companies that transferred from one market segment to another[13].

The data was hand-collected individually from each of the respective country. It is unique in its entirety as it spans over a relatively long period of time covering at least one market cycle of IPO activity in the seven largest European countries ranked in terms of market capitalization, excluding the UK, and is not commercially available.[14] The data collection involved a two-stage process:

First, in order to insure a most complete sample, we identified the IPOs by collecting information from the individual stock exchanges, national publications in the respective country or other sources such as regulatory agencies, central banks, commercial providers and, if necessary, by directly contacting the issuing company. This step included the search for full name of the offering company, nationality, IPO date and place of the offering, total number of shares issued, public float adjusted for

[11] Appendix C, Table 48, lists listing requirements in European countries in detail.
[12] The large number of IPOs issuing dual-class shares is a relatively unique feature of the Swedish IPO market. For Germany, for example, only seven companies issued dual-class shares during the sample period 1988 to 1998.
[13] For empirical evidence relating to privatizations or equity carve-outs, see D'Souza and Megginson (1999) or Vijh (1999).
[14] Capitaldata, a division of Euromoney PLC, is a commercial provider of IPO information. For the period 1988 to 1998, their IPO database includes around 550 companies, almost half of our database. This commercially available data includes only limited cross-sectional IPO characteristics.

overalottment options exercised, issue price, sector and year of foundation. We did not collect data for issuing activity in the secondary market.[15]

For Germany, information provided by the Frankfurt Stock Exchange and the various yearly issues of the Saling Aktienführer were primary data sources of company data.[16] Data on French issuers and issuing characteristics was obtained from the annual lists published by Euronext France and Sociétés cotées, 1996 and 1999 edition, Cofisem. Italian IPO data came from Indici e Dati, 1992 and 1999 edition, Mediobanca, and from the Italian Stock Exchange. Euronext Netherlands and Effectengids, 2000 edition, Kluwer, were the primary source for data on Dutch IPOs. Spanish IPO company data was obtained from the Madrid Official Stock Exchange Bulletins and from CNMV, the Spanish regulating agency. Swedish data is from annual reports of the OM Stockholm Exchanges and from Six AB. The Swiss Stock Exchange and Swiss Central Bank were sources of the data for the sample of Swiss IPOs.[17]

Second, we collected daily closing stock prices from the national stock market operators, academic institutions and, if necessary, commercial services. Sources of the German stock price data included the University of Karlsruhe Stock Price Database, the Frankfurt Stock Exchange and daily issues of the Frankfurter Allgemeine Zeitung. French, Italian and Spanish Stock Price data was made available by Euronext Paris and the Italian and Madrid Stock Exchange, respectively. Data on Swedish stock returns was obtained from Six AB. Dutch and Swiss stock price data was collected from Datastream. We used Dow Jones for the time-series data for the four size-based benchmark indices. Macroeconomic data such as Exchange rates and GDP deflators was collected from Datastream.

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[15] A large number of empirical studies link seasoned issuing activity with IPO performance. For European markets see, for example, Espenlaub and Tonks (1998) or Stehle, Erhardt and Przyborowsky (1998).

[16] We want to thank Hoppenstedt Finanzinformationen GmbH, for allowing access to their archives.

[17] Prof. Alfred Mettler kindly supplied fundamental data on Swiss IPOs issued between 1988 and 1990.

Stock prices are adjusted for dividends, stock splits or rights offerings and were, for this section, calibrated to a European trading day calendar and converted into Euro (€). Share prices represent closing prices and care was taken that quotations represented actual trades. For our sector analysis, we use the Dow Jones STOXX global sector classification standard.[18]

The resulting IPO sample is comprised of 973 companies that conducted an IPO of common and/or preferred stock between 1988 and 1998 on one of the three main market segments of the main national stock exchange operator in Germany (219 companies), France (323), Italy (77), The Netherlands (75), Spain (88), Sweden (148) and Switzerland (43).[19] Based on our original stock exchange records, this represents at least 90 percent of IPO activity in Continental Europe between 1988 and 1998, measured in terms of number of IPOs and aggregate gross proceeds.

The sample does not suffer from survivorship bias. Only seven companies were delisted before their third-year anniversary. In this section, we look at IPOs issued over the period 1988 to 1998 using stock returns through February 23, 2001. This implies a declining sample size of 686 companies when measuring returns over three years and 381 companies when measuring returns over a five-year window. In Appendix B, Table 34 - 47, we provide results based on constant sample sizes of 686 and 381 IPOs, respectively. The results confirm that changes in measurement periods and sample sizes do not change the qualitative nature of the results presented in this section.

[18] The Dow Jones STOXX global industry classification standard is displayed in Appendix A.

[19] The market segments are (Number of IPOs in brackets): Germany (Deutsche Börse AG: Amtlicher Handel (80), Geregelter Markt (89), Neuer Markt (50)); France (SBF-Paris Bourse SA*: Premier Marché (21), Second Marché (231), Nouveau Marché (71)); Italy (Borsa Italiana SpA: Borsa Valori (70) Mercato Ristretto (7)); The Netherlands (Amsterdam Exchanges NV*: Officiële Markt, (56) Officiële Parallel Markt (8)); Spain (Bolsa de Madrid SA: Primer Mercado (56), Segundo Mercado (32)); Sweden (OM Stockholm Exchanges AB: A-list (15), OTC-list (52), O-list (81)); and Switzerland (SWX Swiss Exchange AG: SWX Hauptsegment, (35) SWX Nebensegment (8)). *Merged to Euronext SA.

Table 1
Market Conditions and Sample Characteristics

The sample is comprised of 973 European IPOs. Age is defined as the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. New Economy firms (as a percentage of total number of issues) belong to market sectors 5,13,16 and 17 representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Public Float is the percentage of equity offered. Initial Return is defined as the percentage difference between the final offer price and the first-day closing price. Market measures stock market momentum using the value-weighted Dow Jones STOXX broad-market index, excluding the UK. Size is the total number of shares issued times the final offer price and is expressed in constant end-1998 prices using monthly national consumer price indices. Issuing Volume is defined as the total number of shares issued multiplied by the final offer price and expressed in constant end-1998 prices. For the measurement of inflation-adjusted size and issuing volume, amounts in national currency were concerted using the appropriate € exchange rate at the IPO date. The monthly distribution of European IPOs is as follows: Month of January (25 IPOs), February (30), March (59), April (65), May (95), June (184), July (131), August (25), September (57), October (107), November (98) and December (97).

					New	Public	Initial Returns		Market	Size	Issuing Volume		
IPO Market	Duration	Months	Offerings	Age	Economy	Float	Mean	Median	Change	Median	Total	Mean	Median
Conditions	Months	Number	Number	Years	Percent	Percent	Percent	Percent	Percent	€ million	€ billion	€ million	€ million
Cold Market	Jan-88 - Aug-88	8	41	26	27	36	7.08	4.00	18.66	78.45	2,425.1	59.15	24.74
Cold Market	Apr-90 - Sep-93	42	127	40	10	31	6.13	1.70	8.52	108.97	12,078.6	95.11	35.29
Cold Market	May-94 - Mar-96	23	148	34	20	35	8.25	3.80	12.57	85.56	26,700.0	180.41	26.82
All Cold Markets		73	316	35	17	34	7.25	2.65		90.32	41,203.7	130.39	30.14
Hot Market	Sep-88 - Mar-90	19	130	35	18	31	17.66	10.00	41.94	105.57	12,708.2	97.76	27.09
Hot Market	Oct-93 - Apr-94	7	31	30	35	31	24.49	20.90	13.12	73.28	6,505.8	209.86	22.44
Hot Market	Apr-96 - Dec-98	33	496	21	37	34	21.64	9.00	92.46	60.32	63,219.0	127.46	16.52
All Hot Markets		59	657	24	33	33	20.98	9.52		66.24	82,433.0	125.47	18.33
All 973 issues	Jan-88 - Dec-98	132	973	28	28	33	16.52	7.14	347.97	73.93	123,636.8	127.07	22.02

3.2 Sample

In Table 1, we provide some summary statistics for our sample.[20] While presenting evidence for the sample as a whole, we also divide IPOs based on whether they were issued in "hot" or "cold" markets. Because of big fluctuations in the level of the stock market and IPO activity throughout the sample period, this potentially enables us to draw more inferences about the robustness of the patterns associated with IPOs.

The most frequently used definition of "hot" IPO markets is based on "volume". Loughran and Ritter (1995), for example, describe the 1980s as "hot" because most of that decade had much higher issuance volume than the 1970s. Helwege and Liang (2001) define "hot" and "cold" months according to volume of issuance, based on a three-month centred moving average of the number of IPOs for each month in the sample. Similar to Ritter (1984) and Ibbotson and Jaffe (1975), we define "hot" IPO markets based on the level of underpricing.[21] We also include a proxy for the general level of the stock market into the analysis. Initially, we define those months with higher average monthly underpricing compared to median underpricing for the total sample as "hot" IPO months; we consider those months during which the mean is lower than the median as "cold" IPO months. We apply the same procedure to our proxy for market returns. Months during which the market return exceeds the median for the monthly series of 132 months (January 1988 – December 1998), are defined as "hot" market months. Likewise, months during which the market return is less than the median are considered "cold" months. Finally, we match "hot" ("cold") IPO months with "hot"

[20] The sample differs from US studies in some important respects. Our sample period does not overlap with Ritter (1991) who looks at IPOs from 1971 to 1988. Neither does it completely overlap with Brav and Gompers (1997) who study 3,407 nonventure-backed and 934 venture-backed US IPOs between 1975 and 1992. Moreover, while Ritter (1991) and Brav and Gompers (1997) focus on reporting long-run returns over three and five years, we present evidence on the dynamics of short- and long-run performance over a variety of dimensions.

[21] Because of the presence of some very large IPOs, defining "hot" and "cold" markets by volume does potentially lead to misleading results.

("cold") market months to identify "hot" and "cold" IPO markets. During 118 months, (89 percent of the entire period), a "hot" ("cold") IPO month corresponds to a "hot" ("cold") market month. During 14 months, a "hot" ("cold") IPO month does not correspond to a "hot" ("cold") market months. We attribute part of this to seasonalities in the underwriting industry. The overall pattern confirms our earlier conjecture about the close link between the level of the stock market and underpricing.

Of the 132 months, we identify 73 months as "cold" markets and 59 months as "hot" markets and mark three individual "hot" and "cold" market periods. In more than half of the 132 issuing months, the general market was either stable or falling. For example, the longest "cold" market period occurred between April 1990 and September 1993. During this period, only 127 IPOs went public, averaging 6.13 percent initial return. This period was characterized by subdued economic conditions in Continental Europe following the German Unification. During the 42-month period, the Dow Jones STOXX broad-market index recorded a rise of 8.52 percent. Conversely, during the 33-month "hot" market period between April 1996 and December 1998, 496 IPOs went public with an average initial return of 21.64 percent. During this period, the general level of the market rose by 92.46 percent. Interestingly, the Asian and Russian Financial Crises in the autumn of 1998 did not have an impact on European IPO activity.

Between 1988 and 1998, 973 European companies raised a total of €123.6 billion on the stock market. Ritter (2001) reports that during the same period, 3,872 IPOs raised a total of $237.9 billion in the US. The average issuing volume of European IPOs of €127.1 million, however, is higher than the one reported for the US ($61.4 million). Some large offerings such as privatizations (13) and equity carveouts (26) account for part of the difference. For example, privatizations raised a total of €44.4 billion with a median issuing volume of €2.6 billion. On average, European companies going public

have sold 33 percent of their company to the public (henceforth "public float"), which remained stable throughout the sample period. This observation is within the close range of 30 percent and 36 percent reported by Ritter (2001) for US IPOs issued between 1992 and 1998. Moreover, the average European IPO was 28 years old at the time of going public. While the average age of European IPOs has declined throughout the sample period, it is still high compared to companies going public in the US. Ritter (1991), for example, finds an average age of six years. As shown in Appendix A, European IPOs are clearly widespread among the various industries. This is different to Helwege and Liang (2001) who study 2,072 US IPOs between 1982 and 1993 and point out that US IPOs during this period are drawn largely from the same set of high-technology industries.

Table 1 shows that the sample composition is clustered in certain industries: in "cold" markets, the percentage of New Economy companies of total IPO activity is almost half of what is observed for IPOs issued under "hot" markets. Moreover, the average size of European IPOs in "cold" markets is €90.3 million compared to €66.2 million in "hot" markets. This reinforces the fact that IPO activity in "cold" markets, during which the stock market is generally more stable or declining, is associated with larger and more mature IPOs in Old Economy industries. Table 1 also demonstrates the changing composition of IPO issuers. It indicates that during the 1990s, New Economy sectors have gradually taken a bigger share of the total IPO market. During this time IPO age, size and median issuing volume has also declined considerably. This highlights the fact that money, previously flowing into mature industries with lower growth prospects, had started to flow into young, technology-oriented companies focusing on growth.

3.3 *Methodology*

While the estimation of initial returns is less problematic, there are several factors that must be taken into account when estimating abnormal returns over longer time horizons. Barber and Lyon (1997) and Kothari and Warner (1997) both highlight the problems associated with calculating long-run abnormal returns using either a reference portfolio or an asset pricing model.

Barber and Lyon (1997) demonstrate that many of the commonly used matching procedures are poorly specified and abnormal return estimates can be systematically nonzero. They also show that seemingly minor changes in experimental features can have a major impact on the results. These include the benchmark for measuring abnormal returns, cumulating procedures or the populations from which securities are drawn.[22] In this context, they isolate one parametric procedure that may be well-specified, specifically to calculate abnormal returns as the buy-and-hold returns on a sample firm less the buy-and-hold return on a control firm with similar size and book-to-market characteristics.[23] The authors also suggest a rebalancing bias that arises because the compounded returns of a reference portfolio, such as an equally weighted market index, are usually calculated assuming periodic rebalancing, whereas the returns of sample firms are compounded without rebalancing. Furthermore, they also point out that a new listing bias arises when an IPO firm, which is known to perform badly following an IPO, is added to an index which will cause the index to underperform. Kothari and Warner (1997) also show that long-horizon tests are misspecified. They

[22] In context of European Markets, Dimson and Marsh (1986), report the importance of controlling for the size effect in the United Kingdom. Moreover, Brav and Gompers (1997) find that most institutional investors will not be significantly hurt by investing in IPOs because they usually do not buy the small issues that underperform most.

[23] For the European market, this is difficult because of the relative infancy of many of the stock markets in the study, with few comparable quoted firms and benchmarks available over a long period of time. The use of the Eurostoxx value-weighted size indices as benchmarks may also induce biases that result from the fact that these market indices are value-weighted

find that parametric long-horizon tests will often indicate abnormal performance when none is present and suggest that bootstrap procedures might be a promising way to minimize test statistic misspecification. Moreover, they suggest a survivorship bias, which occurs when the de-listed firms are simply removed and the index is rebalanced. This bias tends to cause the index to outperform a portfolio that includes delisted firms.

It must be noted that the inferences drawn by these authors can themselves be sensitive to experimental design. Both Barber and Lyon (1997) and Kothari and Warner (1997), for example, focus on measuring portfolio long-horizon performance in event time, rather than calendar time. As Fama (1998) points out, event time results may be misleading about the pervasiveness of performance because any verification of an observed puzzle may only reflect investor sentiment. Moreover, as noted in Shleifer and Summers (1990), many trading strategies are based on pseudo-signals, noise, and popular models are correlated, leading to aggregate demand shifts. Consequently, to the degree that the design of the empirical experiment has an impact on the confidence of the reliability of inferences from long-horizon studies, the interpretation of the results on the performance of European IPOs requires caution.

For the evaluation of aftermarket IPO returns, our approach is similar to the empirical methodology in Ritter (1991). Consequently, we show results using but-and-hold returns (BHRs), when reporting long-term abnormal performance of IPOs. This procedure assumes no monthly portfolio rebalancing.[24] However, we extend the performance analysis across several dimensions for the European market. Because we are interested in the dynamics of aftermarket performance, we report aftermarket returns over various holding periods. Furthermore, we also determine how the aftermarket

[24] We have also calculated performance using Cumulative Abnormal Returns (CARs). While not shown separately in this section, we report the results in Appendix B, Table 33 amd Appendix B, Figure 10, respectively. The results on monthly portfolio rebalancing confirm that the use of BHRs biases the long-run performance upwards, a finding consistent with the literature (Ritter (1991) or Teoh, Welch and Wong (1998)). For evidence on the individual European countries, we refer to Chapter III.

performance of European IPOs issued in "hot" and "cold" markets differs. Finally, we are also interested in whether issuing characteristics are related to these performance dynamics and time-varying market conditions. We calculate equally-weighted raw- and benchmark-adjusted returns over 1, 3, 12, 36 and 60 months, whereas one month is defined as a consecutive 21-day-trading interval after the close of the first day of trading. In order to eliminate the effect of national holidays, stock prices for the national countries were first calibrated to a European trading day calendar. Returns were then calculated whenever at least one of the seven markets covered in this study was trading. If the IPO was delisted before the end of the measurement period, we computed the return until the delisting date. Aftermarket returns are compared with four alternative size-based benchmarks, all of which are value-weighted: (1) The Dow Jones STOXX broad-market index, excluding UK, which captures the free-float adjusted market capitalization of around 95 percent of the market capitalization of the countries in our sample, includes 404 European companies and is similar in terms of industry composition to the IPO sample, (2) the Dow Jones STOXX large-cap index, excluding UK companies, (3) the Dow Jones STOXX mid-cap index, excluding UK companies, and (4) the Dow Jones STOXX small-cap index, excluding UK companies. These indices have a history dating back to the start of the sample period in January 1988.[25]

For this section, we also report wealth relatives (WR) by taking the ratio of one plus the IPO return divided by one plus the chosen benchmark return. A wealth relative less than one indicates that the IPO underperforms the chosen benchmark. Similarly, a wealth relative greater than one indicates that the IPO outperforms the chosen benchmark.[26]

[25] The chosen benchmarks also form the basis of derivative products and exchange-traded funds (ETFs).
[26] We do not adjust for betas. A broad literature argues that differences in betas are too small to have significant effects on the conclusions (Ibbotson (1975), Clarkson and Thomson (1990) or Chan and Lakonishok (1992) for the US market, and Keloharju (1993) or Leleux (1996) for European Markets).

Table 2
Initial Returns of European IPOs

Descriptive statistics for the initial return performance of European IPOs (1988-1998) under alternative market conditions and categorized according to age, sector, size, public float (%), and average daily standard deviation (S.D.) for the first 21 days of trading (unadjusted). The initial return is the difference from the final offering price to the first-day closing price. For example, for the youngest age group in "hot" markets, the initial return is 0.2496*100 = 24.96 percent. Based on 132 monthly observations, the first-order autocorrelation coefficient is i) for number of offerings: 0.597[a] (0.086), ii) for average monthly initial returns: 0.300[a] (0.086). In the cross-section of observations, we find a first-order autocorrelation coefficient for initial returns of 0.180 for Old Economy Stocks versus 0.481 for New Economy stocks. The first-order autocorrelation is higher for the number of offerings: 0.238 for Old Economy Stocks and 0.639 for New Economy stocks. All coefficients are highly significant at conventional levels. Because of the influence of few large privatization offerings, we do not find significant autocorrelation in issuing volume; Standard Errors (S.E.) in parenthesis.

	Year	Market Condition			Number of Issues		
Category	1988-1998	Hot	Cold	Hot-Cold	All	Hot	Cold
Age < 14	0.2068[a]	0.2496[a]	0.0766[a]	0.1731[a]	420	316	104
	(0.0186)	(0.0239)	(0.0126)				
15 ≤ Age < 36	0.1654[a]	0.1990[a]	0.0893[a]	0.1096[a]	297	206	91
	(0.0156)	(0.0204)	(0.0194)				
Age ≥ 37	0.0969[a]	0.1333[a]	0.0562[a]	0.0770[a]	256	135	121
	(0.0130)	(0.0165)	(0.0199)				
New Economy	0.2718[a]	0.3126[a]	0.1048[a]	0.2078[a]	270	217	53
	(0.0259)	(0.0313)	(0.0198)				
Old Economy	0.1243[a]	0.1592[a]	0.0659[a]	0.0932[a]	703	440	263
	(0.0092)	(0.0127)	(0.0117)				
Small firms	0.1847[a]	0.2129[a]	0.1089[a]	0.1040[a]	361	263	98
	(0.0176)	(0.0221)	(0.0249)				
Medium firms	0.1729[a]	0.2259[a]	0.0619[a]	0.1639[a]	421	285	136
	(0.0161)	(0.0223)	(0.0124)				
Large firms	0.1114[a]	0.1604[a]	0.0463[a]	0.1141[a]	191	109	82
	(0.0153)	(0.0231)	(0.0158)				
Public Float < 20	0.1413[a]	0.1743[a]	0.0794[a]	0.0950[a]	273	178	95
	(0.0121)	(0.0166)	(0.0134)				
20 ≤ Public Float < 30	0.2143[a]	0.2619[a]	0.0880[a]	0.1740[a]	241	175	66
	(0.0229)	(0.0277)	(0.0359)				
30 ≤ Public Float < 50	0.1795[a]	0.2399[a]	0.0580[a]	0.1819[a]	283	189	94
	(0.0225)	(0.0322)	(0.0132)				
Public Float ≥ 50	0.1122[a]	0.1360[a]	0.0672[a]	0.0688[a]	176	115	61
	(0.0199)	(0.0278)	(0.0225)				
0.0000 ≤ S.D. < 0.0124	0.0542[a]	0.0810[a]	0.0352[a]	0.0458[a]	245	102	143
	(0.0054)	(0.0104)	(0.0051)				
0.0125 ≤ S.D. < 0.0196	0.0969[a]	0.1288[a]	0.0485[a]	0.0803[a]	244	147	97
	(0.0108)	(0.0158)	(0.0109)				
0.0197 ≤ S.D. < 0.0314	0.1333[a]	0.1403[a]	0.1032[a]	0.0370	243	197	46
	(0.0119)	(0.0134)	(0.0258)				
0.0315 ≤ S.D. < ∞	0.3794[a]	0.3935[a]	0.2804[a]	0.1131	241	211	30
	(0.0329)	(0.0357)	(0.0828)				
All IPOs (Mean)	0.1652[a]	0.2098[a]	0.0725[a]	0.1374[a]	973	657	316
	(0.0100)	(0.0137)	(0.0103)				
All IPOs (Median)	0.0714	0.0952	0.0265	0.0687	973	657	316

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

4 Performance Analysis of European Initial Public Offerings

4.1 Initial Returns

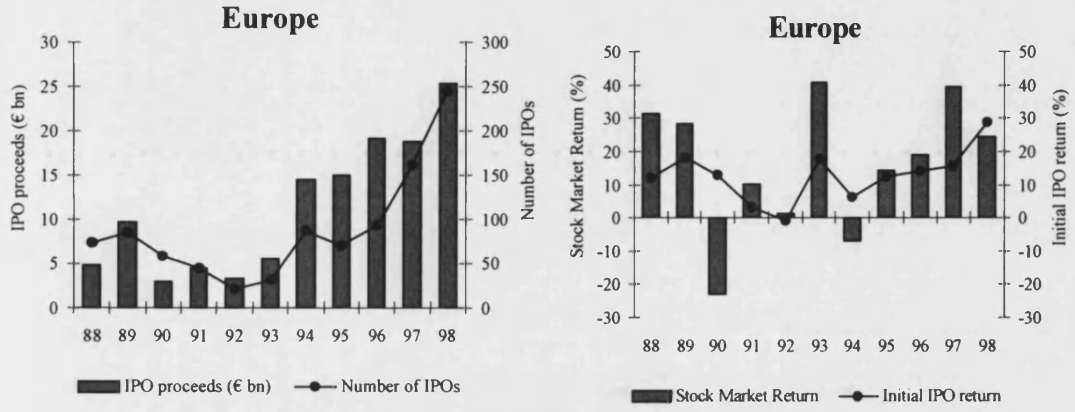
In Table 2, we present evidence concerning the underpricing phenomenon. The average initial return for the 973 European firms that went public between 1988 and 1998 is 16.52 percent. The median is positive 7.14 percent where only 86 of the 973 offerings (8.84 percent) had negative unadjusted initial returns. 129 IPOs (13.26 percent) did not change from the offering price, supporting the conjecture that positive mean initial returns result from a partially censored left tail, which itself stems from stabilization activities by underwriters (Ruud (1993) or Aggarwal (2000)). The findings are generally consistent with US evidence. For a sample of 6,249 US IPOs between 1980 and 2001, Ritter and Welch (2002) find average underpricing to be 18.8 percent, ranging from 5.4 percent to 22.3 percent during our sample period.

In Figure 1, we graph IPO activity and stock market returns for the sample of European IPOs. The first-order autocorrelation coefficient for the time series of 132 monthly observations of average initial returns between January 1988 and December 1998 is 0.300. The autocorrelation is higher when looking at the monthly number of offerings, with a first-order autocorrelation coefficient of 0.597 during the period between 1988 and 1998. Both coefficients are highly significant at conventional levels. Figure 1 also underlines that initial returns and issuing activity in Europe are sensitive to the general state of the stock market.

Table 2 shows the substantial variability in average underpricing when categorizing the sample according to the issuing characteristics. The model uses age, market sector and the standard deviation of aftermarket stock prices as measures of uncertainty, producing results that confirm the monotonic relationship between risk and

Figure 1
IPO Activity and Stock Market Returns

IPO proceeds are measured in 1998 purchasing power which is defined as the number of shares offered to the public times the final offering price. Initial Return is defined as the change from the IPO price to the closing price at the end of the first day of trading. The annual stock market return is defined as the annual change in the value-weighted Dow Jones STOXX broad-market index, excluding the UK.



initial returns, as postulated in the winner's curse explanation of underpricing. For the period 1988-1998, high-risk companies (younger firms) average substantially higher initial returns than low-risk companies (older firms). Initial returns are 10.99 percent higher for the youngest age group as compared to the oldest age group in the sample. Differences increase to 14.75 percent when comparing underpricing of New versus Old Economy IPOs. Using the daily standard deviation of unadjusted aftermarket returns for the first month of trading, an ex-post measure of uncertainty, we confirm our observations. Moreover, not only do the higher-risk categories display higher initial returns, they also show greater variability in initial returns as indicated by the Standard Errors. The relationship between other issuing characteristics and initial returns, however, is less clear. Size and public float do not appear to be strongly related to the level of underpricing.

Evidence from Table 2 also shows that the quantitative relationship between company characteristics and average initial returns are not the same for IPO issued in "hot" or "cold" markets. We find average underpricing of 20.98 percent in "hot"

markets versus 7.25 percent in "cold" markets, a difference of 13.74 percent. Much of this difference is attributable to underpricing among New Economy IPOs. This observation is similar to Ritter (1984) who relates the "hot issue" market of 1980-1981 to IPOs in the natural resources sector. For each issuing characteristic, we also find that average initial returns are significantly higher in "hot" as opposed to "cold" markets. This difference is most pronounced in the category of New Economy IPOs, where the difference amounts to 20.78 percent. The findings confirm the effect of clustering by industry in "hot" markets.

It is important to put the magnitude of initial returns into perspective. Loughran and Ritter (2002) report that from 1990 to1998, companies going public in the US left a total of $27.6 billion on the table, calculated by multiplying the first-day price gain by the number of shares sold. Investment bankers collected fees of €13 billion during this period. They found that most of the money left on the table came from a minority of IPOs whose offering price had been revised upwards in the filing range, a finding consistent with the partial adjustment phenomenon (Hanley (1993)). Although the average amount left on the table is $9.1 million, the median is only $2.3 million. Loughran and Ritter (2002) attribute the willingness to leave such large amounts on the table to Prospect Theory, whereby, in most situations, issuers will sum-up the wealth loss from underpricing with the larger wealth gain obtained from the retained shares. They also argue that leaving money on the table is an indirect form of underwriter compensation.

For the sample of European IPOs, we find similar tendencies. The total amount of money left on the table during the period 1990-1998 amounted to €10.9 billion with underwriters collecting fees upwards of €6 billion. We also find that most IPOs left relatively little money on the table. The average amount left on the table amounted to

€13.4 million while the median was only €1.1 million. However, government privatizations had a strong effect on the results. When excluding privatization issues, which accounted for €5.2 billion of money left on the table, the average amount of money left on the table falls to €7.2 million.[27] As Perotti and Guney (1993), Perotti (1995), Shafik (1996), and Jones, Megginson, Nash, and Netter (1999) all point out, governments and their investment bankers have become extremely adept at manipulating the offer price and allocation terms of IPOs in order to achieve multiple, often competing, political and economic objectives. During the 1990s, for example, European governments decided to kick-start the development of a European equity culture by allocating discounted shares from formerly state-owned monopolies, such as telecommunications companies, to individual retail investors.

4.2 Aftermarket Returns

In Table 3, we report the buy-and-hold performance for European IPOs issued between 1988 and 1998 over different holding periods starting from the close of the first day of trading. In Panel A, we report the benchmark-adjusted equally-weighted aftermarket performance for different holding periods, independent of the market condition at the IPO date. The results indicate that the sample of European IPOs outperformed all the benchmarks up to the first year of aftermarket trading. Over 12 months, for example, the IPOs earned 27.79 percent, on average, while the broad market index earned 15.50 percent, a wealth relative of 1.11. However, the broad-market and large-cap market-adjusted wealth relatives fall substantially when measuring the aftermarket performance over longer periods. Over three years, for example, IPOs

[27] While raising €27.5 billion, four privatizations (Deutsche Telecom AG, France Telecom SA, TNT Poest Group NV and Swisscom AG) accounted for €4.0 billion of money left on the table. From 1996 onwards, each of these companies were brought to the market by using the bookbuilding procedure and recorded significant average underpricing (14.02 percent).

Table 3
Aftermarket Performance of European IPOs

The sample contains 973 European IPOs between 1988 and 1998. Aftermarket returns are measured as equally-weighted buy-and-hold returns, whereas one month is defined as a consecutive 21-day trading interval from the first closing price, using European trading days, assuming a declining sample size. The value-weighted Dow Jones STOXX size indices (Broad-Market, Large-Caps, Mid-Caps and Small-Caps), excluding UK, were used as a proxy for the market benchmark. The wealth relative is the ratio of one plus the average aftermarket period buy-and-hold IPO return, divided by one plus the average aftermarket period benchmark buy-and-hold return. For example, for the month 36 adjustment of IPO returns for the movement in the broad- market benchmark, (1 + 0.6791)/(1+0.5947) = 1.05; Standard Errors (S.E.) in parentheses.

Panel A: Mean Aftermarket Performance of IPOs: All Market Conditions

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0312[a]	0.0178[a]	1.01[b]	0.0206[a]	1.01	0.0104[a]	1.02[a]	0.0016	1.03[a]
(N=973)	(0.0068)	(0.0016)	(0.0066)	(0.0017)	(0.0066)	(0.0015)	(0.0066)	(0.0016)	(0.0066)
Month 3	0.0591[a]	0.0276[a]	1.03[a]	0.0339[a]	1.02[b]	0.0102[a]	1.05[a]	-0.0101[a]	1.07[a]
(N=972)	(0.0111)	(0.0035)	(0.0104)	(0.0035)	(0.0105)	(0.0036)	(0.0105)	(0.0039)	(0.0105)
Month 12	0.2779[a]	0.1550[a]	1.11[b]	0.1791[a]	1.08[c]	0.0910[a]	1.17[a]	0.0173[a]	1.26[a]
(N=970)	(0.0582)	(0.0057)	(0.0575)	(0.0057)	(0.0575)	(0.0058)	(0.0575)	(0.0061)	(0.0578)
Month 36	0.6791[a]	0.5947[a]	1.05	0.7037[a]	0.99	0.3462[a]	1.25[c]	0.0951[a]	1.53[a]
(N=686)	(0.1746)	(0.0172)	(0.1729)	(0.0184)	(0.1729)	(0.0120)	(0.1733)	(0.0091)	(0.1735)
Month 60	0.5974[a]	0.6179[a]	0.99	1.1974[a]	0.73[a]	0.5313[a]	1.04	0.0933[a]	1.46[a]
(N=381)	(0.1245)	(0.0351)	(0.1204)	(0.0426)	(0.1177)	(0.0228)	(0.1193)	(0.0151)	(0.1209)

Panel B: Mean Aftermarket Performance of IPOs: Hot Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0442[a]	0.0232[a]	1.02[b]	0.0264[a]	1.02[c]	0.0131[a]	1.03[a]	0.0039[c]	1.04[a]
(N=657)	(0.0094)	(0.0021)	(0.0093)	(0.0022)	(0.0093)	(0.0020)	(0.0092)	(0.0020)	(0.0092)
Month 3	0.0829[a]	0.0371[a]	1.04[a]	0.0436[a]	1.04[a]	0.0145[a]	1.07[a]	-0.0066	1.09[a]
(N=656)	(0.0156)	(0.0047)	(0.0147)	(0.0047)	(0.0147)	(0.0048)	(0.0147)	(0.0052)	(0.0148)
Month 12	0.3439[a]	0.1825[a]	1.14[c]	0.2068[a]	1.11	0.1022[a]	1.22[a]	0.0292[a]	1.31[a]
(N=655)	(0.0845)	(0.0075)	(0.0837)	(0.0076)	(0.0837)	(0.0075)	(0.0836)	(0.0078)	(0.0839)
Month 36	0.8568[a]	0.6120[a]	1.15	0.7244[a]	1.08	0.3146[a]	1.41[c]	0.0775[a]	1.72[a]
(N=389)	(0.3014)	(0.0239)	(0.2997)	(0.0255)	(0.2997)	(0.0151)	(0.3001)	(0.0124)	(0.3002)
Month 60	0.2795[b]	0.1264[a]	1.14	0.6066[a]	0.80[a]	0.2257[a]	1.04	-0.0903[a]	1.41[a]
(N=119)	(0.1231)	(0.0310)	(0.1228)	(0.0343)	(0.1229)	(0.0194)	(0.1212)	(0.0100)	(0.1222)

Panel C: Mean Aftermarket Performance of IPOs: Cold Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0041	0.0066[a]	1.00	0.0087[a]	1.00	0.0048[b]	1.00	-0.0033	1.01
(N=316)	(0.0069)	(0.0022)	(0.0068)	(0.0022)	(0.0068)	(0.0023)	(0.0068)	(0.0024)	(0.0069)
Month 3	0.0097	0.0077[c]	1.00	0.0137[a]	1.00	0.0014	1.01	-0.0175[a]	1.03[a]
(N=316)	(0.0103)	(0.0043)	(0.0098)	(0.0042)	(0.0098)	(0.0045)	(0.0098)	(0.0051)	(0.0100)
Month 12	0.1406[a]	0.0978[a]	1.04	0.1215[a]	1.02	0.0679[a]	1.07[b]	-0.0076	1.15[a]
(N=315)	(0.0352)	(0.0074)	(0.0333)	(0.0067)	(0.0334)	(0.0085)	(0.0333)	(0.0097)	(0.0338)
Month 36	0.4465[a]	0.5719[a]	0.92[c]	0.6766[a]	0.86[a]	0.3875[a]	1.04	0.1182[a]	1.29[a]
(N=297)	(0.0810)	(0.0243)	(0.0734)	(0.0262)	(0.0733)	(0.0191)	(0.0742)	(0.0133)	(0.0764)
Month 60	0.7418[a]	0.8412[a]	0.95	1.4657[a]	0.71[a]	0.6701[a]	1.04	0.1766[a]	1.48[a]
(N=262)	(0.1716)	(0.0425)	(0.1658)	(0.0522)	(0.1614)	(0.0281)	(0.1646)	(0.0194)	(0.1669)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

returned 67.91 percent on average while the broad market returned 59.47 percent, a ratio of 1.05. Panel A also shows that IPO performance is sensitive to the benchmark employed. Across all measurement horizons, IPOs perform better relative to small-caps than relative to large-caps. In Panels B and C of Table 3, we present results calculated according to the market condition at the time of the IPO. We find that the favourable aftermarket IPO performance is mainly driven by outperformance of IPOs issued in "hot" markets. IPOs issued in "cold" markets underperform in the long-run. For example, investing in the average sample of IPOs in "cold" markets would have left the investor with only €0.92 relative to each Euro invested in the broad-market index after three years, while rendering €1.15 if invested during a "hot" market period.

While not reported separately, the long-run performance picture changes dramatically when looking at the median IPO. A strategy of investing in the median IPO at the end of the first day of trading and holding over a three-year period, would have left the investor with only €0.67 relative to each Euro invested in the broad-market index. This underlines the skewness of the return distribution with only 28 percent of the issuers reporting positive broad-market-adjusted returns, and some extreme winners dominating the mean return picture. In Appendix B, Table 32, we have also calculated value-weighted results for the aftermarket performance of European IPOs. Brav and Gompers (1997) find that value-weighting significantly reduces performance differences. For the sample of European IPOs, however, value-weighting does not significantly change the results from equally-weighting. Indeed, the three-year broad-market-adjusted wealth relative is 1.06 compared to 1.05 for the equally-weighted sample of European IPOs. The wealth relatives fall to 0.73 (equally-weighted) and 0.74 (value-weighted) when measured over five years, respectively.

4.3 Cross-Sectional Results

4.3.1 Performance Categorized by Initial Returns

In order to shed more light on the dynamics of European IPO performance, this section distinguishes firms by issuing characteristic and provides time-series evidence of performance. For each issuing characteristic, we divide the sample into sub-samples and use dummy variables to distinguish each subsample. The resulting regression coefficients measure the difference in average market-adjusted returns across subsamples, calculated for each measurement horizon and market condition. In the rest of this chapter, we will focus on reporting the results adjusted for movements in the value-weighted Dow Jones STOXX broad-market index, excluding the UK.

In Table 4, firms are segmented by the initial return of the IPO. The results are categorized according to four initial return categories and across three dimensions: IPOs issued in all market conditions, "hot" markets, and "cold" markets. Panel A reveals that there is a tendency for companies that have the highest initial returns to have the best aftermarket performance across all measurement horizons. Companies that have the lowest initial returns also exhibit the worst aftermarket performance. The result extends to all measurement horizons and is most significant in the short-run. Over 36 months, for example, the difference between the market-adjusted aftermarket performance between highest and lowest initial returns category is 65.52 percent. In Panels B and C, we are able to disentangle this observation by looking at IPOs issued in "hot" and "cold" markets separately. For IPOs issued in "cold" markets, we find that the positive relationship between initial returns and broad-market-adjusted aftermarket performance is more consistent and more significant, albeit less in magnitude, compared

Table 4
Aftermarket Performance Categorized by Initial Return

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified initial return category and 0 otherwise. The initial return is the percentage difference from the final offering price to the first-day closing price and divided into four categories: IPOs with initial returns of not more than 0%, IPOs with more than 0% but less than 7% initial returns, IPOs with at least 7% but less than 20% initial returns and IPOs with more than 20% initial returns; Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0134[b]	-0.0226	(0.0138)	-0.0180	(0.0184)	0.0678[a]	(0.0188)	0.0963[a]	(0.0190)	973	215	270	250	238
Month 3	0.0315[a]	-0.0424	(0.0219)	0.0217	(0.0293)	0.1227[a]	(0.0298)	0.1483[a]	(0.0301)	972	214	270	250	238
Month 12	0.1229[b]	-0.0436	(0.1225)	0.1826	(0.1643)	0.2671	(0.1669)	0.1923	(0.1688)	970	214	268	250	238
Month 36	0.0845	-0.3006	(0.3676)	0.6181	(0.4882)	0.2319	(0.4961)	0.6552	(0.5216)	686	152	199	185	150
Month 60	-0.0205	-0.1792	(0.2375)	-0.0035	(0.3140)	-0.1228	(0.3341)	1.1742[a]	(0.3779)	381	95	127	97	62

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0210[b]	-0.0146	(0.0209)	-0.0407	(0.0282)	0.0650[b]	(0.0272)	0.0876[a]	(0.0265)	657	123	151	178	205
Month 3	0.0458[a]	-0.0367	(0.0337)	0.0153	(0.0453)	0.1275[a]	(0.0437)	0.1419[a]	(0.0426)	656	122	151	178	205
Month 12	0.1614[c]	-0.0705	(0.1939)	0.3656	(0.2611)	0.3311	(0.2517)	0.1859	(0.2449)	655	122	150	178	205
Month 36	0.2448	-0.5121	(0.7391)	1.5288	(0.9714)	0.5059	(0.9166)	0.8449	(0.9179)	389	64	88	119	118
Month 60	0.1531	0.1761	(0.2912)	0.0266	(0.4028)	-0.3238	(0.3597)	0.2747	(0.3684)	119	21	23	40	35

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0025	-0.0333[a]	(0.0120)	0.0112	(0.0160)	0.0657[a]	(0.0182)	0.1111[a]	(0.0234)	316	92	119	72	33
Month 3	0.0020	-0.0499[a]	(0.0173)	0.0300	(0.0230)	0.1043[a]	(0.0261)	0.1604[a]	(0.0336)	316	92	119	72	33
Month 12	0.0427	-0.0080	(0.0604)	-0.0515	(0.0806)	0.1397	(0.0912)	0.3652[a]	(0.1176)	315	92	118	72	33
Month 36	-0.1254[c]	-0.1468	(0.1339)	-0.0900	(0.1792)	-0.0346	(0.2045)	0.5819[b]	(0.2592)	297	88	111	66	32
Month 60	-0.0994	-0.2800	(0.3055)	0.0121	(0.3997)	-0.1302	(0.4632)	1.9807[a]	(0.5909)	262	74	104	57	27

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

to that for "hot" markets. The underperformance of IPOs is most pervasive in the category of IPOs with zero or negative initial returns. In this category, IPOs issued in "hot" markets underperformed the market by 51.21 percent, while IPOs in "cold" markets underperformed by 14.68 percent over three years.

The findings reveal a number of interesting patterns related to the literature. When considering the short-run dynamics, the result indicates a clearly significant relation between underpricing and performance under the market conditions studied. Underpricing indeed seems to induce sentiment-driven short-run positive feedback strategies (Rajan and Servaes (1993)). The significantly negative returns of IPOs with least underpricing are also indicative of the effect of the cessation of stabilization activities of underwriters in the immediate aftermarket (Hanley, Kumar and Seguin (1992), Ruud (1993)). Moreover, the results for long-run performance contrast with Ritter's (1991) findings which reveal a tendency for firms with high initial returns to have the worst aftermarket performance. This, according to the author, mildly supports DeBondt and Thalers (1985) "overreaction hypothesis" as an explanation for the poor long-run performance of US IPOs. The results are also not consistent with Shiller's (1990) "Impresario" hypothesis, which predicts a negative relation between initial returns and aftermarket performance, in particular for IPOs issued in "hot" markets. As well, our findings do not correspond to the desire of issuers to avoid future lawsuits by underpricing (Tinic (1988)). The results, however, do support the various signaling theories of underpricing (Allen and Faulhaber (1989) or Grinblatt and Hwang (1989)). Here, underpricing separates low-quality firms from high-quality firms, since only high quality firms are expected to recoup the initial loss of underpricing once their true value is revealed.

4.3.2 Performance Categorized by Age

In Table 5, we segment firms according to their age at the time of going public. Ritter (1991) finds poor long-run performance with younger US IPOs and interprets this as being consistent with investor overoptimism and "fads".

For the sample of European IPOs, we find that young IPOs fare substantially better than old IPOs. The pattern consistently extends across all measurement horizons. The magnitude of the market-adjusted return difference is economically significant and accounts for 86.84 percent of return performance, when comparing the youngest with the oldest age group over 36 months. In the short-run, the patterns confirm the large performance differences in favor of the youngest IPO firms. For example, the 419 firms in the youngest age category outperform the market by 31.20 percent over one year. In this case, the difference with their oldest counterparts accounts for 37.90 percent. Results in Panels B and C of Table 5 indicate that the relationship between age and aftermarket returns is not the same for IPOs issued during "hot" and "cold" markets. In "hot" markets, the youngest IPOs have overperformed old firms by 150.79 percent over three years, with similarly positive dynamics over shorter measurement horizons. However, there is no clear indication that could postulate a link between age and aftermarket returns for IPO issued in "cold" markets. Here, the youngest firms underperform the market as well as old firms over three years.

The results for the European IPO market suggest that riskier issues require higher initial returns and that age is a proxy for risk. This also suggests that the role of age differs for "hot" and "cold" markets and that age is a good proxy for investor sentiment, particularly for IPOs in "hot" markets. This is consistent with Helwege and Liang (2001) who find that "... investors are much more (perhaps overly)

Table 5
Aftermarket Performance Categorized by Age

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i} and D_{2i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified age category and 0 otherwise. Age is defined as the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Observations of company age are divided into three categories: IPOs with age between 0-14 years (young firms), 15-36 years (medium-young firms) and IPOs older than 37 years (old firms); Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0134[b]	0.0370[a]	(0.0100)	-0.0244	(0.0156)	-0.0613[a]	(0.0163)	973	420	297	256
Month 3	0.0315[a]	0.0800[a]	(0.0158)	-0.0646[a]	(0.0245)	-0.1091[a]	(0.0256)	972	419	297	256
Month 12	0.1229[b]	0.3120[a]	(0.0872)	-0.2935[b]	(0.1354)	-0.3790[a]	(0.1420)	970	419	297	254
Month 36	0.0845	0.5794[b]	(0.2792)	-0.7318[c]	(0.4186)	-0.8684[b]	(0.4164)	686	262	210	214
Month 60	-0.0205	0.0404	(0.2110)	0.1410	(0.3100)	-0.2554	(0.2852)	381	124	107	150

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0210[b]	0.0494[a]	(0.0132)	-0.0388[c]	(0.0211)	-0.0789[a]	(0.0242)	657	316	206	135
Month 3	0.0458[a]	0.1060[a]	(0.0210)	-0.1007[a]	(0.0334)	-0.1387[a]	(0.0383)	656	315	206	135
Month 12	0.1614[c]	0.3992[a]	(0.1201)	-0.4396[b]	(0.1910)	-0.4867[b]	(0.2199)	655	315	206	134
Month 36	0.2448	1.1135[b]	(0.4635)	-1.4614[b]	(0.6995)	-1.5079[b]	(0.7443)	389	161	126	102
Month 60	0.1531	0.2806	(0.2312)	-0.1643	(0.3224)	-0.1889	(0.3009)	119	34	36	49

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	-0.0025	-0.0008	(0.0118)	0.0178	(0.0173)	-0.0178	(0.0161)	316	104	91	121
Month 3	0.0020	0.0014	(0.0169)	0.0372	(0.0247)	-0.0264	(0.0230)	316	104	91	121
Month 12	0.0427	0.0478	(0.0576)	0.1038	(0.0844)	-0.0919	(0.0788)	315	104	91	120
Month 36	-0.1254[c]	-0.2720[b]	(0.1251)	0.4129[b]	(0.1857)	0.0791	(0.1726)	297	101	84	112
Month 60	-0.0994	-0.0503	(0.2830)	0.2647	(0.4261)	-0.3134	(0.3891)	262	90	71	101

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

optimistic in hot markets, as hot market firms may be able to go public at a more favourable price and certainly raise more money in their offering."

4.3.3 Performance Categorized by Size

In Table 6, firms are segmented by market capitalization (size) into three size categories. As shown in Table 2, small offerings have slightly higher initial returns. Table 6 discloses that smaller offering tend to have the best long-run performance. For example, the smallest IPOs with a market capitalization below €100 million at the first day of trading outperform the largest IPO firms by 57.86 percent over three years. This is similar for IPOs issued in "hot" and "cold" markets. As shown in Panels A, B, and C, the smallest IPOs outperform their larger peers for 27 of the 30 measurement horizons.

Table 6 also reveals a tendency for the smallest offerings in the immediate aftermarket to outperform the market and larger offerings. As seen earlier, our sample of small European IPOs is clustered in "hot" markets, indicated by the relatively small median size of companies going public (€66.2 million). Because small offerings typically have a small public float, they are particularly susceptible to institutional frictions prevailing in the immediate IPO aftermarket and to investor sentiment. Conversely, Ritter (1991) finds a tendency for smaller offerings, which also have the highest initial returns, to have the worst aftermarket performance. In his sample, all size-categories display poor long-run performance. Our results are consistent with our earlier observation that, in contrast to Brav and Gompers (1997), value-weighting does not change the results on aftermarket performance. Owing to their weak statistical power, however, results regarding the role of size in the European market need to be treated with caution.

Table 6
Aftermarket Performance Categorized by Size

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, and D_{2i}, are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified size category and 0 otherwise. Size/Market Capitalization in €m is the number of shares issued times the final offer price and is expressed in constant end-1998 prices. Observations for size are divided into three categories: Firms with a first day market capitalization less than €100m (small firms), between €100 and €500m (medium firms) and exceeding €500m (large firms); Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0134[b]	0.0321[a]	(0.0109)	-0.0274[c]	(0.0148)	-0.0346[c]	(0.0185)	973	361	421	191
Month 3	0.0315[a]	0.0375[b]	(0.0171)	-0.0036	(0.0234)	-0.0223	(0.0291)	972	361	420	191
Month 12	0.1229[b]	0.1973[b]	(0.0944)	-0.1644	(0.1288)	-0.0175	(0.1604)	970	360	419	191
Month 36	0.0845	0.4670	(0.2910)	-0.5975	(0.3942)	-0.5786	(0.4667)	686	242	290	154
Month 60	-0.0205	0.2566	(0.2135)	-0.6038[b]	(0.2813)	-0.0731	(0.3184)	381	120	163	98

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0210[b]	0.0372[b]	(0.0146)	-0.0208	(0.0203)	-0.0427	(0.0270)	657	263	285	109
Month 3	0.0458[a]	0.0420[c]	(0.0232)	0.0181	(0.0323)	-0.0245	(0.0429)	656	263	284	109
Month 12	0.1614[c]	0.2216[c]	(0.1321)	-0.1660	(0.1835)	0.0690	(0.2440)	655	263	283	109
Month 36	0.2448	0.6823	(0.4847)	-0.6444	(0.6715)	-0.8436	(0.8268)	389	149	162	78
Month 60	0.1531	0.4713[b]	(0.2162)	-0.4704[c]	(0.2844)	-0.4622	(0.3286)	119	38	52	29

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	-0.0025	0.0184	(0.0121)	-0.0383[b]	(0.0159)	-0.0168	(0.0180)	316	98	136	82
Month 3	0.0020	0.0252	(0.0174)	-0.0461[b]	(0.0229)	-0.0133	(0.0258)	316	98	136	82
Month 12	0.0427	0.1313[b]	(0.0599)	-0.1456[c]	(0.0784)	-0.0987	(0.0885)	315	97	136	82
Month 36	-0.1254[c]	0.1220	(0.1299)	-0.4658[a]	(0.1707)	-0.1825	(0.1937)	297	93	128	76
Month 60	-0.0994	0.1571	(0.2950)	-0.6674[c]	(0.3889)	0.0996	(0.4363)	262	82	111	69

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

4.3.4 Performance Categorized by Public Float

Table 7 segments the firms by the size of the public float. Here, we divide the sample into four groups. Based on the results from Table 2, public float does not appear to be strongly related to the level of underpricing.

Three interpretations of Table 7 are possible: First, there appears to be a linear relation between public float and market-adjusted aftermarket performance. These performance dynamics are pervasive. Companies issuing least, fare the best. Companies issuing most, fare the worst. For example, after three months of trading, the difference in the broad-market-adjusted return between companies with the smallest and the largest public float is 10.66 percent. This difference increases to 64.23 percent after three years in the aftermarket. The performance patterns are manifested particularly in firms that bring at least 50 percent of their company to the market. Second, the relation between public float and IPO return dynamics is relatively insensitive to the market condition at the IPO date. For instance, companies with the largest public float underperform companies with the lowest public float by 72.61 percent over three years when issued during "hot" markets, and by 54.86 percent during "cold" markets. Third, public float is significantly related to IPO performance in the immediate aftermarket. This effect appears to be stronger under "hot" markets than under "cold" markets. This is indicative of the strong influence of investor sentiment in driving a limited supply of shares, in a market characterized by institutional arrangements unrelated to fundamentals.

The negative relation between public float and aftermarket performance for the European IPO market is consistent with several explanations in the literature. Primary among these are the Jensen and Meckling (1976) agency hypothesis and the Leland and Pyle (1977) signaling hypothesis. In Jensen and Meckling (1976), a higher ownership retention rate, hence lower public float, reduces incentives to undertake non value

Table 7
Aftermarket Performance Categorized by Public Float

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified category of public float and 0 otherwise. Public Float is defined as the percentage of equity offered to the public at the IPO date. Observations on the public float are divided into four categories: Firms with less than 20% of public float, with at least 20% but less than 30% of public float, with at least 30% but less than 50% of public float, and at least 50% of public float; Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0134[b]	0.0625[a]	(0.0124)	-0.0416[b]	(0.0181)	-0.0845[a]	(0.0173)	-0.0788[a]	(0.0197)	973	273	241	283	176
Month 3	0.0315[a]	0.0850[a]	(0.0195)	-0.0292	(0.0285)	-0.0931[a]	(0.0274)	-0.1066[a]	(0.0313)	972	273	241	283	175
Month 12	0.1229[b]	0.1774	(0.1083)	0.1012	(0.1584)	-0.1118	(0.1520)	-0.2609	(0.1734)	970	273	240	282	175
Month 36	0.0845	0.2513	(0.3158)	-0.2374	(0.4744)	0.0321	(0.4566)	-0.6423	(0.5114)	686	206	164	189	127
Month 60	-0.0205	0.2162	(0.2095)	-0.2859	(0.3195)	-0.3244	(0.3215)	-0.4907	(0.3556)	381	126	95	93	67

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0210[b]	0.0828[a]	(0.0175)	-0.0485[c]	(0.0249)	-0.1043[a]	(0.0244)	-0.1076[a]	(0.0279)	657	178	175	189	115
Month 3	0.0458[a]	0.1175[a]	(0.0279)	-0.0315	(0.0396)	-0.1249[a]	(0.0389)	-0.1570[a]	(0.0447)	656	178	175	189	114
Month 12	0.1614[c]	0.1956	(0.1604)	0.1698	(0.2279)	-0.1121	(0.2239)	-0.2726	(0.2568)	655	178	175	188	114
Month 36	0.2448	0.3654	(0.5624)	-0.2107	(0.8127)	0.2581	(0.8086)	-0.7261	(0.8965)	389	111	102	104	72
Month 60	0.1531	0.0872	(0.2165)	0.1776	(0.3042)	-0.1006	(0.3605)	0.1641	(0.3852)	119	39	40	22	18

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0025	0.0246[b]	(0.0123)	-0.0389[b]	(0.0192)	-0.0475[a]	(0.0174)	-0.0249	(0.0196)	316	95	66	94	61
Month 3	0.0020	0.0243	(0.0178)	-0.0482[c]	(0.0278)	-0.0335	(0.0252)	-0.0121	(0.0284)	316	95	66	94	61
Month 12	0.0427	0.1432[b]	(0.0604)	-0.0984	(0.0947)	-0.1135	(0.0856)	-0.2390[b]	(0.0965)	315	95	65	94	61
Month 36	-0.1254[c]	0.1180	(0.1289)	-0.3357	(0.2051)	-0.2506	(0.1876)	-0.5486[a]	(0.2129)	297	95	62	85	55
Month 60	-0.0994	0.2740	(0.2878)	-0.5870	(0.4624)	-0.4115	(0.4293)	-0.7416	(0.4795)	262	87	55	71	49

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

maximizing projects. Leland and Pyle (1977) suggest that, by retaining a significant stake in the firm, entrepreneurs can signal the quality of their firm since ramification can be costly. For US IPOs, Jain and Kini (1994) confirm the relatively superior post-IPO operating performance where entrepreneurs retain a large stake in the firm.

4.3.5 Performance Categorized by Sector

The sample period has been characterized by an unprecedented change caused by the increasing role of information and communications technologies. In our final analysis of cross-sectional offerings characteristics, we study whether the aftermarket performance of European IPOs mirrors this change.

For this purpose, we segment firms according to the attached Dow Jones STOXX global sector classification scheme. Initially, we categorize IPOs according to 18 market sectors. Then, we pool all companies in Sectors 5, 13, 16 and 17 into one group that represents the New Economy sectors (Technology, Media, Telecommunications and Healthcare). For our sample of 973 European IPOs, 270 accounted for New Economy IPOs (28 percent). All other IPOs are classified as Old Economy firms. The average New Economy firm is 16 years old and has a median size of €51.7 million when going public. Conversely, we record an average age of 32 years and a median size of €84.9 million for Old Economy firms. As seen in Table 1, the sample composition of European IPOs has changed in favor of New Economy IPOs at the expense of Old Economy IPOs over time. The change in industry representation is indicative of the flow of capital into growth industries.

Table 2 displays significant differences in terms of underpricing between New and Old Economy IPOs. The findings on aftermarket performance of New Economy versus Old Economy IPOs reported in Table 8 follow a similar, clearly distinctive

Table 8
Aftermarket Performance Categorized by Sector

$R_i = \alpha + \beta D_i + \varepsilon_i$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_i is a (0,1) dummy variable taking the value of 0 if the firm belongs to a market sector defined as New Economy and 1 otherwise. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively. Old economy firms belong to all other sectors; Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance Categorized by Market Sector: All Market Conditions

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0134[b]	0.0477[a]	(0.0125)	-0.0475[a]	(0.0147)	973	270	703
Month 3	0.0315[a]	0.1160[a]	(0.0196)	-0.117[a]	(0.0230)	972	270	702
Month 12	0.1229[b]	0.3685[a]	(0.1087)	-0.340[a]	(0.1280)	970	270	700
Month 36	0.0845	1.3080[a]	(0.3555)	-1.593[a]	(0.4056)	686	159	527
Month 60	-0.0205	0.7982[a]	(0.2733)	-1.010[a]	(0.3034)	381	72	309

Panel B: Aftermarket Performance Categorized by Market Sector: Hot Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0210[b]	0.0566[a]	(0.0160)	-0.053[a]	(0.0196)	657	217	440
Month 3	0.0458[a]	0.1315[a]	(0.0253)	-0.128[a]	(0.0309)	656	217	439
Month 12	0.1614[c]	0.3749[a]	(0.1451)	-0.319[c]	(0.1774)	655	217	438
Month 36	0.2448	1.8065[a]	(0.5673)	-2.147[a]	(0.6651)	389	106	283
Month 60	0.1531	0.5148[c]	(0.2663)	-0.458	(0.2997)	119	25	94

Panel C: Aftermarket Performance Categorized by Market Sector: Cold Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	-0.0025	0.0114	(0.0166)	-0.017	(0.0182)	316	53	263
Month 3	0.0020	0.0524[b]	(0.0236)	-0.061[b]	(0.0259)	316	53	263
Month 12	0.0427	0.3420[a]	(0.0792)	-0.360[a]	(0.0869)	315	53	262
Month 36	-0.1254[c]	0.3109[c]	(0.1718)	-0.531[a]	(0.1895)	297	53	244
Month 60	-0.0994	0.9490[b]	(0.3857)	-1.278[a]	(0.4257)	262	47	215

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

performance pattern. New Economy stocks outperform the market as well as their peers during all measurement periods. Figure 2 graphs the performance dynamics. The return differences are pervasive. For example, the spread in benchmark adjusted returns between New and Old Economy IPOs widened from 4.75 percent after the first month, to 34.0 percent over one year and to 159.30 percent after three years of aftermarket trading. Associated statistics underline the significance of the results that also prevail for IPOs issued in "hot" and "cold" markets. Within sectors, telecommu-nications, technology and healthcare had the best long-run performance, benefiting from

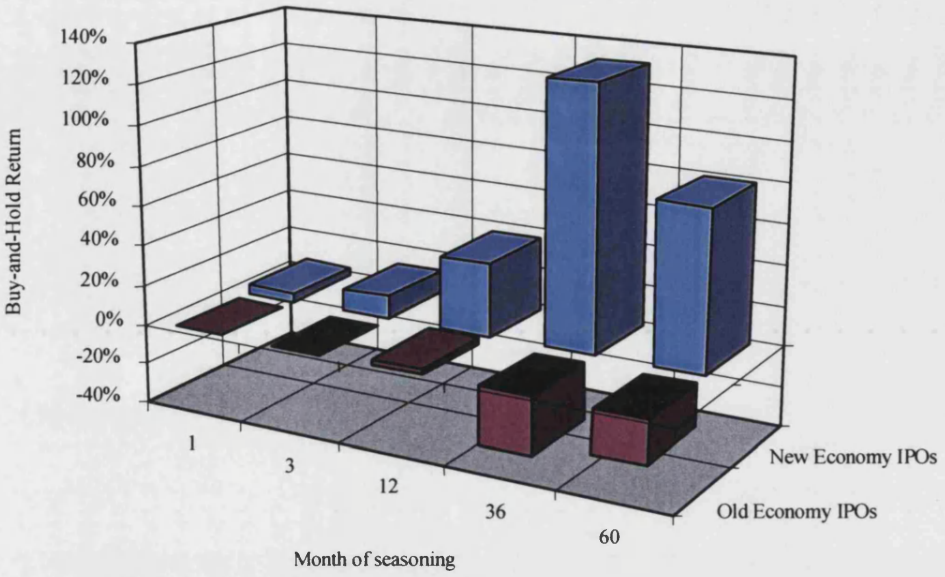


Figure 2. Average market-adjusted aftermarket Performance Categorized by Sector. The initial sample is comprised of 703 Old Economy IPOs and 270 New Economy IPOs. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare. Old Economy firms belong to all other economic sectors in the Dow Jones STOXX global sector classification standard. Returns are measured as buy-and-hold returns from the close at the day of going public where one month is defined as consecutive 21-day-trading period using European trading days.

deregulation, the global technology boom and the shift towards private medical care in Continental Europe. IPOs in sectors representing basic materials or industrial firms (many of which went public in the early 1990s during the boom in German construction activity following the German Unification) fared the worst. All but 5 of the 18 industry groups recorded long-run underperformance.

The magnitude of the performance differences in New versus Old Economy IPOs over such a long time period is puzzling. Generally, the findings are strongly supportive of Brav and Gompers' (1997) conjecture that investors should not treat IPOs as a homogenous group and that subsample analysis can shed more light on the generality of the performance patterns. For Old Economy IPOs, the findings can be interpreted as evidence that is consistent with the fact that firms take advantage of

"windows of opportunity" in bringing their relatively old, mature companies with less growth and earnings potential to the market. The evidence on New Economy IPOs, however, is not consistent with the predictions of either the "windows of opportunity" (Ritter (1991)) or "fads" (Shiller (1990)) hypothesis. It is also not consistent with theories that address the negative link between short- and long-run performance from an institutional perspective (Miller (1977)). The overperformance in New Economy stocks may stem from risk mismeasurement, investor sentiment or unexpected positive shocks, such as the sharp increase of the contribution of the New Economy to productivity growth during a period of unexpectedly prolonged economic growth during the 1990s (Gordon (2000)).[28]

In Figure 3, we graph the difference in three-year performance of New Economy IPOs versus Old Economy IPOs for IPOs issued on a year-by-year basis. We also display the composition of the European IPO sample and extend the information to include the sample composition of European IPOs during 1999 and 2000, the period commonly referred to as "Internet Bubble". Figure 3 underlines how New Economy IPOs issued between 1988 and 1998 outperformed their Old Economy peers consistently over a three-year horizon. The possible exceptions are Old Economy IPOs issued during 1992, which slightly overperformed over a three-year return window.[29] We also find a remarkable change in the sample composition during the "Internet Bubble". This seems to be at least partly driven by the outperformance of previous years' New Economy IPOs.

[28] See also Fortune (March 18, 2002): "The productivity miracle is for real" (page 51).
[29] We also perform the analysis for the three individual "hot" and three "cold" markets defined in Table 1 and find that Old Economy IPOs issued in each of the "hot" and "cold" markets underperform.

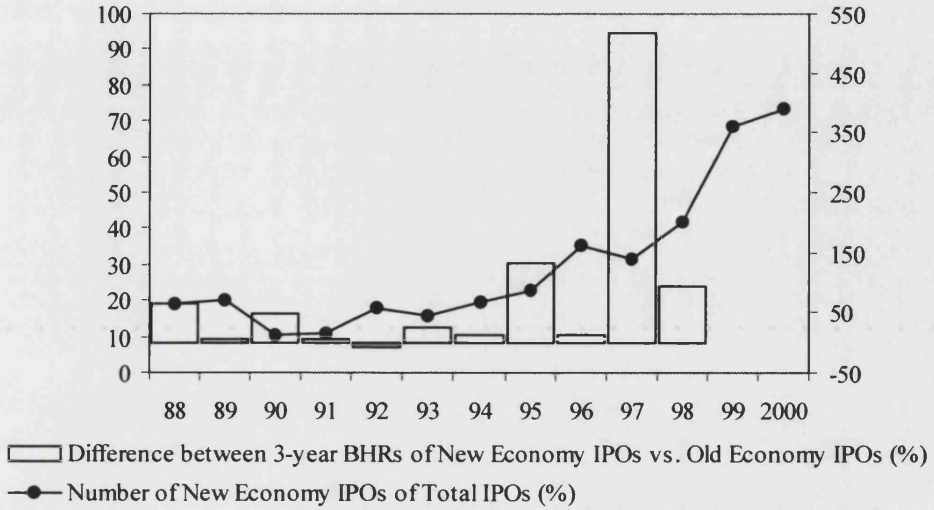


Figure 3. IPO Activity and Performance of New Economy IPOs. The initial sample of European IPOs between 1988-1998 is comprised of 703 Old Economy IPOs and 270 New Economy IPOs. During 1999 and 2000, a total of 535 companies went public in the seven countries under study, 366 of those are classified as New Economy companies. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare. Old Economy firms belong to all other economic sectors in the Dow Jones STOXX global industry classification scheme. Returns are measured as buy-and-hold returns from the close at the day of going public whereas one month is defined as a consecutive 21-day-trading period using European trading days.

5 Regression Results

Our previous analysis shows that the cross-sectional patterns in European IPO performance are not mutually exclusive. For example, IPOs in New Economy sectors experienced the highest initial returns, tended to be the younger companies and also recorded higher returns across all measurement horizons compared their Old Economy peers. This observation holds for New Economy firms issued during "hot" and "cold" markets. To disentangle these observations, we perform univariate regression analysis using the raw return of the IPOs as the dependent variable similar to Ritter (1991). The explanatory variables are the unadjusted initial return, the logarithm of one plus age, the aftermarket return on the broad-market benchmark, the logarithm of one plus size, the public float and a (0,1) dummy variable representing New Economy firms.

Table 9
OLS Regression Results for Aftermarket Performance

$$R_t = \alpha + \beta_1 IR_t + \beta_2 \text{Log}\,(1+age_i) + \beta_3 Market_i + \beta_4 \text{Log}(Size_i) + \beta_5 PublicFloat_i + \beta_6 D_i + \varepsilon_t$$

R_t is the raw return (not reported separately), measured from the first closing price. IR_t is the initial return, defined as the difference between the first closing price and the offering price. Log $(1+age_i)$ is the natural logarithm of one plus the difference between the year of going public and the year of foundation, with firms founded before 1901 assumed to be founded in 1901. $Market_i$ is the return on the value-weighted Dow Jones STOXX broad-market index for the same return interval as the dependent variable. Log $(Size_i)$ is the natural logarithm of inflation adjusted size/market capitalization, defined as the total number of shares issued times the first closing price. $PublicFloat_i$ is the Percentage of Equity offered to the public. D_i is a (0,1) Dummy variable taking on the value of 0 if the issuing firm belongs to a New Economy sector, and 1 otherwise. Standard Errors (S.E.) in parentheses. This table assumes a declining sample size.

Panel A: Aftermarket Performance Categorized by Size: All Market Conditions

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.209[b]	(0.0886)	0.060[a]	(0.0215)	-0.026	(0.0156)	0.835[a]	(0.1303)	-0.018[c]	(0.0109)	-0.103[a]	(0.0307)	0.028[c]	(0.0154)	0.082	973
Month 3	0.056	(0.1389)	0.028	(0.0338)	-0.050[b]	(0.0246)	1.106[a]	(0.0947)	0.006	(0.0172)	-0.140[a]	(0.0485)	0.100[a]	(0.0242)	0.155	972
Month 12	-0.386	(0.7798)	-0.024	(0.1888)	-0.137	(0.1375)	1.730[a]	(0.3240)	0.083	(0.0958)	-0.513[c]	(0.2709)	0.304[b]	(0.1350)	0.041	970
Month 36	0.438	(2.3137)	0.480	(0.7465)	-0.196	(0.4008)	1.282[a]	(0.3892)	-0.047	(0.2790)	-0.862	(0.7806)	1.439[a]	(0.4259)	0.044	686
Month 60	0.045	(1.5609)	1.466[a]	(0.5574)	0.149	(0.2641)	0.950[a]	(0.1737)	-0.039	(0.1899)	-0.806	(0.5330)	0.934[a]	(0.3092)	0.116	381

Panel B: Aftermarket Performance Categorized by Size: Hot Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.276[b]	(0.1287)	0.036	(0.0267)	-0.039[c]	(0.0226)	0.868[a]	(0.1695)	-0.023	(0.0157)	-0.136[a]	(0.0438)	0.033	(0.0204)	0.078	657
Month 3	0.071	(0.2031)	-0.003	(0.0423)	-0.073[b]	(0.0356)	1.179[a]	(0.1208)	0.012	(0.0249)	-0.223[a]	(0.0697)	0.114[a]	(0.0323)	0.158	656
Month 12	-0.785	(1.1858)	-0.075	(0.2463)	-0.210	(0.2073)	1.788[a]	(0.4429)	0.151	(0.1440)	-0.670[c]	(0.4037)	0.316[c]	(0.1868)	0.035	655
Month 36	1.017	(4.2188)	0.095	(1.1723)	-0.636	(0.7309)	1.079	(0.6607)	-0.036	(0.4931)	-0.828	(1.3604)	1.955[a]	(0.7043)	0.040	389
Month 60	2.556	(1.7854)	0.557	(0.4746)	-0.228	(0.2906)	0.497	(0.3643)	-0.275	(0.2035)	0.102	(0.5341)	0.286	(0.3167)	0.073	119

Panel C: Aftermarket Performance Categorized by Size: Cold Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.036	(0.0847)	0.200[a]	(0.0361)	-0.036	(0.0151)	0.739[a]	(0.1657)	-0.005	(0.0106)	-0.037	(0.0294)	0.010	(0.0179)	0.145	316
Month 3	-0.097	(0.1263)	0.176[a]	(0.0530)	0.003	(0.0224)	0.766[a]	(0.1297)	0.009	(0.0158)	0.005	(0.0436)	0.066[b]	(0.0270)	0.166	316
Month 12	0.255	(0.4229)	0.271	(0.1789)	0.038	(0.0753)	1.515[a]	(0.2553)	-0.037	(0.0531)	-0.262[c]	(0.1472)	0.304[a]	(0.0915)	0.179	315
Month 36	0.514	(0.9272)	1.049[a]	(0.3974)	-0.298[c]	(0.1613)	1.423[a]	(0.1700)	-0.148	(0.1158)	-0.794[b]	(0.3214)	0.474[b]	(0.1899)	0.263	297
Month 60	-0.630	(2.1128)	2.437[a]	(0.9183)	0.272	(0.3631)	0.983[a]	(0.2388)	0.024	(0.2650)	-1.296[c]	(0.7414)	1.279[a]	(0.4302)	0.134	262

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

The results are displayed in Table 9. For the sample as a whole, the coefficient of determination is rather low across the measurement periods.[30] It is markedly higher for IPOs issued in "cold" than in "hot" markets. The parameter estimates support the conclusions that were obtained earlier. The initial return category is correlated with the aftermarket performance of IPOs issued in "cold" markets, with four out of five measurement horizons being significantly positive. Age is correlated with immediate aftermarket returns for IPOs issued in "hot" markets, with all signs being negative across return windows. The coefficient on the market indicates that the beta for our sample of European IPOs is time-varying. Given the technology-led rise in share prices, particularly throughout the second half of the sample period, the coefficient on the market return of 1.28 over three years is in line with our expectation that IPOs are slightly riskier than the market. There is only weak evidence to support that size is correlated with returns, confirming our finding that value-weighting does not change our findings regarding aftermarket performance. Moreover, during 14 out of the 15 return horizons studied, the coefficient on the public float is negative, supporting the signaling hypothesis. We also find a strong correlation between market sector and raw returns, underlining the substantial impact of the New Economy sectors on the results of overall aftermarket performance.

6 Summary and Conclusion

The European IPO market has gone through a period of unprecedented change. New Economy sectors have gradually taken a bigger share of total IPO activity, indicating that money previously flowing into mature industries with lower growth prospects had started to flow into young, technology-oriented companies that focus on

[30] We have also experimented with adjusted R^2 s, and do not find qualitatively different results.

growth. This process was facilitated by rising stock markets, the initial success of privatizations fuelling a boom in European share ownership, and the creation of market segments dedictated to young, growth-oriented companies. However, it is unclear whether these developments represent either a structural shift or are just symptoms of a time-varying market condition.

This chapter has focused on the return performance of a large sample of European IPOs during the period 1988-1998. The analysis has been pursued for the sample as a whole and also under two alternative market conditions: for IPOs issued in "hot" markets, when initial returns are high and the general level of the stock market is increasing; and for IPOs issued in "cold" markets, when initial returns are low and the general stock market level is stable or declining. We have split the research agenda into two units: the examination of initial returns and the examination of aftermarket performance. We find significant autocorrelation, which is higher for the number of offerings than for the initial returns. Not surprisingly, we also find significant underpricing, which is related to ex-ante characteristics of uncertainty. We attribute the large amounts of money left on the table during our sample period to some large privatizations.

While we present evidence of short-term overperformance, the results do not indicate that IPOs offered underperform in the long-run. This result appears to be robust across time periods underlining the most recent literature arguing that the long-run underperformance of IPOs is a time-varying phenomenon. Our results are also sensitive to the benchmark employed and return methodology with IPO outperformance being most magnified when compared against small- and medium- sized company benchmarks. The long-run positive aftermarket performance, however, is limited to IPOs issued in "hot" markets. In "cold" markets, the broad-market-adjusted equally-

weighted performance is strongly negative. Moreover, the results on aftermarket performance worsen substantially when looking at the median picture, with some extreme returns driving the performance.

In order to shed some light on the underlying dynamics of aftermarket performance, we categorize returns according to a set of issuing characteristics. We find a strong impact of the initial return category. Here, companies with higher initial returns fare best, underlining the role of underpricing as a signal of firm quality. The quality of the underpricing signal is best in "cold" markets which are characterised by less "noise". The evidence also points to a strong signaling role of the size of the public float, in the sense that it is positively related to aftermarket performance across measurement horizons. This is true for IPOs issued in both "hot" and "cold" markets. Moreover, the cross-sectional findings in this study provide definitive testimony of the overriding influence of the New Economy during the 1990s, which had a dramatic impact on the investment world in general and the European IPO market in particular. We show that the relatively good average performance of European IPOs issued between 1988 and 1998 is due to offerings in the New Economy that account for just 28 percent of the sample. While we do not adjust for risk, it is unlikely that beta alone can account for the performance differences. These results extend across all measurement horizons. Through the outburst of IPO activity in the New Economy sectors relative to the Old Economy on the "New Market" segments during the height of the "Internet Bubble" in 1999 and part of 2000, this multi-year pattern ultimately reversed.

Chapter III

IPOs: Insights from seven European countries

1 Introduction

In recent years, a large body of literature has documented the returns on Initial Public Offerings (IPOs) earned by investors in Europe. For example, using a sample of 712 UK IPOs between 1985 and 1992, Espenlaub, Gregory and Tonks (1998) find that there are negative abnormal returns to a number of alternative benchmark portfolios. They conclude that there are negative abnormal returns from an IPO such that a one-pound investment is worth less than 85 pence after three years. Leleux and Muzyka (1998) analyse the performance of 307 IPOs in France, the UK, Germany, The Netherlands and Belgium, issued between 1987 and 1993. The authors find that European IPO shares exhibit the pattern of long-term underperformance highlighted in the US. Summarizing evidence from a large number of countries, Loughran, Ritter and Rydqvist (1994) report that underpricing, "hot issue" markets and long-run underperformance are global IPO phenomena.

The evidence on IPO performance can also be addressed in a more general context of "Why do companies go public?". In this respect, Ellingsen and Rydqvist (1997) argue that companies tend to emphasize the following reasons for going public: (1) to obtain finance for growth opportunities, (2) to enhance a company's image and increase its publicity,[31] (3) to motivate managers and other employees, and (4) to "cash in" by selling off the financial interest in the company. However, the more fundamental question is why firms go public to achieve these goals. For example, direct sales of

[31] When asked about the reasons for raising funds on the stock market, Nick Ogden, founder of Ogden, an UK-based Internet company, said the flotation "will be as much about raising our profile as raising money". (Source: Sunday Business, March 12th 2000).

stock and bank financing are alternative sources of funds that could potentially finance new projects or allow for transfer of ownership. Moreover, funds raised through stock market introduction are often very expensive. It is generally perceived that the total cost of going public lies between 20 cents and 30 cents per dollar, depending on the size of the firm. The only reasonable explanation for the initial offer is that there are some further future benefits associated with going public that outweigh the high cost of doing so. In this context, Röell (1996) concludes that the reasons why firms pursue an IPO are due to "an informative stock price, a more liquid stock, and increased competition among providers of finance".

Our objective in this chapter is to extend the evidence on IPOs by applying a common empirical research framework to companies that went public between 1988 and 1998 in the following seven individual European Countries: Germany, France, Italy, The Netherlands, Spain, Sweden and Switzerland. This period is of considerable importance as it begins with the aftermath of the 1987 stock market crash, followed by large privatization programmes and eventually by a big boom in European equity culture and issuing activity towards the late 1990s. These individual markets provide a unique opportunity to examine the robustness of findings on the performance of UK and US IPOs within the setting of other market-based financial systems, in which stock markets play an increasingly crucial role in company financing. Moreover, by extending our analysis of the European IPO market to individual countries, we can improve our understanding about the robustness of the patterns reported in Chapter II and the homogeneity of the European IPO market.

Some of our findings include the following:

(1) The underpricing phenomenon, while time-varying, is a consistent feature across all the countries in the study. There is tentative evidence to suggest

that changes in tax regimes (in the case of Sweden and France), the regulatory framework (in the case of Spain) or the IPO mechanism (in the case of France) have had a significant impact on pricing and IPO activity. The results for the long-run performance of IPOs in individual European countries indicate that long-run underperformance is a time-varying phenomenon and sensitive to measurement technique and benchmark adjustment.

(2) When performing significance tests of performance differences between the individual countries, the results, for overall and cross-sectional patterns, confirm similar initial and aftermarket performance of IPOs for each European country. This underlines the homogeneity of the European IPO market in general and the pervasiveness of the observed IPO patterns in particular.

(3) Throughout the sample period, there appears to be a clearly positive link between the degree of a countries' involvement in New Economy IPO activity and long-run IPO performance. While IPOs in Germany, The Netherlands or Sweden perform relatively well over the long-run, IPOs in countries with no New Economy IPO activity, such as Italy and Spain, fared worse. This can help to shed some light on the rationale behind major efforts made by stock exchanges across Europe to establish "New Market" segments during the 1990s.

(4) As demonstrated by the comparison of findings from Chapter II and this Chapter, the design of the empirical experiment, in particular return methodology and benchmark choice, can have an impact on the confidence and reliability of inferences from long-horizon studies.

The structure of this Chapter is as follows: Section 2 describes the institutional arrangements for IPOs in the seven countries under study and reviews the existing empirical literature. In Section 3, we describe the data and methodology. Section 4 presents evidence regarding aftermarket performance. Section 5 presents cross-sectional and time-series evidence on the performance of European IPOs. In Section 6, we check to see whether the results are robust across countries. Section 7 concludes with a summary and interpretation of the findings.

2 Going public in European countries 1988-1998

2.1 Institutional arrangements

In each of the seven countries under study, the regulations regarding an initial public offering (IPO) are set and maintained by the relevant exchange itself, with the consent of the Secretary of the Treasury, and must also be in accordance with legal guidelines that are set under the European Investment Services Directive.

Before a firm can make an IPO, it must first obtain permission from the Ministry of Finance to have its shares listed on an exchange. The request for a listing must be made on the basis of a "notice of introduction", whose contents are subject to detailed regulation and is generally filed 120 days before a company starts trading. In the case that the shares are listed, the professional association or government body acts as the regulatory agency. The issuing firm must also meet certain criteria such as providing annual accounts over a certain period of time, specifying the uses to which the proceeds of the offering will be put, and disclosing the shareholdings of the management and board of directors. Moreover, a chartered accountant must certify the firm's annual accounts, and an offering prospectus must be submitted to the stock exchange by a

member of the association, who sponsors the request. In the countries under study, a universal or an investment bank typically underwrites the IPO.[32] The underwriter is not only involved in working out the registration statement, but is also responsible for managing the underwriting and floatation process.

A company has, in principle, a choice between three market segments in which to list its shares: The Official Market, the Official Parallel Market or the New Market.[33] The choice of market segment is mainly based upon the minimum size of the issue. Moreover, while the minimum Public Float on the Official Market is at least 25 percent, no such requirements exist for shares seeking admission to the Official Parallel Market or the New Market. New Market segments, added since the mid-1990s to many European stock exchanges, cater exclusively to young, high-growth companies in technology-oriented market sectors. Lower requirements for companies listed on the New Market segments in terms of capital and operating history are offset by more stringent transparency and reporting rules after the IPO date. It must be stressed that the relevant authority has the right to waive certain listing requirements.[34] While electronic trading of shares takes place in all market segments in France, Italy, Sweden and Switzerland, the main stock exchange operators in Germany, The Netherlands and Spain have maintained a hybrid system of floor-based and electronic trading.

Firms that intend to go public have – at least in principle – a choice of which method their shares are offered to the public. A company can use one of the following methods to obtaining a listing and issuing equity: "private placing", "offer for sale by

[32] Particularly in Germany, companies seeking a listing have usually been engaged in a long-run relationship with its underwriter ("Hausbankbeziehung").
[33] In Appendix C, Table 48, we summarize the main listing requirements that applied to the stock exchanges in the countries under study between 1988 and 1998. We do not cover companies going public in other market segments, such as the Unregulated Market or NASDAQ Europe (formerly EASDAQ).
[34] This is explicitly stated in the statutes of the Milan Stock Exchange. For companies going public in Sweden, because of the prevalence of dual-class shares, direct focus is given to the voting and ownership structure of companies going public. Here, the minimum number of shareholders necessary for floatation is explicitly stated.

tender", also referred to as "bookbuilding", and "offer for sale at a fixed price".[35] In an "offer for sale at a fixed price", the fixed price element is designed to widen the appeal of the issue for investors by eliminating price uncertainty. The prospectus states the number of shares being offered for sale and the price per share. Investors can then submit bids for the number of shares they wish to take up at the stated price. In "offers for sale at a fixed price", while applications are invited from the general public, the issue is sub-underwritten, at the same price, by a group of financial institutions. Once the price of the issue is fixed, it can neither be changed in response to emerging demand, nor withdrawn. With the possible exception of France, the majority of companies going public in the countries under observation went public through "offers for sale at a fixed price" until the mid-1990s. The major proclaimed disadvantage of an "offer for sale by tender" which uses "bookbuilding" procedure is that it cannot eliminate price uncertainty. However, with strong issuing activity and rising equity markets since 1995, during which companies, led by E Merck AG, a German pharmaceutical company, issued high volumes of shares, the bookbuilding method has been increasingly used as a means for going public as it allows the market itself "much more power in the issuance process".[36] Since the mid-1990s, bookbuilding has become the pricing mechanism of choice for 70 percent of the IPOs in our sample. The inherent advantages of this procedure are that it seeks to assess market conditions before pricing, and that the final issue price is conditioned on market demand.

The average total direct cost for a company going public in the sample varies between 5 percent and 7 percent.[37] This fee structure has been relatively stable over

[35] We do not discuss "Private Placements" in detail because they apply to low volume issues only. Derrien and Womack (1998) and Biais and Faugeron-Crouzet (2002) discuss other IPO mechanism unique to the French market.

[36] Reuters News Service, (December 27, 1995): "German IPO pace to slow but demand still strong."

[37] Kaserer and Kraft (2000) provide a detailed study of floatation costs in Germany. Chen and Ritter (1999) document that in the US, at least 90 percent of deals that raised between 20 and 80 million Dollars

year and country, despite growing competition for mandates between investment banks, and seems to exist irrespectively of type, nature and risk profile of the company. Using 2,051 IPOs in 61 non-US markets between 1992 and 1999, Jenkinson, Ljungqvist and Wilhelm (2000) study whether the introduction of bookbuilding has increased the efficiency of IPOs. They find that – while the direct costs of bookbuilding are typically twice that for fixed-price offers – bookbuilding leads to substantially less underpricing.

In general, the relevant stock exchange operators do not have any rules on how oversubscribed issues are to be allocated, beyond the general principle that the allocation must be done systematically.[38] The degree and method of scaling down is entirely at the discretion of the issuing house and may involve any form or pattern that best suits the particular circumstances or interests of the company and its underwriter.[39] This may involve a ballot and/or scaling down of applications. In fact, the adopted method of allocation reflects the company's preference regarding the profile of its new shareholders, for example a large number of small individual investors versus institutional investors. Reimer (1998) discusses hot German IPOs where institutional investors received a disproportionately large fraction of the shares on sale. This is consistent with the empirical findings by Cornelli and Goldreich (2001) who find that "bidders who participate in many issues receive favourable treatment especially in the more successful (i.e. oversubscribed) issues". Furthermore, Ljungqvist and Wilhelm (2002) document that the frequency of directed share programs (friends and family shares) increased dramatically between 1996 and 1999.

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have underwriting spreads exactly equal to 7 percent, and relate this to the lack of competition between investment bankers.

[38] Oversubscription is a common feature for the IPOs under study. In Germany and The Netherlands, for example, oversubscription has been fuelled by the fact that there is no pre-payment for IPOs. Payment for the shares is made after the allocation of the bids is announced and trading starts.

[39] The fairness of the allocation mechanism has been subject to constant public debate and increasing regulatory scrutiny. See Forbes, (June 22, 1992), pp. 156-162, or Wall Street Journal Europe, (June 15, 1994): "Investors in US Question Access to IPOs, raising issue of Fairness", or Reimer (1998).

2.2 *Previous Literature*

The focus of the empirical literature on IPOs in Continental Europe and Scandinavia has shifted over time. While most of the studies in the early 1990s focus on the underpricing phenomenon and its theoretical foundations, the research has increasingly concentrated on the cross-sectional study of aftermarket performance with respect to unique aspects of each country under observation. This has also involved going beyond the analysis of time-series stock price data to include the evaluation of operating performance data, the types of earnings management around the IPO date, and aspects of finance and law.[40]

2.2.1 *Germany*

Stehle, Erhardt and Przyborowsky (1998) study the short- and long-run performance of a sample of 222 German IPOs between 1960 and 1995. The authors find statistically and economically significant underpricing of 15.7 percent. Using an equally-weighted market portfolio as a benchmark, they also find a statistically insignificant buy-and-hold performance of negative 5.0 percent over a 36-month time horizon. Moreover, they argue that, because IPO stocks are typically small- or medium-sized, market portfolios might not make ideal benchmarks in IPOs studies. According to the study, the results on long-term performance are fully in line with the efficient market hypothesis and the hypothesis of deliberate underpricing. Schuster (1996) focuses on the performance of 126 German IPOs issued between 1988 and 1995. He finds significant short-run overperformance. Moreover, he finds variations in year-to-year performance, across industries and other issuing characteristics, with larger companies as well as those with lower initial returns faring the worst. Due to the high

[40] Using inferences from individual country studies to make general statements about patterns in the European IPO market is difficult because of varying empirical methodologies, different sample sizes, measurement periods and the quality of data.

median age of 49 years, it is hypothesized that the German IPO market is more of an M&A market than a venture capital market, indicated by the fact that IPO proceeds flow into maturing and declining industries, rather than those that are growing and dynamic. Other studies for the German IPO market include Ljungqvist (1997), Uhlir (1989) and Weinberger (1995) who reported evidence concerning underpricing and long-term performance.

2.2.2 France

Derrien and Womack (2002) focus on the efficiency of the main procedures of going public in France under different market conditions and mechanisms: a bookbuilding mechanism similar to the one used in the US, a fixed-price procedure and an auction-like procedure. They show that overall market momentum in the three months prior to an offering is a significant ex ante predictor of the level of underpricing. In the sample of 264 French IPOs that went public on the French Official Parallel Market and New Market between 1992 and 1998, mean underpricing reached 13.2 percent. After controlling for issuer and industry specific factors, they also find that the auction mechanism is associated with less underpricing and lower variance of underpricing. Using Cumulated Average Returns (CARs) starting from the eleventh trading day, they find insignificant average adjusted underperformance of negative 6.2 percent for the sample over a two-year horizon. More generally, their work provides empirical support for the theoretical work of Biais, Bossaerts & Rochet (2002), who find that an IPO mechanism similar to France's auction-like Offre à Prix Minimum (OPM) is optimal.[41] Faugeron-Crouzet, Ginglinger and Vijayraghavan (2001) focus on the relationship between the initial underpricing and the subsequent recourse to the

[41] W.R. Hambrecht, a US investment bank, has recently used a similar procedure called "OpenIPO" for US IPOs. This procedure resulted in substantially less underpricing.

capital market for a sample 288 firms that made an IPO on the French Official Parallel Market between 1983 and 1994. While they find positive initial returns of 18.7 percent for the sample as a whole, they also find that firms which are more undervalued tend to subsequently issue shares, while firms which are not as undervalued tend to subsequently issue other kinds of hybrid security. Degeorge and Derrien (2000) examine the long-run stock price performance and earnings forecasts at the time of the IPO using a sample of 243 French IPOs that went public on the Official Parallel and New Market between 1991 and 1998. Using a variety of benchmarks and calculation methods, they show that IPOs performed normally over a two-year horizon. They also find that the best proxy for investors' expectations is the average forecast issued by financial analysts unaffiliated with the underwriter taking the company public.

2.2.3 Italy

Giudici and Paleari (1999) conduct an empirical study of 135 IPOs on the Milan Stock Exchange between 1985 and 1998. Their analysis shows the existence of two periods characterized by different levels of underpricing. Between 1985 and 1993, the findings are consistent with the empirical results in other countries during this time, such as the negative correlation between underpricing and the firm size, a positive correlation between underpricing and the market trend and the price volatility in the aftermarket, and the fraction of the equity maintained by the controlling shareholders. In the second period between 1994 and 1998, underpricing is lower and the correlation is less significant, which, according to the authors, confirms the "information gathering" theory of Beneviste and Spindt (1989) and validates the importance of placing strategies. For the sample as a whole, they find average underpricing of 23.9 percent. Using buy-and-hold returns, Italian IPOs also underperform the broad market

benchmark by 2.5 percent over three years. This work follows an earlier study done by Cherubini and Ratti (1992), who investigate the underpricing of a sample of 75 Italian companies that were introduced to the Milan main market between 1985 and 1991. They find average underpricing of 29.7 percent and postulate a positive correlation between oversubscription, issuing activity in the secondary market and the degree of underpricing.

2.2.4 The Netherlands

Bosveld and Venneman (2000) analyse the investment and operating performance of a sample of 120 Dutch IPOs between 1983 and 1999 that went public on the three market segments of the Amsterdam Exchanges. They find highly significant average adjusted initial returns of 9.9 percent. The significance and magnitude of these returns, however, do vary widely over time. When calculated without outliers, it appears that the influence of the few extremely high returns is larger than that of the few extremely low returns. Furthermore, when using either of three benchmark adjustments, the authors do not find underperformance during the first three years of trading. Regardless of the benchmark choice, however, IPOs underperform the market after four or five years of trading. They find that, on average, for every Dutch Guilder (NLG) 100 invested in the benchmark, one would have had to invest NLG118 in the IPOs to obtain the same terminal wealth level after four years of trading, or even NLG124 to obtain the same terminal wealth level after five years of trading. They also show that Dutch IPOs are timed to coincide with periods of unusually good operating performance levels and find that the practise of "window dressing" is common prior to the IPO. Roosenboom, Van der Goot, and Mertens (2001) examine the relationship between two forms of earnings management and the fortunes of a sample of 80 IPO firms that went public on

the Amsterdam Exchanges between 1984 and 1994. Their result provides evidence that the form of earnings management during the IPO year can partially explain the cross-sectional variation in long-run stock price performance. Using buy-and-hold returns, firms in which managers tend to overreport earnings during the IPO year subsequently perform poorly, and IPO firms in which managers smooth their income overperform their counterparts by a margin of more than 100 percent during a period of three years, adjusted for a number of different benchmarks. Van der Goot (1997) focuses on the quality of information by studying the offering prospectuses of 74 IPOs on the Amsterdam Exchanges between 1983 and 1992. He finds that cash flow statements do not contribute to reducing information inequality between a firm's management and its investors. Moreover, he stresses that valuation models based on Price-Earnings Ratios or Price-Book Ratios can only explain little of the observed variance in the issuing firm's value. The author also points to a statistically significant negative relationship between firm value and the number of takeover defences introduced by a firm.

2.2.5 Spain

Álvarez and Gonzáles (2001) provide a detailed analysis of the short- and long-run performance of 56 Spanish IPOs, including four foreign issues, on the Madrid Stock Exchange between 1987 and 1997. The authors also investigate the influence of IPO prospectus information on the long-run returns of IPOs. For the sample of companies, they report a highly significant unadjusted underpricing of 12.3 percent. With event windows of three and five years, they report mixed results for long-run performance. The magnitude of abnormal returns depends on the methodology, the weighting method and the benchmark used for the adjustment of IPO returns. While long-run underperformance is present when calculating buy-and-hold returns, it is not present

when using other methodologies for returns measurement, such as calendar time returns or the Fama-French three factor model. Long-run underperformance is also concentrated in small firms. Moreover, none but two of the issuing characteristics of the offer are related to the behaviour of the stock price over three to five years. They find a positive relationship between initial underpricing, long-run performance and the percentage of shares retained confirming the signaling hypothesis. In a similar work, Olcoz and Feldsztaijn (2000) report 10.6 percent initial underpricing of a sample of 99 IPOs in the Madrid and Barcelona Stock Exchanges between 1986 and 1998. This sample also underperformed the Madrid Stock Exchanges General Index (IGBM) by 29.0 percent over three years. Companies with the highest Return on Equity (ROE) at the time of going public tend to be the best performers in the long-run. Rahnema, Fernández, and Martínez Abascal (1992) examine the short- and long-run performance of 85 Spanish IPOs over the period 1985-1990. Here, Spanish IPOs experience, on average, 10.8 percent underpricing. "Handsome returns" may be earned by investing in new issues, but the authors recommend liquidating within the first 90 days after the first market price. In addition, they argue that it is possible to reduce the degree of underpricing by selecting the optimal timing, underwriter, and type of placement.

2.2.6 Sweden

Rydqvist (1993, 1997) documents IPO underpricing from the perspective of companies going public in Sweden. In his sample, composed of 224 new firms and 84 equity carve-outs during 1970-1991, average underpricing reached 39 percent. He stresses the uniqueness of the Swedish IPO market: The significant difference in marginal tax rates between salary increases (85 percent marginal tax) and capital gains (20 percent marginal tax) led firms to allocate a significant portion of the offer to firm

employees and key decision makers of the firm's creditors, suppliers and customers. Therefore, underpricing was driven by an incentive to replace salary increases with tax-efficient capital gains. The tax motivation for underpricing disappeared when a new tax code was introduced in 1990. This led to a subsequent drop in underpricing. In a similar analysis of IPOs between 1970 and 1991, Högholm (1994) finds a positive relationship between the level of underpricing and the level of ex-ante uncertainty surrounding the IPO. Firms belonging to the service sector seem to underprice their IPOs more than other firms. He also finds different levels of underpricing depending on the motive for going public. Using a sample of 162 Swedish IPOs between 1980 and 1990, Loughran, Ritter and Rydqvist (1994) find initial returns of 38.2 percent and a market-adjusted three-year return of 1.2 percent.

A different line of research provides a legal and financial commentary of Swedish IPOs. Holmén and Högfeldt (2000) study how a legal regime, that provides weak minority protection and allows for the separation of votes from capital, affects behavior at the time of and after the IPO. They study 229 Swedish IPOs (excluding equity-carve-outs and spin-offs) between 1979 and 1997, when close to 90 percent of all privately controlled Swedish IPOs used dual-class shares and issued only low-voting B-shares. They find that private owners who place much emphasis on being in control design the corporate charter and the initial ownership structure to maintain control after the IPO. Five years after the IPO, the original private owners of the companies in their sample retained 2/3 of the votes and 44 percent of the capital. Moreover, if the firm has dual-class shares, the controlling owner has a stronger incentive to invest and acquire other firms in stock financed takeovers since the owner only contributes a smaller fraction of the capital but exclusively enjoys all control rights of the larger firms. Furthermore, they find that private owners in control firms that later undertake seasoned

equity offerings retain a significantly higher proportion of votes and capital at the IPO date compared to other privately controlled firms. According to the authors, differences in ownership concentration, investment behavior and takeover frequency between Continental European/Scandinavian and the Anlgo-Saxon countries are, to a large extent, determined by endogenously established differences in security design and initial ownership structure at the IPO date that reflect differences in legal regimes.

2.2.7 Switzerland

Kunz and Aggarwal (1994) study underpricing of a sample of 42 IPOs that were issued in Switzerland between 1983 and 1989. They find a 35.8 percent average initial return between the offering price and the closing price on the first day of trading for 42 Swiss IPOs. No long-run underperformance in the aftermarket is observed. The average excess returns remain well above 30 percent up to three years after the IPO. The authors point to a decrease of underpricing over time, indicating growing competition between investment banks. They also argue that companies may intentionally underprice their stocks in order to invest into their reputation by getting "free publicity". Moreover, they find that the reserved disclosure policy of Swiss companies and the traditionally close ties between issuer and underwriter, may possibly explain the high average underpricing in Switzerland as compared to other countries.

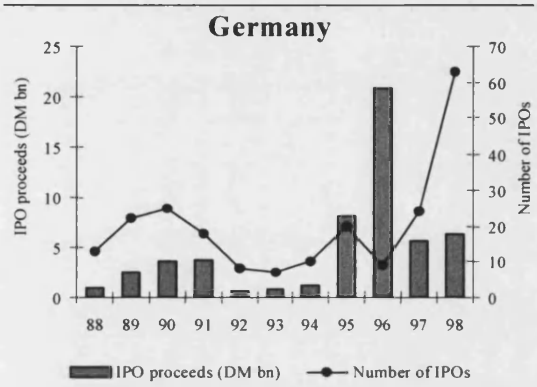
3 Data and Methodology

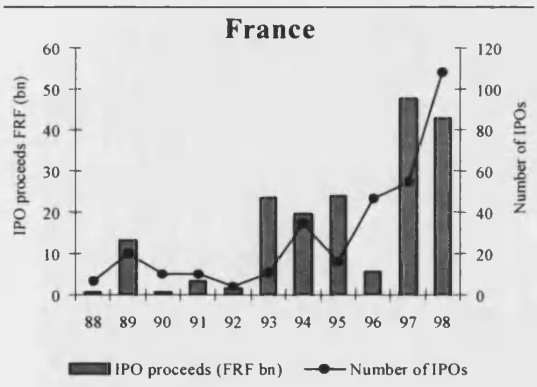
3.1 Data

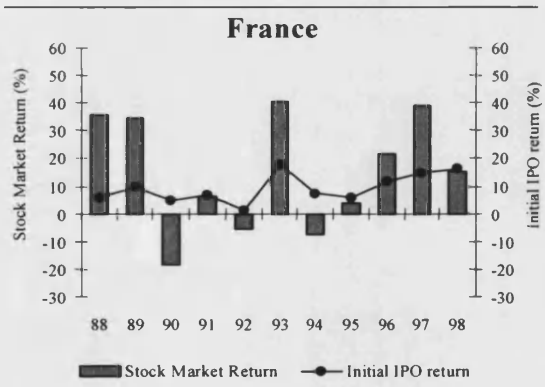
For our study of IPO performance in the individual European countries, we use the same company and returns data as in the previous chapter with the initial sample

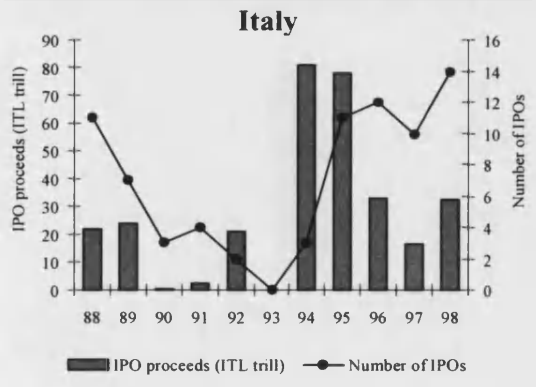
Figure 4
IPO activity and Stock Market Returns in European Countries

IPO proceeds are measured in end-1998 purchasing power and defined as the number of shares offered to the public times the final offering price and include overalottment options (greenshoe), where applicable. The Initial Return is defined as the change from the IPO price to the closing price at the end of the first day of trading. The annual stock market return is defined as the annual change in the national stock market in the country under study. The following indices (all value-weighted) were used as a proxy for the respective national stock market: the FAZ Index (Germany), the SBF 250 Index (France), the MIB Historical Index (Italy), the CBS Index (The Netherlands), the Madrid General Index (Spain), the Affärsvärlden General Index (Sweden) and the Swiss Total Market Index (Switzerland).









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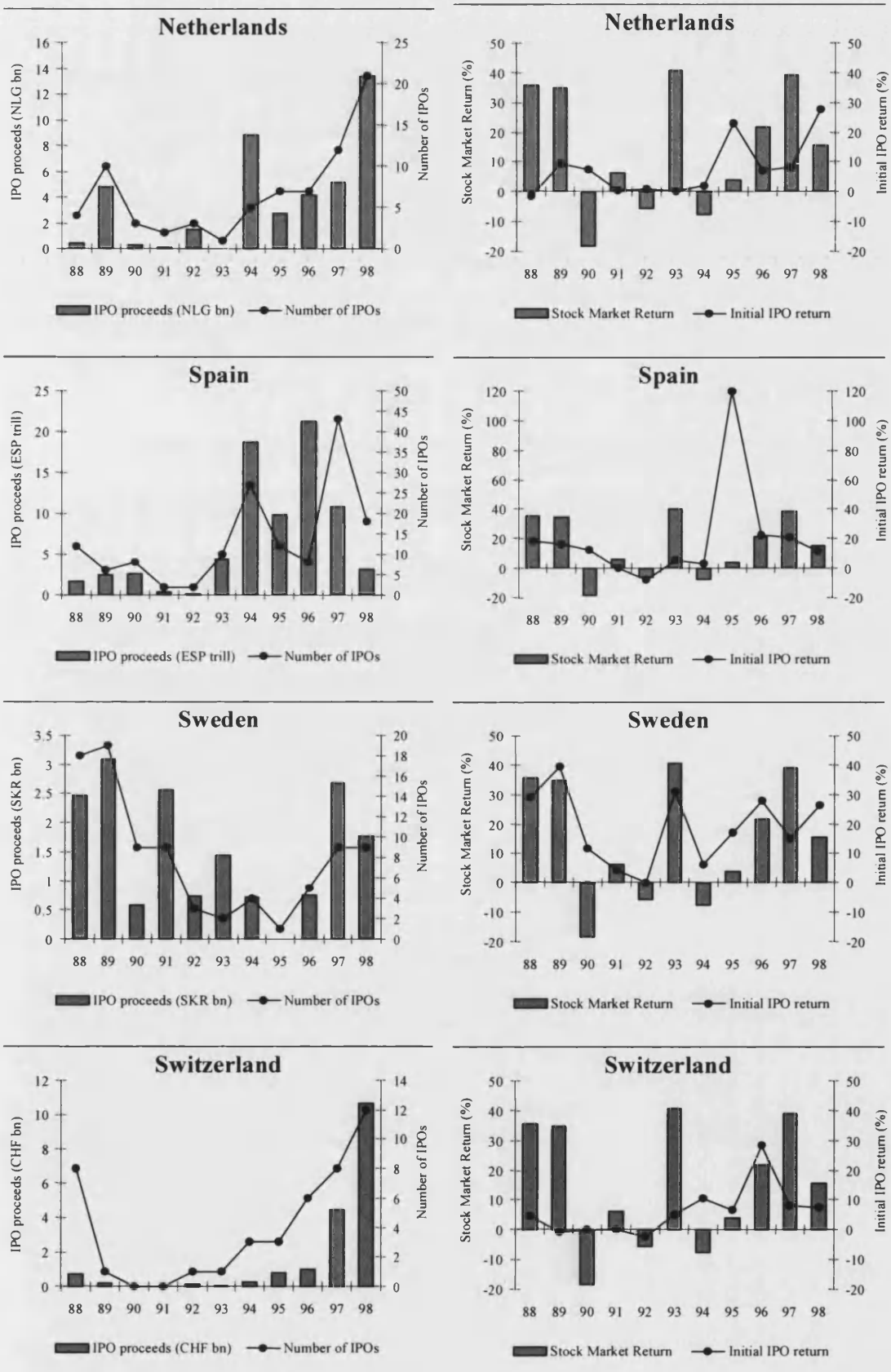


being comprised of 219 German, 323 French, 77 Italian, 75 Dutch, 88 Spanish, 148 Swedish and 43 Swiss IPOs. For this section, however, we calculate returns in local currency using a local trading day calendar. Figure 4 shows that the number and value of IPOs was unevenly distributed across the sample period in each country under study. It underlines that the sample consists of stocks issued in both high activity and low activity markets, in which the underlying momentum in the general level of the stock market is positive. In this respect the sample is consistent with most of the empirical studies in the literature. Figure 4 also underlines the link between IPO activity and general level of the stock market.[42]

Table 10 summarizes the IPO sample characteristics for the individual European countries. The size of the public float (in percent) is relatively uniform across countries. It is also consistent with findings by Espenlaub and Tonks (1998), who report that for a sample of 428 IPOs of UK incorporated, non-financial companies issued during 1986-1991, the average proportion of equity sold was 29.49 percent. Initially, IPOs came from a variety of industries and were carried out by larger and older firms. This coincides with the evidence provided by Loughran, Ritter and Rydqvist (1994) who show that in Continental Europe, most of the firms that enter the market are more mature, larger and more established than their counterparts in the US. However, average age and number of industries represented has declined during the sample period. This is not surprising considering the large number of service- and technology-related IPOs in the German, French and Swedish market segments since the mid-1990s, combined with the rapid rise in equity ownership and financial integration in Continental Europe toward the late 1990s.

[42] Loughran, Ritter and Rydqvist (1994) provide evidence that companies successfully time their offerings for periods when valuations are high, with investors receiving low returns in the long-run.

Table 10
Sample Characteristics

Characteristics of IPOs in European countries between 1988 and 1998. Age of the issuing firm is measured as the calendar year of going public minus the calendar year of foundation, with firms founded before 1901 assumed to be founded in 1901. Public Float is the percentage of equity offered. Firm Size (expressed in local currency units), is the total number of shares issued times the final offer price. Gross Proceeds are in local currency units and defined as the number of shares placed multiplied by the offer price and include overalottment options (greenshoe), where applicable. All values are expressed in end-1998 prices using the monthly consumer price indices relating to each country. Market Sectors is a proxy for the diversity of the IPO market and represents the number of market sectors present out all 18 market sectors defined in the attached Dow Jones STOXX global classification standard.

	Age, years		Public Float, Percentage		Firm Size, millions/billions		Gross Proceeds, millions/billions		Market Sectors
Country	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Number
Germany	35	23	38	33	803.5	192.6	250.4	71.8	17
France	21	13	21	18	1,966.9	250.9	568.1	47.2	18
Italy	25	19	32	29	1,674.0	235.3	404.9	71.9	17
Netherlands	31	18	39	33	1,504.9	290.0	552.6	92.9	15
Spain	38	31	40	38	60.6	21.4	19.1	8.1	16
Sweden	25	14	39	33	1,207.2	337.0	512.2	93.9	15
Switzerland	30	27	65	59	678.7	158.1	428.4	95.1	12

Table 11 presents the distribution of IPOs in Continental Europe and Sweden by year, both in terms of the number of IPOs and gross proceeds. It shows that the number and value of IPOs were not evenly distributed over the sample period. While years 1988 to 1990 were relatively high volume years in all countries under study, years between 1991 and 1993 were years of low issuing activity. For example, during 1990 and 1991, there was no IPO activity in Switzerland, while Italy did not record any IPO activity in 1993. Ahead of large privatization programmes, 1995 represented a year with high IPO activity, in terms of proceeds raised, size of companies and number of IPOs. Most of the issuing activity in Spain was concentrated in 1988 and 1989. This is partially attributable to the effect of the Spanish Securities Markets Law aimed at achieving greater penetration, transparency and liquidity. Moreover, while the strong increase of the number of listings in France was partly driven by the creation

Table 11
Sample Distribution

Distribution of Initial Public Offerings (IPOs) by country and year of issuance from 1988 to 1998, excluding demutualizations, investment companies and foreign issues. Equity carve-outs, spin-offs and privatizations are included. Gross proceeds are in local currency units and defined as the number of shares placed multiplied by the offer price, and include overalottment options (greenshoe), where applicable. Aggregate gross proceeds are expressed in end-1998 prices using monthly consumer price indices of the respective country.

Distribution of European IPOs by Country and Year of Issuance														
	Germany		*France*		*Italy*		*Netherlands*		*Spain*		*Sweden*		*Switzerland*	
IPO Year	Number of IPOs	Aggregate Gross Proceeds DMm	Number Of IPOs	Aggregate Gross Proceeds FRFm	Number of IPOs	Aggregate Gross Proceeds ITLbn	Number Of IPOs	Aggregate Gross Proceeds NLGm	Number of IPOs	Aggregate Gross Proceeds ESPbn	Number of IPOs	Aggregate Gross Proceeds SKRm	Number of IPOs	Aggregate Gross Proceeds CHFm
1988	13	979.0	7	721.6	11	2,214.2	4	402.5	18	246.5	12	1,658.3	8	755.5
1989	22	2,534.2	20	13,493.9	7	2,415.3	10	4,843.3	19	309.8	6	2,480.5	1	191.3
1990	25	3,648.9	10	652.2	3	66.1	3	286.3	9	57.8	8	2,652.9	0	-
1991	18	3,753.3	10	3,316.4	4	238.2	2	48.2	9	256.0	2	439.2	0	-
1992	8	709.3	4	1,551.5	2	2,083.5	3	1,485.2	3	73.8	2	143.9	1	158.1
1993	7	890.4	11	23,589.7	0	-	1	16.8	2	144.1	10	4,488.8	1	63.5
1994	10	1,218.9	35	19,674.2	3	8,095.7	5	8,783.5	4	72.7	27	18,782.9	3	269.4
1995	20	8,129.1	16	24,020.3	11	7,810.5	7	2,766.4	1	0.4	12	9,881.2	3	818.5
1996	9	20,854.7	47	5,810.6	12	3,324.3	7	4,209.0	5	75.2	8	21,267.2	6	1,031.4
1997	24	5,696.3	55	47,754.1	10	1,659.2	12	5,161.0	9	268.9	43	10,833.5	8	4,492.6
1998	63	6,413.8	108	42,923.4	14	3,269.7	21	13,442.5	9	177.3	18	3,175.8	12	10,640.9
Total	219	54,828.2	323	183,508.0	77	31,176.7	75	41,444.6	88	1,682.7	148	75,804.1	43	18,421.2

of the Nouveau Marché in 1996, it was also driven by a change in French tax law.[43] In the other countries under study, there is no relevant legislation in place that would offer any incentive of a fiscal or financial nature to venture capitalists and venture capital companies similar to those in France.

There were also some key institutional determinants of the emergence and growth of firms in Sweden. For example, a gradual deregulation of the capital markets during the sample period, a cut in corporate taxes and the deregulation of previously regulated markets have spurred-on entrepreneurial activity and stock market listings in Sweden since the mid-1990s. This came against the backdrop of traditionally high share ownership: around 60 percent of the Swedish adult population own shares. Davidsson and Henrekson (2000) identify some of the factors that have been particularly favourable for the emergence of Swedish firms, such as deregulation and "fortuitous" facts such as being a frontrunner in certain areas of technology, like telecommunications equipment manufacturing, for example.

3.2 Methodology

As reported earlier, the results of long-term performance studies are very sensitive to methodological choices. Here, we take this robustness issue seriously and present our results using a variety of methods. As in the previous chapter, we use an event-study methodology similar to Ritter (1991) for the evaluation of short- and long-run IPO performance. In this Chapter, two measures of abnormal returns are computed

[43] Under French legislation, there are two primary venture capital vehicles: the Société de capital risque ("SCR") and the Fonds commun de placement à risques ("FCPR"). In order to obtain certain tax benefits, these vehicles are required to invest at least 50 percent of their assets in qualifying non-quoted securities of EU companies. Moreover, when unquoted securities or shares which are eligible to be included in the 50 percent limit upon acquisition by the SCR or FCPR and subsequently become listed on a regulated stock market, they continue to be included within such 50 percent limit during the five-year period following the IPO date. Under certain conditions, if a SCR or a FCPR acquires shares that are listed on the Nouveau Marché, these shares will be considered as non-quoted shares for the purpose of the 50 percent quote. (Source: European Venture Capital Association).

for each country: First, cumulative average returns (CAR_T) are calculated, defined as the average of cumulated benchmark-adjusted returns of individual stocks (R_{it}) using several different benchmarks:

$$CAR_T = \frac{1}{N}\sum_{i=+1}^{N}\sum_{t=+1}^{T} R_{it}$$

As an alternative to using cumulative-average returns, which implicitly assumes monthly portfolio rebalancing, we also compute adjusted and unadjusted three-year buy-and-hold returns (BHRs):

$$BHR_T = \frac{1}{N}\sum_{i=+1}^{N}(1+R_{it})-1$$

where R_{it} is the abnormal return in month t for firm i, with N firms in the sample. While there is greater knowledge about the properties of the distribution and the statistical tests for CARs, BHRs measure actual investors experience. For the evaluation of statistical significance of CAR_T and BHR_T, we use a simple cross-sectional t-test.[44]

To interpret the three-year buy-and-hold performance, we also compute wealth relatives (WR) as a performance measure. The wealth relative is the ratio of one plus the mean IPO three-year holding period return (not in percent) divided by one plus the mean benchmark three-year holding period return (not in percent), excluding the initial return. A wealth relative greater than 1.00 indicates outperformance and a wealth relative less than 1.00 indicates IPO underperformance. The initial return is the

[44] For a further discussion of statistical inference, see Brown and Warner (1980), Kothari and Warner (1997) and Barber and Lyon (1997), for example.

unadjusted change from the offering price to the first closing price and is defined as month 0.[45] The aftermarket period includes the following 36 months, where one month is defined as a successive 21-day period using a local trading day calendar with returns denominated in local currency. For IPOs that are delisted before their third-year anniversary, the three-year buy-and-hold return ends with the last quoted price. To evaluate buy-and-hold returns of up to 36 months of trading, the sample had to be reduced to 677 issues. This is due to the large number of IPOs in 1998, that had not yet traded for three years as of February 2, 2001 (the cut-off date for this study).[46] For the sample as a whole, only seven companies were delisted before their third-year anniversary. This is sharp contrast to Ritter (1991) who reports that out of a total sample of 1,526 US IPOs, 272 firms were delisted before their third-year anniversary on the stock market.

Equally critical is the choice of benchmark. With the exception of Spain and Italy, returns for each individual country were adjusted using three different benchmarks: (1) a value weighted broad-market index, (2) a value weighted large-cap index, and a (3) value weighted small-cap or mid-cap index.[47] We have calculated performance measures without explicitly adjusting for betas. For the US market, Ritter (1991), Ibbotson (1975), Chan and Lakonishok (1990) and Clarkson and Thompson (1990) report that average betas for IPO firms are greater than 1.00 and decline over time. They argue that the difference in betas between the IPOs and the benchmark is too small to have a significant effect on the conclusions. Espenlaub, Gregory and Tonks (1998) apply a modified form of Ibbotson's (1975) RATS method to estimate the betas

[45] Adjusting initial returns for market movements does not change the qualitative nature of the results.
[46] This number (677) is slightly lower than the total number of companies used to evaluate three-year aftermarket performance in Chapter II (686 IPOs). For this section, we used the local trading day calendar for each country instead of the European trading day calendar. Because of more public holidays in some countries, the local trading day calendar contains a smaller number of trading days per year.
[47] For Italy and Spain, no small- or mid-cap index was available covering the full length of the measurement period between 1988 and 2001.

in their sample of 588 UK IPO firms between 1985 and 1995. Similar to US evidence, they find that the significance of the result of underperformance is likely to be understated rather than over-stated and that it is unlikely that the magnitude of the results can be explained away by specification errors. In his sample of 80 Finnish IPOs between 1984 and 1989, Keloharju (1993) concludes that given the magnitude of the cross-sectional betas, it is unlikely that risk mismeasurement alone could account for the result of underperformance of Finish IPOs. For their sample of Dutch IPOs, Roosenboom, Van der Goot, and Mertens (2001) find a beta range between 0.55 and 1.16 over the first 36 months of trading. Similarly, using a sample of 307 firms that went public in five European countries between 1983 and 1991, Leleux and Muzyka (1998) did not record betas in excess of 1.00.

4 Performance Analysis of IPOs in European countries

4.1 Aftermarket Performance

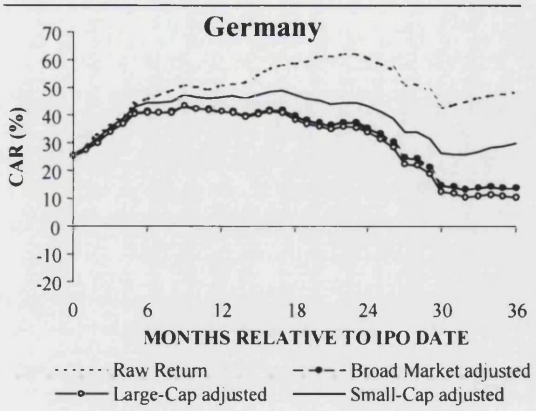
Table 12 reports initial returns and cumulative average returns (CARs) measured up to 36 months after the offering date using a broad-market benchmark for each individual country. The results indicate the complexity of the IPO performance picture. With the exception of Italy, Spain and Switzerland, IPOs experience positive aftermarket performance before the end of the first year of trading. Over the long-term, however, the picture changes dramatically. When assuming monthly portfolio rebalancing, IPOs in all countries record negative average adjusted returns at their third-year anniversary, with French, Italian and Spanish IPOs showing significant underperformance. With the exception of Sweden and Switzerland, the firm's negative performance is reflected in a steady decline in the CARs after their one–year

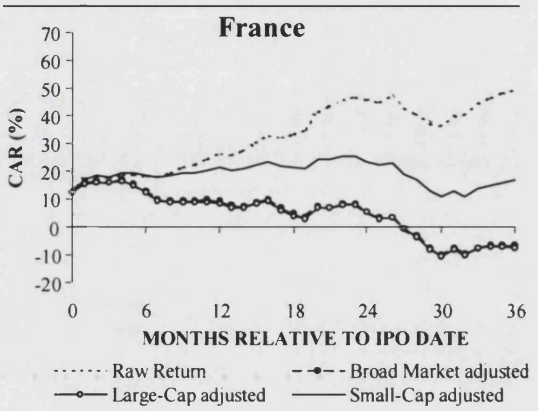
Table 12
Cumulative Average Returns (CARs)

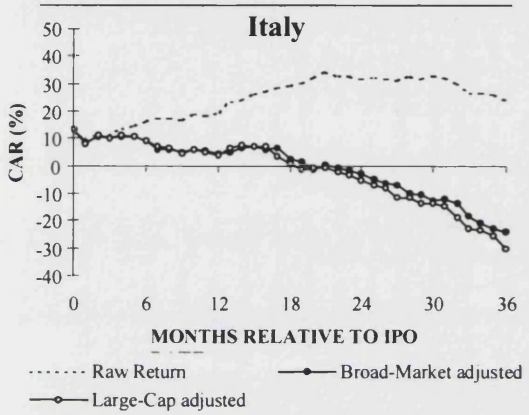
Aftermarket Returns are measured as Cumulative Average Returns (CARs), with associated Standard Errors (S.E.) (in parentheses) for the 36 months after going public, excluding the initial return. One month is defined as a consecutive 21-trading interval using local trading days. For each country, raw returns were adjusted for the following broad-market value-weighted benchmarks: German IPO returns were adjusted for the FAZ Index, French IPO returns for the SBF 250 Index, Italian IPO returns were adjusted for the MIB Historical Index, and the CBS Index, excluding Royal-Dutch, was the benchmark for the Dutch market. Spanish IPO returns were adjusted form movements in the Madrid General Market (IGBM) Index, the Affärsvärlden General Price (AFG) Index was used for the Swedish market, and the Swiss Total Market (STM) Index was the benchmark for the sample of Swiss IPOs. An adjustment for the relevant MSCI national indices does not change the results. Month 0 is the Initial Return interval.

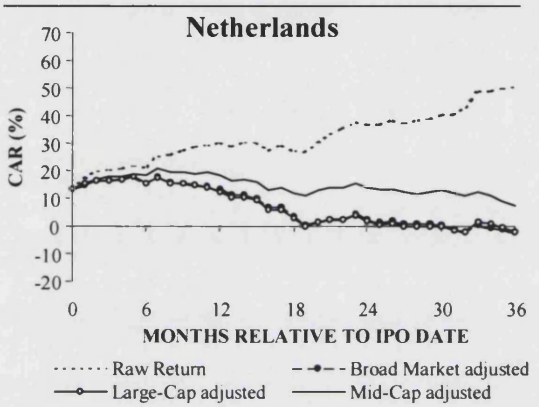
Panel A: Germany								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	219	219	219	219	219	219	190	155
$CAR_{1,t}$	0.2566[a]	0.0208	0.1585[a]	0.1608[a]	0.1419[b]	0.1003	-0.1067	-0.1166
S.E.	(0.0334)	(0.0159)	(0.0417)	(0.0531)	(0.0700)	(0.0725)	(0.0739)	(0.0852)
Panel B: France								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	323	323	323	323	321	315	284	213
$CAR_{1,t}$	0.1237[a]	0.0343[a]	0.0045	-0.0280	-0.0748	-0.0666	-0.2227[a]	-0.1901[a]
S.E.	(0.0104)	(0.0121)	(0.0232)	(0.0339)	(0.0475)	(0.0529)	(0.0553)	(0.0715)
Panel C: Italy								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	77	77	77	77	76	74	70	59
$CAR_{1,t}$	0.1303[a]	-0.0454[a]	-0.0376	-0.0903	-0.1198	-0.1783[b]	-0.2596[a]	-0.4185[a]
S.E.	(0.0327)	(0.0124)	(0.0470)	(0.0613)	(0.0780)	(0.0859)	(0.0777)	(0.0918)
Panel E: The Netherlands								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	75	75	75	75	74	72	67	53
$CAR_{1,t}$	0.1346[a]	0.0163	0.0221	0.0018	-0.0981	-0.1103	-0.1297	-0.1558
S.E.	(0.0259)	(0.0298)	(0.0450)	(0.0667)	(0.0713)	(0.0931)	(0.1091)	(0.1248)
Panel F: Spain								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	88	88	88	87	87	87	80	68
$CAR_{1,t}$	0.1475[a]	-0.0015	-0.0161	-0.0782[b]	-0.1756[a]	-0.2661[a]	-0.3500[a]	-0.3021[a]
S.E.	(0.0260)	(0.0154)	(0.0303)	(0.0388)	(0.0495)	(0.0688)	(0.0761)	(0.1667)
Panel G: Sweden								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	148	148	147	146	141	132	119	99
$CAR_{1,t}$	0.1846[a]	0.0071	0.0295	0.0140	0.0418	0.0523	0.0493	-0.1270
S.E.	(0.0233)	(0.0158)	(0.0286)	(0.0392)	(0.0570)	(0.0644)	(0.0760)	(0.0789)
Panel H: Switzerland								
Month of trading	0	1	6	12	18	24	30	36
Number of firms	43	43	43	43	43	43	42	31
$CAR_{1,t}$	0.0971[a]	-0.0217	-0.0226	-0.0646	-0.0485	-0.0446	-0.0502	-0.1817
S.E.	(0.0228)	(0.0166)	(0.0312)	(0.0518)	(0.0735)	(0.0998)	(0.1127)	(0.1378)

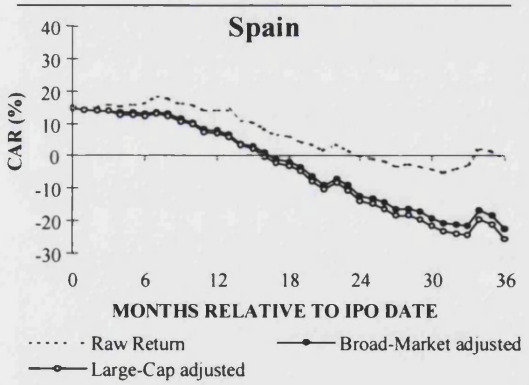
[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

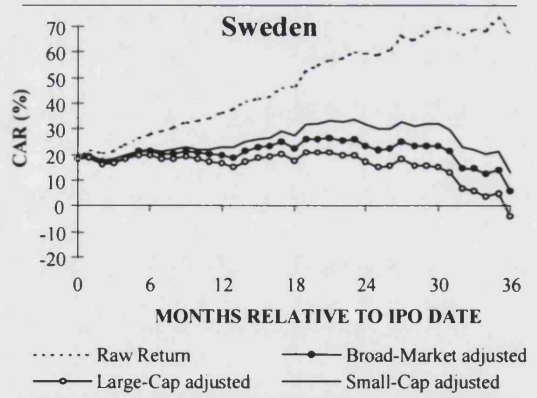

Germany
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad Market adjusted
Large-Cap adjusted
Small-Cap adjusted


France
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad Market adjusted
Large-Cap adjusted
Small-Cap adjusted


Italy
CAR (%)
MONTHS RELATIVE TO IPO
Raw Return
Broad-Market adjusted
Large-Cap adjusted


Netherlands
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad Market adjusted
Large-Cap adjusted
Mid-Cap adjusted


Spain
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad-Market adjusted
Large-Cap adjusted


Sweden
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad-Market adjusted
Large-Cap adjusted
Small-Cap adjusted

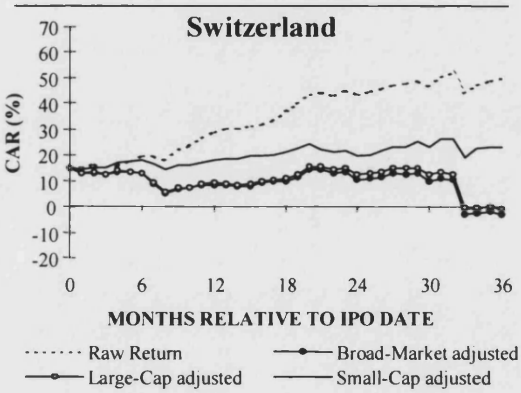

Switzerland
CAR (%)
MONTHS RELATIVE TO IPO DATE
Raw Return
Broad-Market adjusted
Large-Cap adjusted
Small-Cap adjusted

Figure 5. The Long-Run Performance of IPOs in European Countries. Cumulative average returns (CARs) for an equally-weighted portfolio of Initial Public Offerings in Germany, France, Italy, The Netherlands, Spain, Sweden and Switzerland between 1988 and 1998, with monthly rebalancing, month 1 to 36. One month is defined as a consecutive 21-day trading interval using local trading days. With the exception of Italy and Spain, four CAR series are plotted for each country for the 36 months after the IPO date: 1) raw returns (no adjustment); 2) a broad-market value-weighted index adjustment; 3) a value-weighted large-cap index adjustment; and 4) a value-weighted small-cap or mid-cap index adjustment. The FAZ Index (broad-market), the DAX 30 Index (large-caps) and the GSC100 Index (small-caps) were used as benchmarks for the adjustment of raw German IPO returns. French IPO returns were adjusted for the SBF 250 Index (broad-market), the CAC40 Index (large-caps) and the AGEFI Second Market Index (small-caps). Because of a lack of a small-cap benchmark over the full measurement period, Italian IPO returns were adjusted for the following two benchmarks: the MIB Historical Index (broad-market) and the MIB 30 Index (large-caps). Dutch IPO returns were adjusted using the CBS Index, excluding Royal Dutch (broad-market), the EOE Index (large-caps) and the MKAP Index (small/mid-caps) as benchmarks. Due to a lack of benchmarks for small-cap stocks over the sample period, Spanish IPO returns were adjusted using the IGBM Index (broad-market) and the IBEX35 Index (large-caps). The Affärsvärlden General Index (broad-market), the OMX 30 Index (large-caps) and the James Capel Smaller Companies Index (small-caps) were used for the adjustment of raw Swedish IPO returns. Finally, Swiss IPO returns were adjusted for the Swiss Total Market Index (broad-market), the SBC 100 Index (large-caps) and the Swiss Small Cap Index (small-caps). An adjustment for the set of Morgan Stanley country indices (MSCI) leads to similar results. Month 0 is the initial return interval. Returns were calculated on the basis of final closing prices.

anniversary on the stock market. In Figure 5, we have plotted three CAR series, where the initial return is also included. The individual benchmarks are main indices used in each country to describe either the state of the broad-market, the market for large-caps or the market for small- and mid-cap stocks. The distribution of initial returns varies across time and country, and is generally positively skewed. While the initial return picture is broadly similar, Figure 2 confirms that the dynamics in aftermarket performance is not uniform across countries. For German and Dutch IPOs, positive initial returns are followed by months of strongly positive outperformance, until the relative performance picture changes quite dramatically after around six month of trading. The best overall performance picture emerges for Swedish IPOs that start to underperform relatively late. As inspection of Table 12 shows, high Swedish IPO activity in technology- and service-related firms in 1997 preceded the large wave in IPO activity in other European countries in 1998. Many of the Swedish IPOs reached their third-year anniversary by mid-2000, a time when the NASDAQ Index traded slightly off its highs reached in March 2000. The return picture for the Southern European

countries of Italy and Spain is dismal. While both countries experience large initial returns, IPO performance starts to deteriorate early at least until the third-year anniversary. We also find that the performance of IPOs is sensitive to the benchmark employed. IPOs generally perform much better when adjusted for movements in small- or mid-cap indices and perform worse against large-cap indices. One reason why some small- and mid-cap indices match the IPO performance more closely is that index constituents are firms that have recently gone public. This issue is inherent in the countries under study due to a relatively small universe of listed companies.

The reported results are generally in line with the existing empirical literature in the countries under study. Looking at the first 36 months of trading, underperformance across the individual countries does not, however, reach the degree of significance reported in Ritter (1991) who uses a much larger sample and matching firms as a benchmark for reporting abnormal returns.

In Table 13, we show the distribution of unadjusted three-year buy-and-hold (BHRs) returns for the individual countries under study. Median IPO three-year returns are positive in only three countries: The Netherlands, Sweden and Switzerland. Swedish IPOs performed best with a median three-year buy-and-hold return of 26.76 percent. This is due to a large number of companies that recorded a positive performance in absolute terms as well as the existence of few extreme winners. The worst three-year median performance belongs to Spain and Germany. Examination of Table 13 underlines that three-year holding period return distributions are skewed across the countries with few extreme winners dominating the mean return picture. The highest three-year total return of 8,900.0 percent, excluding the initial return of 4.4 percent, belongs to EM.TV AG, a German media company that was introduced

Table 13
Distribution of unadjusted Three-Year Buy-And-Hold Returns

Distribution of unadjusted three-year holding period returns, exclusive of the initial returns, for IPOs in European countries between 1988 and 1998. Returns are measured as three-year unadjusted buy-and-hold returns. One month is defined as a consecutive 21-day trading interval after the first closing price using local trading days. Prices are adjusted for dividends, stock splits and rights offerings.

Three-year unadjusted holding period return																								
Germany			*France*			*Italy*			*Netherlands*			*Spain*			*Sweden*			*Switzerland*						
Rank		IPOs	Rank		IPOs	Rank		IPOs	Rank		IPOs	Rank		IPOs	Rank		IPOs	Rank		IPOs				
1	(lowest)	-0.9123	1	(lowest)	-0.9491	1	(lowest)	-0.8748	1	(lowest)	-0.9865	1	(lowest)	-0.9948	1	(lowest)	-0.9455	1	(lowest)	-0.9865				
10		-0.6418	14		-0.7914	4		-0.6790	4		-0.6548	5		-0.8766	6		-0.7250	2		-0.5312				
19		-0.5890	27		-0.6962	7		-0.5891	7		-0.5537	9		-0.7784	12		-0.4293	4		-0.4872				
29		-0.4378	40		-0.5372	11		-0.4609	10		-0.5346	13		-0.7213	19		-0.3333	6		-0.3306				
39	(25th)	-0.3853	53	(25th)	-0.4193	15	(25th)	-0.2762	13	(25th)	-0.3976	17	(25th)	-0.6952	24	(25th)	-0.2571	8	(25th)	-0.2511				
49		-0.3308	67		-0.3316	18		-0.2544	17		-0.2384	21		-0.6160	30		-0.2151	10		-0.1579				
58		-0.2695	80		-0.1864	22		-0.1861	20		-0.1045	25		-0.5283	36		-0.1317	12		-0.1013				
68		-0.1848	92		-0.1047	25		-0.1157	23		0.0000	30		-0.4264	42		0.0284	14		0.0245				
78	(median)	-0.1323	107	(median)	-0.0283	30	(median)	-0.5700	26	(median)	0.0240	34	(median)	-0.3621	49	(median)	0.2676	16	(median)	0.0812				
87		-0.0528	120		0.0855	34		0.0966	29		0.2285	38		-0.2867	55		0.4445	18		0.4200				
97		0.0657	133		0.1698	38		0.1478	32		0.4948	43		-0.2229	61		0.5625	20		0.9241				
106		0.3652	146		0.4124	42		0.2877	36		0.7243	47		-0.0690	66		0.6170	21		0.9533				
116	(75th)	0.6049	160	(75th)	0.8869	45	(75th)	0.3510	39	(75th)	1.0086	51	(75th)	0.0799	72	(75th)	0.8733	23	(75th)	1.0227				
126		0.7535	173		1.2511	48		0.6507	42		1.3438	55		0.2175	79		1.3151	25		1.2810				
136		1.1216	187		1.7708	52		0.8801	46		2.0831	60		0.6593	86		1.6540	27		1.4113				
146		2.0478	200		2.3948	56		1.6319	49		2.9176	64		1.1939	92		3.6296	29		2.2388				
155	(highest)	89.0000	213	(highest)	22.4783	59	(highest)	3.4651	53	(highest)	9.1250	68	(highest)	7.8378	99	(highest)	10.1489	31	(highest)	4.2268				
All	(Mean)	1.3892	All	(Mean)	0.5369	All	(Mean)	0.1794	All	(Mean)	0.7369	All	(Mean)	-0.0465	All	(Mean)	0.7290	All	(Mean)	0.5595				
Ex.	Top 1%	0.1754	Ex.	Top 1%	0.3319	Ex.	Top 1%	0.1190	Ex.	Top 1%	0.5756	Ex.	Top 1%	-0.1642	Ex.	Top 1%	0.6329	Ex.	Top 1%	0.4373				
Ex.	Top 10%	-0.0314	Ex.	Top 10%	0.0584	Ex.	Top 10%	-0.0581	Ex.	Top 10%	0.2067	Ex.	Top 10%	-0.3501	Ex.	Top 10%	0.2195	Ex.	Top 10%	0.2937				

in 1997 on the Neuer Markt as one of its first companies. This is followed by a three-year unadjusted return of 6,823.1 percent recorded by Mobilcom AG, the first company on the Neuer Markt, which jumped 52.0 percent on its first day of trading. The best French performer was Eurofins Scientific SA with a 2,247.8 percent three-year buy-and-hold return. Sylis SA, a 1997 IPO on the Second Marché, recorded a three-year raw return of 676.3 percent and an initial return of 14.3 percent. The best three-year performance of an Italian IPO belongs to Mediolanum SpA, an Italian Financial Services Company, with an unadjusted return of 346.5 percent, excluding the initial return of 30.8 percent. This is followed by Bulgari Spa, the international fashion and jewellery house that recorded an initial return of 5.7 percent and an unadjusted performance of 317.0 percent over three years. ASM Lithography NV, a 1995 IPO on the Amsterdam Exchanges, was the best Dutch performer. It returned 912.5 percent over three years, excluding the initial return of 22.6 percent. The second best Dutch performer was Baan NV, a software company, with a three-year unadjusted buy-and-hold return of 826.8 percent, excluding the initial return of 55.0 percent. Among the best of the Spanish performers was Tele Pizza SA, a Pizza home delivery service, with a three-year buy-and-hold return of 394.6 percent, excluding its initial return of 34.8 percent. Moreover, Compañía Vinícola del Norte de España SA, a Spanish Wine producer, had a first day return of 28.5 percent and a three-year raw performance of 119.4 percent. In Sweden, LGP Telecom AB, a technology company going public in June 1997 on the OTC list of the OM Stockholm Exchanges, ranked highest with an unadjusted return of 1,014.9 percent, excluding its initial return of 8.5 percent. Sigma AB, a technology company, ranked second highest, recording an unadjusted three-year buy-and-hold return of 962.8 percent, excluding the initial return of 62.3 percent. In the sample of Swiss IPOs, there were several IPOs that had triple-digit investment gains in the three years after their IPO. Clariant AG, a chemicals company, rose by 422.68

percent since its 1995 IPO, excluding the initial return of 0.7 percent. Moreover, Phoenix Mecano AG, an IPO on the Swiss market in September 1988, recorded an unadjusted return of 265.7 percent, excluding the initial return of 5.7 percent.

4.2 Cross-Sectional Performance Patterns

This section documents cross-sectional patterns in the aftermarket performance of IPOs. We perform this analysis for each individual country under study by segmenting the sample by a number of cross-sectional characteristics such as IPO year, sector, age, size, public float and initial return category. For each country, we conduct the analysis for initial and aftermarket returns. This permits examination as to whether initial and aftermarket performance are related to the issuing characteristics of the offer and allows for a more detailed look at IPO performance in general and pan-European IPO performance in particular.

As shown in Figure 5, the quantitative measurement of long-run IPO performance is sensitive to the benchmark employed. For evaluating the long-run performance of the IPOs in the sample, it is not at all clear what constitutes the appropriate benchmark portfolio. As mentioned earlier, the use of small- or mid-cap indices as benchmarks may bias the results in favour of finding no abnormal market-adjusted returns. Throughout the rest of the paper, we will therefore adjust IPO returns for movements in the broad-market value-weighted indices. While not capturing the complete picture of the market for small- and medium-sized stocks, broad-market indices also include large offerings similar to mature IPOs, privatization issues and equity carve-outs. We will also focus on reporting three-year wealth relatives (WR) as the primary measure of IPO aftermarket performance.

Table 14
Initial Returns and the Long-Run performance of German IPOs

Descriptive statistics for the initial and long-run performance of German IPOs, categorized by IPO year, sector, age, size, public float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in DM millions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). The initial return is the difference between the final offering price and the first-day closing price. Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.756 is computed as 1.0311/1.3645.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	60	0.1209[a]	0.0547	0.23	(0.0296)	3.33
IPO year 1991-1994	43	0.0366[a]	0.0122	0.05	(0.0083)	3.17
IPO year 1995-1998	116	0.4083[a]	0.1250	0.62	(0.0574)	6.25
New Economy	57	0.5743[a]	0.1935	0.72	(0.0957)	1.75
Old Economy	162	0.1448[a]	0.0443	0.32	(0.0248)	5.56
Age < 15	87	0.4252[a]	0.1290	0.65	(0.0694)	4.60
15 ≤ Age < 37	51	0.2531[a]	0.0606	0.46	(0.0647)	5.88
Age ≥ 37	81	0.0776[a]	0.0421	0.13	(0.0142)	3.70
Small firms (<100m)	112	0.3174[a]	0.0730	0.58	(0.0545)	2.27
Medium firms (100-500m)	81	0.2287[a]	0.0607	0.43	(0.0475)	5.65
Large firms (>500m)	26	0.0816[a]	0.0695	0.09	(0.0168)	3.92
Public Float < 20	25	0.2463[a]	0.0920	0.36	(0.0720)	0.00
20 ≤ Public Float < 30	64	0.2804[a]	0.1250	0.44	(0.0544)	1.56
30 ≤ Public Float < 50	83	0.2976[a]	0.0526	0.61	(0.0672)	6.02
Public Float ≥ 50	47	0.1571[a]	0.0444	0.38	(0.0551)	8.51
All IPOs	219	0.2566[a]	0.0667	0.49	(0.0334)	4.57

Panel B: Long-Run Performance

Category	N	IPO return	FAZ Index return	Wealth Relative	S.E.	Percentage negative
IPO year 1988-1990	60	0.0157	0.0582	0.960	(0.0802)	65.00
IPO year 1991-1994	42	-0.0799	0.3139	0.700[a]	(0.0747)	76.19
IPO year 1995-1998	53	4.1083	0.8675	2.735	(2.1182)	66.04
New Economy	26	6.7516	0.4648	5.292	(4.1912)	50.00
Old Economy	129	0.3084	0.3920	0.940	(0.1817)	72.09
Age < 15	46	4.5868	0.5210	3.673[c]	(2.4201)	58.70
15 ≤ Age < 37	32	0.0605	0.3319	0.796[b]	(0.1299)	59.38
Age ≥ 37	77	0.0311	0.3645	0.756[a]	(0.0699)	77.92
Small firms (<100m)	32	3.1279	0.3612	3.032	(2.7667)	65.63
Medium firms (100-500m)	82	1.1093	0.4013	1.505	(0.8530)	71.95
Large firms (>500m)	41	0.5920	0.4437	1.103	(0.3296)	63.41
Public Float < 20	19	4.1598	0.5125	3.411	(3.5411)	63.16
20 ≤ Public Float < 30	43	0.4220	0.3193	1.078	(0.3112)	67.44
30 ≤ Public Float < 50	60	1.8751	0.3504	2.129	(1.5096)	63.33
Public Float ≥ 50	33	0.1709	0.5503	0.755[b]	(0.1815)	81.82
Initial Return ≤ 0	22	-0.0840	0.3982	0.655[a]	(0.1422)	90.91
0 < Initial Return < 7	69	1.4573	0.3955	1.761	(1.2793)	63.77
7 ≤ Initial Return < 20	43	0.4995	0.4396	1.042	(0.3153)	67.44
Initial Return ≥ 20	21	4.5306	0.3667	4.047	(3.2787)	61.90
All IPOs (Mean)	155	1.3892	0.4042	1.701	(0.7296)	68.39
All IPOs (Median)	155			0.728		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

4.2.1 Germany

In Table 14, we present evidence concerning the initial (Panel A) and long-run performance (Panel B) for the sample of German IPOs as a whole, and characterised according to a number of cross-sectional characteristics. Underpricing is a cyclical but consistent feature throughout the sample period and confirms the positive link between initial returns and the general level of the stock market. Only 4.57 percent of the IPOs in the sample experienced negative unadjusted initial returns. We also find that, when using buy-and-hold returns, average long-run returns for German IPOs were positive. This positive performance, however, is due to IPOs issued between 1995 and 1998. IPOs issued in "cold" markets during the early 1990s significantly underperform the market. For example, a strategy of investing in all IPOs issued during 1991 and 1994 would have left the investor with only Deutsche Mark (DM) 0.700 relative to each DM invested in the FAZ Index. The underperformance is concentrated in older companies that also exhibit the lower initial returns. Companies in the New Economy, companies with a small public float and companies with higher initial returns perform substantially better. The findings in Table 14 also confirm that the median picture is substantially worse than the mean picture. In our sample, 68.39 percent of the companies underperformed the market with a median wealth relative of 0.728.

4.2.2 France

In Table 15, we summarize the findings on initial and aftermarket performance for the sample of French IPOs. There is significant underpricing, which, however, is less cyclical and lower than in some other countries. This may serve to highlight the efficiency of auction-like IPO mechanisms prevalent in France. Only 6.50 percent of companies had negative first -day initial returns. Contrary to Germany, IPOs issued in

Table 15

Initial Returns and the Long-Run performance of French IPOs

Descriptive statistics for the initial and long-run performance of French IPOs, categorized by IPO year, sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in FRF billions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.721 is computed as 1.0863/1.5059.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	37	0.0759[a]	0.0769	0.08	(0.0136)	0.00
IPO year 1991-1994	60	0.0869[a]	0.0323	0.13	(0.0169)	3.33
IPO year 1995-1998	226	0.1413[a]	0.0880	0.21	(0.0138)	8.41
New Economy	102	0.1533[a]	0.1000	0.22	(0.0216)	5.88
Old Economy	221	0.1100[a]	0.0556	0.17	(0.0114)	6.79
Age < 15	168	0.1299[a]	0.0698	0.21	(0.0165)	9.52
15 ≤ Age < 37	105	0.1352[a]	0.0833	0.17	(0.0166)	1.90
Age ≥ 37	50	0.0785[a]	0.0398	0.10	(0.0143)	6.00
Small firms (<0.33bn)	186	0.1236[a]	0.0790	0.20	(0.0145)	8.60
Medium firms (0.33-1.65bn)	101	0.1352[a]	0.0789	0.18	(0.0181)	0.99
Large firms (>1.65bn)	36	0.0922[a]	0.0286	0.14	(0.0236)	11.11
Public Float < 20	183	0.1216[a]	0.0827	0.16	(0.0115)	2.19
20 ≤ Public Float < 30	73	0.1452[a]	0.0769	0.23	(0.0272)	12.33
30 ≤ Public Float < 50	58	0.1159[a]	0.0260	0.22	(0.0292)	12.07
Public Float ≥ 50	9	0.0422[a]	0.0000	0.08	(0.0264)	11.11
All IPOs	323	0.1237[a]	0.0714	0.19	(0.0104)	6.50

Panel B: Long-Run Performance

Category	N	IPO return	SBF 250 Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	37	-0.0879	0.0369	0.880	(0.0800)	59.46
IPO year 1991-1994	60	0.4750	0.3190	1.118	(0.1381)	60.00
IPO year 1995-1998	116	0.7682	1.1899	0.807	(0.2603)	74.14
New Economy	64	1.0565	0.8161	1.132	(0.4293)	64.06
Old Economy	149	0.3137	0.7134	0.767[a]	(0.1049)	69.13
Age < 15	102	0.6181	0.7993	0.899	(0.2704)	70.59
15 ≤ Age < 37	71	0.6740	0.7995	0.930	(0.1961)	60.56
Age ≥ 37	40	0.0863	0.5059	0.721[a]	(0.1560)	72.50
Small firms (<0.33bn)	112	0.6933	0.8729	0.904	(0.2603)	68.75
Medium firms (0.33-1.65bn)	70	0.2771	0.6367	0.780[b]	(0.1456)	68.57
Large firms (>1.65bn)	31	0.5583	0.5226	1.023	(0.1983)	61.29
Public Float < 20	133	0.4450	0.6391	0.882	(0.1252)	63.91
20 ≤ Public Float < 30	43	1.1452	0.8571	1.155	(0.6002)	69.77
30 ≤ Public Float < 50	32	0.1451	1.0262	0.565[a]	(0.2214)	81.25
Public Float ≥ 50	5	0.2576	0.7676	0.711	(0.3446)	60.00
Initial Return ≤ 0	67	0.3856	0.6792	0.825	(0.1790)	73.13
0 < Initial Return < 7	39	1.1740	0.7888	1.215	(0.5926)	58.97
7 ≤ Initial Return < 20	64	0.5543	0.7078	0.910	(0.2437)	62.50
Initial Return ≥ 20	43	0.1688	0.8597	0.628[a]	(0.2014)	74.42
All IPOs (Mean)	213	0.5369	0.7443	0.881	(0.1481)	67.61
All IPOs (Median)	213			0.631		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

France between 1991 and 1994 overperformed the market. There is also significant long-term underperformance in Old Economy stocks that make up 70 percent of the sample. While the long-run average performance is negative, it is not statistically significant when assuming conventional measures of significance. The data also confirms a tendency for older companies and companies with a large public float to underperform the market and their younger counterparts in the long-run. 67.61 percent of IPOs in the sample underperformed the market, a value similar to one reported for Germany. A strategy of investing in the median French IPO at the end of the first day of trading, and holding it over 36 months, would have left the investor with only French Franc (FRF) 0.631 relative to each FRF invested in the SBF 250 Index.

4.2.3 Italy

Evidence on the performance of Italian IPOs is summarized in Table 16. Here, the following inferences can be drawn: First, Italian IPOs are underpriced on average by 13.03 percent. Underpricing, however, is less significant and more time-varying than for any other country in this study. Indeed, 20.78 percent of Italian IPOs had negative initial returns. Second, only seven percent of the companies under study were New Economy companies, a finding that offers a key insight about the composition of the Italian IPO market during the sample period. Moreover, our results also clearly confirm findings by Giudici and Paleari (1999) who distinguish two separate periods in which aftermarket performance varies substantially: a period up to 1989, when IPOs significantly overperformed the broad-market benchmark, and the remaining period that was characterized by strong underperformance. In our sample, the percentage of companies reporting underperformance rose from 52.63 percent between 1988 and 1990 to 84.85 percent between 1995 and 1998. Furthermore, the cross-sectional patterns exhibit a

Table 16
Initial Returns and the Long-Run performance of Italian IPOs

Descriptive statistics for the initial and long-run performance of Italian IPOs, categorized by IPO year, sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in ITL billions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.772 is computed as 1.2200/1.5794.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	21	0.2709[b]	0.1220	0.49	(0.1067)	28.57
IPO year 1991-1994	9	-0.0051	0.0000	0.11	(0.0364)	44.44
IPO year 1995-1998	47	0.0934[a]	0.0602	0.13	(0.0186)	12.77
New Economy	5	0.2197[b]	0.1010	0.21	(0.0959)	0.00
Old Economy	72	0.1241[a]	0.0535	0.29	(0.0344)	22.22
Age < 15	31	0.1630[b]	0.0500	0.36	(0.0655)	25.81
15 ≤ Age < 37	30	0.1141[a]	0.0842	0.16	(0.0301)	13.33
Age ≥ 37	16	0.0976	0.0236	0.31	(0.0781)	25.00
Small firms (<100bn)	9	0.2368[b]	0.0889	0.35	(0.1178)	22.22
Medium firms (100-500bn)	46	0.1400[a]	0.0551	0.32	(0.0473)	21.74
Large firms (>500bn)	22	0.0665[b]	0.0582	0.14	(0.0308)	18.18
Public Float < 20	6	-0.0099	-0.0062	0.06	(0.0254)	50.00
20 ≤ Public Float < 30	34	0.1848[a]	0.0996	0.39	(0.0677)	17.65
30 ≤ Public Float < 50	30	0.1225[a]	0.0792	0.16	(0.0297)	16.67
Public Float ≥ 50	7	0.0194	0.0081	0.08	(0.0313)	28.57
All IPOs	77	0.1303[a]	0.0593	0.29	(0.0327)	20.78

Panel B: Long-Run Performance

Category	N	IPO return	MIB Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	19	-0.0510	-0.1253	1.085	(0.1486)	52.63
IPO year 1991-1994	7	-0.4778	0.1734	0.445[a]	(0.1784)	100.00
IPO year 1995-1998	33	0.4515	1.2365	0.649[a]	(0.1554)	84.85
New Economy	4	0.1748	0.6421	0.715[b]	(0.1840)	100.00
Old Economy	55	0.2429	1.0807	0.597[a]	(0.2126)	74.55
Age < 15	22	0.1325	0.7108	0.662[a]	(0.1711)	81.82
15 ≤ Age < 37	25	0.2013	0.6819	0.714[b]	(0.2081)	76.00
Age ≥ 37	12	0.2200	0.5794	0.772[b]	(0.1687)	75.00
Small firms (<100bn)	6	0.2846	0.8721	0.686	(0.6386)	83.33
Medium firms (100-500bn)	36	0.0342	0.6644	0.621[a]	(0.1102)	75.00
Large firms (>500bn)	17	0.4500	0.6168	0.897	(0.2224)	76.47
Public Float < 20	6	0.5385	0.7328	0.888	(0.1304)	66.67
20 ≤ Public Float < 30	27	0.0619	0.3671	0.777[c]	(0.1806)	70.37
30 ≤ Public Float < 50	20	0.3064	0.9974	0.654[a]	(0.1963)	80.00
Public Float ≥ 50	6	-0.0740	0.8972	0.488[a]	(0.2416)	100.00
Initial Return ≤ 0	14	-0.0176	0.4736	0.667[a]	(0.1178)	85.71
0 < Initial Return < 7	15	0.2303	0.8849	0.653[b]	(0.2547)	80.00
7 ≤ Initial Return < 20	15	0.2635	0.9203	0.658[a]	(0.1747)	73.33
Initial Return ≥ 20	15	0.2284	0.3953	0.880	(0.2980)	66.67
All IPOs (Mean)	59	0.1794	0.6718	0.705[a]	(0.1127)	76.27
All IPOs (Median)	59			0.669		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

similar tendency to the patterns reported for Germany: there is a clear tendency for IPOs with higher initial returns and higher ownership retention rate to do better in the long-run. Finally, the low number of New Economy IPOs, which has been identified as the main driver behind the relatively favourable IPO performance in other countries, can explain the strong average and median underperformance of Italian IPOs.[48]

4.2.4 The Netherlands

In Table 17, we present evidence concerning the performance of Dutch IPOs. There is significant underpricing that depends on either the market condition at the time of going public or the sector. Only 8.00 percent of the IPOs recorded negative unadjusted initial returns. The long-run performance picture is similar to the one reported for Germany: On average, IPOs have overperformed the market. This overperformance is driven by New Economy stocks, which make up 31 percent of the sample. While an investment in the sample of New Economy IPOs leaves the average investor with Dutch Guilder (NLG) 1.373 relative to each NLG invested in the CBS Index over three years, an investment in Old Economy IPOs leaves the average investor with only 0.868 NLG relative to each NLG invested in the CBS Index. There is also a positive link between offering retention, initial return and long-run performance. We also note that, unlike for Italy, the average and median IPO long-run performance is clearly different, thus underlying the higher probability of finding extremely positive returns in New Economy IPOs, which made up a large percentage of IPOs. Of all the companies, 66.04 percent recorded negative long-run market adjusted performance, a result similar to the one presented for Germany and France.

[48] During the early 1990s, a number of Italian companies such as Luxoticca Group, an eye-ware company, pursued their IPO on a foreign exchange, such as on the New York Stock Exchange (NYSE). Some of these shares substantially outperformed the market in the long-run.

Table 17

Initial Returns and the Long-Run performance of Dutch IPOs

Descriptive statistics for the initial and long-run performance of Dutch IPOs, categorized by IPO year, market sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in NLG millions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.829 is computed as 1.4695/1.7722.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	17	0.0644[a]	0.0250	0.09	(0.0224)	21.43
IPO year 1991-1994	11	0.0116[a]	0.0068	0.01	(0.0038)	0.00
IPO year 1995-1998	47	0.1888[a]	0.0780	0.26	(0.0384)	6.38
New Economy	30	0.1964[a]	0.0479	0.29	(0.0521)	3.33
Old Economy	45	0.0934[a]	0.0317	0.16	(0.0241)	11.11
Age < 15	27	0.1683[a]	0.0828	0.25	(0.0471)	7.41
15 ≤ Age < 37	27	0.1641[a]	0.0741	0.26	(0.0503)	3.70
Age ≥ 37	21	0.0534[a]	0.0239	0.09	(0.0204)	14.29
Small firms (<113m)	17	0.2117[a]	0.0828	0.30	(0.0730)	11.76
Medium firms (113-550m)	31	0.1156[a]	0.0263	0.24	(0.0428)	12.90
Large firms (>550m)	27	0.1079[a]	0.0590	0.13	(0.0245)	0.00
Public Float < 20	20	0.1441[a]	0.0323	0.24	(0.0538)	5.00
20 ≤ Public Float < 30	13	0.2021[b]	0.0250	0.34	(0.0949)	15.38
30 ≤ Public Float < 50	20	0.1349[a]	0.0683	0.21	(0.0465)	5.00
Public Float ≥ 50	22	0.0859[a]	0.0345	0.12	(0.0248)	9.09
All IPOs	75	0.1346[a]	0.0333	0.22	(0.0259)	8.00

Panel B: Long-Run Performance

Category	N	IPO return	CBS Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	17	0.0296	0.1844	0.869	(0.4074)	57.89
IPO year 1991-1994	11	0.4455	0.7175	0.842	(0.2495)	77.78
IPO year 1995-1998	25	1.3460	0.9670	1.193	(0.5493)	68.00
New Economy	17	1.4789	0.8056	1.373	(0.6412)	58.82
Old Economy	36	0.3865	0.5974	0.868	(0.2268)	69.44
Age < 15	18	1.1299	0.6651	1.279	(0.5884)	50.00
15 ≤ Age < 37	18	0.5964	0.5613	1.022	(0.3191)	77.78
Age ≥ 37	17	0.4695	0.7722	0.829	(0.1978)	70.59
Small firms (<113m)	12	1.1578	0.3696	1.575	(0.5186)	33.33
Medium firms (113-550m)	18	0.2512	0.6354	0.765[c]	(0.1991)	72.22
Large firms (>550m)	23	0.8974	0.8405	1.031	(0.5690)	78.26
Public Float < 20	16	1.8536	0.6981	1.680	(0.7089)	56.25
20 ≤ Public Float < 30	8	0.4678	0.3716	1.070	(0.1503)	37.50
30 ≤ Public Float < 50	13	0.0001	0.6100	0.621[b]	(0.2401)	84.62
Public Float ≥ 50	16	0.3533	0.8206	0.743[b]	(0.1877)	75.00
Initial Return ≤ 0	11	0.3486	0.3945	0.967	(0.2869)	54.55
0 < Initial Return < 7	21	0.6089	0.7589	0.915	(0.3061)	76.19
7 ≤ Initial Return < 20	9	0.1234	0.4853	0.756	(0.3067)	77.78
Initial Return ≥ 20	12	1.7769	0.8799	1.477	(0.8881)	50.00
All IPOs (Mean)	53	0.7369	0.6642	1.044	(0.2796)	66.04
All IPOs (Median)	53			0.737		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Table 18

Initial Returns and the Long-Run performance of Spanish IPOs

Descriptive statistics for the initial and long-run performance of Spanish IPOs, categorized by IPO year, sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in ESP billions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.696 is computed as 0.9510/1.3659.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	46	0.1650[a]	0.0835	0.24	(0.0350)	2.17
IPO year 1991-1994	18	0.0064	0.0128	0.10	(0.0237)	27.78
IPO year 1995-1998	24	0.2197[a]	0.0853	0.29	(0.0600)	4.17
New Economy	3	0.3182[b]	0.3165	0.26	(0.1515)	0.00
Old Economy	85	0.1414[a]	0.0764	0.24	(0.0263)	8.24
Age < 15	14	0.1146[a]	0.0590	0.12	(0.0318)	0.00
15 ≤ Age < 37	38	0.1821[a]	0.1055	0.28	(0.0454)	10.53
Age ≥ 37	36	0.1237[a]	0.0646	0.24	(0.0400)	8.33
Small firms (<7bn)	14	0.1691[b]	0.0680	0.31	(0.0833)	0.00
Medium firms (7-33bn)	45	0.1577[a]	0.0764	0.26	(0.0387)	8.89
Large firms (>33bn)	29	0.1211[a]	0.0797	0.18	(0.0335)	10.34
Public Float < 20	11	0.0887[b]	0.0444	0.14	(0.0411)	0.00
20 ≤ Public Float < 30	18	0.1001[a]	0.0799	0.15	(0.0358)	11.11
30 ≤ Public Float < 50	40	0.1478[a]	0.1150	0.18	(0.0284)	10.00
Public Float ≥ 50	19	0.2258[b]	0.0716	0.42	(0.0961)	5.26
All IPOs	88	0.1475[a]	0.0781	0.24	(0.0260)	7.95

Panel B: Long-Run Performance

Category	N	IPO return	IGBM Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	37	-0.4826	-0.1255	0.592[a]	(0.0589)	81.08
IPO year 1991-1994	14	0.0977	0.4334	0.766[a]	(0.1190)	85.71
IPO year 1995-1998	17	0.7840	0.9658	0.907	(0.4545)	82.35
New Economy	2	-0.0367	0.2806	0.752	(0.5202)	50.00
Old Economy	66	-0.3705	-0.3362	0.948[a]	(0.0133)	83.33
Age < 15	11	-0.0651	0.1044	0.847	(0.3027)	72.73
15 ≤ Age < 37	30	-0.0375	0.2272	0.784	(0.2282)	86.67
Age ≥ 37	27	-0.0490	0.3659	0.696[a]	(0.1137)	81.48
Small firms (<7bn)	12	0.2739	0.1981	1.063	(0.5414)	75.00
Medium firms (7-33bn)	32	-0.1721	0.2408	0.667[a]	(0.1449)	84.38
Large firms (>33bn)	24	-0.0393	0.3233	0.726[a]	(0.0841)	83.33
Public Float < 20	10	0.3279	0.4430	0.920	(0.1265)	70.00
20 ≤ Public Float < 30	14	-0.2643	0.1337	0.649[b]	(0.1723)	78.57
30 ≤ Public Float < 50	29	-0.2775	0.0954	0.660[a]	(0.1147)	89.66
Public Float ≥ 50	15	0.3537	0.5851	0.854	(0.4722)	80.00
Initial Return ≤ 0	12	-0.4100	0.0831	0.545[a]	(0.0736)	91.67
0 < Initial Return < 7	18	-0.0001	0.3215	0.757[a]	(0.1157)	72.22
7 ≤ Initial Return < 20	18	-0.3256	0.2322	0.547[a]	(0.1007)	94.44
Initial Return ≥ 20	20	0.3810	0.3441	1.027	(0.3690)	75.00
All IPOs (Mean)	68	-0.0465	0.2624	0.755[a]	(0.1193)	82.35
All IPOs (Median)	68			0.553		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

4.2.5 Spain

We report the results for IPOs issued on the Madrid Stock Exchange in Table 18. The findings are similar to the one presented for IPOs issued on the Milan Stock Exchange. There is significant underpricing which is higher in rising stock markets than in stable and falling stock markets. For the sample as a whole, 7.95 percent recorded negative returns based on the closing price after the first day of trading. Companies from Old Economy sectors dominate the Spanish IPO market during the sample period. Less than four percent of companies are from New Economy sectors. When evaluating aftermarket performance, we can clearly distinguish between two periods: First, a period up to 1990, in which IPOs substantially underperform the market. This period is characterised by regulatory changes following the Spanish Securities Market Reform Act of 1989. Over three years, a strategy of investing in the sample of Spanish IPOs between 1988 and 1990 would have left the average investor with only Spanish Pesetas (ESP) 0.755 relative to each ESP invested in the Madrid General Index (IGBM). Second, the period from 1991 and 1998 was characterized by subdued IPO activity and generally a more favourable long-run performance picture of the companies going public. The results also confirm the signaling role of underpricing for the Spanish IPO market. Looking at the sample as a whole, the mean and median long-run performance of Spanish IPO is dismal, with 82.35 percent of companies underperforming the market benchmark. This could be partly due to the absence of IPOs in New Economy sectors.

4.2.6 Sweden

In Table 19, we display the results for the initial and long-run performance of Swedish IPOs. The overall long-run performance of Swedish IPOs was mixed with 71.72 percent of the IPOs underperforming the market after three years. Without IPOs

Table 19

Initial Returns and the Long-Run performance of Swedish IPOs

Descriptive statistics for the initial and long-run performance of Swedish IPOs, categorized by IPO year, sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in SEK billions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 1.070 is computed as 1.8417/1.7211.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	26	0.2618[a]	0.1755	0.23	(0.0457)	0.00
IPO year 1991-1994	41	0.1178[a]	0.0568	0.21	(0.0334)	21.95
IPO year 1995-1998	81	0.1937[a]	0.0846	0.32	(0.0358)	13.58
New Economy	55	0.2629[a]	0.1474	0.29	(0.0390)	5.45
Old Economy	93	0.1383[a]	0.0714	0.27	(0.0281)	18.28
Age < 15	76	0.1997[a]	0.0961	0.27	(0.0306)	13.16
15 ≤ Age < 37	33	0.1752[a]	0.1000	0.22	(0.0377)	3.03
Age ≥ 37	39	0.1634[a]	0.0500	0.36	(0.0577)	23.08
Small firms (<0.4bn)	84	0.2204[a]	0.1027	0.32	(0.0346)	11.90
Medium firms (0.4-2.0bn)	48	0.1232[a]	0.0508	0.21	(0.0304)	18.37
Large firms (>2.0bn)	16	0.1810[a]	0.0902	0.27	(0.0680)	6.67
Public Float < 20	26	0.2407[a]	0.1841	0.22	(0.0434)	7.69
20 ≤ Public Float < 30	37	0.3278[a]	0.1446	0.41	(0.0676)	2.70
30 ≤ Public Float < 50	42	0.1361[a]	0.0823	0.23	(0.0354)	16.67
Public Float ≥ 50	43	0.0750[a]	0.0500	0.15	(0.0225)	23.26
All IPOs	148	0.1846[a]	0.0866	0.28	(0.0233)	13.51

Panel B: Long-Run Performance

Category	N	IPO return	AFG Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	22	-0.2906	-0.0289	0.731[a]	(0.0798)	77.27
IPO year 1991-1994	32	0.4835	0.9123	0.776[a]	(0.1218)	81.25
IPO year 1995-1998	45	1.4020	1.1286	1.128	(0.3695)	62.22
New Economy	30	1.5212	0.9592	1.287	(0.4887)	60.00
Old Economy	69	0.3846	0.7329	0.799[a]	(0.1231)	76.81
Age < 15	46	0.7928	0.8842	0.952	(0.2688)	69.57
15 ≤ Age < 37	22	0.4368	0.7419	0.825	(0.2564)	77.27
Age ≥ 37	31	0.8417	0.7211	1.070	(0.3446)	70.97
Small firms (<0.4bn)	52	0.9782	0.7905	1.105	(0.3077)	69.23
Medium firms (0.4-2.0bn)	35	0.4692	0.8851	0.779[b]	(0.1677)	77.78
Large firms (>2.0bn)	12	0.4071	0.6051	0.877	(0.1414)	63.64
Public Float < 20	19	1.2267	0.7956	1.240	(0.4899)	73.68
20 ≤ Public Float < 30	24	0.4439	0.6520	0.874	(0.2020)	62.50
30 ≤ Public Float < 50	26	1.0572	0.9014	1.082	(0.5026)	65.38
Public Float ≥ 50	30	0.3575	0.8382	0.739[a]	(0.1498)	83.33
Initial Return ≤ 0	19	0.7819	1.1597	0.825	(0.3498)	84.21
0 < Initial Return < 7	24	0.3794	0.7821	0.774[b]	(0.1927)	75.00
7 ≤ Initial Return < 20	26	0.9686	0.7319	1.137	(0.4552)	69.23
Initial Return ≥ 20	30	0.7676	0.6504	1.071	(0.3256)	63.33
All IPOs (Mean)	99	0.7290	0.8015	0.960	(0.1768)	71.72
All IPOs (Median)	99			0.726		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

in New Economy sectors, the average long-run IPO performance would have been dismal. The 148 Swedish IPOs record an average underpricing of 18.46 percent, with 13.51 percent trading in negative territory based on their first close. Underpricing was highest between 1988 and 1990. None of the 26 IPOs between 1988 and 1990 recorded a negative initial return. This can be explained by the fact that underpricing up until 1990 was driven by an incentive to replace salary increases by tax efficient capital gains. Another important feature of the Swedish IPO market is that 37 percent of Swedish IPOs during the sample period belong to the New Economy sectors, the highest compared to the other six countries in this study. Most of the New Economy stocks went public between 1995 and 1997, which is strongly apparent when dividing IPO performance by IPO year. For example, a strategy of investing in the basket of Swedish IPOs between 1991 and 1994 at the first closing price and then holding them over a three-year period, would have left the investor with only Swedish Krona (SEK) 0.776 relative to each SEK invested in the AFG Index. In contrast, Swedish IPOs issued between 1995 and 1998 rose, on average, by 140.20 percent over three years while the AFG Index recorded a rise of 112.86 percent, a ratio of 1.128. The results displayed in Table 19 also verify our previous observations that the magnitude of long-run performance is sensitive to the size of the public float and the degree of underpricing.

4.2.7 Switzerland

In Table 20, we present evidence concerning the performance of Swiss IPOs going public on the respective market segments of the SWX stock exchange between 1988 and 1998. We cannot reject that Swiss IPOs were underpriced, on average, across the sample period. However, the recorded degree of underpricing is markedly lower than for other European countries across the sample period. An interesting feature of the

Table 20

Initial Returns and the Long-Run performance of Swiss IPOs

Descriptive statistics for the initial and long-run performance of Swiss IPOs, categorized by IPO year, sector, age, size, Public Float (%) and initial return (%). New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare respectively in the attached Dow Jones STOXX global sector classification standard. Old Economy firms belong to all other sectors. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Size/Market Capitalization in CHF millions is the number of shares issued times the final offer price (expressed in constant end-1998 prices). Long-run returns are measured as mean three-year buy-and-hold returns (ex. the initial return) whereas three-years is defined as 36 consecutive 21-day trading intervals after the first close using local trading days. For example, for the oldest age category, the Wealth Relative of 0.835 is computed as 1.4691/1.7601.

Panel A: Initial Returns

Category	N	Mean	Median	Standard Deviation	S.E.	Percentage negative
IPO year 1988-1990	10	0.0343	0.0149	0.07	(0.0216)	30.00
IPO year 1991-1994	4	0.0908[a]	0.0882	0.07	(0.0349)	0.00
IPO year 1995-1998	29	0.1196[a]	0.0489	0.17	(0.0319)	10.34
New Economy	18	0.1444[a]	0.1169	0.16	(0.0387)	16.67
Old Economy	25	0.0629[b]	0.0227	0.13	(0.0260)	12.00
Age < 15	17	0.0965[b]	0.0400	0.18	(0.0431)	23.53
15 ≤ Age < 37	13	0.1120[a]	0.0765	0.10	(0.0264)	7.69
Age ≥ 37	13	0.0829[c]	0.0194	0.16	(0.0451)	3.85
Small firms (<80m)	6	0.0642[b]	0.0438	0.08	(0.0319)	0.00
Medium firms (80-450m)	28	0.1235[a]	0.0529	0.17	(0.0329)	17.86
Large firms (>450m)	9	0.0368[c]	0.0194	0.06	(0.0203)	11.11
Public Float < 20	2	0.0496[c]	0.0496	0.04	(0.0270)	0.00
20 ≤ Public Float < 30	2	0.1301	0.1301	0.15	(0.1033)	0.00
30 ≤ Public Float < 50	10	0.1377[b]	0.0854	0.18	(0.0567)	0.00
Public Float ≥ 50	29	0.0841[a]	0.0375	0.15	(0.0271)	20.69
All IPOs	43	0.0971[a]	0.0400	0.15	(0.0228)	13.95

Panel B: Long-Run Performance

Category	N	IPO return	STM Index return	*Wealth Relative*	S.E.	Percentage negative
IPO year 1988-1990	10	0.2754	0.1997	1.063	(0.3785)	70.00
IPO year 1991-1994	4	0.8104	0.9888	0.910	(0.4351)	75.00
IPO year 1995-1998	17	0.6676	0.8422	0.905	(0.2459)	64.71
New Economy	12	0.7337	0.7534	0.989	(0.2814)	66.67
Old Economy	19	0.4495	0.5910	0.911	(0.2398)	68.42
Age < 15	13	0.5727	0.6278	0.966	(0.3061)	69.23
15 ≤ Age < 37	9	0.6309	0.5852	1.029	(0.2539)	55.56
Age ≥ 37	9	0.4691	0.7601	0.835	(0.3932)	77.78
Small firms (<80m)	6	-0.1098	0.4164	0.628[c]	(0.2726)	83.33
Medium firms (80-450m)	19	0.6779	0.6889	0.993	(0.2200)	63.16
Large firms (>450m)	6	0.8539	0.7803	1.041	(0.5257)	66.67
Public Float < 20	1	-0.1579	0.2933	0.651	-	100.00
20 ≤ Public Float < 30	1	0.9913	1.1113	0.943	-	100.00
30 ≤ Public Float < 50	8	1.1413	0.8974	1.129	(0.4435)	50.00
Public Float ≥ 50	21	0.3515	0.5564	0.868	(0.2134)	71.43
Initial Return ≤ 0	5	0.5664	0.4028	1.117	(0.4195)	80.00
0 < Initial Return < 7	15	0.5731	0.6100	0.977	(0.3075)	66.67
7 ≤ Initial Return < 20	6	0.7013	0.9044	0.893	(0.3627)	66.67
Initial Return ≥ 20	5	0.3415	0.7355	0.773	(0.4062)	60.00
All IPOs (Mean)	31	0.5595	0.6538	0.943	(0.1849)	67.74
All IPOs (Median)	31			0.774		

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Swiss IPO market is the large number of New Economy IPOs that drive both initial and long-run aftermarket returns. For the sample as a whole, we do not find significant long-run underperformance. Of all the IPOs in the sample, 67.74 percent recorded negative market adjusted returns in the long-run, a number slightly lower than reported for other European countries. Owning to the small sample sizes, it is difficult to draw inferences about the explanatory power of cross-sectional characteristics and long-run aftermarket performance of Swiss IPOs.

5 Checks of Performance Differences

Putting the methodological issues in performance differences between Chapter II and Chapter III aside, in order to investigate the patterns in IPO performance across countries, we measure the significance of country-by-country performance differences. This analysis is performed for 21 pairs of countries for the sample as a whole and for IPOs categorized by the issuing characteristics identified above using the conventional two samples test for Mean Difference. Moreover, because the results may be biased because of the skewness of the return distributions, we perform further robustness checks using the nonparametric Wilcoxon rank sum test.

In Table 21, we report the result for the significance of differences in initial returns. The findings confirm our earlier observation. While significantly higher underpricing of Swedish IPOs offered between 1988 and 1990 indicates the effect of underpricing as tax-efficient compensation of management, the large number of young companies going public during 1998 explains the significantly higher level of underpricing for German IPOs, when compared to their European counterparts. German and Swedish underpricing was particularly significantly different when compared to France. This underlines the effect of certain IPO mechanisms that are relatively unique

Table 21

Test for Significance of Initial Return Differences

In each Panel, we measure whether the adjusted initial return performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two samples test for Mean Difference and the nonparametric Wilcoxon rank sum test. The initial return (IR) is the percentage difference between the final offering price and the first-day closing price. Significance values correspond to p-values.

Tests for significance of Initial Returns (IR) Differences

Country	IR	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.2566		0.0000	0.0348	0.0396	0.0489	0.1098	0.3690
France (FR)	0.1237			0.8034	0.6613	0.3243	0.0059	0.3704
Italy (IT)	0.1303				0.9185	0.6790	0.1764	0.4811
Netherlands (NL)	0.1346					0.7282	0.1847	0.3288
Spain (ES)	0.1475						0.3071	0.2158
Sweden (SD)	0.1846							0.0533
Switzerland (SW)	0.0971							
Country	IR	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.2566		0.0296	0.0729	0.1044	0.6884	0.4381	0.0751
France (FR)	0.1237			0.6488	0.9817	0.3350	0.0273	0.5481
Italy (IT)	0.1303				0.7137	0.2950	0.0569	0.9172
Netherlands (NL)	0.1346					0.3256	0.0466	0.6464
Spain (ES)	0.1475						0.2960	0.1675
Sweden (SD)	0.1846							0.0295
Switzerland (SW)	0.0971							

to the French IPO market during the sample period. For other country pairs, the results do not indicate a significant difference in underpricing.

Findings for the significance in long-run performance differences between IPOs in the seven European countries under study are shown in Table 22. Of the 21 country pairs, 17 do not indicate significant differences in long-run IPO performance. An exception is the sample of German IPOs, which, on average, have substantially outperformed French IPOs. Much like for Initial Returns, this is due to the favourable performance of German IPOs issued during the late 1990s. Italy ranks lowest in the long-run performance ranking. It substantially underperformed most of the other countries in the study, which, as argued earlier, could be due to the lack of IPO activity in the New Economy sectors in this market.

Table 22

Test for Significance of Long-Run Return Differences

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two-sample test for Mean Difference and the nonparametric Wilcoxon rank sum test. Long-run returns are measured as broad-market adjusted mean three-year buy-and-hold returns (BHR_T) whereas three years is defined as 36 consecutive 21-day trading intervals using local trading days. Significance values correspond to p-values.

Tests for significance of Long-Run Performance (BHR_T) Differences

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.9850		0.0664	0.1999	0.4667	0.2446	0.2550	0.5118
France (FR)	-0.2074			0.2293	0.3991	0.7086	0.5869	0.7753
Italy (IT)	-0.5584				0.0222	0.1441	0.0499	0.0305
Netherlands (NL)	0.0649					0.1502	0.6480	0.6554
Spain (ES)	-0.3089						0.3116	0.3223
Sweden (SD)	-0.0725							0.9471
Switzerland (SW)	-0.0943							
Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.9850		0.0261	0.0158	0.6398	0.2611	0.2565	0.9098
France (FR)	-0.2074			0.5102	0.1872	0.4764	0.2786	0.1615
Italy (IT)	-0.5584				0.0908	0.2084	0.1383	0.0782
Netherlands (NL)	0.0649					0.8345	0.7337	0.7386
Spain (ES)	-0.3089						0.9844	0.5043
Sweden (SD)	-0.0725							0.4314
Switzerland (SW)	-0.0943							

The analysis of cross-sectional results for the significance in performance differences across the seven European countries also helps to shed some more light on some of the cross-sectional findings reported earlier. In Appendix D, Tables 49 - 60, significance tests are conducted by categorizing IPOs in each of the seven countries according to the issuing characteristic at the IPO date. We can infer that the significantly negative performance of Spanish IPOs was an isolated event limited to IPOs issued between 1988 and 1990, a time when changes in Spain's securities markets law facilitated the process of going public. Moreover, tests for New Economy IPOs indicate insignificant performance differences across countries. The same result applies when comparing the significance of performance differences of IPOs categorized by issuing characteristics such as Old Economy sector, oldest age category or largest size.

In our pooled sample of 973 European IPOs in Chapter II, we found a tendency for companies that retained the least at the IPO date to underperform the most in the long-run. The results displayed in Appendix D, Tables 57 - 58, confirm significant underperformance of companies with the highest public float at the IPO date. The result is not driven by one single country, but extends across all countries in this study. A slightly different picture emerges when categorizing long-run returns according to the initial returns category. While there is a clear tendency for companies with the lowest initial returns to perform similarly, French IPOs in the highest initial return category perform significantly worse. In this respect, the majority of all other IPOs in the countries do not show significant performance differences when compared with each other. This result is robust to both forms of statistical measurement used. For France, therefore, there is weak support for the signaling explanation of underpricing.

In order to underline the sensitivity of our analysis to methodological choices extensively addressed in Barber and Lyon (1997) and Kothari and Warner (1997), we compare the findings on the aftermarket performance of IPOs in the individual European countries pursued in this section to the results using the pooled sample of European IPOs in the previous chapter. The results are shown in Appendix E, Table 61, and indicate methodological issues across two dimensions: First, in both studies (Table 61, Panel A and B), the results on monthly portfolio rebalancing (CARs) confirm that the use of buy-and-hold returns (BHRs) biases the long-run performance upwards, a findings consistent with Ritter (1991), Schuster (1996) or Teoh, Welch and Wong (1998). Second, while there is overall consistency in the findings on raw and adjusted returns between Chapter II and Chapter III – the slight difference being due to the use of a European versus Local Trading Day Calendar resulting in different sample sizes at the and the conversion of stock prices into Euro (€) when appropriate at the individual

country level - the choice of a pan-European benchmark index versus a local benchmark index with a potentially large divergence in sector weightings has a clear influence on the results.

6 Summary and Conclusion

In this chapter, we have analysed the short- and long-run performance of Initial Public Offerings (IPOs) in seven individual European countries between 1988 and 1998, a time characterized by a rapid change. In all countries, companies going public were significantly underpriced. Average initial returns are also related to age and the percentage of New Economy stocks of total IPO activity. In each country under study, there appears to be a close link between IPO activity, the level of underpricing and the general level of the stock market. Moreover, the results point to the effects of tax incentives (in the case of Sweden or France), the IPO mechanism (in the case of France) and changes in the regulatory environment (in the case of Spain) on the level of underpricing and IPO activity.

The long-run aftermarket performance of IPOs issued in the seven European countries is mixed. We find that a strategy of investing in IPOs at the end of the first day of trading, and holding them over a three-year period, would have left the investor in German IPOs with DM1.701 relative to each DM invested in the FAZ Index, and the investor in Dutch IPOs with NLG1.044 relative to each NLG invested in the CBS Index. Investors in other countries would have underperformed the market: the investor in Swedish IPOs would have been left with only SEK0.960 to each SEK invested in the AFG Index, the investor in Swiss IPOs would have been left with CHF0.943 relative to each CHF invested in the STM Index, and the investor in French IPOs with FRF0.881 relative to each FRF invested in the SBF 250 Index. Spanish and Italian IPOs fared the

worst: an investment in the sample of Spanish IPOs resulted in ESP0.755 for each ESP invested in the IGBM Index after three years. The investor in Italian IPOs would have been left with only ITL0.705 for each ITL invested in the MIB Historical Index over three years.

We have also shown that aftermarket performance is sensitive to benchmark adjustment and return methodology. In the countries under study, returns on IPOs were more favourable when adjusted for movements in small- or mid-cap indices, when available. We also found that the use of cumulative average returns (CARs) results in a more negative long-run performance picture when compared to buy-and-hold returns (BHRs). An analysis of CARs of German, Dutch and Swedish IPOs indicates strong overperformance during the first months on the stock market. Capturing the positive returns in the countries faring best depends on the investor's ability of finding the extreme winner. This describes the essence of the IPO market.

For each individual country, we have also documented various cross-sectional and time-series patterns in long-run performance by segmenting IPOs according to a number of issuing characteristics. When categorizing performance according to the public float at the IPO date, for example, we find that companies retaining the least amount of equity at the IPO date perform particularly poorly. We also show that the relatively favourable average return picture is driven by the outperformance of IPOs in sectors representing the New Economy. This applies to Germany, France, The Netherlands, Sweden and Switzerland, the five countries with significant New Economy IPO activity during the sample period. Stock exchanges in countries that did not manage to cater to companies in New Economy sectors during the sample period via New Market segments, such as Italy or Spain, did the worst. Moreover, the poor performance of Old Economy IPOs relative to the market and their New Economy peers is not an

isolated event as it extends to all countries under study. Significance tests of performance differences indicate broad similarity in underpricing and long-run return behaviour of IPOs in the seven countries under study, which underlines the homogeneity of the European IPO market and the pervasiveness of the reported IPO patterns.

Chapter IV

Management Behaviour and Market Response

1 Introduction

A recent line of empirical research on Initial Public Offerings (IPOs) links the conventional measurement of stock returns with accounting information, aimed at providing more insights into the phenomena associated with IPOs and the decision for going public. Using a sample of 1,649 US IPOs issued between 1980 and 1992, Theo, Welch and Wong (1998) document the effect of the choice of accounting method towards earnings management during the IPO year on aftermarket stock price performance. They find that IPO issuers that use discretionary current accruals aggressively during the IPO year have a three-year aftermarket stock return of approximately 20 percent less than IPO issuers who manage their earnings more conservatively during this time.

One of the important implications of this study is that the market does respond to earnings management behaviour which signals fundamental information about the IPO firms. This result, however, draws heavily on the fact that three-year aftermarket performance is measured starting from a substantial period of time after the IPO date.[49] This measurement procedure leaves open the question of when the market starts to respond to fundamental information. The measuring strategy should not matter if the market is efficient as thought. However, if the market is not perfectly efficient, then the market learning process is an important issue to both economists and practitioners. It

[49] Teoh, Welch and Wong (1998) measure the stock performance from three to six months after the end of the first fiscal year, that is itself several months after the IPO date (an average six months in the German market, for example).

might well be true that the market responds earlier than the time the previous literature has implied.

It is well known that IPOs perform poorly in the long-run, but outperform the market in the short-run (e.g., Stoll and Curley (1970), Ritter (1991), Schuster (1996)). This perplexing evidence might indicate that the IPO market is not largely determined by fundamental information of IPO firms in the short-run. In another paper, using a sample of 489 US IPOs between 1974 and 1984, Chaney and Lewis (1998) study the relationship between IPO aftermarket performance and yet another form of earnings management: income smoothing. They find that firms that report earnings with less variability relative to cash earned from operations perform better than other firms. Chaney and Lewis (1998) measure the stock performance from the IPO date, but their horizon is five years. Since income smoothing is an ex-post measurement, a long measurement horizon is very likely to bury the time characteristic of a market learning process. The result therefore gives little clue to the question of when the market responds.

The short-run overperformance of IPO stocks has drawn increasing attention in the recent literature. Several papers have tried to build-up theoretical models to explain this phenomenon. Scheinkman and Xiong (2002) derive an equilibrium model of bubbles where overconfidence and differences of beliefs can push the stock price above its fundamentals. In another recent paper, Duffie, Gârleanu and Pederson (2002) present a model in which short-selling constraints can drive the IPO stock price to an excessively high level before it declines. These models claim that the IPO market is at least partially determined by factors such as divergence of opinion (Miller (1977)), overconfidence or other institutional arrangements unique to the IPO market, such as

stabilization, the "quiet period" or lock-up rules. Obviously, none of them is fundamental information about IPO firms.

In this paper, we study a set of 126 companies going public between 1988 and 1997 in the German market, with the aim to broaden our understanding of several unexplored issues related to IPOs. Using the same framework of Teoh, Welch and Wong (1998) and Chaney and Lewis (1998), we examine the relationship between the management behaviour towards earnings management and aftermarket performance in the German IPO market. By applying a similar measurement specification, we test whether the relationship between management behaviour, proxied by the aggressiveness of using discretionary current accruals and income smoothing, and the aftermarket IPO performance identified in the US market, also holds in one other major IPO market. We then deviate from this benchmark measuring specification to test whether the IPO market is informationally efficient in the sense that management behaviour can be efficiently inferred by the market. We also go beyond prior work to further examine the relationship between the two forms of strategic behaviour towards earnings management, and test how the market responds to their interaction. Finally, we combine the typical empirical IPO methodology of Ritter (1991) and the framework of discretionary current accruals and income smoothing to examine the driving sources of the dynamics of aftermarket IPO performance.

Our major findings in this chapter include the following:

(1) Managers of IPO firms tend to use discretionary current accruals to buoy up earnings during the IPO year and, to some extent, manage the firms' income. The long-run performance of German IPOs is related to such earnings-management behaviour. Firms that use discretionary current accruals more conservatively during the IPO year and firms that smooth their reported

income more, outperform their counterparts in the long-run. These results are generally consistent with US evidence.

(2) The two commonly identified earnings management strategies in IPOs are found to be not deterministic, yet complementary. In the long-run, firms that use discretionary current accruals during IPO years more conservatively also tend to smooth their reported income more. Firms undertaking both strategies outperform the market and IPOs that only apply any one of the two strategies.

(3) The relationship between IPO aftermarket performance and strategic earnings-reporting behaviour documented in the previous literature is sensitive to both the measurement horizon and the starting date. Ironically, we find that firms managing their earnings more opportunistically perform better than those managing their earnings more conservatively, when performance is measured from a date closer to the IPO and also when it is measured over shorter horizons.

(4) The market takes a significant period of time to incorporate fundamentals into IPO prices. During this period, fundamental information about the IPO has weak explanatory power for long-run performance and the IPO market is dominated by other non-fundamental "noise". After a period of learning, the market starts to respond and the power of fundamentals to explain long-run IPO returns increases substantially.

The structure of the chapter is as follows. Section 1 describes the data and sample characteristics. In Section 2, we measure Management Behaviour with Discretionary Current Accruals (DCA). Section 3 deals with the measurement of Management Behaviour with Income Smoothing (IS). A comparative analysis of the

two methods of earnings management is provided in Section 4. In Section 5, we study the dynamics of the explanatory power of fundamentals related to aftermarket performance. Section 6 concludes the paper with a summary and a discussion of the findings.

2 Market Background and Data

2.1 Market Background

During the past decade, German Financial Markets have gone through some radical developments. One of the fundamental features of these developments has been the increasing tendency of companies towards going public. At the end of 2001, more than 1,000 German companies were listed on the Deutsche Börse AG or on one of the regional stock exchanges, double the number from the beginning of 1988, the start of our sample period. While this number seems to be small compared to worldwide figures, it indicates the structural shift towards an equity culture in Continental Europe in general and Germany in particular.

This structural shift has been enforced by developments such as the initial success of the much publicized flotation of Deutsche Telecom AG, the country's former telecommunications monopoly, in November 1996. By the end of 2000, 12.33 million people – or 19.3 percent of the adult population in Germany – owned shares, 50 percent more than the previous year and double the level at the end of 1997, a change unprecedented in Germany's post-war financial history.[50] During this period, the German IPO market has also developed as one of the fundamental pillars of Continental European IPO activity. For our sample period between 1988 and 1997, for example,

[50] Source: Financial Times. Glagau (1876) documents evidence of a flurry of IPO activity on the Berlin Stock Exchange between 1871 and 1875 which indeed has some strikingly similar features to the IPO wave in the late 1990's on the Neuer Markt, the market segment for growth companies set up in 1997.

German IPO activity accounted, on average, for more than 25 percent of total IPO activity in Continental Europe based on number, funds raised and market capitalization.

2.2 Data

Our original sample consists of 156 companies from a total of 162 companies going public between 1988 and 1997 on the German domestic market, meeting the following criteria: (1) an offer price of Deutsche Mark (DM) 5.00 per share or more; (2) a market capitalization, measured in terms of end-1997 purchasing power, of DM 5.0 million or more; (3) the offering being unseasoned and involving common and/or preferred stock; and (4) the company being listed either on the Official Market (Amtlicher Handel), the Official Parallel Market (Geregelter Markt) or the New Market (Neuer Markt). We exclude foreign listings, investment companies, companies that changed the market segment and Real Estate Investment Trusts (REITs).[51]

In addition to these criteria, we must also have a minimum of one year pre-IPO and four years post-IPO accounting and stock price data available. After excluding IPOs from the Financial Sector (12), Privatization Issues (1) and IPOs with no reliable pre-IPO accounting information (17), the original sample falls to 126 companies for which we have a complete set of accounting and stock price data available. The total sample of companies represents around 88 percent of all IPOs in the respective market segments going public in Germany between 1988 and 1997. An interesting feature of our data is that it does not suffer from survivorship bias. Accounting for survivorship is a frequent issue in US studies. This has to do with the large number of mergers, acquisitions, takeovers and bankruptcies in the US market. Moreover, the delisting rules are clearly

[51] We account for issues on the Frankfurt stock exchange and all regional stock exchanges. During the sample period, the share of the Frankfurt Stock Exchange, in terms of total German turnover in equity trading, has risen from 52 percent to 85 percent, underlying the increasing significance of the exchange. (Source: Deutsche Börse AG). We exclude offerings on the Over-the-Counter market (Freiverkehr).

set out in the US regulatory framework. Until recently, this has not been the case in Germany. All the IPOs from the original sample were still listed after their fifth-year anniversary on the stock market. We therefore conclude that our sample is highly representative of the German IPO market during the sample period.

Due to a lack of accounting data spanning over a reasonably long period of time, this study does not include IPOs issued between 1998 and 2000. For the evaluation of earnings management, we use the full version (Vollbilanz) of balance sheets and income statements (inflation-adjusted) available from Hoppenstedt Verlag, a provider of financial data.[52] Other information such as year of foundation or market sector was taken from the yearly issues of Hoppenstedt's Saling Aktienführer. To evaluate accounting numbers, we use consolidated financial statements, when available. Consolidated financial statements (Weltbilanz) are not the basis for either taxation or profit distribution. However, Financial Analysts draw heavily upon information contained in consolidated statements because they capture a more complete picture of, for example, the operating activities of companies with foreign subsidiaries. The full set of consolidated statements is available for 58 percent of the companies in our study. For the rest, we extract the accounting information from parent company accounts (Muttergesellschaft).[53] The stock price data and GDP deflators were taken from Datastream and our own IPO database. We use the Dow Jones STOXX global sector classification standard for market sector classification.[54]

In Figure 6, we illustrate our timing convention. The fiscal year in which the IPO occurs is Year 0 and includes both pre- and post-IPO information. Fiscal year –1 ends before the IPO. The large majority of German companies in our sample end their fiscal

[52] A Specimen Balance Sheet and Profit and Loss Account shown in Appendix F, Table 62.
[53] Due to the lack of foreign subsidiaries, for example, parent company accounts are equivalent to consolidated accounts for most of the 42 percent of companies that report only parent company accounts.
[54] The Dow Jones STOXX global sector classification standard is displayed in Appendix A, Table 31.

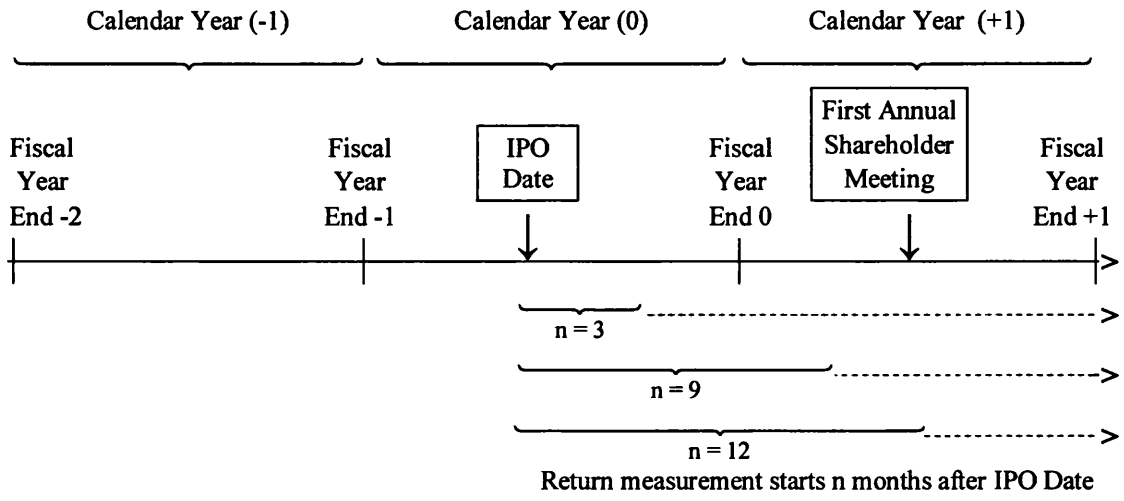


Figure 6. Time line

year with the calendar year. Our initial screening of IPOs is based on the company characteristics around the IPO date. It is important to note that, on average, German IPOs went public towards the middle of the calendar year. For example, as illustrated in Table 1, 65 percent of the companies in the sample conducted their IPO between May and October.

Because one of our main goals is to shed some light on the relationship between management behaviour and market response, we measure returns over 36 months. In order to compare our findings with the literature, we chose our benchmark starting date as nine months after the IPO. To study the dynamics in the relationship, we then move our starting date away and closer to the IPO date. In this case, we measure long-run performance after three and twelve months following the IPO. Interestingly, our benchmark starting date corresponds closely to the First Annual Shareholder Meeting (Erste Allgemeine Aktionärsversammlung).[55]

[55] Based on the observations taken from a sample of 785 Annual Shareholder Meetings in 2002, almost 75 percent of the meetings took place during May, June and July (Source: Schutzgemeinschaft der Kleinaktionäre e.V.)

Table 23
Sample Distribution and Firm Characteristics

The sample consists of 126 IPOs going public between 1988 and 1997. The initial return is defined as the percentage change from the offering price to the first-day closing price. Age is defined as the year of going public minus the year of foundation, with companies founded before 1901 assumed to be founded in 1901. Size is defined as the number of shares times the closing price at the first day of trading, including overalottment options, where applicable, and expressed in end-1997 prices. The retention ratio (in percent) is defined as one minus the size of the public float (in percent). Underpricing is defined as the percentage change from the final offering price to the closing price after the first day of trading. Privatizations (1) and Financial Companies are excluded (12). We use the Dow Jones STOXX global sector classification standard for market sector classification.

Panel A: Sample Distribution classified by Market Sector

Market Sector	Sector Code	Frequency	Percentage
Basic Resources	1	3	2.4
Chemicals	2	3	2.4
Automobiles	3	8	6.3
Cyclical Goods & Services	4	27	21.4
Retail	6	9	7.1
Food & Beverages	7	5	4.0
Non-Cyclical Goods & Services	8	8	6.3
Healthcare	13	6	4.8
Construction	14	16	12.7
Industrial Goods & Services	15	24	19.0
Technology	16	14	11.1
Utilities	18	3	2.4
Total		126	100.0

Panel B: Sample Distribution classified by IPO Year and Calendar Month

Calendar Year	Frequency	Percentage	Calendar Month	Frequency	Percentage
1988	10	7.9	Jan.	3	2.4
1989	17	13.5	Feb.	5	4.0
1990	22	17.5	Mar.	4	3.2
1991	14	11.1	Apr.	6	4.8
1992	8	6.3	May	10	7.9
1993	6	4.8	Jun.	17	13.5
1994	8	6.3	Jul.	24	19.0
1995	16	12.7	Aug.	3	2.4
1996	6	4.8	Sep.	9	7.1
1997	19	15.1	Oct.	19	15.1
			Nov.	15	11.9
			Dec.	11	8.7
All firms	126	100.0	All firms	126	100.0

Panel C: Firm Characteristics

	Mean	Median
Age (years)	44.2	39.5
Underpricing (percent)	11.6	4.8
Retention Ratio (percent)	66.2	66.7
Debt/Equity Ratio (pre- IPO)	1.429	1.093
Debt/Equity Ratio (post- IPO)	0.779	0.643
Size (DM millions)	437.5	195.9

In this study, we report performance using equally-weighted buy-and-hold returns (BHRs) because it measures actual investors' experience.[56] Aftermarket returns are measured as equally-weighted buy-and-hold returns, whereas one month is defined as a consecutive 21-day trading interval from the close of the first day of trading, using local trading days over the respective measurement interval. We adjust returns for movements in the value-weighted FAZ Index (Index der Frankfurter Allgemeinen Zeitung). This index is composed of the 100 most actively traded companies, adjusted for rights offerings and stock splits, and embraces about 75 percent of stock volume traded in German shares.

Table 23 provides some descriptive statistics for the 126 IPOs in our sample. Panel A indicates that there is some industry clustering in the sample of IPOs, with four sectors representing almost 65 percent of the sample. It is not surprising to see so many construction-related companies in the sample, representing a large proportion of IPO activity following German unification and the subsequent surge in construction activity. Limiting this analysis to IPOs before 1998 eliminates the dominance in technology-related companies. Panel B documents considerable differences in issuing activity when characterizing the sample according to the calendar year of going public. In line with low IPO activity in other Continental European countries, there is also a considerably low level in issuing activity during the early 1990s in Germany. Apart from the reasons addressed earlier, the reversal of fortunes in the German IPO market after 1994 can also be linked to the success of some large offerings from companies such as Adidas AG, a sportswear company, and in particular the phenomenal long-run performance of SAP AG, an enterprise software company that recorded, and MLP AG, a financial services company, two IPOs in 1988.

[56] For a complete discussion of BHRs versus Cumulative Average Returns (CARs), see e.g., Fama (1998), Barber and Lyon (1997), Brown and Warner (1980), Kothari and Warner (1997) and Loughran and Ritter (2000).

In Panel C, reports number of characteristics for our IPO sample. The average IPOs is 44 years old before going public. IPOs retain 66 percent of their equity after going public and are underpriced by 11.69 percent, on average. The IPOs have an average market capitalization of DM437.5 million, consistent with the average IPO in Continental Europe during this period. As we have excluded privatizations, the size of Deutsche Telecom AG, a telecommunications company, does not influence the mean picture. As seen in Panel C, the IPO has a strong effect on the capital structure: The average debt-equity ratio declines from 1.429 pre-IPO to 0.779 post-IPO.

3 Market Response to Management Behaviour around the IPO year

3.1 Measuring Management Behaviour using Discretionary Current Accruals (DCA)

It is well known that there is high information asymmetry between issuers and public investors during the IPO process (Rao (1993)). Investors draw heavily on the financial statements published by issuers. For issuers, higher reported earnings lead to higher offering prices and hence higher IPO proceeds. This high information asymmetry provides issuers with both the incentive and the opportunity to window-dress their company accounts, in order to present better-looking financial statements for the IPO year. Furthermore, after the IPO, the firm also has an incentive to boost earnings at least for some time. The well-known reasons include inside interest (managers or entrepreneurs might want to sell part of personal holdings after the lock-up period) and outside pressure from underwriters or regulatory aspects.[57] Firms that wish to manipulate their earnings can achieve this goal by various means. One of the typical

[57] Theo, Welch and Wong (1998) provide a full discussion on the incentives of firms to boost their earnings before and after the IPO date.

ways to do so is to use accruals.[58] Accruals are changes in non-cash working capital before income taxes payable, less total depreciation expenses and can be decomposed into current accruals and long-term accruals.[59] Current accruals include short-term assets and liabilities from the day-to-day operations of the firm. Managers can deliberately increase current accruals in various ways, including advancing recognition of revenues with credit sales, delaying the recognition of expenses, decreasing bad-debt expenses or decreasing inventory write-offs. Long-term accrual adjustment, which involves long-term assets, is, if at all, harder to achieve.[60] We base our measures of managers' opportunistic behaviour around the IPO date on their discretionary use of current accruals because managers have greater flexibility and control over current accruals as those are less prone to changes in firm business conditions.

From the investors' perspective, it is difficult to distinguish the accrual adjustment that is aimed at boosting higher short-term share prices from that aimed at reconciling the mismatch of economic realities between accrual accounting events and timing of cash flows. Given the fact that some of the accrual adjustments are appropriate and necessary for certain business conditions, it is even harder to infer how much of the proportion of the accrual adjustment is discretionary. The justified use of accruals, however, is not something that is totally independent from the firm's business activity. As pointed out in Kaplan (1985), changes in some working capital accounts and, thereby, accruals depend on the business activity of the firm. All things being equal, the accrual of a firm should be a relatively stable function of the firm's economic activities. Indeed, this is the spirit of the widely used accrual decomposing expectations model of Jones (1991). As in Teoh, Welch and Wong (1998), we use a variation of

[58] Under Generally Accepted Accounting Principles, GAAP, the firms using accrual accounting systems are allowed to make adjustments when reporting earnings.
[59] This definition is adopted from Jones (1991) who tests in the context of earnings management during import relief investigations by the United States International Trade Commission (ITC).
[60] See, for example, Guenther (1994) and Teoh, Welch and Wong (1998).

Jones' model because the emphasis is to decompose current accruals into a non-discretionary and discretionary part. This variation assumes that the current accruals, other things being equal, are a function of the amount of the firm's business activities, which are proxied by sales.[61]

The model specification is:

$$\frac{CA_{j,t}}{TA_{j,t-1}} = \alpha(\frac{1}{TA_{j,t-1}}) + \beta(\frac{\Delta Sales_{j,t}}{TA_{j,t-1}}) + industry\ dummies + \varepsilon_{j,t} \qquad (1)$$

where j is the IPO firm index (j=1,...,126). *CA* measures Current Accruals. *TA* is Total Assets. $\Delta Sales$ is the change in sales from $Year_{t-1}$ to $Year_t$. Industry dummies are aimed at capturing the different features of the Accrual-Sales relationship across different industries.[62]

In this paper, Current Accruals (CA) are calculated as:

CA = Δaccounts receivables + Δinventory + Δother current assets

- [Δaccounts payable + Δtax payable + Δother current liabilities] (2)

Given the current accruals of a firm i at year t, $CA_{i,t}$, the firm's discretionary current accruals of that year is the difference between its actual current accruals and expected current accruals:

$$DCA_{i,t} = \frac{CA_{i,t}}{TA_{i,t-1}} - \left[\hat{\alpha}\frac{1}{TA_{i,t-1}} + \hat{\beta}\frac{\Delta Sales_{i,t} - \Delta TR_{i,t}}{TA_{i,t-1}}\right] \qquad (3)$$

where DCA is Discretionary Current Accruals, ΔTR is the change in Trade Receivables. Trade receivables represent amounts on open account owed by customers for goods and

[61] The derivation of the DCA and IS coefficients is illustrated in Appendix F, Table 63.
[62] We also experimented with year dummies, not reported, to capture any cyclical and seasonal effects. The result is similar to the one that is reported.

services sold in the ordinary course of the business. We subtract the increase in trade receivables from changes in sales to allow for the possibility of credit sales manipulation by the issuer (for example, by allowing generous credit policies to obtain high sales prices ahead of the offering). $\hat{\alpha}$ and $\hat{\beta}$ are estimations of regression coefficients from equation (1) using a pooled estimation sample.[63]

Following Roosenboom, van der Goot and Mertens (2000), who study the relationship between methods of earnings management and aftermarket performance for a sample of 64 firms going public on the Amsterdam Exchanges between 1984 and 1994, we estimate model (1) using pooled time-series and cross-sectional data. Once estimated, $\hat{\alpha}$ and $\hat{\beta}$ can be used to estimate the discretionary current accruals.[64]

3.2 Time-Series Properties Of Discretionary Current Accruals (DCA)

In Table 24, we present evidence concerning the time-series and cross-sectional characteristics of Discretionary Current Accruals (DCA) for German IPOs. Panel A displays the distribution of DCA by year relative to the IPO year for the sample as a whole.

The results indicate a clear tendency towards earnings management by using DCA around the IPO year. For example, the average percentage of DCA in Year -1 amounts to minus nine percent of total of the previous years' assets. The DCA rises to positive seven percent during the year of going public and remains positive during the first fiscal year. The strongly positive and significant mean and median confirms that

[63] This is similar to Teoh, Welch and Wong (1998) who also subtract the increase in Trade Receivables from changes in Sales to allow for the possibility of Credit Sales. Their results are robust to omitting this adjustment. Teoh, Wong and Rao (1998) discuss the robustness of this valuation method relative to other measures.

[64] By using the pooled data, we have 1,170 firm-year observations in our estimation sample. We did not exclude observations for the year that firms conducted the IPO, from the sample. We experimented without IPO year observations and find that the results do not change qualitatively.

Table 24

Time Series and Cross-Sectional Characteristics of Discretionary Current Accruals (DCA)

The sample consists of 126 German IPOs going public during 1988 and 1997, excluding Privatizations (1) and Financial Companies (12). Panel A reports the distribution of Discretionary Current Accruals (DCA) by Year relative to IPO date for the sample as a whole from Year –1 to Year 4 of going public. In Panel B, observations are divided into Quartiles ranked from the most conservative (Quartile 4) to the most conservative (Quartile 1) earnings manager. Year 0 is the IPO year.

Panel A: Distribution of Discretionary Current Accruals by Year Relative to IPO date, Total Sample

		Year –1	Year 0	Year 1	Year 2	Year 3	Year 4
Whole Sample	Mean	-0.09	0.07	0.06	-0.03	-0.01	0.00
	p-value	0.01	0.02	0.33	0.12	0.63	0.92
	Median	-0.09	0.05	0.00	0.00	-0.01	-0.01
	z-value	0.00	0.00	0.46	0.32	0.25	0.49
	All firms	82	126	126	126	124	103

Panel B: Distribution of Discretionary Current Accruals by Year Relative to IPO date, split in Quartiles

		Year –1	Year 0	Year 1	Year 2	Year 3	Year 4
Quartile 1	Mean	-0.17	-0.27	0.01	-0.06	0.02	-0.04
	p-value	0.00	0.00	0.83	0.08	0.40	0.16
	Median	-0.17	-0.20	0.05	-0.05	-0.02	-0.06
	z-value	0.01	0.00	0.15	0.09	0.98	0.11
	All firms	16	31	31	31	31	29
Quartile 2	Mean	-0.08	-0.01	-0.05	-0.09	-0.04	0.00
	p-value	0.20	0.20	0.04	0.20	0.15	0.95
	Median	-0.08	-0.01	-0.04	0.00	-0.04	0.01
	z-value	0.08	0.42	0.07	0.34	0.02	0.76
	All firms	23	31	31	31	31	27
Quartile 3	Mean	0.03	0.11	0.02	-0.01	-0.01	0.01
	p-value	0.71	0.00	0.42	0.84	0.76	0.70
	Median	0.03	0.12	0.02	0.00	-0.01	-0.01
	z-value	0.70	0.00	0.32	0.79	0.82	0.70
	All firms	23	31	31	31	30	24
Quartile 4	Mean	-0.17	0.43	0.25	0.02	0.01	0.04
	p-value	0.03	0.00	0.29	0.43	0.81	0.22
	Median	-0.17	0.30	0.00	0.01	0.01	0.00
	z-value	0.08	0.00	0.43	0.36	0.62	0.46
	All firms	20	33	33	33	32	23

management "borrows" a part of accruals from other years, to potentially convey abnormally positive fundamental information about the company at the time of going public. The dynamics of the DCA component over time indicates that, on average, aggressive earnings management using DCA during the IPO year is only a short-run phenomenon because companies have to make up for the advance borrowing of earnings at the long-run cost of their current accruals. This is manifested in a negative

DCA from Year 2 of going public to the end of the measurement period. The results in Panel A are remarkably similar to the findings reported in Theo, Welch and Wong (1998) and Roosenboom, van der Goot and Mertens (2000), who find the same patterns for the US and Dutch IPO markets.

In Panel B, we rank the companies into quartiles depending on the aggressiveness of using DCA during the IPO year. Here, we can distinguish between companies that manage their earnings most conservatively around the IPO year, summarized in Quartile 1 (Q1), and companies that manage their earnings most aggressively, summarized in Quartile 4 (Q4). Panel B verifies our earlier results that show a wide variation in the opportunistic behaviour towards earnings management via DCA during the IPO year. For example, while the average DCA for the most conservative companies (Q1) deviates negative 27 percent from its mean during the IPO year, the deviation for the most aggressive group (Q4) is positive 43 percent. Panel B also explores the dynamics of DCA in more detail. While the most conservative companies manage their earnings more aggressively following the IPO, the most aggressive earnings managers have to life up to reality and apply a much more conservative use of DCA in later years.

3.3 Discretionary Current Accruals (DCA) and IPO Stock Returns

In this section, we extend the analysis to include the relation between Discretionary Current Accruals (DCA) and the short- and long-run stock price performance of German IPOs. Because our focus is on the dynamics of aftermarket returns, we measure aftermarket performance starting after three, nine and twelve months following the first day of trading. This procedure marks a crucial difference in comparison to the existing

Table 25
IPO performance categorized by Issue Year DCA Quartiles

The sample consists of 126 German IPOs between 1988 and 1997. Returns are calculated as equally-weighted buy-and-hold returns. One month is defined as a consecutive 21-day trading interval using the local trading calendar. Returns are reported separately as raw returns and returns adjusted by the broad-based value-weighted FAZ Index. The raw and market-adjusted buy-and-hold return is calculated after three, nine and twelve months following the IPO. Difference (Diff.) refers to the percentage change between the most aggressive earnings manager (Q4) and the most conservative earnings manager (Q1) in terms of DCA. Associated test statistics for Diff. refer to mean difference tests.

Panel A: Measurement period starts three months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.4269	0.1245	-0.0318	0.3671	1.1978	1.0733	1.0428	0.3541	-0.0632	0.4786	3.2587	2.9047	0.1836	0.4358	-0.1457	0.2963	0.1503	-0.2855
p-value	0.2001	0.1019	0.6330	0.0177	0.3482	0.4124	0.2403	0.1003	0.5032	0.0209	0.3408	0.4077	0.0815	0.0656	0.1658	0.0497	0.6078	0.4456
Adjusted returns	0.3561	0.0519	-0.0765	0.2727	1.1265	1.0746	0.8121	0.1409	-0.2812	0.1932	3.0510	2.9101	-0.1771	0.1082	-0.4654	-0.1976	-0.1550	-0.2632
p-value	0.2835	0.4618	0.1959	0.0656	0.3765	0.4110	0.3586	0.4736	0.0047	0.3072	0.3708	0.4055	0.0959	0.6407	0.0002	0.1831	0.5995	0.4851

Panel B: Measurement period starts nine months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.0527	0.1175	-0.0305	0.1379	-0.0098	-0.1272	0.1047	0.2991	-0.1470	0.2509	0.0213	-0.2777	-0.1010	0.1287	-0.1748	-0.0378	-0.3070	-0.4357
p-value	0.2372	0.0591	0.6241	0.0491	0.9427	0.4030	0.1532	0.0893	0.0913	0.0651	0.9002	0.2515	0.0280	0.2745	0.0310	0.6625	0.0000	0.0014
Adjusted returns	-0.0574	-0.0316	-0.1264	0.0127	-0.0828	-0.0511	-0.1465	0.0523	-0.4016	-0.0846	-0.1518	-0.2041	-0.4579	-0.2040	-0.5658	-0.5237	-0.5332	-0.3292
p-value	0.2032	0.5930	0.0502	0.8332	0.5645	0.7463	0.0454	0.7604	0.0001	0.5076	0.3810	0.4009	0.0000	0.1808	0.0000	0.0000	0.0000	0.0550

Panel C: Measurement period starts twelve months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.0584	0.1025	-0.0014	0.1566	-0.0192	-0.1217	0.0550	0.2672	-0.1329	0.1458	-0.0532	-0.3204	-0.1130	0.0801	-0.1641	-0.0777	-0.2797	-0.3597
p-value	0.1389	0.1338	0.9820	0.0391	0.8533	0.3310	0.3743	0.1253	0.1314	0.1854	0.6289	0.1125	0.0192	0.5350	0.0319	0.4018	0.0006	0.0158
Adjusted returns	-0.0713	-0.0209	-0.1361	-0.0083	-0.1171	-0.0962	-0.2167	0.0311	-0.4110	-0.2317	-0.2528	-0.2839	-0.4732	-0.2755	-0.5859	-0.5094	-0.5192	-0.2437
p-value	0.0490	0.7462	0.0130	0.8892	0.2458	0.4242	0.0004	0.8539	0.0000	0.0264	0.0284	0.1565	0.0000	0.0954	0.0000	0.0000	0.0000	0.1731

US literature, in which the evaluation of investment performance starts three to six months after the publication of the first annual report.[65]

In Table 25, we report the adjusted and unadjusted buy-and-hold performance of German IPOs, categorized by DCA quartiles and calculated across various measurement periods and different starting dates. The results do confirm evidence that German IPOs issued during the sample period have underperformed, on average, in the long-run. When measured over three years, this underperformance is statistically and economically significant. For example, when viewing our return window after nine months of trading, the sample of 126 German IPOs underperformed the FAZ Index by 45.79 percent. When looking at shorter measurement horizons, however, the underperformance falls substantially to 14.54 percent over two years and 5.74 percent when measured over one year. Table 25 also shows that the magnitude of IPO aftermarket performance is not only sensitive to the length of the measurement period, but also to its starting date. Results in Panel A, B, and C indicate that the closer the starting point of the measurement period to the IPO date, the more favourable the long-run performance picture. The discrepancy is particularly large when calculating returns over short measurement horizons. For the sample as a whole, the two-year market-adjusted performance is positive 81.21 percent when measured after three months of trading and negative 21.67 percent when the two-year measurement begins after twelve months of trading.

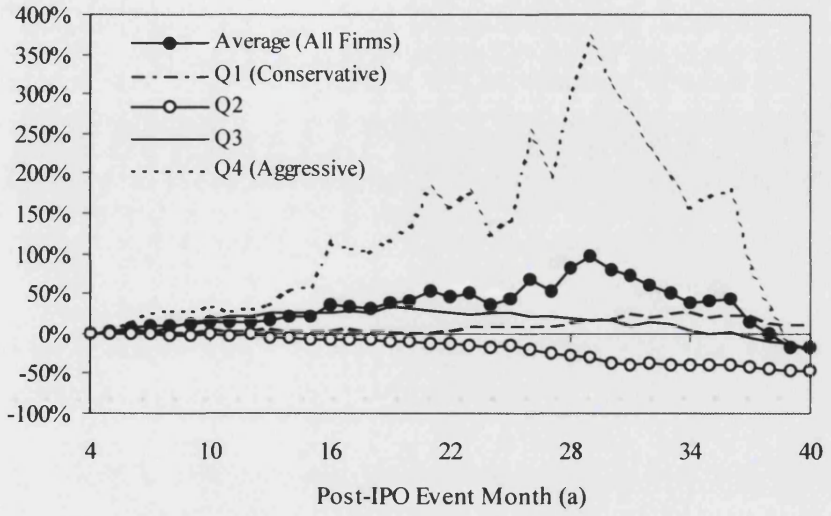
Apart from the results obtained for the sample as whole, we also document aftermarket performance when categorizing the sample by DCA Quartile. This allows us to take a closer look at the cross-section of earnings management behaviour and market response. When return measurement starts after nine or twelve months following

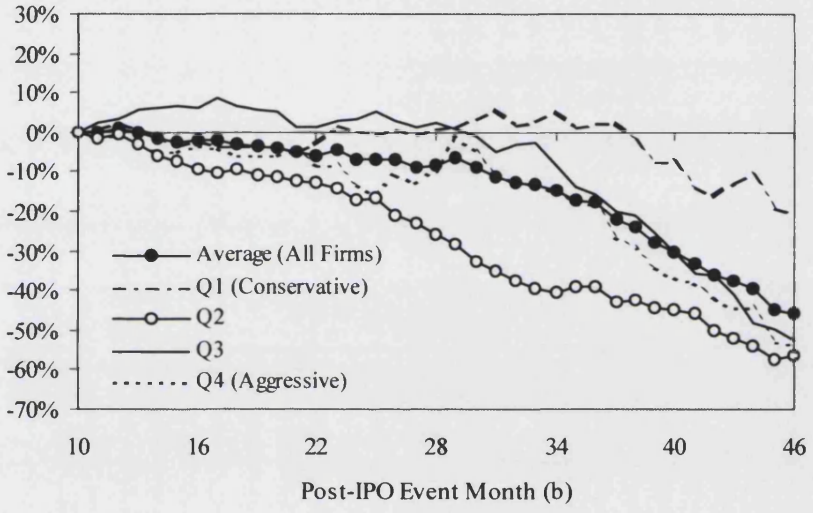
[65] Starting performance measurement after three to six months following the publication of the First Annual Report roughly corresponds to our benchmark starting date of nine months.

the IPO, companies that are less opportunistic towards earnings management during the IPO year outperform their counterparts over three years. When measuring three year returns starting after nine and twelve month of trading, for example, the market-adjusted return difference between the most conservative (Q1) and most aggressive (Q4) groups is 24.37 percent and 32.92 percent, respectively. When applying these starting times, this difference also generally applies when looking at shorter return horizons. Companies that manage earnings more conservatively during the IPO year consistently outperform their more aggressive counterparts. The longer the measurement horizon, the larger and more significant is this difference. When measuring from the benchmark starting date and afterwards, the results clearly indicate that the market identifies earnings management behaviour.

However, when measuring performance after month three following the IPO, the one-year and two-year return picture changes dramatically. The results are displayed in Panel A of Table 25. The most aggressive managers substantially outperform their conservative counterparts. The difference of the market-adjusted return between the most aggressive (Q4) and the most conservative group (Q1) amounts to 107.46 percent over one year and 291.01 percent over two years. One reason for this discrepancy is that the more opportunistic managers in the IPO year tend to be the more aggressive managers in the year following the IPO. When measuring returns over three-years starting after three month of trading, however, this "wrong" relationship is corrected.[66] The result is plotted in Figure 7.

[66] The company with the largest price increase was EM.TV AG, a Media company, which recorded a DCA coefficient of 0.8962 and a three-year market-adjusted buy-and-hold return of positive 817.78 percent when measured after three months following the IPO, negative 63.56 percent when measured after nine month and negative 77.37 percent after twelve months after the IPO.





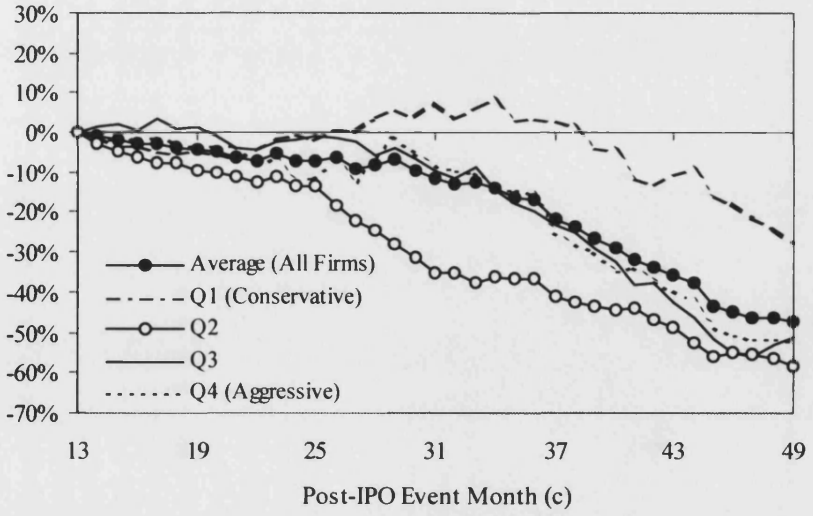


Figure 7. Market-adjusted buy-and-hold returns of DCA Quartiles (%). Returns are measured over 36 months with measurement starting after three, nine and twelve months post-IPO. Our proxy for earnings management is the firm's use of discretionary accruals (DCA). Firms are divided into quartiles based on how aggressively they manage earnings during the IPO year.

4. Market Response to Income Reporting Strategies

4.1 Measuring Management Behaviour with Income Smoothing (IS)

In contrast to firms using accruals to boost earnings in the short-term, firms might want to smooth their income to signal the firm's long-term strategy. As in Chaney and Lewis (1998), smoothing income is a long-term strategy and, in doing so, managers communicate the firm's "permanent earnings", a strategy which enhances investors' current and future perception of a firm. It is believed that firms with good future prospects will be able to smooth their income more effectively than firms that use accruals aggressively for window dressing, as discretionary accruals must reverse in the future. Thus, whether income is smoothed can be viewed as a management strategy that conveys fundamental information of a firm.

In this paper, the measure of income smoothing is the same as in Roosenboom, van Goot and Mertens (2000). The income smoothing (IS) coefficient is defined as the ratio of the variance in operating cash flow changes to variance of operating income changes:

$$IS_i = \frac{Var(\Delta CF_i)}{Var(\Delta OI_i)} \tag{4}$$

where ΔCF_i is defined as changes in operating cash flow for firm i, and ΔOI_i is defined as the changes in operating income for firm i.

The income smoothing (IS) coefficient defined in (4) compares the relative variability of changes in operating cash flow with the relative variability of changes in operating income. Since the operating cash flow is essentially not manageable, a successful income smoothing strategy will lead to a smaller variability in the changes of

Table 26

Distribution of the Income Smoothing (IS) coefficient

For the analysis of Income Smoothing (IS), the sample is reduced to 124 companies because of missing information on operating cash flows for two companies (Refugium AG and Pro Sieben AG). We use the Mean difference test and Wilcoxon signed test to test for mean difference and the significance of the median.

Distribution of the proxy for Income Smoothing categorized by IS Quartiles							
	ALL	Q1	Q2	Q3	Q4	Diff.	p.value
Mean	1.18	0.80	0.98	1.13	1.81	-1.01	0.0000
p-value	0.0003						
Median	1.05	0.84	0.98	1.13	1.54	-0.70	0.0000
z-value	0.0008						
Max	4.91	0.91	1.05	1.22	4.91		
Min	0.17	0.17	0.91	1.05	1.22		
N	124	31	31	31	31		

operating income (OI) and hence a larger coefficient for income smoothing. In other words, an income smoothing (IS) coefficient greater than one points to a company that tends to smooth its operating income relative to its operating cash flows. The drawback of this measurement is that we can only measure a firm's income smoothing ex-post.

In this study, we use five years of operating data to measure each IPOs income smoothing coefficient. In Table 26, we present some descriptive statistics for our sample of German IPOs. For the sample as a whole, the mean income smoothing coefficient is 1.18 and the median value is 1.05. Both values are significant at conventional levels. This indicates that, on average, German IPOs engage in earnings management by using income smoothing. Table 26 also documents the distribution of the proxy for Income Smoothing by dividing the total sample into four equally-sized groups. The results reveal large and significant differences in the IS coefficient between conservative earnings managers who smooth the most (Q4), and aggressive earnings managers who smooth the least (Q1).

4.2. Income Smoothing (IS) and IPO Stock Returns

In Table 27, we present the main findings. The results are reported both for the sample as a whole and for the individual Quartiles. Similarly, we measure performance with a benchmark starting date of nine months after the IPO. We also deviate from this benchmark starting date in order to study the dynamics of the market response. The result for measuring starting time of three-month, nine-month and twelve-month performance dynamics are presented in Panel A, B and C of Table 27.

The results underline some earlier observations that the degree of aggressiveness in earnings management is related to the stock price performance. Over the long-run, companies with a higher IS coefficient tend to outperform their most aggressive counterpart regardless of the starting date of the measurement period. Based on market-adjusted three-year stock returns, the difference is 57.47 percent, 30.75 percent and 28.01 percent when measured from month three, nine and twelve following the IPO, respectively. The difference is consistently large and significant when measuring returns over two or three years after the start of the measurement periods. When measured over a one-year horizon, however, the difference in performance between companies that apply income smoothing most and those that do least, is not significant. This finding confirms our earlier result that the market is not able to respond to earnings management choices effectively in the short-run. However, the result here is less significant than the one when we used DCA. In Figure 8, the dynamics of aftermarket performance are shown graphically. Here, a similar picture to the one observed in Figure 7 emerges. The most conservative companies (Q4) display a significantly better performance than their more aggressive counterparts over the long-run. In the short-run, however, the differences are less clear. For example, in Graph (a) the second most aggressive group (Q2) outperforms others up until the medium-term.

Table 27

IPO performance categorized by Issue Year IS Quartiles

The sample consists of 124 German IPOs between 1988 and 1997. Returns are calculated as equally-weighted buy-and-hold returns. One month is defined as a consecutive 21-day trading interval using the local trading calendar. Returns are reported separately as raw returns and returns adjusted by the broad-based value-weighted FAZ Index. The raw and market-adjusted buy-and-hold return is calculated after three, nine and twelve months following the IPO. Difference (Diff.) refers to the percentage change between the most aggressive earnings manager (Q1) and the most conservative earnings manager (Q4) in terms of IS. Associated test statistics for Diff. refer to mean difference tests.

Panel A: Measurement period starts three months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.4210	-0.0392	1.4914	0.1399	0.0919	0.1311	1.0611	-0.0782	3.7122	0.1643	0.4462	0.5244	0.1768	-0.1948	0.3835	0.0751	0.4434	0.6382
p-value	0.2134	0.4185	0.2740	0.0873	0.2637	0.1672	0.2396	0.3897	0.3084	0.2285	0.0530	0.0320	0.0956	0.0244	0.2239	0.5476	0.0700	0.0132
Adjusted returns	0.3501	-0.0604	1.4021	0.0551	0.0035	0.0639	0.8319	-0.2759	3.4616	-0.0307	0.1727	0.4485	-0.1821	-0.5251	0.0048	-0.2579	0.0496	0.5747
p-value	0.2992	0.2564	0.3024	0.4645	0.9658	0.5089	0.3547	0.0069	0.3406	0.7905	0.4003	0.0494	0.0889	0.0001	0.9877	0.0508	0.8313	0.0288

Panel B: Measurement period starts nine months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.0571	-0.0762	0.1760	0.0767	0.0520	0.1282	0.1010	-0.1390	0.1388	0.0170	0.3870	0.5260	-0.0991	-0.2380	-0.1280	-0.0984	0.0682	0.3062
p-value	0.2067	0.0815	0.2506	0.2530	0.3826	0.0813	0.1691	0.0985	0.4301	0.8354	0.0597	0.0168	0.0310	0.0011	0.1467	0.3246	0.5183	0.0158
Adjusted returns	-0.0559	-0.1340	0.0406	-0.0693	-0.0610	0.0731	-0.1501	-0.3157	-0.1722	-0.2241	0.1114	0.4271	-0.4608	-0.5628	-0.4872	-0.5380	-0.2553	0.3075
p-value	0.2225	0.0133	0.7976	0.2535	0.2564	0.3227	0.0412	0.0012	0.3406	0.0123	0.5665	0.0480	0.0000	0.0000	0.0000	0.0005	0.0573	0.0564

Panel C: Measurement period starts twelve months after the IPO date

	Year 1 (one year)						Year 2 (two years)						Year 3 (three years)					
Return	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.	All	Q1	Q2	Q3	Q4	Diff.
Raw returns	0.0648	-0.0193	0.0978	0.0591	0.1215	0.1408	0.0477	-0.1322	0.0290	-0.0387	0.3326	0.4648	-0.1087	-0.1892	-0.1209	-0.1625	0.0379	0.2271
p-value	0.1033	0.7726	0.3785	0.3259	0.1054	0.1576	0.4346	0.1432	0.7694	0.6059	0.0804	0.0261	0.0247	0.0081	0.2196	0.1019	0.7460	0.0944
Adjusted returns	-0.0675	-0.1022	-0.0614	-0.0867	-0.0195	0.0827	-0.2250	-0.3548	-0.2832	-0.2934	0.0313	0.3861	-0.4752	-0.5820	-0.4404	-0.5762	-0.3020	0.2801
p-value	0.0648	0.0855	0.5654	0.1138	0.7616	0.3396	0.0002	0.0000	0.0044	0.0016	0.8643	0.0524	0.0000	0.0000	0.0002	0.0001	0.0444	0.0922

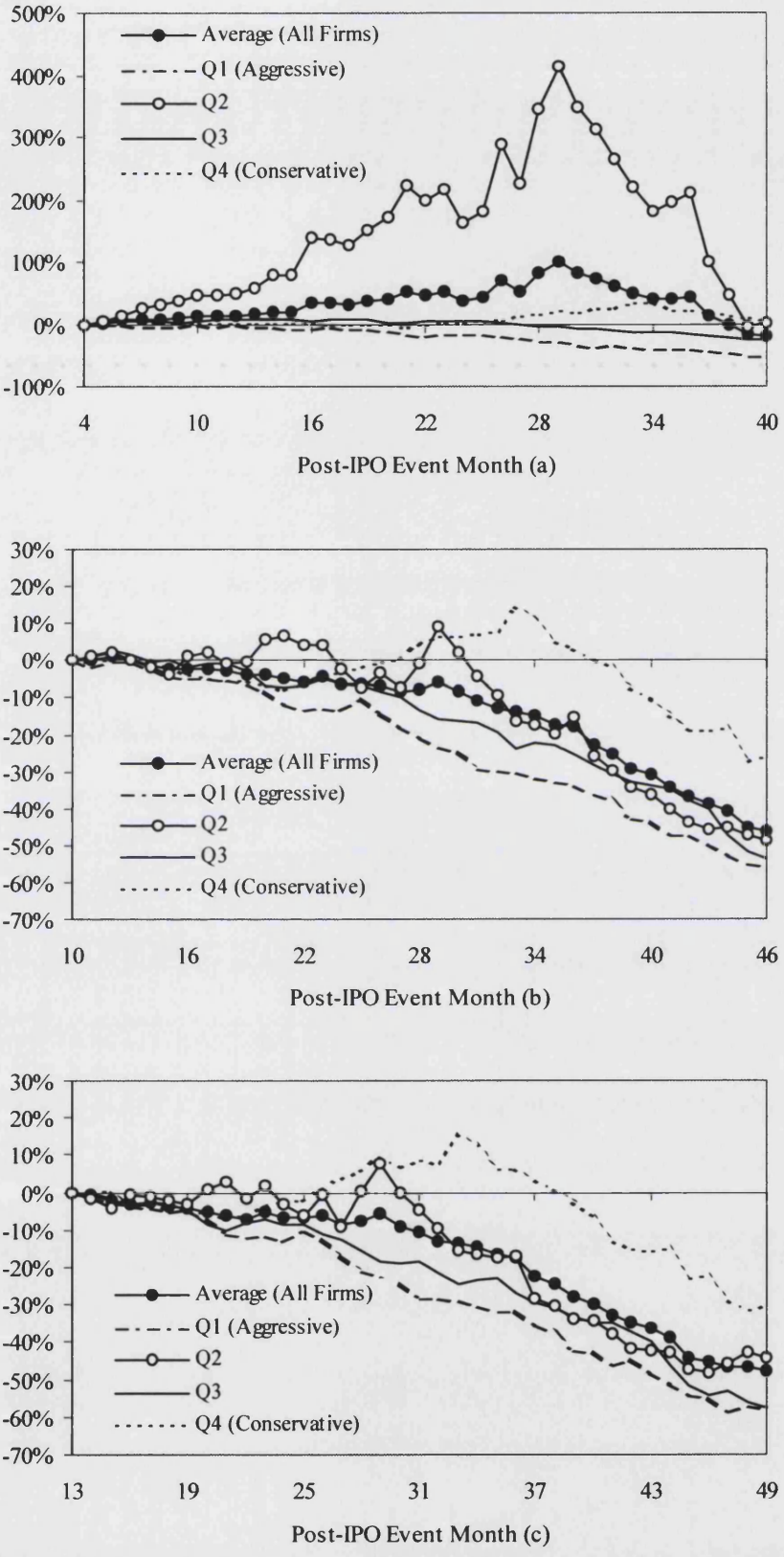


Figure 8. Market-adjusted buy-and-hold returns of IS Quartiles (%). Returns are measured over 36 months with measurement starting after three, nine and twelve months post-IPO. Our proxy for earnings management is the firm's use of income smoothing (IS). Firms are divided into Quartiles based on how aggressively they manage earnings during the IPO year.

Figure 8 underlines the importance of the month of seasoning when measuring aftermarket returns. Results reported from a date closer to the IPO make the distribution of returns more susceptible to the effect of other factors, such as extreme returns. It should be noted that the magnitude of long-run returns in the most conservative group of income smoothers (Q4) is clearly different from the rest of the sample companies which, in turn, do not display a large divergence in performance among them.[67]

5 Comparative Analysis of Methods of Earnings Management

Thus far, we have investigated two widely cited forms of earnings management and the market response. While we have shown that the use of DCA is a predominantly short-term tool for opportunistic earnings managers, the nature of IS lies clearly in its ability to provide a framework for strategic long-run earnings management. In this section, we focus on the relation between these two forms, which thus far has been left unexplored in the literature. Based on our earlier results, we hypothesize a link between DCA and IS and design our research methodology accordingly.

In Panel A of Table 28, we replicate the distribution of the DCA coefficients (in Quartiles) from Table 24 and calculate the IS coefficient of each DCA group. There is a tendency that companies, which manage their earnings least opportunistically in terms of DCA, also have the highest IS coefficient. For example, the most conservative group in terms of DCA recording a DCA of –0.27 also has the highest IS coefficient of 1.30. In Panel B, we replicate the distribution of our IS coefficient (in Quartiles) from Table 26 and calculate the DCA of each IS group. Here, we find a similar tendency to the one reported above: companies with a higher income smoothing coefficient, that are also

[67] This notion is similar to Brav and Gompers (1997) who find that the widely acclaimed underperformance reported for US IPOs in Ritter (1991) is due to nonventure-backed IPOs, and that venture-backed IPOs, which make up 21.52 percent of the sample, do not significantly underperform. Schuster (2002) finds that New Economy stocks, that account for around 28 percent of the sample, drive the positive aftermarket performance of a sample of 973 European IPOs issued between 1988 and 1998.

Table 28

Discretionary Current Accruals (DCA) versus Income Smoothing (IS)

In this table, we compare the two proxies for earnings management: Discretionary Current Accruals (DCA) and Income Smoothing (IS). We set the number of companies to 124, the sample size used when we measured the IS coefficient. In Panel A, companies are grouped by their DCA quartile. In Panel B, companies are grouped by their IS quartile. Diff. refers to the mean difference of Q1 and Q4. We use the Mean difference test and Wilcoxon signed test to test for mean difference and the significance of the median difference.

Panel A: DCA and IS Grouped by DCA in the IPO year

Proxy		All	Q1	Q2	Q3	Q4	Diff.	p-value
DCA	Mean	0.07	-0.27	-0.01	0.11	0.43	-0.70	0.0000
	Median	0.05	-0.20	-0.01	0.12	0.30	-0.50	0.0000
IS	Mean	1.18	1.30	1.16	1.11	1.15	0.15	0.3854
	Median	1.05	1.11	1.06	1.06	1.02	0.03	0.1440
	N	124	31	31	31	31		

Panel B: DCA and IS Grouped by IS

Proxy		All	Q1	Q2	Q3	Q4	Diff.	p-value
IS	Mean	1.18	0.80	0.98	1.13	1.81	-1.01	0.0000
	Median	1.05	0.84	0.98	1.13	1.54	-0.70	0.0000
DCA	Mean	0.07	0.11	0.03	0.08	0.05	0.06	0.3434
	Median	0.05	0.12	0.05	0.04	0.02	0.10	0.2503
	N	124	31	31	31	31		

better stock market performers over the long-term, have a tendency to manage their earnings less opportunistically during the year of going public. In contrast, companies which have a low tendency to smooth their income are also likely to manage their earnings more aggressively. For example, the most aggressive group in terms of IS (Q1) recording a median IS coefficient of 0.84, has the highest median DCA of 0.12. The results suggest that the two forms of earnings management are clearly not mutually exclusive. The column headed Diff. shows the difference in the coefficient between Q1 and Q4. The last column in Table 28 reports the p-value of the mean difference test of coefficients between Q1 and Q4. While there is a tendency for companies to apply various techniques for earnings management, either equally aggressively or conservatively, the lack of statistical significance for both the mean and median might suggest that the two strategies are not deterministic.

Table 29

IPO performance of companies in the DCA/IS intersection

Table VII presents the adjusted and unadjusted buy-and-hold performance of the Best DCA/IS (Panel A) and Worst DCA/IS intersection (Panel B). The sample consists of 124 German IPOs going public between 1988 and 1997. Aftermarket returns are calculated as equally-weighted returns whereas one month is defined as a consecutive 21-day trading period using the local trading calendar. Adjusted and Unadjusted mean and median returns are calculated from month three, nine and twelve following the IPO date. Returns are adjusted using the broad-based value-weighted FAZ Index as the benchmark.

Panel A: Best DCA/IS intersection

Returns	3 months after IPO	9 months after IPO	12 Months after IPO
Raw returns	1.2981	0.4119	0.3760
Median	0.6616	0.3830	0.2780
Adjusted returns	0.8577	0.1900	0.1785
Median	0.2456	0.1856	0.0243
Number of IPOs	10	10	10

Panel B: Worst DCA/IS intersection

Returns	3 months after IPO	9 months after IPO	12 Months after IPO
Raw returns	-0.2241	-0.2641	-0.2013
Median	-0.3524	-0.3797	-0.2972
Adjusted returns	-0.4995	-0.3965	-0.4398
Median	-0.3515	-0.4413	-0.3670
Number of IPOs	9	9	9

In Table 29, we analyse the impact of the interaction of these two forms of earnings management on the dynamics of aftermarket returns. In Panel A, we present evidence concerning the long-run performance of companies, which fall into the intersection of companies with the most conservative form of earnings management in terms of DCA (Q1) and IS (Q4). Panel B contains the result of those companies that fall into the intersection that applies the most aggressive behaviour towards earnings management in terms of DCA (Q4) and IS (Q1). This approach allows us to study whether companies that use both forms of earnings management most conservatively (Best DCA/Best IS Quartile) do in fact experience performance differences and vice versa.

Overall, the results do confirm our earlier observation that the magnitude of long-run performance is sensitive to the start of the measurement period. There is a strong indication that mean and median returns of companies falling into the intersection of Best DCA/Best IS outperform other companies, that do not fall into this

intersection, by a considerable margin. This result extends to all starting dates of our measurement period. For example, when measuring performance following the ninth month of aftermarket trading, the ten companies which fell into the Best DCA/Best IS intersection returned a market-adjusted 19.00 percent, while in Table 25, the best DCA group (Q1) only enjoyed a negative 20.40 percent three-year market-adjusted return. Similarly, in Table 27, the best IS Group (Q4) recorded a negative 25.53 percent three-year market-adjusted return when measured after nine months of trading.

The results are less robust for the intersection of Worst DCA/Worst IS, which is generally in line with the returns of the worst DCA and worst IS Quartiles reported in Tables 25 and 27.[68] This is not surprising as 75 percent of the sample in both earnings management regimes produced similar long-run underperformance. It must be noted that, due to the small sample size, reported results must be treated with caution.

6 Aftermarket Return Dynamics and Earnings Management

As documented throughout the paper, the dynamics of aftermarket performance are sensitive to the start of the period from which returns are measured. Starting the measurement period at a date closer to the date of going public has a dramatically different effect on the return dynamics than when measuring returns from a date further away from the IPO date. In this section, we combine the empirical methodology of Ritter (1991) with the framework for analysing DCA and IS, in order to disentangle the observations. We include the two major explanatory variables DCA and IS, which are proxies for the fundamentals of IPO firms, into the regression model described in Ritter (1991) where most of the explanatory variables have no accounting features.

[68] Three out of the nine companies in the Worst DCA/Worst IS intersection are companies associated with strong retail brands: Jil Sander AG, a fashion company; Leica Camera AG, a camera manufacturer; and Marbert AG, a cosmetics company.

We use market-adjusted three-year returns as the dependent variable and measure performance following month three, nine and twelve of trading. The explanatory variables are the DCA coefficient in the IPO year, the IS coefficient, a proxy for New Economy companies (NEW), the logarithm of market value (MV), the log of one plus age, the percentage of equity retained (ER) and the initial return.[69]

The generalised model specification is as follows:

$$R_i = \alpha + \beta_1 DCA_i + \beta_2 IS_i + \beta_3 NEW_i + \beta_4 Log(MV_i) + \beta_5 Log(1+Age_i) + \beta_6 ER_i + \beta_7 IR_i + \varepsilon_i \qquad (5)$$

Table 30 reports the major results of a set of multivariate regression models (5). The results in Table 30 shed more light on our earlier observations about both the short- and long-run dynamics of IPO returns and the explanatory power of both proxies for earnings management. When measuring long-run returns in the three months after the IPO (Panel A), both proxies for earnings management have very little power to explain long-run returns. Including our accounting proxies for earnings management in the regression leads to just a marginal increase in explanatory power from 9.35 percent to 10.30 percent.[70] In this case, the New Economy proxy shows considerable statistical power. This confirms our conjecture made in the previous chapter that the positive long-run abnormal return performance measured from the first day of trading of a sample of 973 European IPOs issued between 1988 and 1998 is driven by firms in the New Economy sectors. The power of the two accounting proxies for earnings management that help to explain long-run returns, however, increases dramatically when long-run performance is measured after nine or twelve months of trading. As shown in Panel B, not only does the inclusion of the DCA and IS increase the overall explanatory power of

[69] New Economy firms represent Technology, Media, Telecommunications and Healthcare, respectively.
[70] The R^2s reported in this study are unadjusted. We also checked adjusted R^2s and found that it does not change the results qualitatively.

Table 30

OLS Regression Results for the Aftermarket Performance

$R_i = \alpha + \beta_1 DCA_i + \beta_2 IS_i + \beta_3 NEW_i + \beta_4 Log(MV_i) + \beta_5 Log(1+Age_i) + \beta_6 ER_i + \beta_7 IR_i + \varepsilon_i$.

R_i is the three-year market adjusted return, measured from the applicable measurement starting date. DCA_i is the DCA of company i at the year of the IPO. IS_i is the income smoothing coefficient of company i measured over the whole period. DCA_i and IS_i are proxies for earnings management. New Economy (NEW_i) firms belong to market sectors 5,13,15,17 representing Technology, Media, Telecommunications and Healthcare, respectively, in the Dow Jones STOXX global sector classification scheme. $Log(MV_i)$ is the Market Value of the Firm at the IPO date defined as the total number of shares issued (including overalottment options) times the IPO price, measured in end-1997 purchasing power. $Log(1+ Age_i)$ is defined as the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. $EquityRetention_i$ (ER) is defined as one minus the percentage of Equity offered based on the IPO date. IR_i measures the Initial Returns of the IPO defined as the unadjusted percentage change between the IPO price and the first closing price; Standard Error (S.E) in parenthesis.

Panel A: Coefficient estimates based on starting measurement after three months of going public

α	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	R^2
-0.1893[c]	0.1063							0.0001
(0.1089)	(0.3267)							
-0.4390		0.2175						0.0100
(0.2541)		(0.1955)						
1.0700			0.6855[b]	-0.0694	-0.1304	0.6133	0.2072	0.0935
(05437)			(0.3076)	(0.1022)	(0.0942)	(0.5614)	(0.5059)	
0.7186	0.1125	0.2105	0.7043[b]	-0.0649	-0.1234	0.5871	0.1938	0.103
(2.0156)	(0.3220)	(0.1922)	(0.3091)	(0.1033)	(0.0947)	(0.5636)	(0.5112)	

Panel B: Coefficient estimates based on starting measurement after nine months of going public

α	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	R^2
-0.4399[a]	-0.3089[c]							0.0244
(0.0589)	(0.1768)							
-0.7220[a]		0.2212[b]						0.0346
(0.1374)		(0.1057)						
0.0313			0.2588	-0.0331	-0.0165	0.1982	0.2924	0.0552
(1.0999)			(0.1719)	(0.0571)	(0.0526)	(0.3138)	(0.2828)	
-0.5570	-0.3108[c]	0.2120[b]	0.2639	-0.0146	-0.0144	0.1791	0.3601	0.1140
(1.0969)	(0.1752)	(0.1046)	(0.1682)	(0.0562)	(0.0515)	(0.3067)	(0.2782)	

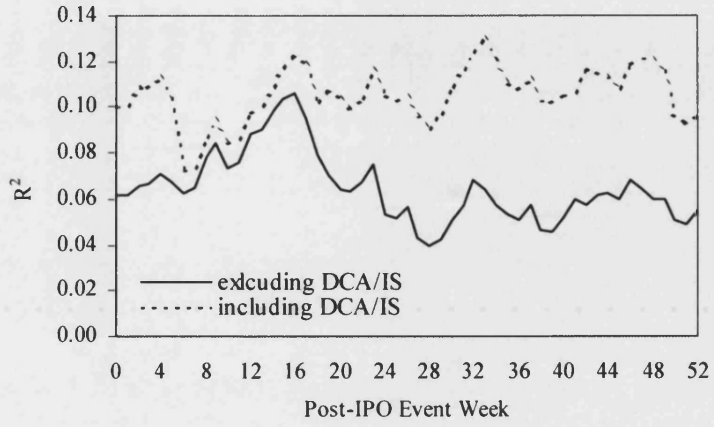
Panel B: Coefficient estimates based on starting measurement after twelve months of going public

α	$\hat{\beta}_1$	$\hat{\beta}_2$	$\hat{\beta}_3$	$\hat{\beta}_4$	$\hat{\beta}_5$	$\hat{\beta}_6$	$\hat{\beta}_7$	R^2
-0.4582[a]	-0.2504							0.0161
(0.0590)	(0.1770)							
-0.7139[a]		0.2021[b]						0.0291
(0.1374)		(0.1057)						
0.3912			0.2191	-0.0484	-0.0011	0.0043	0.2708	0.0461
(1.1020)			(0.1723)	(0.0572)	(0.0527)	(0.3144)	(0.2833)	
-0.1271	-0.2405	0.1962[b]	0.2253	-0.0328	0.0013	-0.0143	0.3244	0.0901
(1.1085)	(0.1771)	(0.1057)	(0.1700)	(0.0568)	(0.0521)	(0.3100)	(0.2811)	

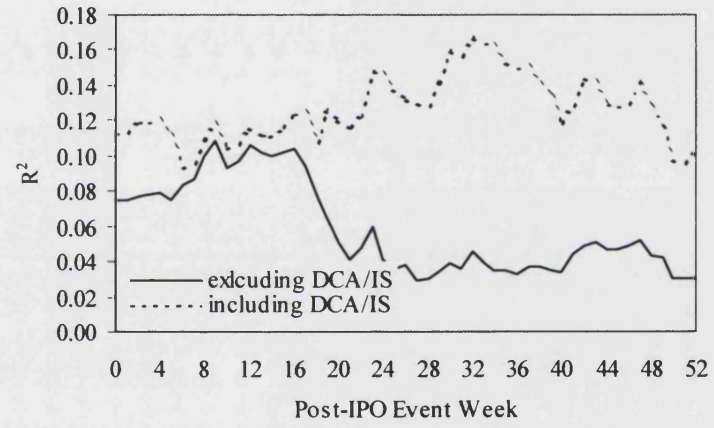
[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

the regression model from 5.52 percent to 11.40 percent, but DCA and IS also become significant. This finding demonstrates that factors other than fundamentals drive IPO prices in the short-run. In an environment characterized by high levels of "divergence of

Panel A: Model Explanatory Power Dynamics (adjusted returns)



Panel B: Model Explanatory Power Dynamics (raw returns)



Panel C: Weekly Anormal Returns

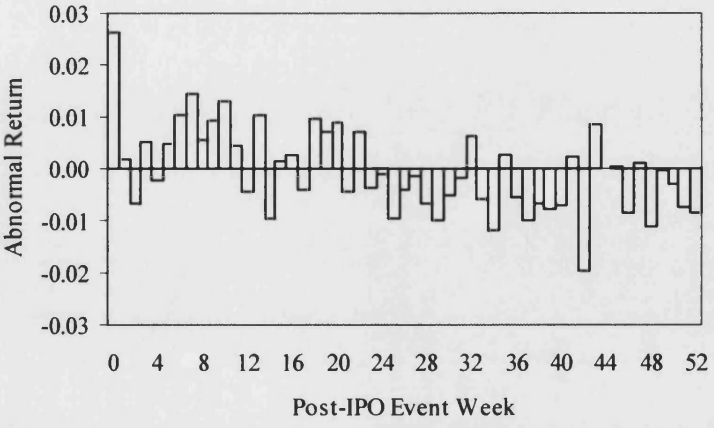


Figure 9. Model Explanatory Power Dynamics and Weekly Abnormal Returns. In Panel A and B, we measure the power of the regression model (including DCA/IS and excluding DCA/IS) from Table 30 to explain 36-month buy-and-hold returns. Panel C measures the weekly abnormal return dynamics (FAZ Index adjusted) during the first year of trading.

opinion" (Miller (1977)), factors such as company characteristics (such as age, initial return, free-float, size or economic sector), short-selling constraints (Duffie, Gârleanu and Pederson (2002) and Gecy, Musto and Reed (2001)), lock-up periods (Brav and Gompers (2002)), underwriter stabilization (Aggarwal (2000)) or the expiration of the "quiet period" (Bradley, Jordan and Ritter (2002)) may be the driving forces behind short-run IPO returns.

In Figure 9, we study the explanatory power dynamics of model (5) in more detail. The 36-months returns (both raw and adjusted) are measured starting from the first week to 52 weeks after the IPO date. The R^2s of the regression with and without the proxies for fundamentals (DCA and IS) are plotted in Panels A and B, respectively. Clearly, the R^2s of the model, with and without the variables explaining fundamentals, are almost the same for the first several months after the IPO date. Take, for example, the adjusted return (Panel A). The model explanatory power with and without fundamentals starts to diverge only four to five months after the IPO date. After that, the explanatory power of the typical IPO explaining variables (such as size, age, initial returns, economic sector) starts to decrease while the explanatory power of fundamentals starts to increase dramatically. Both of them remain relatively stable one or two months afterwards. This pattern also holds when the raw return is used (Panel B).[71] The substantially increased model explanatory power with DCA and IS after four to five months indicates that fundamentals start to play a bigger role in determining the long-run return of IPO stocks. After that time, the non-fundamental factors lessen their impact in determining IPO long-run performance.

We investigate this issue further by examining the actual short-term return dynamics of IPO stocks. The results are reported in Panel C of Figure 9. In Panel C, we

[71] When the raw return is used, the market return is added the right-hand side of the model (5).

document average weekly abnormal returns of IPO stocks. Clearly, during the first five to six months (the time that the fundamentals take to establish their role), the IPO stocks perform well relative to the market. After that, however, they start to underperform. When comparing the time when the fundamental factors start to play a bigger role with the time when the IPO stocks start to underperform, a clear picture emerges: in the short-run, IPO stocks outperform the market and their return dynamics are essentially driven by factors other than fundamentals. After some period of learning, fundamentals start to play a bigger role and IPOs start to underperform. This result casts light upon the reported anomaly documenting the significant short-run overperformance in IPOs in general and German IPOs in particular, as well as the sharp drop-off in performance thereafter.

7 Summary and Conclusion

This paper has analysed management behaviour towards earnings management and the dynamics of the subsequent market response. The analysis has been conducted through the evaluation of accounting information and stock prices of a large number of companies that chose to go public in Germany over the ten-year period between 1988 and 1997. We have defined two widely acknowledged forms of earnings management and have investigated some issues that have so far remained unexplained. To our knowledge, this is the first study that applies this concept to German IPOs, a market which has gained considerable international attention during the past decade.

For the sample of German IPOs, we provide evidence that the IPO event itself may give managers an incentive to opportunistically manage earnings so as to maximize IPO proceeds. We also find that the form of earnings management during the IPO year is indeed linked to the long-run aftermarket performance. Firms that perform best over

the long-run manage earnings least opportunistically. This applies to the two methods of earnings management studied. We also find that two types of earnings management are not deterministic, yet complementary. The ten IPOs that fall into the intersection of companies with the lowest DCA and highest IS substantially outperform the rest of the sample and the market.

The outperformance of the less aggressive companies could be due to a variety of reasons such as varying risk premia, the empirical methodology or simply bad luck. To check for the robustness of our results, we exercised a set of robustness analyses. We found that the risk premium proxied by the standard deviation of monthly returns or age does not show significant difference between the more conservative and more aggressive earnings management groups. Since a broad set of the empirical literature (Clarkson and Thompson (1990), Ritter (1991), Chan and Lakonishok (1992), Keloharju (1993), Leleux and Muzyka (1998)) rejects the notion that beta can explain away the differences in return performance of IPO stocks, we believe that beta adjustments cannot account for the large performance discrepancies identified in this study. Moreover, using cumulative returns, another conventional method of returns measurement, we find that the qualitative nature of the results does not change.

This analysis has also been set up with the aim of shedding some light on the forces behind the return dynamics in aftermarket trading of IPOs. We find that the long-run performance is sensitive to the starting date of the measurement period. The explanatory power of both DCA and IS for long-run returns, proxies for fundamentals of IPO firms, increases dramatically when the performance is measured after some time of trading in the aftermarket (four to five months). This result indicates that investor sentiment, driven by institutional peculiarities in an IPO market typically characterised by high levels of "divergence of opinion" (such as the immediate IPO aftermarket),

replaces fundamentals as the driving force behind the short-run price dynamics. It takes many months for the market to catch-up to the company fundamentals conveyed in the proxies for earnings management.

For academics and practitioners alike, the findings presented here have a number of repercussions: for academics, it matters when to start measuring performance. Delaying the start of the measurement period beyond the first four months is most likely going to improve the explanatory power of accounting information. Investors should not treat IPOs like any other firm that is being traded in the market, particularly during a firm's first year of trading because IPO returns, as shown in this analysis, are largely driven by factors other than fundamentals in the short-run. The message for firms is that there is always a trade-off between short-term gains and long-term losses. If a firm is concerned about its long-term perspective, it should not manage its earnings aggressively, because the market is going to catch up sooner or later.

The findings also provide a potential rational for investors to ignore IPO fundamentals in the short-run, because the extreme winner is likely to be found in those companies that manage earnings more aggressively. This indeed sheds light on the short-run aftermarket return dynamics of US IPOs during Internet bubble of 1999 and part of 2000, and on the even more extreme events that took place on the Neuer Markt and its subsequent fall.

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Appendix A: Sector Classification

Table 31: **Global Sector Classification Standard**[59]

The Dow Jones STOXX global sector classification standard groups companies that have similar primary revenue sources. There are 10 economic sectors and derived from these – in increasingly finer classifications – are 18 market sectors (used for this study), 51 industry groups and 89 sub-groups. New Economy firms (270) belong to Market Sectors 5, 13, 16 and 17, representing Media [MDI], Healthcare [HCR], Technology [TEC] and Telecommunications [TLS], respectively. For the purpose of this study, all other Market Sectors are defined as belonging to the Old Economy. Europe (EU) = Total Number of IPOs issued between 1988 and 1998 in Germany (BD), France (FR), Italy (IT), the Netherlands (NL), Spain (SP), Sweden (SD) and Switzerland (SW).

Market Sectors		*Country and Number of IPOs*							
		EU	BD	FR	IT	NL	SP	SD	SW
1	Basic Resources [BAS]	46	5	13	3	3	9	11	2
2	Chemicals [CHM]	27	4	10	4	5	1	0	3
3	Automobiles [ATO]	36	10	11	4	4	1	6	0
4	Cyclical Goods and Services [CGS]	124	33	39	21	6	9	10	6
5	Media [MDI]	32	3	18	3	1	2	5	0
6	Retail [RTS]	44	16	19	1	3	1	4	0
7	Food & Beverage [FOB]	51	7	24	2	1	12	3	2
8	Non-Cyclical Goods & Services [NCG]	63	13	26	1	8	9	5	1
9	Energy [ENE]	11	0	4	2	1	2	2	0
10	Banks [BNK]	20	3	2	6	0	6	2	1
11	Financial Services [FSV]	58	12	13	6	4	9	13	1
12	Insurance [INS]	17	4	5	5	0	2	0	1
13	Healthcare [HCR]	54	7	22	1	4	0	14	6
14	Construction [CNS]	47	18	8	2	3	13	3	0
15	Industrial Goods & Services [IGS]	147	32	45	12	7	9	34	8
16	Technology [TEC]	170	43	56	1	24	1	34	11
17	Telecommunications [TLS]	14	4	6	0	1	0	2	1
18	Utilities [UTI]	12	5	2	3	0	2	0	0
	Total	973	219	323	77	75	88	148	43

[59] For the complete classification standard see: http://www.stoxx.com/indexes/guide/index_guide.pdf

Appendix B: Alternative Performance Tests

Table 32: **Aftermarket Performance (Value-Weighted)**

The sample contains 973 European Initial Public Offerings between 1988 and 1998. Aftermarket returns are measured as *value-weighted* buy-and-hold returns whereas one month is defined as consecutive 21-day trading interval from the close of the first day of trading using European trading days, assuming a declining sample size. If the IPO is delisted before the end of the measurement period, we calculate the return until the delisting date. Aftermarket returns are compared with alternative benchmarks. The Dow Jones STOXX, size-based benchmarks, ex. UK, were used as a proxy for the European market. The wealth relative (WR) is the ratio on one plus the average aftermarket period buy-and-hold IPO return divided by one plus the average aftermarket benchmark buy-and-hold return. For example, for the month 36 adjustment of IPO returns for the movement in the broad market, (1+0.7414)/(1+0.6495) = 1.06; Standard Errors (S.E.) in parentheses.

Aftermarket Performance of IPOs: All Market Conditions

		IPO and Benchmark Returns							
Aftermarket	Raw Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0059	0.0116	0.99	0.0147	0.99	0.0057	1.00	-0.0049	1.01
(N=973)	(0.0068)	(0.0117)	(0.0067)	(0.0148)	(0.0067)	(0.0057)	(0.0053)	(-0.0048)	(0.0066)
Month 3	0.0374[a]	0.0463	0.99	0.0526	0.99	0.0321	1.01	0.0096	1.03[a]
(N=972)	(0.0111)	(0.0467)	(0.0104)	(0.0534)	(0.0104)	(0.0319)	(0.0105)	(0.0093)	(0.0105)
Month 12	0.2422[a]	0.1513	1.08	0.1766	1.06	0.0882	1.14[a]	0.0147	1.22[a]
(N=970)	(0.0582)	(0.1402)	(0.0575)	(0.1673)	(0.0576)	(0.0773)	(0.0576)	(0.0120)	(0.0578)
Month 36	0.7412[a]	0.6495	1.06	0.7625	0.99	0.3784	1.26[b]	0.1128	1.56[a]
(N=686)	(0.1746)	(0.6153)	(0.1729)	(0.7718)	(0.1733)	(0.2996)	(0.1733)	(0.0721)	(0.1735)
Month 60	0.7763[a]	1.1732	0.82[a]	1.4143	0.74[a]	0.6698	1.06	0.2003	1.48[a]
(N=381)	(0.1245)	(1.4353)	(0.1178)	(1.9223)	(0.1177)	(0.6296)	(0.1193)	(0.1353)	(0.1210)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 33: Cumulative Average Returns (CARs) for Alternative Benchmarks

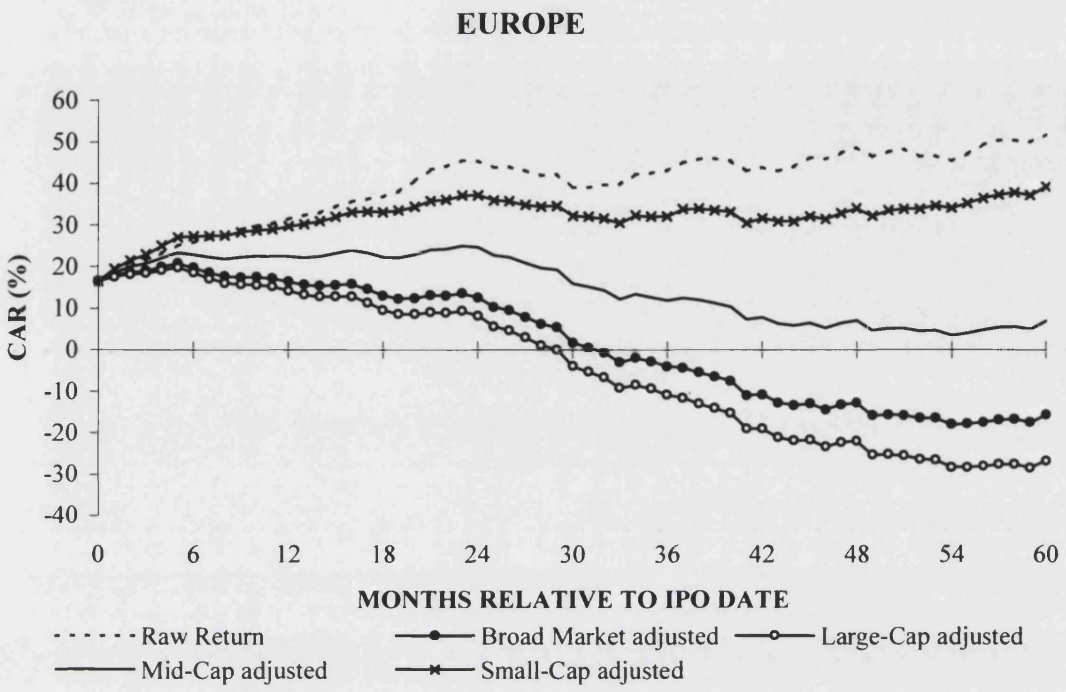
Aftermarket Returns are measured as Cumulative Average Returns (CARs) (not in percent), with associated Standard Errors (S.E.) (in parentheses) for 60 months after going public, excluding the initial returns. One month is defined as a consecutive 21-day trading interval using European trading days. The value-weighted Dow Jones STOXX size indices (Broad-Market, Large-Caps, Mid-Caps and Small Caps), excluding UK, were used as a proxy for the market benchmark respectively.

Month	IPO Return		Broad Market adjusted		Large-Cap adjusted		Mid-Cap adjusted		Small-Cap adjusted	
	CAR	S.E.	CAR	S.E.	CAR	S.E.	CAR	S.E.	CAR	S.E.
1	0.0312[a]	(0.0068)	0.0134[b]	(0.0066)	0.0106	(0.0067)	0.0208[a]	(0.0066)	0.0296[a]	(0.0066)
2	0.0461[a]	(0.0087)	0.0215[b]	(0.0084)	0.0166[b]	(0.0084)	0.0347[a]	(0.0084)	0.0500[a]	(0.0085)
3	0.0512[a]	(0.0105)	0.0252[a]	(0.0098)	0.0187[c]	(0.0098)	0.0431[a]	(0.0098)	0.0646[a]	(0.0098)
4	0.0678[a]	(0.0122)	0.0346[a]	(0.0112)	0.0263[b]	(0.0112)	0.0569[a]	(0.0113)	0.0857[a]	(0.0114)
5	0.0862[a]	(0.0141)	0.0432[a]	(0.0131)	0.0332[b]	(0.0131)	0.0685[a]	(0.0131)	0.1054[a]	(0.0133)
6	0.0933[a]	(0.0151)	0.0327[b]	(0.0141)	0.0203	(0.0142)	0.0636[a]	(0.0142)	0.1083[a]	(0.0143)
7	0.1036[a]	(0.0158)	0.0205	(0.0149)	0.0060	(0.0150)	0.0582[a]	(0.0149)	0.1091[a]	(0.0151)
8	0.1097[a]	(0.0165)	0.0115	(0.0156)	-0.0045	(0.0159)	0.0540[a]	(0.0156)	0.1094[a]	(0.0158)
9	0.1247[a]	(0.0173)	0.0093	(0.0162)	-0.0085	(0.0162)	0.0577[a]	(0.0162)	0.1176[a]	(0.0164)
10	0.1339[a]	(0.0179)	0.0097	(0.0171)	-0.0091	(0.0171)	0.0605[a]	(0.0170)	0.1227[a]	(0.0172)
11	0.1391[a]	(0.0183)	0.0069	(0.0176)	-0.0127	(0.0175)	0.0593[a]	(0.0174)	0.1246[a]	(0.0176)
12	0.1499[a]	(0.0197)	-0.0005	(0.0204)	-0.0226	(0.0188)	0.0588[a]	(0.0188)	0.1322[a]	(0.0190)
13	0.1588[a]	(0.0210)	-0.0081	(0.0201)	-0.0323	(0.0201)	0.0564[a]	(0.0200)	0.1374[a]	(0.0202)
14	0.1651[a]	(0.0226)	-0.0110	(0.0215)	-0.0370[c]	(0.0215)	0.0590[a]	(0.0214)	0.1440[a]	(0.0216)
15	0.1800[a]	(0.0240)	-0.0089	(0.0227)	-0.0368	(0.0228)	0.0673[a]	(0.0228)	0.1550[a]	(0.0228)
16	0.1917[a]	(0.0257)	-0.0065	(0.0242)	-0.0361	(0.0242)	0.0738[a]	(0.0242)	0.1662[a]	(0.0243)
17	0.1977[a]	(0.0264)	-0.0188	(0.0250)	-0.0512[b]	(0.0250)	0.0688[a]	(0.0251)	0.1673[a]	(0.0251)
18	0.2028[a]	(0.0272)	-0.0346	(0.0257)	-0.0694[a]	(0.0258)	0.0579[b]	(0.0258)	0.1662[a]	(0.0258)
19	0.2170[a]	(0.0275)	-0.0424	(0.0261)	-0.0794[a]	(0.0262)	0.0560[b]	(0.0262)	0.1697[a]	(0.0262)
20	0.2413[a]	(0.0282)	-0.0408	(0.0268)	-0.0795[a]	(0.0269)	0.0636[b]	(0.0270)	0.1793[a]	(0.0269)
21	0.2688[a]	(0.0292)	-0.0342	(0.0279)	-0.0743[a]	(0.0280)	0.0758[a]	(0.0281)	0.1930[a]	(0.0280)
22	0.2762[a]	(0.0290)	-0.0349	(0.0281)	-0.0758[a]	(0.0281)	0.0772[a]	(0.0282)	0.1959[a]	(0.0280)
23	0.2902[a]	(0.0295)	-0.0294	(0.0285)	-0.0717[b]	(0.0286)	0.0856[a]	(0.0286)	0.206[a]	(0.0285)
24	0.2893[a]	(0.0301)	-0.0388	(0.0291)	-0.0833[a]	(0.0292)	0.0817[a]	(0.0292)	0.2066[a]	(0.0291)
25	0.2733[a]	(0.0302)	-0.0621[b]	(0.0291)	-0.1088[a]	(0.0292)	0.0628[b]	(0.0293)	0.1945[a]	(0.0291)
26	0.2748[a]	(0.0305)	-0.0703[b]	(0.0294)	-0.1181[a]	(0.0295)	0.0572[c]	(0.0295)	0.1928[a]	(0.0294)
27	0.2661[a]	(0.0307)	-0.0860[a]	(0.0295)	-0.1351[a]	(0.0296)	0.0438	(0.0296)	0.1832[a]	(0.0295)
28	0.2548[a]	(0.0311)	-0.1022[a]	(0.0297)	-0.1538[a]	(0.0298)	0.0321	(0.0299)	0.1794[a]	(0.0299)
29	0.2574[a]	(0.0313)	-0.1109[a]	(0.0298)	-0.1645[a]	(0.0298)	0.0269	(0.0300)	0.1812[a]	(0.0299)
30	0.2250[a]	(0.0316)	-0.1482[a]	(0.0302)	-0.2043[a]	(0.0302)	-0.0060	(0.0302)	0.1567[a]	(0.0303)
31	0.2258[a]	(0.0319)	-0.1599[a]	(0.0303)	-0.2179[a]	(0.0304)	-0.0134	(0.0306)	0.1551[a]	(0.0305)
32	0.2315[a]	(0.0327)	-0.1718[a]	(0.0312)	-0.2315[a]	(0.0312)	-0.0223	(0.0313)	0.1505[a]	(0.0313)
33	0.2325[a]	(0.0342)	-0.1951[a]	(0.0323)	-0.2575[a]	(0.0324)	-0.0434	(0.0324)	0.1397[a]	(0.0325)
34	0.2569[a]	(0.0353)	-0.1850[a]	(0.0332)	-0.2495[a]	(0.0333)	-0.0317	(0.0333)	0.1579[a]	(0.0335)
35	0.2595[a]	(0.0365)	-0.1929[a]	(0.0342)	-0.2591[a]	(0.0343)	-0.0381	(0.0343)	0.1550[a]	(0.0344)
36	0.2658[a]	(0.0376)	-0.2052[a]	(0.0350)	-0.2742[a]	(0.0350)	-0.0467	(0.0351)	0.1552[a]	(0.0353)
37	0.2854[a]	(0.0383)	-0.2082[a]	(0.0356)	-0.2808[a]	(0.0357)	-0.0407	(0.0357)	0.1730[a]	(0.0359)
38	0.2938[a]	(0.0388)	-0.2199[a]	(0.0362)	-0.2947[a]	(0.0362)	-0.0451	(0.0363)	0.1742[a]	(0.0364)
39	0.2952[a]	(0.0391)	-0.2293[a]	(0.0365)	-0.3053[a]	(0.0365)	-0.0519	(0.0366)	0.1708[a]	(0.0368)

Appendix C *continued:*

40	0.2898[a] (0.0403)	-0.2399[a] (0.0378)	-0.3175[a] (0.0378)	-0.0607 (0.0379)	0.1658[a] (0.0381)
41	0.2651[a] (0.0389)	-0.2748[a] (0.0362)	-0.3548[a] (0.0362)	-0.0923[b] (0.0363)	0.1396[a] (0.0367)
42	0.2736[a] (0.0394)	-0.2732[a] (0.0368)	-0.3551[a] (0.0368)	-0.0874[b] (0.0370)	0.1511[a] (0.0373)
43	0.2652[a] (0.0400)	-0.2926[a] (0.0375)	-0.3767[a] (0.0375)	-0.1024[a] (0.0376)	0.1433[a] (0.0379)
44	0.2752[a] (0.0403)	-0.2986[a] (0.0376)	-0.3838[a] (0.0376)	-0.1065[a] (0.0377)	0.1436[a] (0.0381)
45	0.2968[a] (0.0413)	-0.2951[a] (0.0384)	-0.3826[a] (0.0385)	-0.1012[a] (0.0386)	0.1552[a] (0.0389)
46	0.2930[a] (0.0416)	-0.3097[a] (0.0386)	-0.3995[a] (0.0386)	-0.1133[a] (0.0388)	0.1490[a] (0.0392)
47	0.3083[a] (0.0440)	-0.2975[a] (0.0411)	-0.3882[a] (0.0411)	-0.1012[b] (0.0412)	0.1634[a] (0.0416)
48	0.3210[a] (0.0452)	-0.2934[a] (0.0423)	-0.3855[a] (0.0423)	-0.0946[b] (0.0425)	0.1742[a] (0.0429)
49	0.2990[a] (0.0450)	-0.3239[a] (0.0419)	-0.4188[a] (0.0419)	-0.1194[a] (0.0421)	0.1565[a] (0.0427)
50	0.3113[a] (0.0448)	-0.3212[a] (0.0420)	-0.4174[a] (0.0420)	-0.1141[a] (0.0422)	0.1696[a] (0.0427)
51	0.3181[a] (0.0455)	-0.3232[a] (0.0430)	-0.4205[a] (0.0430)	-0.1136[a] (0.0431)	0.1735[a] (0.0435)
52	0.3000[a] (0.0465)	-0.3296[a] (0.0444)	-0.4289[a] (0.0444)	-0.1200[a] (0.0445)	0.1733[a] (0.0449)
53	0.3011[a] (0.0464)	-0.3295[a] (0.0444)	-0.4305[a] (0.0443)	-0.1181[a] (0.0443)	0.1814[a] (0.0446)
54	0.2895[a] (0.0474)	-0.3448[a] (0.0451)	-0.4480[a] (0.0451)	-0.1310[a] (0.0450)	0.1756[a] (0.0454)
55	0.3057[a] (0.0481)	-0.3432[a] (0.0459)	-0.4483[a] (0.0459)	-0.1251[a] (0.0459)	0.1876[a] (0.0462)
56	0.3281[a] (0.0480)	-0.3394[a] (0.0459)	-0.4456[a] (0.0459)	-0.1167[b] (0.0459)	0.1991[a] (0.0462)
57	0.3385[a] (0.0493)	-0.3339[a] (0.0474)	-0.4413[a] (0.0474)	-0.1114[b] (0.0473)	0.2075[a] (0.0474)
58	0.3388[a] (0.0501)	-0.3322[a] (0.0482)	-0.4412[a] (0.0483)	-0.1094[b] (0.0480)	0.2127[a] (0.0482)
59	0.3347[a] (0.0505)	-0.3404[a] (0.0487)	-0.4501[a] (0.0487)	-0.1157[b] (0.0485)	0.2061[a] (0.0485)
60	0.3525[a] (0.0532)	-0.3220[a] (0.0506)	-0.4328[a] (0.0506)	-0.0964[c] (0.0505)	0.2263[a] (0.0506)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.



Appendix B, Figure 10. The Long-Run Performance of IPOs in Europe. Cumulative average returns (CARs) for an equally-weighted portfolio of European Initial Public Offerings, with monthly rebalancing, month 1 to 60. One month is defined as a consecutive 21-day trading interval using European trading days. Five CAR series are plotted for the first 60 months after the IPO date: 1) Raw returns (no adjustment), 2) broad-market adjustment using the STOXX broad-market index (value-weighted), excluding UK, 3) large-cap adjustment using the STOXX large-cap index (value-weighted), excluding UK, 4) mid-cap adjustment using the STOXX mid-cap index (value-weighted), excluding UK and 5) small-cap adjustment using the STOXX small-cap index (value-weighted), excluding UK. Month 0 is the initial return interval. Returns were calculated on the basis of final closing prices.

Appendix B: Alternative Performance Tests

Table 34: **Aftermarket Performance - constant sample size (686 IPOs)**

The sample contains 686 European IPOs between 1988 and 1997. Aftermarket returns are measured as equally-weighted buy-and-hold returns, whereas one month is defined as a consecutive 21-day trading interval from the first closing price, using European trading days. The value-weighted Dow Jones STOXX size indices (Broad-Market, Large-Caps, Mid-Caps and Small-Caps), excluding UK, were used as a proxy for the market benchmark. The wealth relative is the ratio of one plus the average aftermarket period buy-and-hold IPO return, divided by one plus the average aftermarket period benchmark buy-and-hold return. For example, for the month 36 adjustment of IPO returns for the movement in the broad-market benchmark, (1 + 0.6791)/(1+0.5947) = 1.05; Standard Errors (S.E.) in parentheses.

Panel A: Mean Aftermarket Performance of IPOs: All Market Conditions

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0233[a]	0.0164[a]	1.01	0.0184[a]	1.00	0.0120[a]	1.01[c]	0.0065[a]	1.02[a]
(N=686)	(0.0065)	(0.0016)	(0.0064)	(0.0017)	(0.0064)	(0.0016)	(0.0064)	(0.0016)	(0.0064)
Month 3	0.0682[a]	0.0473[a]	1.02[b]	0.0517[a]	1.02	0.0374[a]	1.03[a]	0.0244[a]	1.04[a]
(N=686)	(0.0110)	(0.0030)	(0.0105)	(0.0030)	(0.0106)	(0.0030)	(0.0105)	(0.0033)	(0.0105)
Month 12	0.3308[a]	0.1708[a]	1.14[b]	0.1933[a]	1.12[c]	0.1252[a]	1.18[a]	0.0418[a]	1.28[a]
(N=686)	(0.0788)	(0.0073)	(0.0780)	(0.0073)	(0.0780)	(0.0070)	(0.0781)	(0.0073)	(0.0784)
Month 36	0.6791[a]	0.5947[a]	1.05	0.7037[a]	0.99	0.3462[a]	1.25[c]	0.0951[a]	1.53[a]
(N=686)	(0.1746)	(0.0172)	(0.1729)	(0.0184)	(0.1729)	(0.0120)	(0.1733)	(0.0091)	(0.1735)
Month 60	0.5974[a]	0.6179[a]	0.99	1.1974[a]	0.73[a]	0.5313[a]	1.04	0.0933[a]	1.46[a]
(N=381)	(0.1245)	(0.0351)	(0.1204)	(0.0426)	(0.1177)	(0.0228)	(0.1193)	(0.0151)	(0.1209)

Panel B: Mean Aftermarket Performance of IPOs: Hot Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0369[a]	0.0231[a]	1.01	0.0252[a]	1.01	0.0168[a]	1.02[b]	0.0129[a]	1.02[b]
(N=389)	(0.0100)	(0.0022)	(0.0099)	(0.0023)	(0.0099)	(0.0020)	(0.0099)	(0.0022)	(0.0098)
Month 3	0.1119[a]	0.0759[a]	1.03[b]	0.0794[a]	1.03[c]	0.0633[a]	1.05[a]	0.0545[a]	1.05[a]
(N=389)	(0.0174)	(0.0036)	(0.0169)	(0.0037)	(0.0170)	(0.0035)	(0.0168)	(0.0035)	(0.0168)
Month 12	0.4752[a]	0.2238[a]	1.21[c]	0.2457[a]	1.18[c]	0.1661[a]	1.27[b]	0.0768[a]	1.37[a]
(N=389)	(0.1357)	(0.0108)	(0.1349)	(0.0110)	(0.1348)	(0.0098)	(0.1349)	(0.0100)	(0.1354)
Month 36	0.8568[a]	0.6120[a]	1.15	0.7244[a]	1.08	0.3146[a]	1.41[c]	0.0775[a]	1.72[a]
(N=389)	(0.3014)	(0.0239)	(0.2997)	(0.0255)	(0.2997)	(0.0151)	(0.3001)	(0.0124)	(0.3002)
Month 60	0.2795[b]	0.1264[a]	1.14	0.6066[a]	0.80[a]	0.2257[a]	1.04	-0.0903[a]	1.41[a]
(N=119)	(0.1231)	(0.0310)	(0.1228)	(0.0343)	(0.1229)	(0.0194)	(0.1212)	(0.0100)	(0.1222)

Panel C: Mean Aftermarket Performance of IPOs: Cold Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0054	0.0075[a]	1.00	0.0096[a]	1.00	0.0058[b]	1.00	-0.0019	1.01
(N=297)	(0.0072)	(0.0022)	(0.0071)	(0.0022)	(0.0071)	(0.0024)	(0.0071)	(0.0025)	(0.0072)
Month 3	0.0108	0.0097[b]	1.00	0.0156[a]	1.00	0.0033	1.01	-0.0151[a]	1.03[b]
(N=297)	(0.0107)	(0.0043)	(0.0101)	(0.0042)	(0.0101)	(0.0046)	(0.0101)	(0.0051)	(0.0103)
Month 12	0.1417[a]	0.1014[a]	1.04	0.1247[a]	1.02	0.0716[a]	1.07[b]	-0.0040	1.15[a]
(N=297)	(0.0369)	(0.0076)	(0.0349)	(0.0069)	(0.0350)	(0.0087)	(0.0349)	(0.0100)	(0.0355)
Month 36	0.4465[a]	0.5719[a]	0.92[c]	0.6766[a]	0.86[a]	0.3875[a]	1.04	0.1182[a]	1.29[a]
(N=297)	(0.0810)	(0.0243)	(0.0734)	(0.0262)	(0.0733)	(0.0191)	(0.0742)	(0.0133)	(0.0764)
Month 60	0.7418[a]	0.8412[a]	0.95	1.4657[a]	0.71[a]	0.6701[a]	1.04	0.1766[a]	1.48[a]
(N=262)	(0.1716)	(0.0425)	(0.1658)	(0.0522)	(0.1614)	(0.0281)	(0.1646)	(0.0194)	(0.1669)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 35: Aftermarket Performance of European IPOs - constant sample size (381 IPOs)

The sample contains 381 European IPOs between 1988 and 1995. Aftermarket returns are measured as equally-weighted buy-and-hold returns, whereas one month is defined as a consecutive 21-day trading interval from the first closing price, using European trading days. The value-weighted Dow Jones STOXX size indices (Broad-Market, Large-Caps, Mid-Caps and Small-Caps), excluding UK, were used as a proxy for the market benchmark. The wealth relative is the ratio of one plus the average aftermarket period buy-and-hold IPO return, divided by one plus the average aftermarket period benchmark buy-and-hold return. For example, for the month 36 adjustment of IPO returns for the movement in the broad-market benchmark, (1 + 0.6791)/(1+0.5947) = 1.05; Standard Errors (S.E.) in parentheses.

Panel A: Mean Aftermarket Performance of IPOs: All Market Conditions

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0144[b]	0.0118[a]	1.00	0.014[a]	1.00	0.009[a]	1.00	0.004[b]	1.01[c]
(N=381)	(0.0061)	(0.0020)	(0.0061)	(0.0020)	(0.0061)	(0.0020)	(0.0060)	(0.0021)	(0.0061)
Month 3	0.0379[a]	0.0226[a]	1.02[c]	0.027[a]	1.01	0.017[a]	1.02[b]	0.006	1.03[a]
(N=381)	(0.0094)	(0.0035)	(0.0088)	(0.0034)	(0.0089)	(0.0039)	(0.0088)	(0.0043)	(0.0088)
Month 12	0.1358[a]	0.0753[a]	1.06[b]	0.093[a]	1.04	0.054[a]	1.08[a]	-0.008	1.15[a]
(N=381)	(0.0294)	(0.0076)	(0.0278)	(0.0072)	(0.0279)	(0.0084)	(0.0277)	(0.0093)	(0.0281)
Month 36	0.3266[a]	0.4184[a]	0.94	0.517[a]	0.87[a]	0.262[a]	1.05	0.019	1.30[a]
(N=381)	(0.0632)	(0.0223)	(0.0568)	(0.0237)	(0.0569)	(0.0179)	(0.0572)	(0.0133)	(0.0588)
Month 60	0.5974[a]	0.6179[a]	0.99	1.1974[a]	0.73[a]	0.5313[a]	1.04	0.0933[a]	1.46[a]
(N=381)	(0.1245)	(0.0351)	(0.1204)	(0.0426)	(0.1177)	(0.0228)	(0.1193)	(0.0151)	(0.1209)

Panel B: Mean Aftermarket Performance of IPOs: Hot Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0363[a]	0.0207[a]	1.02	0.0225[a]	1.01	0.0171[a]	1.02[b]	0.0174[a]	1.02[c]
(N=119)	(0.0098)	(0.0033)	(0.0101)	(0.0035)	(0.0103)	(0.0032)	(0.0098)	(0.0030)	(0.0098)
Month 3	0.0952[a]	0.0505[a]	1.04[a]	0.0508[a]	1.04[a]	0.0476[a]	1.05[a]	0.0537[a]	1.04[b]
(N=119)	(0.0172)	(0.0046)	(0.0168)	(0.0046)	(0.0171)	(0.0057)	(0.0165)	(0.0052)	(0.0166)
Month 12	0.1334[a]	0.0290[c]	1.10[a]	0.0327[b]	1.10[a]	0.0313[c]	1.10[a]	0.0033	1.13[a]
(N=119)	(0.0393)	(0.0165)	(0.0365)	(0.0154)	(0.0369)	(0.0180)	(0.0361)	(0.0196)	(0.0363)
Month 36	-0.0199	0.0508[a]	0.93	0.1291[a]	0.87[b]	-0.0276	1.01	-0.1993[a]	1.22[a]
(N=119)	(0.0648)	(0.0158)	(0.0624)	(0.0144)	(0.0627)	(0.0168)	(0.0619)	(0.0166)	(0.0620)
Month 60	0.2795[b]	0.1264[a]	1.14	0.6066[a]	0.80[a]	0.2257[a]	1.04	-0.0903[a]	1.41[a]
(N=119)	(0.1231)	(0.0310)	(0.1228)	(0.0343)	(0.1229)	(0.0194)	(0.1212)	(0.0100)	(0.1222)

Panel C: Mean Aftermarket Performance of IPOs: Cold Markets

		IPO and Benchmark Returns							
Aftermarket	IPO Return	Broad-Market	Wealth Relative	Large-Caps	Wealth Relative	Mid-Caps	Wealth Relative	Small-Caps	Wealth Relative
Month 1	0.0044	0.0077[a]	1.00	0.0097[a]	0.99	0.0060[b]	1.00	-0.0018	1.01
(N=262)	(0.0077)	(0.0024)	(0.0076)	(0.0024)	(0.0076)	(0.0025)	(0.0075)	(0.0026)	(0.0076)
Month 3	0.0119	0.0099[b]	1.00	0.0157[a]	1.00	0.0034	1.01	-0.0152[a]	1.03[a]
(N=262)	(0.0109)	(0.0045)	(0.0102)	(0.0043)	(0.0102)	(0.0048)	(0.0103)	(0.0053)	(0.0104)
Month 12	0.1370[a]	0.0963[a]	1.04	0.1210[a]	1.01	0.0639[a]	1.07[b]	-0.0138	1.15[a]
(N=262)	(0.0389)	(0.0078)	(0.0369)	(0.0072)	(0.0370)	(0.0090)	(0.0369)	(0.0101)	(0.0375)
Month 36	0.4840[a]	0.5854[a]	0.94	0.6932[a]	0.88[a]	0.3931[a]	1.07	0.1186[a]	1.33[a]
(N=262)	(0.0854)	(0.0257)	(0.0777)	(0.0276)	(0.0777)	(0.0203)	(0.0783)	(0.0141)	(0.0806)
Month 60	0.7418[a]	0.8412[a]	0.95	1.4657[a]	0.71[a]	0.6701[a]	1.04	0.1766[a]	1.48[a]
(N=262)	(0.1716)	(0.0425)	(0.1658)	(0.0522)	(0.1614)	(0.0281)	(0.1646)	(0.0194)	(0.1669)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 36: Aftermarket Performance Categorized by Initial Return - constant sample size (686 IPOs)

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified initial return category and 0 otherwise. The initial return is the percentage difference from the final offering price to the first-day closing price and divided into four categories: IPOs with initial returns of not more than 0%, IPOs with more than 0% but less than 7% initial returns, IPOs with at least 7% but less than 20% initial returns and IPOs with more than 20% initial returns; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0069	-0.0323[b]	(0.0132)	0.0013	(0.0176)	0.0724[a]	(0.0179)	0.0886[a]	(0.0188)	686	152	199	185	150
Month 3	0.0290[b]	-0.0470[b]	(0.0219)	0.0202	(0.0291)	0.1118[a]	(0.0296)	0.1456[a]	(0.0311)	686	152	199	185	150
Month 12	0.1600[b]	-0.0707	(0.1658)	0.2302	(0.2202)	0.3567	(0.2237)	0.2993	(0.2352)	686	152	199	185	150
Month 36	0.0845	-0.3006	(0.3676)	0.6181	(0.4882)	0.2319	(0.4961)	0.6552	(0.5216)	686	152	199	185	150
Month 60	-0.0205	-0.1792	(0.2375)	-0.0035	(0.3140)	-0.1228	(0.3341)	1.1742[a]	(0.3779)	381	95	127	97	62

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0138	-0.0336[a]	(0.0239)	-0.0073[b]	(0.0314)	0.0781[a]	(0.0297)	0.0831[a]	(0.0297)	389	64	88	119	118
Month 3	0.0360[b]	-0.0468	(0.0412)	0.0179	(0.0541)	0.1166[b]	(0.0511)	0.1420[a]	(0.0512)	389	64	88	119	118
Month 12	0.2514[c]	-0.1664	(0.3328)	0.6430	(0.4373)	0.5374	(0.4126)	0.3561	(0.4133)	389	64	88	119	118
Month 36	0.2448	-0.5121	(0.7391)	1.5288	(0.9714)	0.5059	(0.9166)	0.8449	(0.9179)	389	64	88	119	118
Month 60	0.1531	0.1761	(0.2912)	0.0266	(0.4028)	-0.3238	(0.3597)	0.2747	(0.3684)	119	21	23	40	35

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0021	-0.0314[b]	(0.0125)	0.0082	(0.1670)	0.0634[a]	(0.0191)	0.1127[a]	(0.0242)	297	88	111	66	32
Month 3	0.0011	-0.0471[a]	(0.0177)	0.0221	(0.0236)	0.1030[a]	(0.0270)	0.1584[a]	(0.0342)	297	88	111	66	32
Month 12	0.0403	-0.0010	(0.0627)	-0.0746	(0.0839)	0.1339	(0.0957)	0.3737[a]	(0.1214)	297	88	111	66	32
Month 36	-0.1254[c]	-0.1468	(0.1339)	-0.0900	(0.1792)	-0.0346	(0.2045)	0.5819[b]	(0.2592)	297	88	111	66	32
Month 60	-0.0994	-0.2800	(0.3055)	0.0121	(0.3997)	-0.1302	(0.4632)	1.9807[a]	(0.5909)	262	74	104	57	27

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 37: Aftermarket Performance Categorized by Age - constant sample size (686 IPOs)

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i} and D_{2i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified age category and 0 otherwise. Age is defined as the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Observations of company age are divided into three categories: IPOs with age between 0-14 years (young firms), 15-36 years (medium-young firms) and IPOs older than 37 years (old firms); Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0069	0.0220[b]	(0.0103)	-0.0085	(0.0155)	-0.0399[a]	(0.0154)	686	262	210	214
Month 3	0.0290[b]	0.0661[a]	(0.0169)	-0.0573[b]	(0.0254)	-0.0887[a]	(0.0253)	686	262	210	214
Month 12	0.1600[b]	0.4254[a]	(0.1258)	-0.3845[b]	(0.1885)	-0.4722[b]	(0.1876)	686	262	210	214
Month 36	0.0845	0.5794[b]	(0.2792)	-0.7318[c]	(0.4186)	-0.8684[b]	(0.4164)	686	262	210	214
Month 60	-0.0205	0.0404	(0.2110)	0.1410	(0.3100)	-0.2554	(0.2852)	381	124	107	150

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0138	0.0360[b]	(0.0153)	-0.0250	(0.0231)	-0.0537[b]	(0.0246)	389	161	126	102
Month 3	0.0360[b]	0.1057[a]	(0.0259)	-0.1152[a]	(0.0392)	-0.1236[a]	(0.0417)	389	161	126	102
Month 12	0.2514[c]	0.6582[a]	(0.2085)	-0.6894[b]	(0.3146)	-0.6998[b]	(0.3347)	389	161	126	102
Month 36	0.2448	1.1135[b]	(0.4635)	-1.4614[b]	(0.6995)	-1.5079[b]	(0.7443)	389	161	126	102
Month 60	0.1531	0.2806	(0.2312)	-0.1643	(0.3224)	-0.1889	(0.3009)	119	34	36	49

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	-0.0021	-0.0003	(0.0122)	0.0175	(0.0180)	-0.0179	(0.0168)	297	101	84	112
Month 3	0.0011	0.0029	(0.0171)	0.0333	(0.0254)	-0.0298	(0.0236)	297	101	84	112
Month 12	0.0403	0.0542	(0.0595)	0.0947	(0.0883)	-0.1058	(0.0820)	297	101	84	112
Month 36	-0.1254[c]	-0.2720[b]	(0.1251)	0.4129[b]	(0.1857)	0.0791	(0.1726)	297	101	84	112
Month 60	-0.0994	-0.0503	(0.2830)	0.2647	(0.4261)	-0.3134	(0.3891)	262	90	71	101

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 38: Aftermarket Performance Categorized by Size - constant sample size (686 IPOs)

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, and D_{2i}, are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified size category and 0 otherwise. Size/Market Capitalization in €m is the number of shares issued times the final offer price and is expressed in constant end-1998 prices. Observations for size are divided into three categories: Firms with a first day market capitalization less than €100m (small firms), between €100 and €500m (medium firms) and exceeding €500m (large firms); Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0069	0.0344[a]	(0.0107)	-0.0467[a]	(0.0145)	-0.0341[c]	(0.0172)	686	242	290	154
Month 3	0.0290[b]	0.0660[a]	(0.0176)	-0.0799[a]	(0.0239)	-0.0503[c]	(0.0283)	686	242	290	154
Month 12	0.1600[b]	0.3112[b]	(0.1312)	-0.3113[c]	(0.1778)	-0.0857	(0.2105)	686	242	290	154
Month 36	0.0845	0.4670	(0.2910)	-0.5975	(0.3942)	-0.5786	(0.4667)	686	242	290	154
Month 60	-0.0205	0.2566	(0.2135)	-0.6038[b]	(0.2813)	-0.0731	(0.3184)	381	120	163	98

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0138	0.0427[a]	(0.0159)	-0.0477[b]	(0.0221)	-0.0451[c]	(0.0272)	389	149	162	78
Month 3	0.0360[b]	0.0896[a]	(0.0272)	-0.0943[b]	(0.0376)	-0.0713	(0.0463)	389	149	162	78
Month 12	0.2514[c]	0.4238[c]	(0.2179)	-0.4127	(0.3019)	-0.0023	(0.3717)	389	149	162	78
Month 36	0.2448	0.6823	(0.4847)	-0.6444	(0.6715)	-0.8436	(0.8268)	389	149	162	78
Month 60	0.1531	0.4713[b]	(0.2162)	-0.4704[c]	(0.2844)	-0.4622	(0.3286)	119	38	52	29

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	-0.0021	0.0209[c]	(0.0126)	-0.0427[a]	(0.0166)	-0.0179	(0.0188)	297	93	128	76
Month 3	0.0011	0.0281	(0.0179)	-0.0537[b]	(0.0235)	-0.0151	(0.0266)	297	93	128	76
Month 12	0.0403	0.1308[b]	(0.0622)	-0.1449[c]	(0.0818)	-0.1064	(0.0928)	297	93	128	76
Month 36	-0.1254[c]	0.1220	(0.1299)	-0.4658[a]	(0.1707)	-0.1825	(0.1937)	297	93	128	76
Month 60	-0.0994	0.1571	(0.2950)	-0.6674[c]	(0.3889)	0.0996	(0.4363)	262	82	111	69

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 39: Aftermarket Performance Categorized by Public Float - constant sample size (686 IPOs)

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified category of public float and 0 otherwise. Public Float is defined as the percentage of equity offered to the public at the IPO date. Observations on the public float are divided into four categories: Firms with less than 20% of public float, with at least 20% but less than 30% of public float, with at least 30% but less than 50% of public float, and at least 50% of public float; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0069	0.0402[a]	(0.0116)	-0.0272	(0.0174)	-0.0557[a]	(0.0167)	-0.0615[a]	(0.0187)	686	206	164	189	127
Month 3	0.0290[b]	0.0621[a]	(0.0192)	-0.0415	(0.0288)	-0.0567[b]	(0.0277)	-0.0848[a]	(0.0310)	686	206	164	189	127
Month 12	0.1600[b]	0.2106	(0.1424)	0.0741	(0.2139)	-0.0368	(0.2059)	-0.3121	(0.2306)	686	206	164	189	127
Month 36	0.0845	0.2513	(0.3158)	-0.2374	(0.4744)	0.0321	(0.4566)	-0.6423	(0.5114)	686	206	164	189	127
Month 60	-0.0205	0.2162	(0.2095)	-0.2859	(0.3195)	-0.3244	(0.3215)	-0.4907	(0.3556)	381	126	95	93	67

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0138	0.0535[a]	(0.0183)	-0.0256	(0.0265)	-0.0631[b]	(0.0264)	-0.0869[a]	(0.0292)	389	111	102	104	72
Month 3	0.0360[b]	0.0945[a]	(0.0315)	-0.0499	(0.0455)	-0.0765[c]	(0.0453)	-0.1347[a]	(0.0502)	389	111	102	104	72
Month 12	0.2514[c]	0.2682	(0.2530)	0.1593	(0.3656)	0.0247	(0.3637)	-0.3520	(0.4033)	389	111	102	104	72
Month 36	0.2448	0.3654	(0.5624)	-0.2107	(0.8127)	0.2581	(0.8086)	-0.7261	(0.8965)	389	111	102	104	72
Month 60	0.1531	0.0872	(0.2165)	0.1776	(0.3042)	-0.1006	(0.3605)	0.1641	(0.3852)	119	39	40	22	18

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0021	0.0246[b]	(0.0125)	-0.0361[c]	(0.0199)	-0.0475[a]	(0.0182)	-0.0301	(0.0206)	297	95	62	85	55
Month 3	0.0011	0.0243	(0.0178)	-0.0430	(0.0283)	-0.0342	(0.0259)	-0.0240	(0.0294)	297	95	62	85	55
Month 12	0.0403	0.1432[b]	(0.0613)	-0.0935	(0.0975)	-0.1152	(0.0892)	-0.2680[a]	(0.1012)	297	95	62	85	55
Month 36	-0.1254[c]	0.1180	(0.1289)	-0.3357	(0.2051)	-0.2506	(0.1876)	-0.5486[a]	(0.2129)	297	95	62	85	55
Month 60	-0.0994	0.2740	(0.2878)	-0.5870	(0.4624)	-0.4115	(0.4293)	-0.7416	(0.4795)	262	87	55	71	49

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 40: Aftermarket Performance Categorized by Sector - constant sample size (686 IPOs)

$$R_i = \alpha + \beta D_i + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_i is a (0,1) dummy variable taking the value of 0 if the firm belongs to a market sector defined as New Economy and 1 otherwise. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively. Old economy firms belong to all other sectors; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance Categorized by Market Sector: All Market Conditions

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0069	0.0391[a]	(0.0132)	-0.0418[a]	(0.0151)	686	159	527
Month 3	0.0290[b]	0.0903[a]	(0.0217)	-0.0904[a]	(0.0248)	686	159	527
Month 12	0.1600[b]	0.4728[a]	(0.1616)	-0.407[b]	(0.1844)	686	159	527
Month 36	0.0845	1.3080[a]	(0.3555)	-1.5930[a]	(0.4056)	686	159	527
Month 60	-0.0205	0.7982[a]	(0.2733)	-1.0110[a]	(0.3034)	381	72	309

Panel B: Aftermarket Performance Categorized by Market Sector: Hot Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0138	0.0529[a]	(0.0188)	-0.0538[b]	(0.0221)	389	106	283
Month 3	0.0360[b]	0.1093[a]	(0.0321)	-0.1007[a]	(0.0377)	389	106	283
Month 12	0.2514[c]	0.5382[b]	(0.2582)	-0.3941	(0.3027)	389	106	283
Month 36	0.2448	1.8065[a]	(0.5673)	-2.1470[a]	(0.6651)	389	106	283
Month 60	0.1531	0.5148[c]	(0.2663)	-0.4581	(0.2997)	119	25	94

Panel C: Aftermarket Performance Categorized by Market Sector: Cold Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	-0.0021	0.0114	(0.0168)	-0.0164	(0.0186)	297	53	244
Month 3	0.0011	0.0524	(0.0236)	-0.0625	(0.0261)	297	53	244
Month 12	0.0403	0.3420[a]	(0.0805)	-0.3663	(0.0888)	297	53	244
Month 36	-0.1254[c]	0.3109[c]	(0.1718)	-0.5310[a]	(0.1895)	297	53	244
Month 60	-0.0994	0.9490[b]	(0.3857)	-1.2780[a]	(0.4257)	262	47	215

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 41: OLS Regression Results for Aftermarket Performance - constant sample size (686 IPOs)

$$R_t = \alpha + \beta_1 IR_t + \beta_2 \text{Log}\,(1+age_i) + \beta_3 Market_i + \beta_4 \text{Log}(Size_i) + \beta_5 PublicFloat_i + \beta_6 D_i + \varepsilon_t$$

R_t is the raw return (not reported separately), measured from the first closing price. IR_t is the initial return, defined as the difference between the first closing price and the offering price. Log $(1+age_i)$ is the natural logarithm of one plus the difference between the year of going public and the year of foundation, with firms founded before 1901 assumed to be founded in 1901. $Market_i$ is the return on the value-weighted Dow Jones STOXX broad-market index for the same return interval as the dependent variable. Log $(Size_i)$ is the natural logarithm of inflation adjusted size/market capitalization, defined as the total number of shares issued times the first closing price. $PublicFloat_i$ is the Percentage of Equity offered to the public. D_i is a (0,1) Dummy variable taking on the value of 0 if the issuing firm belongs to a New Economy sector, and 1 otherwise. Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance Categorized by Size: All Market Conditions

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.162[b]	(0.0838)	0.680[a]	(0.1490)	0.109[a]	(0.0271)	-0.005	(0.0145)	-0.017[c]	(0.0102)	-0.086[a]	(0.0283)	0.029[c]	(0.0154)	0.086	686
Month 3	0.156	(0.0139)	1.019[a]	(0.1325)	0.105[b]	(0.0452)	-0.025	(0.0242)	-0.013	(0.0169)	-0.099[b]	(0.0472)	0.071[a]	(0.0259)	0.121	686
Month 12	0.063	(1.0465)	1.570[a]	(0.4152)	0.184	(0.3384)	-0.183	(0.1816)	0.040	(0.1267)	-0.524	(0.3545)	0.312	(0.1932)	0.034	686
Month 36	0.438	(2.3137)	0.480	(0.7465)	-0.196	(0.4008)	1.282[a]	(0.3892)	-0.047	(0.2790)	-0.862	(0.7806)	1.439[a]	(0.4259)	0.044	686
Month 60	0.045	(1.5609)	1.466[a]	(0.5574)	0.149	(0.2641)	0.950[a]	(0.1737)	-0.039	(0.1899)	-0.806	(0.5330)	0.934[a]	(0.3092)	0.116	381

Panel B: Aftermarket Performance Categorized by Size: Hot Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.232[c]	(0.1359)	0.658[a]	(0.2254)	0.065[c]	(0.0381)	-0.010	(0.0235)	-0.023	(0.0161)	-0.110[a]	(0.0440)	0.038[c]	(0.0229)	0.069	389
Month 3	0.315	(0.2348)	1.119[a]	(0.2411)	0.073	(0.0660)	-0.050	(0.0403)	-0.026	(0.0277)	-0.157[a]	(0.0760)	0.072[c]	(0.0394)	0.090	389
Month 12	0.052	(1.9095)	1.474[b]	(0.6549)	0.083	(0.5326)	-0.342	(0.3283)	0.084	(0.2243)	-0.695	(0.6165)	0.297	(0.3184)	0.024	389
Month 36	1.017	(4.2188)	0.095	(1.1723)	-0.636	(0.7309)	1.079	(0.6607)	-0.036	(0.4931)	-0.828	(1.3604)	1.955[a]	(0.7043)	0.040	389
Month 60	2.556	(1.7854)	0.557	(0.4746)	-0.228	(0.2906)	0.497	(0.3643)	-0.275	(0.2035)	0.102	(0.5341)	0.286	(0.3167)	0.073	119

Panel C: Aftermarket Performance Categorized by Size: Cold Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.044	(0.0883)	0.714[a]	(0.1757)	0.219[a]	(0.0379)	-0.002	(0.0154)	-0.005	(0.0110)	-0.048	(0.0306)	0.009	(0.0181)	0.155	297
Month 3	-0.093	(0.1306)	0.767[a]	(0.1367)	0.180[a]	(0.0555)	0.003	(0.0227)	0.009	(0.0163)	-0.022	(0.0450)	0.067[a]	(0.0271)	0.169	297
Month 12	0.328	(0.4430)	1.527	(0.2669)	0.304	(0.1897)	0.034	(0.0771)	-0.044	(0.0555)	-0.327	(0.1540)	0.309	(0.0931)	0.185	297
Month 36	0.514	(0.9272)	1.049[a]	(0.3974)	-0.300[c]	(0.1613)	1.423[a]	(0.1700)	-0.148	(0.1158)	-0.794[b]	(0.3214)	0.474[b]	(0.1899)	0.263	297
Month 60	-0.630	(2.1128)	2.437[a]	(0.9183)	0.272	(0.3631)	0.983[a]	(0.2388)	0.024	(0.2650)	-1.296[c]	(0.7414)	1.279[a]	(0.4302)	0.134	262

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 42: **Aftermarket Performance Categorized by Initial Return - constant sample size (381 IPOs)**

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified initial return category and 0 otherwise. The initial return is the percentage difference from the final offering price to the first-day closing price and divided into four categories: IPOs with initial returns of not more than 0%, IPOs with more than 0% but less than 7% initial returns, IPOs with at least 7% but less than 20% initial returns and IPOs with more than 20% initial returns; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0026	-0.0252[b]	(0.0118)	0.0047	(0.0156)	0.0471[a]	(0.0166)	0.0873[a]	(0.0187)	381	95	127	97	62
Month 3	0.0154[c]	-0.0303[c]	(0.0170)	0.0110	(0.0224)	0.0806[a]	(0.0239)	0.1319[a]	(0.0270)	381	95	127	97	62
Month 12	0.0606[b]	0.0408	(0.0550)	-0.0825	(0.0727)	0.0520	(0.0774)	0.2089[b]	(0.0875)	381	95	127	97	62
Month 36	-0.0918	-0.0574	(0.1171)	-0.1165	(0.1548)	-0.1320	(0.1648)	0.2814	(0.1864)	381	95	127	97	62
Month 60	-0.0205	-0.1792	(0.2375)	-0.0035	(0.3140)	-0.1228	(0.3341)	1.1742[a]	(0.3779)	381	95	127	97	62

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0156	-0.0117	(0.0237)	-0.0063	(0.0328)	0.0297	(0.0293)	0.0621[b]	(0.0300)	119	21	23	40	35
Month 3	0.0448[a]	-0.0021	(0.0396)	0.0069	(0.0548)	0.0444	(0.0489)	0.1042[b]	(0.0501)	119	21	23	40	35
Month 12	0.1044[a]	0.0410	(0.0877)	0.0918	(0.1214)	0.0513	(0.1083)	0.0966	(0.1110)	119	21	23	40	35
Month 36	-0.0707	0.0171	(0.1487)	0.0683	(0.2057)	-0.2038	(0.1836)	-0.1105	(0.1881)	119	21	23	40	35
Month 60	0.1531	0.1761	(0.2912)	0.0266	(0.4028)	-0.3238	(0.3597)	0.2747	(0.3684)	119	21	23	40	35

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0033	-0.0291[b]	(0.0137)	0.0079	(0.0179)	0.0536[a]	(0.0208)	0.1063[a]	(0.0265)	262	74	104	57	27
Month 3	0.0020	-0.0383[b]	(0.0184)	0.0137	(0.0241)	0.0942[a]	(0.0279)	0.1393[a]	(0.0356)	262	74	104	57	27
Month 12	0.0407	0.0408	(0.0678)	-0.1210	(0.0888)	0.0525	(0.1028)	0.3544[a]	(0.1312)	262	74	104	57	27
Month 36	-0.1014	-0.0785	(0.1497)	-0.1527	(0.1958)	-0.1127	(0.2269)	0.7140[b]	(0.2895)	262	74	104	57	27
Month 60	-0.0994	-0.2800	(0.3055)	0.0121	(0.3997)	-0.1302	(0.4632)	1.9807[a]	(0.5909)	262	74	104	57	27

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 43: **Aftermarket Performance Categorized by Age - constant sample size (381 IPOs)**

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i} and D_{2i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified age category and 0 otherwise. Age is defined as the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Observations of company age are divided into three categories: IPOs with age between 0-14 years (young firms), 15-36 years (medium-young firms) and IPOs older than 37 years (old firms); Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0026	0.0071[c]	(0.0106)	0.0090[b]	(0.0156)	-0.0180	(0.0144)	381	124	107	150
Month 3	0.0154[c]	0.0171	(0.0154)	0.0174	(0.2270)	-0.0168	(0.0208)	381	124	107	150
Month 12	0.0606[b]	0.0616	(0.0486)	0.0777	(0.0715)	-0.0580	(0.0657)	381	124	107	150
Month 36	-0.0918	-0.2012	(0.1024)	0.3494	(0.1504)	0.0483	(0.1384)	381	124	107	150
Month 60	-0.0205	0.0404	(0.2110)	0.1410	(0.3100)	-0.2554	(0.2852)	381	124	107	150

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	0.0156	0.0355[c]	(0.0190)	-0.0225	(0.0265)	-0.0325	(0.0247)	119	34	36	49
Month 3	0.0448[a]	0.0849[a]	(0.0314)	-0.0781[c]	(0.0437)	-0.0399	(0.0408)	119	34	36	49
Month 12	0.1044[a]	0.1795[a]	(0.0684)	-0.1294	(0.0953)	-0.0875	(0.0890)	119	34	36	49
Month 36	-0.0707	-0.0025	(0.1175)	-0.0882	(0.1638)	-0.1008	(0.1529)	119	34	36	49
Month 60	0.1531	0.2806	(0.2312)	-0.1643	(0.3224)	-0.1889	(0.3009)	119	34	36	49

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	Total	D=0	D=1	D=2
Month 1	-0.0033	-0.0037	(0.0128)	0.0213	(0.0193)	-0.0140	(0.0177)	262	90	71	191
Month 3	0.0020	-0.0090	(0.0172)	0.0571[b]	(0.0259)	-0.0130	(0.0236)	262	90	71	191
Month 12	0.0407	0.0171	(0.0624)	0.1674[c]	(0.0940)	-0.0564	(0.0858)	262	90	71	191
Month 36	-0.1014	-0.2762[b]	(0.1361)	0.5456[a]	(0.2049)	0.0994	(0.1871)	262	90	71	191
Month 60	-0.0994	-0.0503	(0.2830)	0.2647	(0.4261)	-0.3134	(0.3891)	262	90	71	101

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 44: **Aftermarket Performance Categorized by Size - constant sample size (381 IPOs)**

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, and D_{2i}, are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified size category and 0 otherwise. Size/Market Capitalization in €m is the number of shares issued times the final offer price and is expressed in constant end-1998 prices. Observations for size are divided into three categories: Firms with a first day market capitalization less than €100m (small firms), between €100 and €500m (medium firms) and exceeding €500m (large firms); Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0026	0.0224b	(0.0108)	-0.0357b	(0.0142)	-0.0179	(0.0161)	381	120	163	98
Month 3	0.0154[c]	0.0319	(0.0156)	-0.0376b	(0.0206)	-0.0021b	(0.0233)	381	120	163	98
Month 12	0.0606[b]	0.1252b	(0.0495)	-0.0983	(0.0653)	-0.0876	(0.0739)	381	120	163	98
Month 36	-0.0918	0.1247	(0.1037)	-0.4022a	(0.1366)	-0.1424	(0.1546)	381	120	163	98
Month 60	-0.0205	0.2566	(0.2135)	-0.6038[b]	(0.2813)	-0.0731	(0.3184)	381	120	163	98

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	0.0156	0.0331[c]	(0.0179)	-0.0305	(0.0236)	-0.0181	(0.0273)	119	38	52	29
Month 3	0.0448[a]	0.0748[b]	(0.0298)	-0.0531	(0.0393)	-0.0279	(0.0454)	119	38	52	29
Month 12	0.1044[a]	0.1783	(0.0646)	-0.0888	(0.0849)	-0.1440	(0.0981)	119	38	52	29
Month 36	-0.0707	0.0383	(0.1104)	-0.2054	(0.1452)	-0.0787	(0.1678)	119	38	52	29
Month 60	0.1531	0.4713[b]	(0.2162)	-0.4704[c]	(0.2844)	-0.4622	(0.3286)	119	38	52	29

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

								Number of Issues			
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	D=0	D=1	D=2	D=3
Month 1	-0.0033	0.0174	(0.0134)	-0.0381[b]	(0.0177)	-0.0173	(0.0198)	262	82	111	69
Month 3	0.0020	0.0121	(0.0182)	-0.0305	(0.0240)	0.0106	(0.0269)	262	82	111	69
Month 12	0.0407	0.1006	(0.0660)	-0.1030	(0.0870)	-0.0616	(0.0976)	262	82	111	69
Month 36	-0.1014	0.1647	(0.1427)	-0.4939a	(0.1882)	-0.1728	(0.2111)	262	82	111	69
Month 60	-0.0994	0.1571	(0.2950)	-0.6674[c]	(0.3889)	0.0996	(0.4363)	262	82	111	69

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 45: Aftermarket Performance Categorized by Public Float - constant sample size (381 IPOs)

$$R_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 D_{3i} + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_{1i}, D_{2i}, and D_{3i} are (0,1) dummy variables taking the value of 1 if the IPO falls into the specified category of public float and 0 otherwise. Public Float is defined as the percentage of equity offered to the public at the IPO date. Observations on the public float are divided into four categories: Firms with less than 20% of public float, with at least 20% but less than 30% of public float, with at least 30% but less than 50% of public float, and at least 50% of public float; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance of IPOs Categorized by Initial Return: All Market Conditions

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0026	0.0291[a]	(0.0105)	-0.0366[b]	(0.0160)	-0.0452[a]	(0.0161)	-0.0370[b]	(0.0178)	381	126	95	93	67
Month 3	0.0154[c]	0.0325[b]	(0.0153)	-0.0235	(0.0234)	-0.0286	(0.0235)	-0.0244	(0.0260)	381	126	95	93	67
Month 12	0.0606[b]	0.1267[a]	(0.0482)	-0.0280	(0.0735)	-0.1220[c]	(0.0740)	-0.1667[b]	(0.0818)	381	126	95	93	67
Month 36	-0.0918	0.0500	(0.1021)	-0.1596	(0.1557)	-0.1597	(0.1566)	-0.3142[c]	(0.1732)	381	126	95	93	67
Month 60	-0.0205	0.2162	(0.2095)	-0.2859	(0.3195)	-0.3244	(0.3215)	-0.4907	(0.3556)	381	126	95	93	67

Panel B: Aftermarket Performance of IPOs Categorized by Initial Return: Hot Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	0.0156	0.0472[a]	(0.0175)	-0.0476[c]	(0.0246)	-0.0402	(0.0292)	-0.0579[c]	(0.0312)	119	39	40	22	18
Month 3	0.0448[a]	0.0705[b]	(0.0296)	-0.0213	(0.0415)	-0.0669	(0.0492)	-0.0410	(0.0526)	119	39	40	22	18
Month 12	0.1044[a]	0.0740	(0.0638)	0.0882	(0.0896)	-0.0756	(0.1062)	0.0972	(0.1135)	119	39	40	22	18
Month 36	-0.0707	-0.1856[c]	(0.1082)	0.1584	(0.1521)	0.0180	(0.1802)	0.3859[b]	(0.1926)	119	39	40	22	18
Month 60	0.1531	0.0872	(0.2165)	0.1776	(0.3042)	-0.1006	(0.3605)	0.1641	(0.3852)	119	39	40	22	18

Panel C: Aftermarket Performance of IPOs Categorized by Initial Return: Cold Markets

										Number of Issues				
Aftermarket	R_i	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	Total	D=0	D=1	D=2	D=3
Month 1	-0.0033	0.0210	(0.0130)	-0.0343	(0.0209)	-0.0442[b]	(0.0194)	-0.0271	(0.0217)	262	87	55	71	49
Month 3	0.0020	0.0154	(0.0177)	-0.0357	(0.0285)	-0.0115	(0.0264)	-0.0152	(0.0295)	262	87	55	71	49
Month 12	0.0407	0.1503[b]	(0.0635)	-0.0978	(0.1021)	-0.1437	(0.0948)	-0.2679[b]	(0.1058)	262	87	55	71	49
Month 36	-0.1014	0.1557	(0.1389)	-0.3252	(0.2232)	-0.2473	(0.2072)	-0.5904[a]	(0.2314)	262	87	55	71	49
Month 60	-0.0994	0.2740	(0.2878)	-0.5870	(0.4624)	-0.4115	(0.4293)	-0.7416	(0.4795)	262	87	55	71	49

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 46: Aftermarket Performance Categorized by Sector - constant sample size (381 IPOs)

$$R_i = \alpha + \beta D_i + \varepsilon_i$$

The model is estimated for each of the return measurement horizons (1, 3, 12, 36 and 60 months) and for different market conditions (All Market Conditions, Hot Markets and Cold Markets). R_i is the broad-market-adjusted return. D_i is a (0,1) dummy variable taking the value of 0 if the firm belongs to a market sector defined as New Economy and 1 otherwise. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively. Old economy firms belong to all other sectors; Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance Categorized by Market Sector: All Market Conditions

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0026	0.0220	(0.0140)	-0.0243	(0.0155)	381	72	309
Month 3	0.0154[c]	0.0545[a]	(0.0202)	-0.0481[b]	(0.0224)	381	72	309
Month 12	0.0606[b]	0.2460[a]	(0.0632)	-0.2294[a]	(0.0702)	381	72	309
Month 36	-0.0918	0.2770[b]	(0.1337)	-0.445[a]	(0.1485)	381	72	309
Month 60	-0.0205	0.7982[a]	(0.2733)	-1.0110[a]	(0.3034)	381	72	309

Panel B: Aftermarket Performance Categorized by Market Sector: Hot Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	0.0156	0.0536[a]	(0.0218)	-0.0485[b]	(0.0246)	119	25	94
Month 3	0.0448[a]	0.0842[b]	(0.0367)	-0.0498	(0.0413)	119	25	94
Month 12	0.1044[a]	0.1239	(0.0800)	-0.0247	(0.0900)	119	25	94
Month 36	-0.0707	0.1063	(0.1355)	-0.2240	(0.1524)	119	25	94
Month 60	0.1531	0.5148[c]	(0.2663)	-0.4581	(0.2997)	119	25	94

Panel C: Aftermarket Performance Categorized by Market Sector: Cold Markets

						Number of Issues		
Aftermarket	R_i	α	S.E.	$\hat{\beta}$	S.E.	Total	D=0	D=1
Month 1	-0.0033	0.0053	(0.0178)	-0.0105	(0.0197)	262	47	215
Month 3	0.0020	0.0387	(0.0240)	-0.0447[c]	(0.0264)	262	47	215
Month 12	0.0407	0.3109[a]	(0.0852)	-0.3293[a]	(0.0941)	262	47	215
Month 36	-0.1014	0.3672[c]	(0.1882)	-0.5572[a]	(0.2077)	262	47	215
Month 60	-0.0994	0.9490[b]	(0.3857)	-1.2780[a]	(0.4257)	262	47	215

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix B: Alternative Performance Tests

Table 47: OLS Regression Results for Aftermarket Performance - constant sample size (381 IPOs)

$$R_t = \alpha + \beta_1 IR_t + \beta_2 \text{Log}\,(1+age_i) + \beta_3 Market_i + \beta_4 \text{Log}(Size_i) + \beta_5 PublicFloat_i + \beta_6 D_i + \varepsilon_t$$

R_t is the raw return (not reported separately), measured from the first closing price. IR_t is the initial return, defined as the difference between the first closing price and the offering price. Log $(1+age_i)$ is the natural logarithm of one plus the difference between the year of going public and the year of foundation, with firms founded before 1901 assumed to be founded in 1901. $Market_i$ is the return on the value-weighted Dow Jones STOXX broad-market index for the same return interval as the dependent variable. Log $(Size_i)$ is the natural logarithm of inflation adjusted size/market capitalization, defined as the total number of shares issued times the first closing price. $PublicFloat_i$ is the Percentage of Equity offered to the public. D_i is a (0,1) Dummy variable taking on the value of 0 if the issuing firm belongs to a New Economy sector, and 1 otherwise. Standard Errors (S.E.) in parentheses.

Panel A: Aftermarket Performance Categorized by Size: All Market Conditions

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.089	(0.0777)	0.634[a]	(0.1554)	0.114[a]	(0.0279)	0.003	(0.0132)	-0.010	(0.0094)	-0.056[b]	(0.0264)	0.017	(0.0154)	0.100	381
Month 3	-0.049	(0.1155)	0.893[a]	(0.1293)	0.116[a]	(0.0411)	0.011	(0.0198)	0.006	(0.0140)	-0.042	(0.0392)	0.046[b]	(0.0230)	0.156	381
Month 12	0.214	(0.3623)	1.264	(0.1875)	0.200	(0.1300)	0.016	(0.0615)	-0.023	(0.0440)	-0.213	(0.1234)	0.204	(0.0722)	0.144	381
Month 36	0.253	(0.7587)	1.342	(0.1329)	0.623	(0.2712)	0.166	(0.1283)	-0.088	(0.0920)	-0.453	(0.2588)	0.404	(0.1502)	0.239	381
Month 60	0.045	(1.5609)	1.466[a]	(0.5574)	0.149	(0.2641)	0.950[a]	(0.1737)	-0.039	(0.1899)	-0.806	(0.5330)	0.934[a]	(0.3092)	0.116	381

Panel B: Aftermarket Performance Categorized by Size: Hot Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.151	(0.1438)	0.200	(0.2871)	-0.010	(0.0392)	-0.001	(0.0234)	-0.013	(0.0163)	-0.075	(0.0431)	0.039	(0.0254)	0.066	119
Month 3	0.238	(0.2514)	0.823[b]	(0.3664)	0.040	(0.0676)	-0.010	(0.0414)	-0.020	(0.0285)	-0.075	(0.0752)	0.030	(0.0448)	0.067	119
Month 12	0.980	(0.5415)	0.917[a]	(0.2132)	0.048	(0.1444)	-0.097	(0.0892)	-0.094	(0.0617)	0.038	(0.1620)	-0.033	(0.0964)	0.162	119
Month 36	0.411	(0.9100)	1.066[a]	(0.3618)	-0.161	(0.2419)	-0.202	(0.1476)	-0.050	(0.1036)	0.475[c]	(0.2723)	0.213	(0.1614)	0.130	119
Month 60	2.556	(1.7854)	0.557	(0.4746)	-0.228	(0.2906)	0.497	(0.3643)	-0.275	(0.2035)	0.102	(0.5341)	0.286	(0.3167)	0.073	119

Panel C: Aftermarket Performance Categorized by Size: Cold Markets

Aftermarket	α	S.E.	$\hat{\beta}_1$	S.E.	$\hat{\beta}_2$	S.E.	$\hat{\beta}_3$	S.E.	$\hat{\beta}_4$	S.E.	$\hat{\beta}_5$	S.E.	$\hat{\beta}_6$	S.E.	R^2	N
Month 1	0.040	(0.0937)	0.752[a]	(0.1876)	0.210[a]	(0.0408)	0.002	(0.0162)	-0.006	(0.0117)	-0.047	(0.0327)	0.006	(0.0191)	0.145	262
Month 3	-0.166	(0.1324)	0.793[a]	(0.1437)	0.153[a]	(0.0569)	0.013	(0.0228)	0.017	(0.0165)	-0.021	(0.0459)	0.053	(0.0274)	0.167	262
Month 12	0.123	(0.4669)	1.553[a]	(0.2934)	0.294	(0.2021)	0.067	(0.0803)	-0.023	(0.0583)	-0.361[b]	(0.1638)	0.289[a]	(0.0984)	0.175	262
Month 36	0.524	(1.0024)	1.444[a]	(0.1871)	1.214[a]	(0.4365)	0.338[c]	(0.1722)	-0.151	(0.1253)	-0.942[a]	(0.3513)	0.552[a]	(0.2042)	0.266	262
Month 60	-0.630	(2.1128)	2.437[a]	(0.9183)	0.272	(0.3631)	0.983[a]	(0.2388)	0.024	(0.2650)	-1.296[c]	(0.7414)	1.279[a]	(0.4302)	0.134	262

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix C: Listing Requirements

Table 48: **Listing Requirements on European Market Segments**

These minimum listing requirements were in effect during 2001 and are also broadly applicable to the study period between 1988 and 1998. The number in parenthesis corresponds to the number of IPOs in the sample. This study does not include issues on the Italian Nuovo Mercato, Spanish Nuevo Mercado and SWX Swiss New Market. The Swedish *New Market* section includes IPOs going public on Aktietorget Norden AB and SBI AB.

Minimum Listing Requirements on Alternative Market Segments: Germany (Stock exchange operator: Deutsche Börse AG)		
Amtlicher Handel (Official Market) (80)	*Geregelter Markt (Official Parallel Market (89)*	*Neuer Markt (New Market) (50)*
Company should have existed for at least three years; a min. of 25% of nominal equity must be offered to the market; turnover between €50-100m with min. nominal stockholder equity of €1.25m; at least 50,000 shares must be offered with gross proceeds exceeding €25m; no stringent requirement concerning the use of funds; issuance of different share classes possible; no retention obligation for existing shareholders; operates under public law; in addition to the annual financial statements, a minimum of one interim report covering the first six months of the financial year is required; required to comply with ad-hoc publicity rules.	No set requirements for size of free float and for the company's minimum age; min. amount of shares issued: 10,000; companies going public usually have gross proceeds smaller than €25m and turnover smaller than €50-100m; the nominal stockholder equity must be at least €250,000; no stringent requirement concerning the use of funds; issuance of different share types possible; no set retention obligation for existing shareholders; operates under public law; in addition to the annual financial statements, a minimum of one interim report covering the first six months of the financial year is required; required to comply with ad-hoc publicity rules.	Company should have existed for at least one year (recently changed to three years); min. expected market capitalization: €5m; nominal stockholder equity: min. €250,000; number of shares for free float: min. 100,000; at least 25% of the shares widely held; at least 50% of the issue volume to be placed should originate from a capital increase; existing shareholders and issuer shall retain shares for the first six months following the IPO; established in 1997 to attract young, high growth companies; operates under private law; three quarterly reports per business year and one annual report are required; required to comply with ad-hoc publicity rules.
Minimum Listing Requirements on Alternative Market Segments: France (Stock exchange operator: SBF-Paris Bourse SA)		
Premier Marché (Official Market) (21)	*Second Marché (Official Parallel Market) (231)*	*Nouveau Marché (New Market) (71)*
Company must provide three years of certified consolidated statements; min. gross proceeds of €250m; at least 25% of the company must be publicly placed representing a min. of 600,000 shares; company must provide quarterly updates and half-year results and one annual report; listing applicable to large, established French and Foreign companies.	Company must provide certified consolidated accounts for the last two years prior to listing; min. size of the floatation between €10-20m; min. percentage of equity offered: 10%; company must provide quarterly updates and half-year results and one annual report; applicable to medium-sized companies (or large companies seeking an eventual listing on the Premier Marché); established in 1983.	No min. operating history; min. nominal equity: €250,000; min. no. of shares offered: 100,000 representing a float of at least €1.5m; for companies in existence of less than two years, offering must constitute a capital increase; management/personnel must keep 80% of shares for three years after the IPO; same reporting requirements as for other market segments; established in 1996.
Minimum Listing Requirments on Alternative Market Segments: Italy (Stock exchange operator: Borsa Italiana SpA)		
Borsa Valori (Official Market) (70)	*Mercato Ristretto (Official Parallel Market) (7)*	*Nuovo Mercato (New Market) (0)*
Company must provide three years of consolidated annual accounts; foreseeable market capitalization: at least €5m; may admit companies with lower market capitalization if deemed as adequate; min. public float: 25% of shares outstanding represented by shares of the same class.	Issuer must carry on, directly or through its subsidiaries, an activity capable of generating revenues; a foreseeable market capitalisation of at least €500,000; adequate distribution presumed to exist where shares representing at least 20 % of the capital represented by shares of the same class are distributed among the public.	Annual accounts published and filed for the last financial years; min. floatation: 20% of capital; min. nominal shareholder equity: €5m representing at least 100,000 shares; constant information and three quarterly financial reports; initial shareholders must keep 80% of their shares after quotation for one year; established in 1999.

Appendix C *continued:*

Minimum Listing Requirements on Alternative Market Segments: Netherlands (Stock exchange operator: Amsterdam Exchanges NV)		
Officiële Markt (Official Market) (56)	*Officiële Parallel Markt (Official Parallel Market) (8)*	*Nieuwe Markt (New Market) (11)*
Business run by the issuer must have a track record of at least three years; at the time of first admission at least three out of five issuer's book years preceding such admission must have closed with a net profit; issuer capital must amount to at least €5m; a min. of 10% of the capital placed must be available for trading; lock-up period: 180 days after the IPO.	Applicable to Dutch IPOs from 1988-1993; min. nominal value of shareholder equity: NGL4m; min. gross proceeds for an IPO: NGL2.5m; since 1994 the Official Parallel Market is closed for IPOs.	New economy stocks must have a track record of at least one year (other companies: three years); after admission to listing, at least 100,000 shares must be placed; tradable market value at least €5m; all listed companies are also required to satisfy the requirements that apply to the Official Market; quarterly figures and annual certified accounts; established in 1997.
Minimum Listing Requirements on Alternative Market Segments: Spain (Stock exchange operator: Bolsa de Madrid SA)		
Primer Mercado (Official Market) (56)	*Segundo Mercado (Official Parallel Market) (32)*	*Nuevo Mercado (New Market) (0)*
Provide audited financial statements for the three years prior to IPO; min. nominal shareholder equity: €1.5m, excluding stakes of 25% or more belonging to two shareholders; at least 100 shareholders must own less than 25% of the capital; (in the last two years before IPO or in three of the last five years) must have distributed a dividend of 6% of its capital.	Official prospectus has to be filed with the Spanish supervisory authority (CNMV); min. capital reserves of €250,000; in addition, 20% of the capital should be available for trading in the market; a security issue prospectus must be presented and other administrative and legal certificates provided.	Approved 1999, operational since 2000, to create a "special trading section for innovative, high technology companies offering considerable future growth prospects, although at higher levels of risk than the traditional sectors"; part of the continuous market, but subject to more information regulations than other market segments.
Minimum Listing Requirements on Alternative Market Segments: Sweden (Stock exchange operator: OM Stockholm Exchanges AB)		
A-list (Official Market) (15)	*OTC-list (Official Parallel Market) (52)*	*O-list (New Market) (81)*
Must have at least three years of verifiable history and possess documented profit earning capacity; have at least 2,000 shareholders; possess an ownership structure under which at least 25% of the equities in the company and 10% of the votes are owned by the general public; min. market value: SEK 300m; approval must be obtained from the Swedish Financial Supervisory Authority; dual class shares common.	Must have at least three years of verifiable history and possess documented profit earning capacity; have at least 500 shareholders; possess an ownership structure under which at least 25% of the equity in the company and 10% of the votes are owned by the general public; have a market value of at least SEK50m; approval must be obtained from the Swedish Financial Supervisory Authority.	No history and profit-earning capability requirement; required: at least 300 shareholders and an ownership structure under which at least 10% of the equity in the company and 10% of the votes are owned by the general public; approval granted by the Swedish Financial Supervisory Authority; dual class shares common (low voting B shares and high voting A shares).
Minimum Listing Requirements on Alternative Market Segments: Switzerland (Stock exchange operator: SWX Swiss Exchange AG)		
SWX Hauptsegment (Official Market) (35)	*SWX Nebensegment (Official Parallel Market) (8)*	*SWX New Market (New Market) (0)*
Issuer must present audited accounts covering three complete financial years; issuer must have a min. nominal equity of CHF25m; at least 25% of shares must be floated publicly; sustained or expected capitalisation of at least CHF25m; no set rules on lock-up periods for insiders; price sensitive facts and relevant company events must be disclosed; reports must be provided annually with semi-annual updates.	Applicable to Swiss IPOs issued during 1988; min. nominal value of shareholder equity: CHF1m; min. gross proceeds: CHF2.5m; applicable to small- and medium-sized companies.	Shareholders' equity must amount to at least CHF2.5m; min. 20% of the equity capital must be in diversified hands; total market cap: min. CHF8m; company must demonstrate an operating and financial track record extending over at least 12 months before the IPO; account must be in IAS or US GAAP; lock-up period: six months following the IPO; the IPO must involve a capital increase of at least 50%.

Appendix D: Tests of Country Differences

Table 49: Significance Tests of Country Differences categorized by IPO year - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two-samples test for Mean Difference. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Significance values correspond to p-values.

Panel A: IPO year 1988 - 1990

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.0425		0.4944	0.6169	0.8884	0.0061	0.1245	0.6326
France (FR)	-0.1248			0.2765	0.7339	0.0223	0.2624	0.4162
Italy (IT)	0.0389				0.6340	0.0031	0.0581	0.9116
Netherlands (NL)	-0.0675					0.0543	0.2862	0.6989
Spain (ES)	-0.3572						0.3347	0.0558
Sweden (SD)	-0.2617							0.2286
Switzerland (SW)	0.0757							

Panel B: IPO year 1991 - 1994

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3938		0.0024	0.1662	0.8588	0.6938	0.7986	0.4319
France (FR)	0.1560			0.0477	0.1494	0.0966	0.0062	0.5462
Italy (IT)	-0.6713				0.4772	0.1279	0.3837	0.2439
Netherlands (NL)	-0.3547					0.9526	0.7929	0.7742
Spain (ES)	-0.3357						0.6458	0.6197
Sweden (SD)	-0.4288							0.5084
Switzerland (SW)	-0.1784							

Panel C: IPO year 1995 - 1998

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	3.2408		0.0141	0.1345	0.3538	0.3662	0.2045	0.3665
France (FR)	-0.4217			0.3568	0.2114	0.7338	0.1469	0.7202
Italy (IT)	-0.8884				0.0128	0.0884	0.0136	0.0188
Netherlands (NL)	0.3397					0.4674	0.9147	0.4230
Spain (ES)	-0.1819						0.4950	0.9889
Sweden (SD)	0.2734							0.4726
Switzerland (SW)	-0.1746							

Appendix D: Tests of Country Differences

Table 50: Significance Tests of Country Differences categorized by IPO year - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Significance values correspond to p-values.

Panel A: IPO year 1988 - 1990

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.0425		0.8614	0.3618	0.6808	0.0054	0.1687	0.5074
France (FR)	-0.1248			0.3999	0.9559	0.0335	0.2999	0.6915
Italy (IT)	0.0389				0.4904	0.0008	0.0320	0.2661
Netherlands (NL)	-0.0675					0.2433	0.6440	0.9411
Spain (ES)	-0.3572						0.3223	0.5470
Sweden (SD)	-0.2617							0.9522
Switzerland (SW)	0.0757							

Panel B: IPO year 1991 - 1994

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3938		0.0063	0.1982	0.6732	0.6466	0.5185	0.8656
France (FR)	0.1560			0.0223	0.0818	0.1079	0.0064	0.3114
Italy (IT)	-0.6713				0.5962	0.1718	0.5301	0.3152
Netherlands (NL)	-0.3547					0.6092	0.9235	0.8513
Spain (ES)	-0.3357						0.5160	0.9588
Sweden (SD)	-0.4288							0.6447
Switzerland (SW)	-0.1784							

Panel C: IPO year 1995 - 1998

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	3.2408		0.0003	0.0062	0.9317	0.6711	0.8530	0.5838
France (FR)	-0.4217			0.7426	0.0057	0.1355	0.0024	0.0114
Italy (IT)	-0.8884				0.0202	0.1342	0.0113	0.0091
Netherlands (NL)	0.3397					0.7609	0.6173	0.7610
Spain (ES)	-0.1819						0.6390	0.3753
Sweden (SD)	0.2734							0.5734
Switzerland (SW)	-0.1746							

Appendix D: Tests of Country Differences

Table 51: Significance Tests of Country Differences categorized by Sector - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two-samples test for Mean Difference. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX sector classification standard. Significance values correspond to p-values.

Panel A: New Economy

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	6.2868		0.0291	0.5184	0.2847	0.6835	0.1499	0.3158
France (FR)	0.2404			0.5523	0.6555	0.9103	0.6504	0.7951
Italy (IT)	-0.7864				0.2839	0.2173	0.3289	0.1925
Netherlands (NL)	0.6375					0.7172	0.9249	0.4016
Spain (ES)	-0.0343						0.7584	0.9849
Sweden (SD)	0.5621							0.4712
Switzerland (SW)	-0.0197							

Panel B: Old Economy

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.0836		0.1234	0.1229	0.7405	0.3905	0.3223	0.9058
France (FR)	-0.3998			0.4565	0.4182	0.6428	0.7698	0.4000
Italy (IT)	-0.5415				0.1602	0.2080	0.2801	0.1208
Netherlands (NL)	-0.2054					0.6326	0.5419	0.8564
Spain (ES)	-0.3173						0.8585	0.5051
Sweden (SD)	-0.3484							0.4389
Switzerland (SW)	-0.1415							

Appendix D: Tests of Country Differences

Table 52: Significance Tests of Country Differences categorized by Sector - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. New Economy firms belong to Market Sectors 5, 13, 16 and 17, representing Technology, Media, Telecommunication and Healthcare, respectively, in the attached Dow Jones STOXX sector classification standard. Significance values correspond to p-values.

Panel A: New Economy

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	6.2868		0.0295	0.0943	0.4987	1.0000	0.2422	0.4852
France (FR)	0.2404			0.6297	0.1920	0.5371	0.3365	0.2951
Italy (IT)	-0.7864				0.2750	0.1333	0.3639	0.2121
Netherlands (NL)	0.6375					0.7485	0.7842	0.9826
Spain (ES)	-0.0343						0.6815	0.6593
Sweden (SD)	0.5621							0.7108
Switzerland (SW)	-0.0197							

Panel B: Old Economy

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.0836		0.1435	0.0841	0.6816	0.5138	0.3395	0.9817
France (FR)	-0.3998			0.6801	0.4718	0.5692	0.6099	0.3918
Italy (IT)	-0.5415				0.2899	0.3036	0.3523	0.2398
Netherlands (NL)	-0.2054					1.0000	0.8001	0.7589
Spain (ES)	-0.3173						0.7580	0.9537
Sweden (SD)	-0.3484							0.6776
Switzerland (SW)	-0.1415							

Appendix D: Tests of Country Differences

Table 53: Significance Tests of Country Differences categorized by Age - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two samples test for mean difference. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Age is the year of going public minus the year of foundation, with firms founded before 1901 assumed to be founded in 1901. Significance values correspond to p-values.

Panel A: Age < 15

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	4.0658		0.0119	0.1957	0.3582	0.3991	0.0912	0.3723
France (FR)	-0.1812			0.4537	0.3611	0.9888	0.8401	0.8706
Italy (IT)	-0.6383				0.0640	0.1892	0.2024	0.1045
Netherlands (NL)	0.4529					0.4296	0.3370	0.4908
Spain (ES)	-0.1695						0.8929	0.7965
Sweden (SD)	-0.0913							0.9466
Switzerland (SW)	-0.0558							

Panel B: 15 ≤ Age < 37

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.2714		0.6335	0.1978	0.3744	0.9792	0.8988	0.2655
France (FR)	-0.1255			0.2053	0.6976	0.6797	0.6378	0.7607
Italy (IT)	-0.5748				0.1523	0.3245	0.4108	0.1084
Netherlands (NL)	0.0465					0.4781	0.4593	0.9989
Spain (ES)	-0.2646						0.9071	0.4870
Sweden (SD)	-0.3051							0.4282
Switzerland (SW)	0.0457							

Panel C: Age ≥ 37

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3334		0.5620	0.7912	0.9685	0.5497	0.0649	0.8613
France (FR)	-0.4195			0.9090	0.7373	0.9828	0.1280	0.7343
Italy (IT)	-0.3846				0.8483	0.8878	0.3807	0.8199
Netherlands (NL)	-0.3263					0.6904	0.3690	0.9315
Spain (ES)	-0.4150						0.1690	0.6786
Sweden (SD)	0.1206							0.5466
Switzerland (SW)	-0.2910							

Appendix D: Tests of Country Differences

Table 54: Significance Tests of Country Differences categorized by Age - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. BHR_T is defined as the broad-market adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Age is the year of going public minus the year of foundation, with firm founded before 1901 assumed to be founded in 1901. Significance values correspond to p-values.

Panel A: Age < 15

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	4.0658		0.0077	0.0245	0.6949	0.7271	0.1253	0.7382
France (FR)	-0.1812			0.7495	0.1310	0.3303	0.2879	0.1693
Italy (IT)	-0.6383				0.1404	0.1368	0.1985	0.1693
Netherlands (NL)	0.4529					0.7739	0.4365	0.8902
Spain (ES)	-0.1695						0.7159	1.0000
Sweden (SD)	-0.0913							0.4525
Switzerland (SW)	-0.0558							

Panel B: 15 ≤ Age < 37

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.2714		0.7893	0.0995	0.8650	0.3028	0.3403	0.2970
France (FR)	-0.1255			0.2669	0.6421	0.9496	0.8142	0.3530
Italy (IT)	-0.5748				0.2451	0.2633	0.4919	0.0659
Netherlands (NL)	0.0465					0.6053	0.5271	0.3224
Spain (ES)	-0.2646						0.7066	0.0423
Sweden (SD)	-0.3051							0.1880
Switzerland (SW)	0.0457							

Panel C: Age ≥ 37

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3334		0.5951	0.4600	0.4763	0.6672	0.8016	0.2305
France (FR)	-0.4195			0.5551	0.9106	0.8540	0.4228	0.5334
Italy (IT)	-0.3846				0.6160	0.3275	0.8204	0.4639
Netherlands (NL)	-0.3263					0.6164	0.3690	0.4910
Spain (ES)	-0.4150						0.5987	0.2325
Sweden (SD)	0.1206							0.2105
Switzerland (SW)	-0.2910							

Appendix D: Tests of Country Differences

Table 55: Significance Tests of Country Differences categorized by Size - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two samples test for mean difference. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Size is the number of shares issued times the final offer price and is expressed in constant end-1998 prices. Significance values correspond to p-values.

Panel A: Small Firms

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	2.7667		0.0591	0.5909	0.6728	0.5593	0.2448	0.6141
France (FR)	-0.1796			0.6207	0.2244	0.7561	0.4031	0.7610
Italy (IT)	0.7470				0.0964	0.3649	0.3222	0.7532
Netherlands (NL)	0.8226					0.3383	0.3635	0.1113
Spain (ES)	0.0759						0.8723	0.4590
Sweden (SD)	0.1877							0.4404
Switzerland (SW)	-0.5262							

Panel B: Medium Firms

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.7080		0.2552	0.2846	0.5418	0.4164	0.3930	0.6880
France (FR)	-0.3596			0.1278	0.8595	0.8224	0.8508	0.2577
Italy (IT)	-0.7038				0.2154	0.1300	0.1496	0.0060
Netherlands (NL)	-0.4143					0.9959	0.9701	0.2168
Spain (ES)	-0.4130						0.9672	0.1311
Sweden (SD)	-0.4039							0.1711
Switzerland (SW)	-0.0110							

Panel C: Large Firms

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.1483		0.7865	0.5233	0.8531	0.2439	0.5712	0.9332
France (FR)	0.0357			0.4684	0.9843	0.0960	0.4651	0.9402
Italy (IT)	-0.1927				0.6799	0.4280	0.9355	0.5916
Netherlands (NL)	0.0469					0.3796	0.7022	0.9760
Spain (ES)	-0.3626						0.3760	0.1649
Sweden (SD)	-0.2176							0.5180
Switzerland (SW)	0.0736							

Appendix D: Tests of Country Differences

Table 56: Significance Tests of Country Differences categorized by Size - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Size is the number of shares issued times the final offer price and is expressed in constant end-1998 prices. Significance values correspond to p-values.

Panel A: Small Firms

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	2.7667		0.0173	0.0234	0.1000	0.3409	0.1988	0.1848
France (FR)	-0.1796			0.4736	0.0063	0.2418	0.0486	0.7087
Italy (IT)	0.7470				0.0320	0.0182	0.0572	0.1797
Netherlands (NL)	0.8226					0.0449	0.0382	0.0320
Spain (ES)	0.0759						0.8432	0.3845
Sweden (SD)	0.1877							0.4987
Switzerland (SW)	-0.5262							

Panel B: Medium Firms

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.7080		0.4631	0.0838	0.5212	0.6981	0.4996	0.2568
France (FR)	-0.3596			0.2492	0.9464	0.8203	0.9601	0.1565
Italy (IT)	-0.7038				0.3860	0.3085	0.3276	0.0399
Netherlands (NL)	-0.4143					0.6380	0.9348	0.2331
Spain (ES)	-0.4130						1.0000	0.1535
Sweden (SD)	-0.4039							0.1453
Switzerland (SW)	-0.0110							

Panel C: Large Firms

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.1483		0.4417	0.7867	0.0933	0.3983	1.0000	0.8643
France (FR)	0.0357			0.3806	0.0609	0.0789	0.4626	0.5063
Italy (IT)	-0.1927				0.3286	0.6281	0.9263	0.8648
Netherlands (NL)	0.0469					0.3070	0.2741	0.5109
Spain (ES)	-0.3626						0.5397	0.9799
Sweden (SD)	-0.2176							1.0000
Switzerland (SW)	0.0736							

Appendix D: Tests of Country Differences

Table 57: Significance Tests of Country Differences categorized by Public Float - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two samples test for Mean Difference. Public Float (%) is the percentage of equity offered. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Significance values correspond to p-values.

Panel A: Public Float < 20

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	3.6473		0.0053	0.5579	0.5293	0.4533	0.3760	NA
France (FR)	0.0000			0.9684	0.0024	0.8634	0.1005	NA
Italy (IT)	-0.1942				0.2744	0.7934	0.5063	NA
Netherlands (NL)	1.1441						0.4008	NA
Spain (ES)	-0.1151						0.4347	NA
Sweden (SD)	0.4311							NA
Switzerland (SW)	-0.4512							

Panel B: 20.0 ≤ Public Float < 30

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.1026		0.7838	0.2807	0.9386	0.3767	0.4899	NA
France (FR)	0.2882			0.4031	0.9273	0.5187	0.5448	NA
Italy (IT)	-0.3596				0.1800	0.8969	0.5899	NA
Netherlands (NL)	0.1600					0.0734	0.3419	NA
Spain (ES)	-0.3980						0.5267	NA
Sweden (SD)	-0.2082							NA
Switzerland (SW)	0.2882							

Panel C: 30.0 ≤ Public Float < 50

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	1.5246		0.2482	0.3896	0.5132	0.3843	0.5557	0.7584
France (FR)	-0.8811			0.8015	0.4811	0.0527	0.0465	0.2910
Italy (IT)	-0.7987				0.5505	0.0526	0.1224	0.0198
Netherlands (NL)	-0.6105					0.3166	0.2976	0.0809
Spain (ES)	-0.3787						0.2799	0.0591
Sweden (SD)	0.1558							0.9254
Switzerland (SW)	0.2440							

Panel D: Public Float ≥ 50.0

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3794		0.7905	0.1218	0.6566	0.7228	0.6721	0.5417
France (FR)	-0.5100			0.2082	0.9946	0.7478	0.9411	0.5222
Italy (IT)	-1.0803				0.1442	0.2862	0.1007	0.0494
Netherlands (NL)	-0.5129					0.5807	0.8999	0.3167
Spain (ES)	-0.2314						0.5288	0.9555
Sweden (SD)	-0.4807							0.2796
Switzerland (SW)	-0.2050							

Appendix D: Tests of Country Differences

Table 58: Significance Tests of Country Differences categorized by Public Float - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. Public Float (%) is the percentage of equity offered. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. Significance values correspond to p-values.

Panel A: Public Float < 20

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	3.6473		0.4827	0.7805	0.6121	0.5726	0.7951	0.9000
France (FR)	0.0000			0.6079	0.1246	0.4263	0.2785	0.9588
Italy (IT)	-0.1942				0.8577	0.8749	0.9260	0.8571
Netherlands (NL)	1.1441					0.8971	0.7561	0.9412
Spain (ES)	-0.1151						0.6683	0.5455
Sweden (SD)	0.4311							0.8000
Switzerland (SW)	-0.4512							

Panel B: 20.0 ≤ Public Float < 30

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.1026		0.1204	0.4717	0.2233	0.3629	0.6448	0.9545
France (FR)	0.2882			0.5895	0.1316	0.7345	0.4091	0.7273
Italy (IT)	-0.3596				0.0671	0.6937	0.7434	0.8571
Netherlands (NL)	0.1600					0.0950	0.3132	0.6667
Spain (ES)	-0.3980						0.7766	0.6667
Sweden (SD)	-0.2082							0.8000
Switzerland (SW)	0.2882							

Panel C: 30.0 ≤ Public Float < 50

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	1.5246		0.0001	0.0020	0.0347	0.1848	0.2026	0.4077
France (FR)	-0.8811			0.2571	0.1185	0.0010	0.0163	0.0224
Italy (IT)	-0.7987				0.4259	0.0098	0.1591	0.0339
Netherlands (NL)	-0.6105					0.1433	0.5076	0.1847
Spain (ES)	-0.3787						0.6820	0.3351
Sweden (SD)	0.1558							0.2362
Switzerland (SW)	0.2440							

Panel D: Public Float ≥ 50.0

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.3794		1.0000	0.0980	0.7735	0.8413	0.8851	0.5115
France (FR)	-0.5100			0.4286	0.9681	0.7354	0.9454	0.7051
Italy (IT)	-1.0803				0.1775	0.1570	0.1235	0.0488
Netherlands (NL)	-0.5129					0.8609	0.9183	0.3868
Spain (ES)	-0.2314						0.8397	0.5681
Sweden (SD)	-0.4807							0.3978
Switzerland (SW)	-0.2050							

Appendix D: Tests of Country Differences

Table 59: Significance Tests of Country Differences categorized by Initial Return - Mean Difference Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the conventional two samples test for Mean Difference. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. The initial return is the percentage difference from the final offering price to the first-day closing price. Significance values correspond to p-values.

Panel A: Initial Return ≤ 0

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.4822		0.5607	0.5534	0.1343	0.9570	0.7720	0.0814
France (FR)	-0.2936			0.4252	0.5902	0.6402	0.8266	0.4948
Italy (IT)	-0.6006				0.0582	0.4720	0.5881	0.0236
Netherlands (NL)	-0.0465					0.1292	0.5204	0.6862
Spain (ES)	-0.4931						0.7975	0.0354
Sweden (SD)	-0.3778							0.4602
Switzerland (SW)	0.1635							

Panel B: 0 < Initial Return < 7

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	1.0617		0.7031	0.5664	0.6020	0.5859	0.5057	0.6932
France (FR)	0.3852			0.3223	0.5148	0.4225	0.3090	0.6663
Italy (IT)	-0.6543				0.3271	0.2453	0.4617	0.1598
Netherlands (NL)	-0.1672					0.6889	0.5371	0.7872
Spain (ES)	-0.3216						0.7422	0.3608
Sweden (SD)	1.0617							0.2944
Switzerland (SW)	-0.0369							

Panel C: 7 ≤ Initial Return < 20

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.0599		0.5929	0.1370	0.5927	0.2243	0.7455	0.7655
France (FR)	-0.1535			0.2260	0.7949	0.3884	0.4181	0.9514
Italy (IT)	-0.7840				0.1894	0.2996	0.1065	0.1541
Netherlands (NL)	-0.3267					0.3454	0.4821	0.7878
Spain (ES)	-0.5578						0.1574	0.1965
Sweden (SD)	0.2366							0.6527
Switzerland (SW)	-0.2031							

Panel D: Initial Return ≥ 20.0

Country	BHR_T	Conventional two samples test for Mean Difference (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	4.1639		0.0383	0.2713	0.4614	0.2302	0.1494	0.5114
France (FR)	-0.6910			0.2152	0.0104	0.0665	0.0295	0.6283
Italy (IT)	-0.2076				0.2122	0.6326	0.5284	0.7519
Netherlands (NL)	0.8671					0.3193	0.3209	0.3765
Spain (ES)	0.0369						0.8740	0.5877
Sweden (SD)	0.1172							0.5396
Switzerland (SW)	-0.3940							

Appendix D: Tests of Country Differences

Table 60: Significance Tests of Country Differences categorized by Initial Return - Wilcoxon Rank Sum Test

In each Panel, we measure whether the adjusted long-run IPO performance in one country is significantly different from the adjusted long-run IPO performance in another country. This analysis is performed for 21 country pairs using the nonparametric Wilcoxon rank sum test. BHR_T is defined as the broad-market-adjusted buy-and-hold return from the first close to the third-year anniversary on the stock market, whereas one month is defined as a 21-day-trading period using local trading days. The initial return is the percentage difference from the final offering price to the first-day closing price. Significance values correspond to p-values.

Panel A: Initial Return ≤ 0

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	-0.4822		0.7001	0.7717	0.1434	0.6063	0.7465	0.0550
France (FR)	-0.2936			0.5018	0.3149	0.9076	0.5530	0.1838
Italy (IT)	-0.6006				0.0609	0.4641	0.9727	0.0655
Netherlands (NL)	-0.0465					0.3470	0.1454	0.8269
Spain (ES)	-0.4931						0.6748	0.1035
Sweden (SD)	-0.3778							0.0268
Switzerland (SW)	0.1635							

Panel B: 0 < Initial Return < 7

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	1.0617		0.7059	0.1374	0.2185	0.8875	0.1806	0.6404
France (FR)	0.3852			0.3248	0.8417	0.9661	0.5692	0.7309
Italy (IT)	-0.6543				0.5520	0.2754	0.5400	0.2737
Netherlands (NL)	-0.1672					0.2944	0.9014	0.8992
Spain (ES)	-0.3216						0.4307	0.6300
Sweden (SD)	1.0617							0.4840
Switzerland (SW)	-0.0369							

Panel C: 7 ≤ Initial Return < 20

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	0.0599		0.3823	0.0522	0.7035	0.0923	0.8010	0.9881
France (FR)	-0.1535			0.2375	0.8602	0.5414	0.6402	0.6825
Italy (IT)	-0.7840				0.3786	0.4211	0.1079	0.2051
Netherlands (NL)	-0.3267					0.2746	0.2039	0.4537
Spain (ES)	-0.5578						0.9852	0.9460
Sweden (SD)	0.2366							0.9812
Switzerland (SW)	-0.2031							

Panel D: Initial Return ≥ 20.0

Country	BHR_T	Nonparametric Wilcoxon rank sum test (p-value)						
		BD	FR	IT	NL	ES	SD	SW
Germany (BD)	4.1639		0.0115	0.5258	0.7540	0.5699	0.6974	0.5270
France (FR)	-0.6910			0.1232	0.0678	0.0498	0.0108	0.3555
Italy (IT)	-0.2076				0.6141	0.9869	0.6424	1.0000
Netherlands (NL)	0.8671					0.8933	0.9235	0.6461
Spain (ES)	0.0369						1.0000	0.9215
Sweden (SD)	0.1172							0.6638
Switzerland (SW)	-0.3940							

Appendix E: Sensitivity Analysis

Table 61: Relationship between findings in Chapter II and Chapter III

This table demonstrates performance differences between the empirical methodology used in Chapter II and Chapter III using two methods for calculating returns (BHRs and CARs). The main differences between the empirical methodology used in Chapter II and Chapter III are the following: 1) the use of a European trading day calendar (Chapter II) versus a local trading day calendar (Chapter III) (this results in a smaller sample size for the calculation of long-run returns in Chapter III (686 versus 677 companies)), 2) stock prices in Chapter II are converted into Euro (€), whenever appropriate, versus local currency units (Chapter III), and 3) the choice of a pan-European benchmark (Chapter II) versus national benchmarks (Chapter III). Returns were calculated as buy-and-hold returns (BHRs) and Cumulative Average Returns (CARs) from the close of the first day of trading to the three-year anniversary on the stock markets with one month defined as a 21-day-trading interval. In this table, returns are reported as RAW returns (no adjustment) and returns adjusted for movements in the broad market (ADJ). The Dow Jones Eurostoxx broad-market index (Chapter II) and the respective national broad-market indices (Chapter III) are used as benchmarks. The large difference in the RAW and ADJ returns using both return methodologies between Panel A and Panel B in French IPOs is due to the additional four companies available for calculating three-year returns in Chapter II. When excluding those companies from calculation in Chapter II, the increase in French BHRs, amounts to 52.49 percent versus 47.80 reported.

Panel A: Pan-European Study (Chapter II)

			Return Methodology							
			Buy-and-Hold Returns (BHRs)				Cumulative Average Returns (CARs)			
Country	No	%	RAW	S.E.	ADJ	S.E.	RAW	S.E.	ADJ	S.E.
Germany	156	22.7	1.3654[b]	(0.7206)	0.8872	(0.7159)	0.2279[a]	(0.0447)	-0.1557[a]	(0.0572)
France	217	31.6	0.4780[a]	(0.1337)	-0.2135	(0.1326)	0.2892[b]	(0.1210)	-0.2511[c]	(0.1525)
Italy	58	8.5	0.1789	(0.1119)	-0.4470[a]	(0.1009)	0.1161	(0.0974)	-0.3758[a]	(0.0910)
Netherlands	68	9.9	-0.0303	(0.1617)	-0.4083[a]	(0.1411)	-0.1324	(0.0992)	-0.4608[a]	(0.1214)
Spain	55	8.0	0.7237[a]	(0.2549)	0.1506	(0.2396)	0.3847[a]	(0.1446)	-0.0720	(0.0921)
Sweden	101	14.7	0.8281[a]	(0.1997)	0.1515	(0.1870)	0.5293[a]	(0.0961)	0.0048	(0.0594)
Switzerland	31	4.5	0.5616[a]	(0.1997)	-0.1296	(0.1949)	0.3756[b]	(0.1566)	-0.1730	(0.1330)
All	686	100.0	0.6791[a]	(0.1746)	0.0844	(0.1729)	0.2658[a]	(0.0376)	-0.2052[a]	(0.0349)

Panel B: Individual-Country Study (Chapter III)

			Return Methodology							
			Buy-and-Hold Returns (BHRs)				Cumulative Average Returns (CARs)			
Country	No	%	RAW	S.E.	ADJ	S.E.	RAW	S.E.	ADJ	S.E.
Germany	155	22.9	1.3892[c]	(0.7369)	0.9850	(0.7318)	0.2301[a]	(0.0448)	-0.1166[a]	(0.0439)
France	213	31.5	0.5369[a]	(0.1490)	-0.2074	(0.1483)	0.3717[a]	(0.1413)	-0.1901	(0.1388)
Italy	58	8.6	0.1794	(0.1171)	-0.4924[a]	(0.1050)	0.1104	(0.0940)	-0.4185[a]	(0.0918)
Netherlands	68	10.0	-0.0465	(0.2481)	-0.3089[c]	(0.1068)	-0.1433	(0.1055)	-0.3021[a]	(0.0865)
Spain	53	7.8	0.7369[a]	(0.2763)	0.0727	(0.2791)	0.3725[a]	(0.1413)	-0.1558	(0.1248)
Sweden	99	14.6	0.7290[a]	(0.1887)	-0.0725	(0.1747)	0.4786[a]	(0.0916)	-0.1270	(0.0789)
Switzerland	31	4.6	0.5595[a]	(0.2014)	-0.0943	(0.1840)	0.3510[b]	(0.1479)	-0.1817	(0.1378)
All	677	100.0	0.6888[a]	(0.1802)	0.0616	(0.1786)	0.2762[a]	(0.0387)	-0.1973[a]	(0.0340)

[a,b,c] denote statistical significance at the 0.01, 0.05, and 0.10 levels, respectively, based on a simple t-test.

Appendix F: DCA and IS Methodology

Table 62: **Specimen Balance Sheet and Profit and Loss Account**

For each individual German Initial Public Offerings (IPO), we collected the information for calculating the proxies for earnings management (the Discretionary Current Accrual (DCA) and Income Smoothing (IS) coefficients) from balance sheet and profit and loss accounts based on the full version (Vollbilanz) available from Hoppenstedt Finanzinformationen GmbH (in English and German language), a Germany-based provider of financial data.

row		row	
1	Name: Company XYZ (Version in English)	1	Name: Firma XYZ (Version in German)
2	Date	2	Datum
3	**ASSETS**	3	**AKTIVA**
4	outstanding contributions to subscribed capital	4	Ausstehende Einlagen
5	.thereof called-in	5	.(davon eingefordert)
6	expenses for starting up + extending business operations	6	Aufw. f. Ingangsetz./Erweit. Geschäftsb.
7	fixed assets	7	Anlagevermögen
8	.gross values at the beginning of the year	8	.Anfangsbestand
9	.additions	9	.Zugänge
10	.appreciation/write-ups	10	.Zuschreibungen
11	.disposals	11	.Abgänge
12	.other changes	12	.Sonstige Veränderungen
13	..additions incl changes in scope of consolidation	13	..(dav. Zug. incl. Veränd. Kons.kreis)
14	.accumulated depreciation and write-downs	14	.Kumulierte Abschreibungen
15	..thereof depreciation during the year	15	..(davon Geschäftsjahresabschreibungen)
16	..thereof appreciation/write-ups under depreciation	16	..(dav. Zuschr. b. Abschr.)
17	.intangible assets	17	.Immaterielle Vermögensgegenstände
18	..gross values at the beginning of the year	18	..Anfangsbestand
19	..additions	19	..Zugänge
20	..appreciation/write-ups	20	..Zuschreibungen
21	..disposals	21	..Abgänge
22	..other changes	22	..Sonstige Veränderungen
23	...additions incl changes in scope of consolidation	23	...(dav. Zug. incl. Veränd. Kons.kreis)
24	..accumulated depreciation and write-ups	24	..Kumulierte Abschreibungen
25	...thereof depreciation during the year	25	...(dav. Geschäftsjahresabschreib.)
26	...thereof appreciation/write-ups under depreciation	26	...(dav. Zuschr. b. Abschr.)
27	..franchises, patents/similar rights/assets & licences	27	..Konzessionen
28	...gross values at the beginning of the year	28	...Anfangsbestand
29	...additions	29	...Zugänge
30	...appreciation/write-ups	30	...Zuschreibungen
31	...disposals	31	...Abgänge
32	...other changes	32	...Sonstige Veränderungen
33	....additions incl changes in scope of consolidation	33	....(dav. Zug. incl. Veränd. Kons.kreis)
34	...accumulated depreciation and write-ups	34	...Kumulierte Abschreibungen
35	....thereof depreciation during the year	35	....(dav. Geschäftsjahresabschreib.)
36	....thereof appreciation/write-ups under depreciation	36	....(dav. Zuschr. b. Abschr.)
37	..goodwill (from indiv statements/capital consolidation)	37	..Geschäfts- oder Firmenwert
38	...thereof goodwill from capital consolidation	38	...(dav. Unterschiedsbetrag aus Konsol.
39	...gross values at the beginning of the year	39	...Anfangsbestand
40	...additions	40	...Zugänge
41	...appreciation/write-ups	41	...Zuschreibungen
42	...disposals	42	...Abgänge
43	...other changes	43	...Sonstige Veränderungen
44	....additions incl changes in scope of consolidation	44	....(dav. Zug. incl. Veränd. Kons.kreis)
45	...accumulated depreciation and write-ups	45	...Kumulierte Abschreibungen
46	....thereof depreciation during the year	46	....(dav. Geschäftsjahresabschreib.)
47	....thereof appreciation/write-ups under depreciation	47	....(dav. Zuschr. b. Abschr.)
48	..advance payments	48	..Geleistete Anzahlungen
49	...gross values at the beginning of the year	49	...Anfangsbestand
50	...additions	50	...Zugänge
51	...appreciation/write-ups	51	...Zuschreibungen
52	...disposals	52	...Abgänge
53	...other changes	53	...Sonstige Veränderungen
54	....additions incl changes in scope of consolidation	54	....(dav. Zug. incl. Veränd. Kons.kreis)
55	...accumulated depreciation and write-ups	55	...Kumulierte Abschreibungen
56	....thereof depreciation during the year	56	....(dav. Geschäftsjahresabschreib.)
57	....thereof appreciation/write-ups under depreciation	57	....(dav. Zuschr. b. Abschr.)

APPENDIX F *continued*:

58	.fixed tangible assets	58	.Sachanlagen
59	..gross values at the beginning of the year	59	..Anfangsbestand
60	..additions	60	..Zugänge
61	..appreciation/write-ups	61	..Zuschreibungen
62	..disposals	62	..Abgänge
63	..other changes	63	..Sonstige Veränderungen
64	...additions incl changes in scope of consolidation	64	...(dav. Zug. incl. Veränd. Kons.kreis)
65	..accumulated depreciation and write-ups	65	..Kumulierte Abschreibungen
66	...thereof depreciation during the year	66	...(dav. Geschäftsjahresabschreib.)
67	...thereof appreciation/write-ups under depreciation	67	...(dav. Zuschr. b. Abschr.)
68	..real estate, leasehold rights	68	..Grundstücke
69	...gross values at the beginning of the year	69	...Anfangsbestand
70	...additions	70	...Zugänge
71	...appreciation/write-ups	71	...Zuschreibungen
72	...disposals	72	...Abgänge
73	...other changes	73	...Sonstige Veränderungen
74	....additions incl changes in scope of consolidation	74	....(dav. Zug. incl. Veränd. Kons.kreis)
75	...accumulated depreciation and write-ups	75	...Kumulierte Abschreibungen
76	....thereof depreciation during the year	76	....(dav. Geschäftsjahresabschreib.)
77	....thereof appreciation/write-ups under depreciation	77	....(dav. Zuschr. b. Abschr.)
78	..technical equipment and machinery	78	..Technische Anlagen und Maschinen
79	...gross values at the beginning of the year	79	...Anfangsbestand
80	...additions	80	...Zugänge
81	...appreciation/write-ups	81	...Zuschreibungen
82	...disposals	82	...Abgänge
83	...other changes	83	...Sonstige Veränderungen
84	....additions incl changes in scope of consolidation	84	....(dav. Zug. incl. Veränd. Kons.kreis)
85	...accumulated depreciation and write-ups	85	...Kumulierte Abschreibungen
86	....thereof depreciation during the year	86	....(dav. Geschäftsjahresabschreib.)
87	....thereof appreciation/write-ups under depreciation	87	....(dav. Zuschr. b. Abschr.)
88	..other equipment, fixtures and office equipment	88	..And. Anlagen
89	...gross values at the beginning of the year	89	...Anfangsbestand
90	...additions	90	...Zugänge
91	...appreciation/write-ups	91	...Zuschreibungen
92	...disposals	92	...Abgänge
93	...other changes	93	...Sonstige Veränderungen
94	....additions incl changes in scope of consolidation	94	....(dav. Zug. incl. Veränd. Kons.kreis)
95	...accumulated depreciation and write-ups	95	...Kumulierte Abschreibungen
96	....thereof depreciation during the year	96	....(dav. Geschäftsjahresabschreib.)
97	....thereof appreciation/write-ups under depreciation	97	....(dav. Zuschr. b. Abschr.)
98	..advance payments and construction in progress	98	..Geleistete Anzahlungen/Anlagen im Bau
99	...gross values at the beginning of the year	99	...Anfangsbestand
100	...additions	100	...Zugänge
101	...appreciation/write-ups	101	...Zuschreibungen
102	...disposals	102	...Abgänge
103	...other changes	103	...Sonstige Veränderungen
104	....additions incl changes in scope of consolidation	104	....(dav. Zug. incl. Veränd. Kons.kreis)
105	...accumulated depreciation and write-ups	105	...Kumulierte Abschreibungen
106	....thereof depreciation during the year	106	....(dav. Geschäftsjahresabschreib.)
107	....thereof appreciation/write-ups under depreciation	107	....(dav. Zuschr. b. Abschr.)
108	..fixed assets leased to customers	108	..Vermietete Anlagengegenstände
109	...gross values at the beginning of the year	109	...Anfangsbestand
110	...additions	110	...Zugänge
111	...appreciation/write-ups	111	...Zuschreibungen
112	...disposals	112	...Abgänge
113	...other changes	113	...Sonstige Veränderungen
114	....additions incl changes in scope of consolidation	114	....(dav. Zug. incl. Veränd. Kons.kreis)
115	...accumulated depreciation and write-ups	115	...Kumulierte Abschreibungen
116	....thereof depreciation during the year	116	....(dav. Geschäftsjahresabschreib.)
117	....thereof appreciation/write-ups under depreciation	117	....(dav. Zuschr. b. Abschr.)
118	.financial assets	118	.Finanzanlagen
119	..thereof with a remaining term exceeding 1 year	119	..(davon mit Restlaufzeit über 1 Jahr)
120	..thereof to members of company boards	120	..(dav. an Mitgl. v. Gesellschaftsorg.)
121	..thereof to partners	121	..(davon an Gesellschafter)
122	..gross values at the beginning of the year	122	..Anfangsbestand

APPENDIX F *continued*:

123 ..additions	123 ..Zugänge
124 ..appreciation/write-ups	124 ..Zuschreibungen
125 ..disposals	125 ..Abgänge
126 ..other changes	126 ..Sonstige Veränderungen
127 ...additions incl changes in scope of consolidation	127 ...(dav. Zug. incl. Veränd. Kons.kreis)
128 ..accumulated depreciation and write-ups	128 ..Kumulierte Abschreibungen
129 ...thereof depreciation during the year	129 ...(dav. Geschäftsjahresabschreib.)
130 ...thereof appreciation/write-ups under depreciation	130 ...(dav. Zuschr. b. Abschr.)
131 ..shares in affiliated companies	131 ..Anteile an verbunden Unternehmen
132 ...gross values at the beginning of the year	132 ...Anfangsbestand
133 ...additions	133 ...Zugänge
134 ...appreciation/write-ups	134 ...Zuschreibungen
135 ...disposals	135 ...Abgänge
136 ...other changes	136 ...Sonstige Veränderungen
137 ....additions incl changes in scope of consolidation	137 ....(dav. Zug. incl. Veränd. Kons.kreis)
138 ...accumulated depreciation and write-ups	138 ...Kumulierte Abschreibungen
139 ....thereof depreciation during the year	139 ....(dav. Geschäftjahresabschreib.)
140 ....thereof appreciation/write-ups under depreciation	140 ....(dav. Zuschr. b. Abschr.)
141 ..shares in associated companies	141 ..Ant. an assoz. Untern.
142 ...thereof goodwill from equity consolidation	142 ...(dav. Untersch.Betrag aus Equ.-Kons.)
143 ...gross values at the beginning of the year	143 ...Anfangsbestand
144 ...additions	144 ...Zugänge
145 ...appreciation/write-ups	145 ...Zuschreibungen
146 ...disposals	146 ...Abgänge
147 ...other changes	147 ...Sonstige Veränderungen
148 ....additions incl changes in scope of consolidation	148 ....(dav. Zug. incl. Veränd. Kons.kreis)
149 ...accumulated depreciation and write-ups	149 ...Kumulierte Abschreibungen
150 ....thereof depreciation during the year	150 ....(dav. Geschäftjahresabschreib.)
151 ....thereof appreciation/write-ups under depreciation	151 ....(dav. Zuschr. b. Abschr.)
152 ..loans to affiliated companies	152 ..Ausl. an verb. Untern.
153 ...gross values at the beginning of the year	153 ...Anfangsbestand
154 ...additions	154 ...Zugänge
155 ...appreciation/write-ups	155 ...Zuschreibungen/Aufzinsungen
156 ...disposals	156 ...Abgänge
157 ...other changes	157 ...Sonstige Veränderungen
158 ....additions incl changes in scope of consolidation	158 ....(dav. Zug. incl. Veränd. Kons.kreis)
159 ...accumulated depreciation and write-ups	159 ...Kumulierte Abschreibungen
160 ....thereof depreciation during the year	160 ....(dav. Gesch.j.abschr./Abzins.)
161 ....thereof appreciation/write-ups under depreciation	161 ....(dav. Zuschr. b. Abschr.)
162 ..loans to associated companies	162 ..Ausl. an assoz. Untern.
163 ...gross values at the beginning of the year	163 ...Anfangsbestand
164 ...additions	164 ...Zugänge
165 ...appreciation/write-ups	165 ...Zuschreibungen/Aufzinsungen
166 ...disposals	166 ...Abgänge
167 ...other changes	167 ...Sonstige Veränderungen
168 ....additions incl changes in scope of consolidation	168 ....(dav. Zug. incl. Veränd. Kons.kreis)
169 ...accumulated depreciation and write-ups	169 ...Kumulierte Abschreibungen
170 ....thereof depreciation during the year	170 ....(dav. Gesch.j.abschr./Abzins.)
171 ....thereof appreciation/write-ups under depreciation	171 ....(dav. Zuschr. b. Abschr.)
172 ..other share investments	172 ..Beteiligungen
173 ...gross values at the beginning of the year	173 ...Anfangsbestand
174 ...additions	174 ...Zugänge
175 ...appreciation/write-ups	175 ...Zuschreibungen
176 ...disposals	176 ...Abgänge
177 ...other changes	177 ...Sonstige Veränderungen
178 ....additions incl changes in scope of consolidation	178 ....(dav. Zug. incl. Veränd. Kons.kreis)
179 ...accumulated depreciation and write-ups	179 ...Kumulierte Abschreibungen
180 ....thereof depreciation during the year	180 ....(dav. Geschäftsjahresabschreib.)
181 ....thereof appreciation/write-ups under depreciation	181 ....(dav. Zuschr. b. Abschr.)
182 ..loans to other share investments	182 ..Ausleihungen an Beteiligungsunterneh.
183 ...thereof with remaining term exceeding 1 year	183 ...(dav. mit Restlaufzeit über 1 Jahr)
184 ...gross values at the beginning of the year	184 ...Anfangsbestand
185 ...additions	185 ...Zugänge
186 ...appreciation/write-ups	186 ...Zuschreibungen/Aufzinsungen
187 ...disposals	187 ...Abgänge

APPENDIX F *continued*:

188	...other changes	188	...Sonstige Veränderungen
189	....additions incl changes in scope of consolidation	189	....(dav. Zug. incl. Veränd. Kons.kreis)
190	...accumulated depreciation and write-ups	190	...Kumulierte Abschreibungen
191	....thereof depreciation during the year	191	....(dav. Geschäftsjahresabschreib.)
192	....thereof appreciation/write-ups under depreciation	192	....(dav. Zuschr. b. Abschr.)
193	..securities of fixed assets	193	..Wertpapiere des Anlagevermögens
194	...gross values at the beginning of the year	194	...Anfangsbestand
195	...additions	195	...Zugänge
196	...appreciation/write-ups	196	...Zuschreibungen
197	...disposals	197	...Abgänge
198	...other changes	198	...Sonstige Veränderungen
199	....additions incl changes in scope of consolidation	199	....(dav. Zug. incl. Veränd. Kons.kreis)
200	...accumulated depreciation and write-ups	200	...Kumulierte Abschreibungen
201	....thereof depreciation during the year	201	....(dav. Geschäftsjahresabschreib.)
202	....thereof appreciation/write-ups under depreciation	202	....(dav. Zuschr. b. Abschr.)
203	..other financial assets	203	..Sonstige Finanzanlagen
204	...thereof with remaining term exceeding 1 year	204	...(dav. mit Restlaufzeit über 1 Jahr)
205	...thereof to members of company boards	205	...(dav. an Mitgl. v. Gesellsch.-Org.)
206	...thereof to partners	206	...(davon an Gesellschafter)
207	...gross values at the beginning of the year	207	...Anfangsbestand
208	...additions	208	...Zugänge
209	...appreciation/write-ups	209	...Zuschreibungen
210	...disposals	210	...Abgänge
211	...other changes	211	...Sonstige Veränderungen
212	....additions incl changes in scope of consolidation	212	....(dav. Zug. incl. Veränd. Kons.kreis)
213	...accumulated depreciation and write-ups	213	...Kumulierte Abschreibungen
214	....thereof depreciation during the year	214	....(dav. Geschäftsjahresabschreib.)
215	....thereof appreciation/write-ups under depreciation	215	....(dav. Zuschr. b. Abschr.)
216	items treated as fixed assets	216	Anlagevermögenähnliche Posten
217	.leasing equipment and assets leased or rented out	217	.Vermietvermögen
218	.nuclear fuel	218	.Kernbrennelemente
219	.special items from companies of the mining industrie	219	.Vorabraum
220	.special assets	220	.Sondervermögen
221	..thereof to accounting in accordance with DMBilG 1990	221	..(dav. Sonderbil. nach DMBilG)
222	current assets	222	Umlaufvermögen
223	.current assets leased to customers	223	.Vermietete Erzeugn. im Umlaufvermögen
224	.fixed assets intended to be sold	224	.Zum Verkauf best. Gegenstände des AV
225	.inventories (net value)	225	.Vorräte (gesamt)
226	..inventories (gross value)	226	..Vorräte (unspezifiziert)
227	..raw material and supplies	227	..Roh- /Hilfs-/Betriebsstoffe
228	..work in process	228	..Unfertige Erzeugnisse / Arbeiten
229	..finished goods and merchandise	229	..Fertige Erzeugnisse / Waren
230	..goods and services not yet invoiced	230	..Noch nicht abgerechnete Aufträge
231	..goods and services not yet completed	231	..In Ausführung befindliche Arbeiten
232	..advance payments	232	..Geleistete Anzahlungen
233	...thereof with remaining term exceeding 1 year	233	...(dav. mit Restlaufzeit über 1 Jahr)
234	..payments received on account of orders	234	..Erhaltene Anzahlungen auf Bestellung.
235	...thereof with remaining term exceeding 1 year	235	...(dav. mit Restlaufzeit über 1 Jahr)
236	..other deductions (part pay't/provision etc)	236	..Sonstige Abzüge (Abschlagszahl. u.ä.)
237	...thereof with remaining term exceeding 1 year	237	...(dav. mit Restlaufzeit über 1 Jahr)
238	.receivables and other current assets	238	.Forderungen und son. Vermögensgegenst.
239	..thereof with remaining term exceeding 1 year	239	..(davon mit Restlaufzeit über 1 Jahr)
240	..thereof from affiliated companies	240	..(davon an verbundene Unternehmen)
241	..thereof from associated companies	241	..(davon an assoziierte Unternehmen)
242	..from other co's in which participations are held	242	..(davon an Beteiligungsunternehmen)
243	..value adjustments/over value adjustments set off direct	243	..(dav. direkt abges. Wertberichtigung)
244	..thereof from members of company board	244	..(dav. ggü. Mitgl. v. Gesellsch.-Org.)
245	..thereof to partners	245	..(davon an Gesellschafter)
246	..trade receivables	246	..Ford. aus Lieferungen und Leistungen
247	...thereof with remaining term exceeding 1 year	247	...(dav. mit Restlaufzeit über 1 Jahr)
248	..receivables from partially complete services	248	..Ford. aus teilfertigen Leistungen
249	...thereof with remaining term exceeding 1 year	249	...(dav. mit Restlaufzeit über 1 Jahr)
250	..receivables from goods/services not yet invoiced	250	..Ford. aus noch nicht abger. Leistung.
251	...thereof with remaining term exceeding 1 year	251	...(dav. mit Restlaufzeit über 1 Jahr)
252	..receivables from leasing and rental business	252	..Ford. aus Vermietung und Verpachtung

APPENDIX F *continued*:

253	...thereof with remaining term exceeding 1 year	253	...(dav. mit Restlaufzeit über 1 Jahr)
254	..receiv. fr. contracts, prelim agreem., custmrsodial serv's	254	..Ford. aus Verträgen + Betreuung
255	...thereof with remaining term exceeding 1 year	255	...(dav. mit Restlaufzeit über 1 Jahr)
256	..receivables from affiliated companies	256	..Ford. an verb. Untern.
257	...thereof with remaining term exceeding 1 year	257	...(dav. Restl. >1 Jahr)
258	...thereof trade receivables	258	...(dav. aus Lief. + Leist.)
259	..receivables from associated companies	259	..Ford. an assoz. Untern.
260	...thereof with remaining term exceeding 1 year	260	...(dav. Restl. >1 Jahr)
261	...thereof trade receivables	261	...(dav. aus Lief. + Leist.)
262	..receivables from other co's participations are held	262	..Forderungen an Beteiligungen
263	...thereof with remaining term exceeding 1 year	263	...(dav. mit Restlaufzeit über 1 Jahr)
264	...thereof trade receivables	264	...(dav. aus Lieferungen + Leistungen)
265	..receivables from co brd members	265	..Ford. an Mitgl. v. Gesellsch.-Organen
266	...thereof with remaining term exceeding 1 year	266	...(dav. mit Restlaufzeit über 1 Jahr)
267	..other receivables and other current assets	267	..Son. Forderungen + Vermögensgegenst.
268	...thereof with remaining term exceeding 1 year	268	...(dav. mit Restlaufzeit über 1 Jahr)
269	...contributions called-in/supplementary or contractual	269	...(dav. eingeford. Einl./Nachschüsse)
270	..payments received	270	..Erhaltene Anzahlungen bei Forderungen
271	...thereof with remaining term exceeding 1 year	271	...(dav. mit Restlaufzeit über 1 Jahr)
272	..other deductions (e.g. part pay'ts)	272	..Sonstige Abzüge (Abschlagszahl. u.ä.)
273	...thereof with remaining term exceeding 1 year	273	...(dav. mit Restlaufzeit über 1 Jahr)
274	.securities of current assets	274	.Wertpapiere des Umlaufvermögens
275	..shares in affiliated companies	275	..Anteile an verbundenen Unternehmen
276	...thereof shares in associated companies	276	...(dav. Ant. an assoziierten Untern.)
277	..own shares	277	..Eigene Anteile
278	..other securities	278	..Sonstige Wertpapiere
279	...thereof bonds	279	...(davon Schuldscheine)
280	.liquid funds	280	.Liquide Mittel
281	..thereof with remaining term exceeding 1 year	281	..(davon mit Restlaufzeit über 1 Jahr)
282	..cash in hand, central bank and postal giro balances	282	..Kasse
283	..cheques	283	..Schecks
284	..bank balances	284	..Guthaben bei Kreditinstituten
285	...thereof with remaining term exceeding 1 year	285	...(dav. mit Restlaufzeit über 1 Jahr)
286	prepaid expenses	286	Rechnungsabgrenzungsposten (Aktiva)
287	.thereof discounts in accordance with §250(3) HGB	287	.(davon Disagio)
288	prepaid tax	288	Steuerabgrenzung
289	loss not covered by equity capital	289	Nicht d. Eigenkap. gedeckter Fehlbetr.
290	.thereof loss of shareholders with unlimited liability	290	.(dav. Verlustanteil pers. haft. Ges.)
291	total assets	291	Bilanzsumme (Aktiva)
292	.contingent receivables	292	.Eventualforderungen
293	**LIABILITIES AND SHAREHOLDERS' EQUITY**	293	**P A S S I V A**
294	equity (capital and reserves)	294	Eigenkapital
295	.thereof special accounting in accord with DMBilG 1990	295	.(dav. Sonderbil. nach DMBilG)
296	.capital	296	.Kapital
297	..called-in capital	297	..Eingefordertes Kapital
298	...subscribed capital	298	...Gezeichnetes Kapital
299	...thereof value of ordinary share	299	...(davon Nennwert Stammaktien)
300	...thereof value of preference share	300	...(davon Nennwert Vorzugsaktien)
301	....thereof preferred shares	301	....(davon Vorzüge)
302	...non called-in capital	302	...Nicht eingeford. aussteh. Einlagen
303	..proprietary accounts of liable shareholders	303	..Kapitalkonten haft. Gesellschafter
304	..other capital	304	..Andere Kapitalbestandteile
305	...thereof profit-sharing certificates	305	...(davon Genußscheine)
306	...thereof capital share from remaining members	306	...(dav. Gesch.Guth. verb. Mitgl.)
307	...thereof capital share from retiring members	307	...(dav. Gesch.guth. aussch. Mitgl.)
308	...thereof capital share from cancelled shares	308	...(dav. Gesch.Guth. gek. Gesch.Ant.)
309	...thereof contributions of limited partners	309	...(davon Kommanditeinlage)
310	.general reserves	310	.Offene Rücklagen
311	..thereof set off direct as goodwill	311	..(dav. direkt abges. Untersch.betr.)
312	..capital reserves	312	..Kapitalrücklagen
313	...thereof set off direct as goodwill	313	...(dav. direkt abges. Untersch.betr.)
314	...additional pd-in capital from share issues etc.	314	...Agio aus Wertpapieremissionen u.ä.
315	...additional or supplementary contr. from shareholders	315	...Zuzahl./Nachschüsse von Gesellsch.
316	...funds derived from reductions in share capital etc.	316	...Beträge aus Kapitalherabsetz. u.ä.
317	..revenue reserves	317	..Gewinnrücklagen

APPENDIX F *continued*:

318	...thereof set off direct as goodwill	318	...(dav. direkt abges. Untersch.betr.)
319	...legal reserves	319	...Gesetzliche Rücklage
320	...uncommitted reserves	320	...Freie Rücklagen
321	....reserves for own shares	321	....Rücklage für eigene Anteile
322	.....thereof holdings in controlling or parent company	322	.....(dav. Ant. an herrsch. Untern.)
323	....statutory reserves	323	....Satzungsmäßige Rücklagen
324	....other revenue reserves	324	....Andere Gewinnrücklagen
325	.....equity part from re-instatement of original values	325	.....(dav. EK-Ant. v. Wertaufholung)
326	.....equity part of tax-deductible reserves	326	.....(dav. EK-Ant. abzugsf. Rückl.)
327	.....thereof reserves for repairs/replacements/rationalis.	327	.....(dav. Instandhaltungsrücklagen)
328	.....thereof contingency reserves	328	.....(davon Risikorücklagen)
329	.....thereof reserves for foundations/charities	329	.....(dav. Rücklagen für Stiftungen)
330	.....thereof set off direct as goodwill	330	.....(dav. als Goodwill dir. abges.)
331	.adjustment items from consolidation	331	.Unterschiedsbetrag aus Kapitalkonsolid.
332	.adjustment items for shares held by third parties	332	.Anteile anderer Gesellschafter
333	..thereof shares in profits	333	..(davon Gewinnanteile)
334	..thereof shares in losses	334	..(davon Verlustanteile)
335	..thereof shares in capital	335	..(davon Kapitalanteile)
336	.balance sheet result	336	.Bilanzergebnis
337	..net income/loss for the year	337	..Jahresüberschuß / -fehlbetrag
338	..net income/loss carried forward from the previous year	338	..Gewinn- / Verlustvortrag aus Vorjahr
339	..profit/loss	339	..Bilanzgewinn / -verlust
340	...net income/loss carried forward from the previous yr	340	...(dav. Gewinn-/Verlustvortr. a. Vj.)
341	equity related funds	341	Eigenkapitalähnliche Mittel
342	.special item with an equity portion	342	.Sonderposten mit Rücklageanteil
343	..taxation reserves	343	..Steuerrechtliche Rücklagen
344	...special items accord. to(sale of certain fixed assets)	344	...Sonderposten gemäß § 6b EStG
345	...special items acc. to sect. 35 EStR (replacem. of assets)	345	...Sonderposten gem. Abschnitt 35 EStR
346	...special items acc. with § 52(8) EStG (pension accruals)	346	...Sonderposten gemäß § 52 (5) EStG
347	...special items in accord with Investment Allowance Act	347	...Sonderposten gemäß InvZulG
348	...special items in accord with Developing Countries Act	348	...Sonderposten gemäß EntwLStG
349	...special items in accord with Foreign Investment Act	349	...Sonderposten gemäß AuslInvG
350	...other special items	350	...Sonstige Sonderposten
351	...special items in accord with foreign legal provisions	351	...Sonderposten nach ausländ. Recht
352	..special depreciation in accordance with taxation law	352	..Steuerrechtliche Sonderabschreibungen
353	...thereof value adjustments of fixed assets	353	...(dav. Wertberichtigungen zum AV)
354	....thereof value adjustments of land and buildings	354	....(dav. Wb. a. Grundstücke/Gebäude)
355	...value adjustments of current assets/import deductions	355	...(dav. Wertberichtigungen zum UV)
356	.grants	356	.Zuschüsse
357	..thereof declared tax-free	357	..(davon als steuerfrei bezeichnet)
358	..investment grants	358	..Investitionszuschüsse
359	..grants to cover building costs	359	..Baukostenzuschüsse/Anschlußbeiträge
360	..grants on earnings	360	..Ertragszuschüsse
361	..other mixed grants	361	..Sonstige (gemischte) Zuschüsse
362	outside/borrowed capital	362	Fremdkapital
363	.provisions	363	.Rückstellungen
364	..thereof long-term	364	..(dav. längerfristig)
365	..thereof special accounting in accord with DMBilG 1990	365	..(dav. Sonderbil. n. DMBilG)
366	..adjustment items from consolidation	366	..(dav. Untbetr. a. d. Kons.)
367	..provision for pensions and similar commitments	367	..Pensionsrückstellungen
368	...deficit arising from non-allocation	368	...(Fehlbetrag aus unterl. Zuführung)
369	..other provisions	369	..Andere Rückstellungen
370	...provisions for taxation	370	...Steuerrückstellungen
371	....thereof for deferred taxes	371	....(davon latente Steuern)
372	...other provisions	372	...Sonstige Rückstellungen
373	....provisions to cover guarantee claims	373	....Gewährleistungsrückstellungen
374	....provisions to cover repairs	374	....Instandhaltungsrückstellungen
375	....provisions to cover removal of waste materials	375	....Abraumbeseitigungsrückstellungen
376	....all other provisions	376	....Restliche Rückstellungen
377	.liabilities	377	.Verbindlichkeiten
378	..thereof short-term	378	..(davon kurzfristig)
379	..thereof long-term	379	..(davon langfristig)
380	..thereof secured by mortgages and similar rights	380	..(dav. d. Pfandr. u.ä. ges.)
381	..secured by mortgages on real estate & similar rights	381	..(durch Grundpfandrechte gesichert)
382	..thereof to members of company boards	382	..(dav. ggü. Mitgl. v. Gesellsch.-Org.)

APPENDIX F *continued*:

383	..thereof to partners	383	..(dav. geg. Gesellschaftern)
384	..contributions of dormant partners	384	..Einlagen stiller Gesellschafter
385	...thereof with a remaining term of up to 1 year	385	...(dav. vor Abl. eines Jahres fällig)
386	...thereof with a remaining term of more than 5 years	386	...(dav. Restlaufzeit über 5 Jahre)
387	...thereof secured by mortgages and similar rights	387	...(dav. d. Pfandr. u.ä. ges.)
388	...secured by mortgages on real estate & similar rights	388	...(durch Grundpfandrechte gesichert)
389	..loans granted by shareholders	389	..Gesellschafterdarlehen
390	...thereof with a remaining term of up to 1 year	390	...(dav. vor Abl. eines Jahres fällig)
391	...thereof with a remaining term of more than 5 years	391	...(dav. Restlaufzeit über 5 Jahre)
392	...thereof secured by mortgages and similar rights	392	...(dav. d. Pfandr. u.ä. ges.)
393	...secured by mortgages on real estate & similar rights	393	...(durch Grundpfandrechte gesichert)
394	..loans, bonds, obligations	394	..Anleihen / Schuldverschreibungen
395	...thereof with a remaining term of up to 1 year	395	...(dav. vor Abl. eines Jahres fällig)
396	...thereof with a remaining term of more than 5 years	396	...(dav. Restlaufzeit über 5 Jahre)
397	...thereof secured by mortgages and similar rights	397	...(dav. d. Pfandr. u.ä. ges.)
398	...secured by mortgages on real estate & similar rights	398	...(durch Grundpfandrechte gesichert)
399	...thereof convertible	399	...(davon konvertibel)
400	...therof profit-sharing certificates	400	...(davon Genußscheine)
401	..loans, mortgages	401	..Darlehen / Hypotheken / Schuldscheine
402	...thereof with a remaining term of up to 1 year	402	...(dav. vor Abl. eines Jahres fällig)
403	...thereof with a remaining term of more than 5 years	403	...(dav. Restlaufzeit über 5 Jahre)
404	...thereof secured by mortgages and similar rights	404	...(dav. d. Pfandr. u.ä. ges.)
405	...secured by mortgages on real estate & similar rights	405	...(durch Grundpfandrechte gesichert)
406	..liabilities to banks	406	..Verbindlichkeiten ggü. Kreditinstit.
407	...thereof with a remaining term of up to 1 year	407	...(dav. vor Abl. eines Jahres fällig)
408	...thereof with a remaining term of more than 5 years	408	...(dav. Restlaufzeit über 5 Jahre)
409	...thereof secured by mortgages and similar rights	409	...(dav. d. Pfandr. u.ä. ges.)
410	...secured by mortgages on real estate & similar rights	410	...(durch Grundpfandrechte gesichert)
411	..payments received on account of orders	411	..Erhaltene Anzahlungen auf Bestellung.
412	...thereof with a remaining term up to 1 year	412	...(dav. vor Abl. eines Jahres fällig)
413	...thereof with a remaining term of more than 5 years	413	...(dav. Restlaufzeit über 5 Jahre)
414	...thereof secured by mortgages and similar rights	414	...(dav. d. Pfandr. u.ä. ges.)
415	...secured by mortgages on real estate & similar rights	415	...(durch Grundpfandrechte gesichert)
416	..trade liabilities	416	..Verblk. aus Lieferungen + Leistungen
417	...thereof with a remaining term up to 1 year	417	...(dav. vor Abl. eines Jahres fällig)
418	...thereof with a remaining term of more than 5 years	418	...(dav. Restlaufzeit über 5 Jahre)
419	...thereof secured by mortgages and similar rights	419	...(dav. d. Pfandr. u.ä. ges.)
420	...secured by mortgages on real estate & similar rights	420	...(durch Grundpfandrechte gesichert)
421	..liabilities on bills accepted and drawn	421	..Wechselverbindlichkeiten
422	...thereof with a remaining term up to 1 year	422	...(dav. vor Abl. eines Jahres fällig)
423	...thereof with a remaining term of more than 5 years	423	...(dav. Restlaufzeit über 5 Jahre)
424	...thereof secured by mortgages and similar rights	424	...(dav. d. Pfandr. u.ä. ges.)
425	...secured by mortgages on real estate & similar rights	425	...(durch Grundpfandrechte gesichert)
426	..liabilities to affiliated companies	426	..Verbindlk. ggü. verbundenen Unterneh.
427	...thereof with a remaining term up to 1 year	427	...(dav. vor Abl. eines Jahres fällig)
428	...thereof with a remaining term of more than 5 years	428	...(dav. Restlaufzeit über 5 Jahre)
429	...thereof secured by mortgages and similar rights	429	...(dav. d. Pfandr. u.ä. ges.)
430	...secured by mortgages on real estate & similar rights	430	...(durch Grundpfandrechte gesichert)
431	...thereof trade liabilities	431	...(dav. aus Lieferungen + Leistungen)
432	..liabilities to associated companies	432	..Verbindlk. ggü. assoziierten Untern.
433	...thereof with a remaining term up to 1 year	433	...(dav. vor Abl. eines Jahres fällig)
434	...thereof with a remaining term of more than 5 years	434	...(dav. Restlaufzeit über 5 Jahre)
435	...thereof secured by mortgages and similar rights	435	...(dav. d. Pfandr. u.ä. ges.)
436	...secured by mortgages on real estate & similar rights	436	...(durch Grundpfandrechte gesichert)
437	...thereof trade liabilities	437	...(dav. aus Lieferungen + Leistungen)
438	..liabilities to companies in which participations are held	438	..Verbindlichkeiten ggü. Beteiligungen
439	...thereof with a remaining term up to 1 year	439	...(dav. vor Abl. eines Jahres fällig)
440	...thereof with a remaining term of more than 5 years	440	...(dav. Restlaufzeit über 5 Jahre)
441	...thereof secured by mortgages and similar rights	441	...(dav. d. Pfandr. u.ä. ges.)
442	...secured by mortgages on real estate & similar rights	442	...(durch Grundpfandrechte gesichert)
443	...thereof trade liabilities	443	...(dav. aus Lieferungen + Leistungen)
444	..other liabilities	444	..Sonstige Verbindlichkeiten
445	...thereof with a remaining term up to 1 year	445	...(dav. vor Abl. eines Jahres fällig)
446	...thereof with a remaining term of more than 5 years	446	...(dav. Restlaufzeit über 5 Jahre)
447	...thereof secured by mortgages and similar rights	447	...(dav. d. Pfandr. u.ä. ges.)

APPENDIX F *continued*:

448	...secured by mortgages on real estate & similar rights	448	...(durch Grundpfandrechte gesichert)
449	...liabilities for taxation	449	...Verbindlichkeiten aus Steuern
450	....thereof with a remaining term up to 1 year	450	....(dav. vor Abl. eines Jahr. fäll.)
451	....thereof with a remaining term of more than 5 years	451	....(dav. Restlaufzeit über 5 Jahre)
452	...thereof secured by mortgages and similar rights	452	...(dav. d. Pfandr. u.ä. ges.)
453	....secured by mortgages on real estate & similar rights	453	....(durch Grundpfandrechte gesich.)
454	...liabilities relating to social security	454	...Vblk. im Rahmen der soz. Sicherheit
455	....thereof with a remaining term up to 1 year	455	....(dav. vor Abl. eines Jahr. fäll.)
456	....thereof with a remaining term of more than 5 years	456	....(dav. Restlaufzeit über 5 Jahre)
457	...thereof secured by mortgages and similar rights	457	...(dav. d. Pfandr. u.ä. ges.)
458	....secured by mortgages on real estate & similar rights	458	....(durch Grundpfandrechte gesich.)
459	...other liabilities	459	...Restliche Verbindlichkeiten
460	....thereof with a remaining term up to 1 year	460	....(dav. vor Abl. eines Jahr. fäll.)
461	....thereof with a remaining term of more than 5 years	461	....(dav. Restlaufzeit über 5 Jahre)
462	...thereof secured by mortgages and similar rights	462	...(dav. d. Pfandr. u.ä. ges.)
463	....secured by mortgages on real estate & similar rights	463	....(durch Grundpfandrechte gesich.)
464	deferred income	464	Rechnungsabgrenzungsposten (Passiva)
465	total equity and liabilities	465	Bilanzsumme (Passiva)
466	.contingent liabilities and other obligations	466	.Eventualverbindlichkeiten
467	..contingent liabilities	467	..Haftungsverhältnisse
468	...thereof to affiliated companies	468	...(dav. ggü. verbundenen Unternehmen)
469	...contingent liabilities on discounted bills of exchange	469	...(dav. aus Wechselindossamenten)
470	...contingent liabilities from guarantees & indemnity	470	...(davon Verblk. aus Bürgschaften)
471	...thereof contingent liabilities arising from warranties	471	...(dav. Verblk. aus Gewährleistungen)
472	...contingent liabilit. fr. securit. arrang. f. cust. liabilit.	472	...(dav. Sich. -Best. f. fremde Vblk.)
473	..other financial obligations	473	..Sonstige finanzielle Verpflichtungen
474	...thereof to affiliated companies	474	...(dav. ggü. verbundenen Unternehmen)
475	...thereof liabilites from leasing and rental agreements	475	...(dav. aus Miet-/Leasingverträgen)
476	....thereof short-term	476	....(dav. kurzfristig)
477	....thereof medium-term	477	....(dav. mittelfristig)
478	....thereof long-term	478	....(dav. langfristig)
479	....thereof actual value	479	....(dav. Barwert)
480	...commitments from investments	480	...(dav. Bestellobligo für Sachanl.)
481	**PROFIT AND LOSS ACCOUNT**	**481**	**G + V**
482	.sales revenue/turnover	482	.Umsatz / Außenumsatz / Erlöse (netto)
483	..excise duties were deducted from sales in the amount of	483	..n. Abz. abges. Verbr.St.
484	..equalisation levies accord. to the 3rd Coal Power Act	484	..n. Abz. abges. Ausgl.Abgabe
485	.inc/dec in inven. of finished products/work in progress	485	.Bestandsveränderungen
486	.own work capitalized	486	.Aktivierte Eigenleistungen
487	.other operating income	487	.Sonstige betriebliche Erträge
488	..thereof special and not planned	488	..(dav. als außerordentlich bezeichnet)
489	..thereof expenses not related to the according period	489	..(dav. periodenfremd)
490	..income from disposal of fixed assets and write-ups	490	..Ertr. aus Anlageabgängen/Zuschreib.
491	..income from release of accruals	491	..Erträge aus Rückstellungsauflösungen
492	..income from liquidation of special items	492	..Ertr. aus der Sopo-Auflösung
493	...in accord with °6b EStG (sale of certain fixed assets)	493	...(davon gemäß § 6b EStG)
494	...in accord with °52 EStG (provisions for pensions)	494	...(davon gemäß § 52 (5) EStG)
495	...thereof in accordance with foreign legal law	495	...(dav. gem. ausl. Rechtsvorschr.)
496	..other income	496	..Sonstige Erträge
497	.cost of materials	497	.Materialaufwand
498	..cost of raw materials and supplies + of purchased goods	498	..Roh-/Hilfs-/Betriebsstoffe/bez. Waren
499	..cost of purchased services	499	..Bezogene Leistungen
500	gross result	500	Rohergebnis (Gesamtkostenverfahren)
501	.personnel expenses	501	.Personalaufwand
502	..wages and salaries	502	..Löhne und Gehälter
503	..social security contributions/exp for pensions	503	..Soz.Abgaben/Altersvers./Unterstützung
504	...thereof compulsory social security contributions	504	...(davon gesetzlicher Sozialaufwand)
505	...thereof expenses for pensions	505	...(davon Altersversorgung)
506	...thereof expenses for other employee benefits	506	...(davon Unterstützung)
507	.depreciation	507	.Abschreibungen
508	..extraordinary & special depreciation & right-offs	508	..(dav. Sonderabschreibungen)
509	..write-downs, depreciation of value adjustments	509	..Abschr. auf SA/IV/Ingangs. G-Betrieb
510	...extraordinary/special depreciation & right-offs	510	...(dav. Sonderabschreibungen)
511	..depreciation on current assets	511	..Abschr. auf UV
512	..special depreciation on current assets	512	..Sonderabschreibungen auf UV

APPENDIX F *continued*:

513	.other operating expenses	513	.Sonstige betriebliche Aufwendungen
514	..thereof special and not planned	514	..(dav. als außerordentlich bezeichnet)
515	..thereof expenses not related to the according period	515	..(dav. periodenfremd)
516	..loss from value or disposals of current assets	516	..Verluste aus Wertmind./Abgängen im UV
517	..losses from value or disposals of fixed assets	517	..Verluste aus Wertmind./Abgängen im AV
518	..allocations to special items with reserve character	518	..Einstell. in Sopo mit Rücklageanteil
519	...in accord with °6b EStG (sale of certain fixed assets)	519	...(davon gemäß § 6b EStG)
520	...in accord with °52 EStG (provisions for pensions)	520	...(davon gemäß § 52 (5) EStG)
521	...thereof in accordance with foreign legal law	521	...(dav. gem. ausl. Rechtsvorschrift.)
522	..other expenses	522	..Sonstige Aufwendungen
523	operating expenses of the original business	523	Betriebsaufwend. des gewöhnl. Geschäfts
524	.results from direct investments	524	.Beteiligungsergebnis
525	..income from participation interest	525	..Erträge aus Beteiligungen
526	...thereof from co-operation tax credit	526	...(dav. aus Kö-Steuer-Anrechnung)
527	...thereof from affiliated companies	527	...(davon aus verbundenen Unternehmen)
528	...thereof from associated companies	528	...(dav. aus assoziierten Unternehmen)
529	..income from profit-pooling/transfer agreements	529	..Erträge aus Gewinnabführungsverträgen
530	...thereof transfer to cover taxes by parent company	530	...(dav. Abführung f. übern. Steuern)
531	...thereof from affiliated companies	531	...(davon aus verbundenen Unternehmen)
532	...thereof from associated companies	532	...(dav. aus assoziierten Unternehmen)
533	..expenses from assumption of loss	533	..Aufwendungen aus Verlustübernahme
534	...thereof from affiliated companies	534	...(davon für verbundene Unternehmen)
535	...thereof from associated companies	535	...(davon für assoziierte Unternehmen)
536	.net interest income/loss	536	.Zinsergebnis
537	..interest and similar income	537	..Zinsen und ähnliche Erträge
538	...thereof from affiliated companies	538	...(davon aus verbundenen Unternehmen)
539	...thereof from associated companies	539	...(dav. aus assoziierten Unternehmen)
540	..income from financial assets	540	..Erträge aus Finanzanlagen
541	...thereof from affiliated companies	541	...(davon aus verbundenen Unternehmen)
542	...thereof from associated companies	542	...(dav. aus assoziierten Unternehmen)
543	..interest and similar expenses	543	..Zinsen und ähnliche Aufwendungen
544	...thereof to affiliated companies	544	...(davon an verbundene Unternehmen)
545	...thereof to associated companies	545	...(davon an assoziierte Unternehmen)
546	.other financial result	546	.Übriges Finanzergebnis
547	..write-downs of financial assets and securities	547	..Abschreib. auf FA / Wertpap. des UV
548	...thereof special and not planned	548	...(dav. als außerordentl. bezeichnet)
549	...thereof write-downs from financial assets	549	...(dav. Abschreibungen auf FA)
550	...thereof write-downs from securities of current assets	550	...(davon Abschreibungen auf Wertpap.)
551	..other financial income	551	..Sonstige Finanzerträge
552	..other financial expenses	552	..Sonstige Finanzaufwendungen
553	financial results of ordinary business	553	Finanzergebnis d. gewöhnlichen Geschäfts
554	results from ordinary activities	554	Ergebnis der gewöhnl. Geschäftstätigkeit
555	.extraordinary income	555	.Außerordentliche Erträge
556	.extraordinary expenses	556	.Außerordentliche Aufwendungen
557	extraordinary result	557	Außerordentliches Ergebnis
558	.income taxes	558	.EE - Steuern / Steuererstattungen
559	..thereof corporation tax	559	..(davon Körperschaftsteuern)
560	..thereof trade profit tax	560	..(davon Gewerbeertragsteuern)
561	.other taxes	561	.Sonstige Steuern / Steuererstattungen
562	..thereof property tax	562	..(davon Vermögensteuern)
563	..thereof trade capital tax	563	..(davon Gewerbekapitalsteuern)
564	.offsetting of taxation	564	.Steuerverrechnungen
565	total taxes	565	Ausgewies. Steuern / Steuererstattungen
566	.compensation payments/equilization payments	566	.Ausschüttungen / Ausgleichszahlungen
567	..thereof other changes	567	..davon sonstige Veränderungen
568	.income transferred from profit-pooling/transfer agreemts	568	.Gewinnabführung aufgrund von Verträgen
569	.income from transfer of losses	569	.Erträge aus Verlustübernahmen
570	offsetting of results before net income/loss for the year	570	Ergebnisverrechnungen vor Jahresergebnis
571	net income/loss for the year	571	Jahresüberschuß / -fehlbetrag
572	.net income/loss carried forward from the previous year	572	.Ergebnisvortrag aus Vorjahr
573	.changes to reserves	573	.Rücklagenveränderung
574	..changes to revenue reserves	574	..Veränderung der Gewinnrücklagen
575	...additions to revenue reserves	575	...Einstellung in Gewinnrücklagen
576	...withdrawals from revenue reserves	576	...Auflösung von Gewinnrücklagen
577	..changes to capital reserves	577	..Veränderung der Kapitalrücklagen

APPENDIX F *continued*:

578	...additions to capital reserves	578	...Einstellung in Kapitalrücklagen
579	...withdrawals from capital reserves	579	...Auflösung von Kapitalrücklagen
580	.profit and loss to minority interests	580	.Anteile Dritter
581	..thereof shares in profit	581	..(davon Gewinnanteile)
582	..thereof shares in losses	582	..(davon Verlustanteile)
583	.other changes	583	.Sonstige Veränderungen
584	changes before profit/loss	584	Veränderungen vor Bilanzgewinnausweis
585	profit/loss	585	Bilanzgewinn / -verlust
586	.dividends	586	.Dividende / Ausschüttungen
587	.changes to reserves pursuant to shareholder's resolution	587	.Rücklagenveränderungen nach HV-Beschluß
588	..changes to revenue reserves	588	..Veränderung der Gewinnrücklagen
589	...additions to revenue reserves	589	...Einstellung in Gewinnrücklagen
590	...withdrawals from revenue reserves	590	...Auflösung von Gewinnrücklagen
591	..changes to capital reserves	591	..Veränderung der Kapitalrücklagen
592	...additions to capital reserves	592	...Einstellung in Kapitalrücklagen
593	...withdrawals from capital reserves	593	...Auflösung von Kapitalrücklagen
594	.other changes	594	.Sonstige Veränderungen
595	.profit/loss carried forward to the following year	595	.Ergebnisvortrag in das neue Jahr
596	.divi. from parent co (only shown in consolid. statement)	596	.Dividende der Mutterges. bei Konzern
597	sales revenue/turnover	597	Umsatzerlöse
598	income from participating interest	598	Erträge aus Beteiligungen
599	staff expenses	599	Personalaufwand
600	.wages and salaries	600	.Löhne und Gehälter
601	.social security contributions & exp for pensions	601	.Soz.Abg./Altersversorg./Unterstützung
602	..thereof compulsory social security contributions	602	..(davon Gesetzlicher Sozialaufwand)
603	..thereof expenses for pensions	603	..(davon Altersversorgung)
604	..thereof expenses fot other employee benefits	604	..(davon Unterstützung)

Appendix F: DCA and IS Methodology

Table 63: **Calculation of DCA and IS coefficients**

To illustrate the calculation of DCA and IS, we list each component of formula (1), (2) and (3) (for the calculation of the DCA coefficient) and formula (4) (for the calculation of the IS coefficient). The Row is associated with the position of the relevant item in the specimen balance sheet and profit and loss statement in Appendix F, Table 62.

Panel A: Calculation of DCA

Item	Row	Formula
Current Accruals (CA) = Δaccounts receivable + Δinventory + Δother current assets - [Δaccounts payable+ Δtax payable + Δother current liabilities]		(2)
Accounts receivable + Other current assets	238	(2)
Inventory	225	(2)
Accounts Payable	407+412+417+422+427	(2)
Tax payable	449	(2)
Other current liabilities	433+439+445+455+460	(2)
Trade receivables	246	(3)
Sales	482	(3)
Total assets	291	(3)

Panel B: Calculation of IS

Item	Row	Formula
Operating Income (OI) = gross result – operating expenses		(4)
Gross result	500	(4)
Operating expenses	523	(4)
Operating Cash Flow = Operating Income (OI) + Depreciation - Current Accruals (CA)		(4)
Depreciation	15	(4)