European Sovereign Debt Crisis and the Performance of Dutch IPOs

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Abstract

We provide new evidence of the impact of the ongoing deep financial crisis on the performance of Dutch IPOs during the period from January 1990 to May 2012. The findings indicate an increasing level of underpricing as a result of the recent financial crunch. This situation is attributed to the aggressive efforts of underwriters to create demand as well as their strong focus on rewarding investors for their participation. Their actions build the soil for long-term underperformance, a conclusion supported by multiple studies in the literature. Pre-owner loyalty signals the IPOs' quality and promotes compensation by less underpricing. Going public with the aid of a reputable underwriter does not pay off, as it does not reduce the amount of money left on the table. Consistent with the information revelation theory, we argue that the underpricing phenomenon can be largely explained by a general desire for listing.

Keywords: Initial Public Offerings, European Sovereign Debt Crises (ESDC), Long-run Share Price Performance

JEL classification: *G12, G14, G24*

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1. INTRODUCTION

The recent global financial crisis, the worst since the Great Depression, owes its birth to the United States housing bubble and its perpetual nature to the European Sovereign Debt Crisis (ESDC), which has made it impossible for some countries in the euro-zone to repay or refinance their government debts without the assistance of third parties. The inability of these euro countries to service their debt-scared depositors, caused in part by mass savings being withdrawn from accounts, has led to serious problems in the banking system. Banks no longer possess the financial strength which they used to have in the past to lend funds to firms and sponsor investment projects. As a result, companies are faced with a new reality, as they can no longer borrow capital from the banks. Therefore, those with a great need for cash have been considering listing in stock markets, but the situation in this sector has changed as well, as the cost of equity has increased to compensate for the investors' risk.

Overall, the number of initial public offerings (IPOs) worldwide has precipitously dropped after the technology stock bubble burst in 2000 and collapsed to new lows during the European sovereign debt crisis (ESDC) of 2008 and its aftermath. The low number of IPOs over the last decade has generated much discussion among private company executives, exchange officials, policy makers, and the financial press, as well as among venture capitalists and buyout firms that depend on an active IPO market for their existence. However, so far this issue has not received a great deal of academic attention (Gao et al., (2012)). Ritter (2011) recently suggested that much of the decline may be due to a structural shift that has lessened the profitability of small independent companies relative to that of larger, more established organizations that are better capable of realizing economies of scope.

There is extensive evidence of underpricing (e.g., Loughran et al., (1995); Lee et al., (1996); Jenkinson et al., (2005); Gajewski & Gresse, (2006); Tian & Megginson, (2007); Ritter, (2009); Chambers & Dimson, (2009); Cai et al., (2010); Thomadakis et al. (2013); Gounopoulos & Hoebelt, (2013)) and there are convincing international indications of long-term underperformance. Generally, the poor results of newly listed public companies as reflected by returns lower than the market benchmarks, become visible only after a longer-term period. Studies in numerous countries have confirmed underperformance after one (Aggarwal & Rivoli, (1990); Lee et al., (1996); Chan et al., (2004),[2] to three (Ritter (1991); Lee et al., (1996); Chan et al., (2004); Merikas et al., (2009) or five years (Loughran & Ritter, (1995). Following the so-called fads theory, Aggarwal and Rivoli (1990) attribute underperformance to a temporary overvaluation of the IPO firm at the offering date. After a while, this over-optimism disappears, after which the value of the new share is downwardly adjusted.

[2] Surprisingly, Katsuna et al. (2009) report 1-year holding-period returns in excess of 200%.

Ritter (1991) has further advanced the fads theory by showing that IPO firms with a high-risk profile (i.e., younger, smaller, and active in vulnerable sectors) are more easily subject to shareholder sentiments, the so-called fads of the stock market. Further exploring the shareholder sentiment concept, Cornelli et al. (2006) reveal that high grey market prices (indicating over-optimism) are a very good predictor of first-day aftermarket prices, whereas low grey market prices (indicating excessive pessimism) are not. This asymmetry occurs because larger (institutional) investors can choose between keeping the shares allocated to the IPO or reselling them when small investors are overoptimistic.

Our research addresses a number of important questions related to the performance of IPOs in the context of the European Sovereign Debt Crisis (ESDC). It contributes to the academic body of literature by providing evidence of the effect of this crisis and its aftermath on the performance of Dutch IPOs. We start with the following main question: Has the recent financial crisis affected the listings and the level of underpricing? If yes, to what extent? Has the long-term performance of Dutch IPOs increased following the recent financial crisis? How do the various benchmarks affect the long-term performance in the Netherlands? What are the determinants that affect short- and long-term performance?

Part of the period covered in our comparative study concerns the Internet bubble, which induced a large number of growth (new economy) firms to go public, resulting in a hot issue market from 1997 to 2000.[3] As regards this time, the IPO literature particularly focuses on the phenomenon of "hot issue markets," i.e., periods characterized by a large number of offerings and a high average underpricing (Ritter, (1984); Derrien, (2005); Ljungqvist et al. (2006); Derrien & Kecskes, (2007). However, obviously for time-motivated reasons, the literature has not yet elaborately explored the European Sovereign debt crisis, an event which has driven the entire globe into a deep recession. This situation reminds us that we are now in what we can describe as an ultimate "cold issue market."

Throughout the hot and cold periods, the level of IPO underpricing may fluctuate, depending on the moment when a firm chooses to go public. These alterations require businesses to have easy access to capital funds in the markets. Traditionally, periods of crisis have been associated with uncertainty and information asymmetry (Lowry (2003)). In the uncertain economic environments resulting from these circumstances, venture capitalists and investors are reluctant to invest their money in financial markets unless there is some guarantee of obtaining attractive rewards for the risk they bear. Companies which decide to raise equity during a financial crisis should be willing to accept the consequences of the cold market, i.e. changes in the level of underpricing. This issue highlights the

[3] Gajeski and Gresse (2006) argue that for some countries (France, Belgium, Sweden, Poland), the hot period started in 1997. There are four countries that do not match the general pattern. For the Polish, Turkish, and to a lesser extent the Greek markets, 1995 and 1996 were also active periods.

objective of this research, which is focused on identifying and explaining the phenomenon of (cold) crisis in the context of the Dutch stock market.

During the study period covered, many changes took place in the international arena that affected the Dutch market. The most important one and the central theme of our study, is the European sovereign debt crisis, the depth of which is comparable with that of the crisis of 1929. Furthermore, also of considerable importance is the fact that quite recently two more crises occurred: the 2000 Internet bubble crisis, which affected both the stock market and the number of listings, and the 2007 subprime mortgage bubble, which is an extension of the European sovereign debt crisis. These events raised questions regarding bank solvency and damaged investor confidence and even further impacted the global stock markets, which suffered large losses during late 2007 and early 2008.

Our aim is to map out the Dutch market's response to the European sovereign debt crisis and the levels of shareholder returns, based on various benchmarks. As regards this issue, Dimson and Marsh (1986) and Fama and French (1996b) provide considerable evidence that benchmark selection can have an important impact on the scale of the abnormal returns. We compare the abnormal returns among a number of alternative benchmarks. In addition, we compute the abnormal returns up to three years after the offering. In our study we employ three models: the basic capital asset pricing model (CAPM), the Fama and French (1996) three-factor model, and the Carhart (1997) FF3F-type model, extended for the occasion of this research.

We employ a sample of 144 Dutch IPOs listed over the period Jan 1990 – May 2012. The findings indicate an increasing level of Dutch IPO underpricing as a result of the ESDC. During the European Sovereign Debt crisis the short-term returns to the investors actually increased, as these investors were rewarded for the risk of participating in IPOs during a highly uncertain financial period. In the long term, however, IPOs in the Netherlands appear to underperform, yielding negative abnormal returns. With respect to the factors that determine the long-run performance of IPOs, we see in line with our predictions - a positive and significant relationship between the size of the firm and the returns to the investors in the three-year long-term period of our study. This result suggests that large firms perform better and are safer to invest in, in the long term. We also observe a positive relationship between market condition (hot/cold) and returns in the long aftermarket. This relationship holds strong irrespective of the period (one, two, or three years) of study. Finally, in contrast to our expectations, non-reputable underwriters are associated with better returns in the very long term (up to 36 months).

Our study makes several contributions to the IPO literature. First, the paper is based on a unique, up-to-date database and provides new evidence of investor returns from IPOs as an alternative investment option in the face of the European sovereign debt crisis. Second, it maps out the characteristics of companies that decide to list in an extreme financial environment. Third, it is the first

Dutch study to explore long-term returns using the Fama and French's (1996) (extended) value-weighted three-factor model. Fourth, it makes an effort to explain its results in the context of an existing theoretical framework and attempts to position the new evidence within the context of developed markets.

The remainder of this paper is organized as follows. Section 2 reviews the international literature. Section 3 formulates the hypothesis while section 4 presents the data and analyzes the methodology. Section 5 shows the results regarding the long-term performance of IPOs and section 6 presents the regression outcomes. The robustness of our results is tested in Section 7. Finally, section 8 concludes the paper.

2. RELATED LITERATURE

A. Theoretical Framework

There are multiple theories which try to explain the concept of underpricing; the situation where a new issue yields a large gain (relative to its offering price) immediately after listing has been reported in many markets. Ibbotson and Jaffe (1975) were the first to speak about hot issue markets. In his principal agent model, Baron (1982) assumes that investment banks act as the agents of the issuers, which could cause a moral hazard situation. Ritter (1984) presents the ex ante uncertainty theory while Beatty and Ritter (1986) argue that the amount of ex ante uncertainty regarding true firm value is the main determinant of the IPO's level of underpricing. Beatty and Ritter build on Rock (1986), who interprets underpricing as a premium for uninformed investors to deal with the winner's curse problem they face vis-à-vis informed investors. This information asymmetry between poorly informed and well-informed investors is the best-known explanation of the underpricing issue, with Booth and Smith (1986), Carter and Manaster (1990), and Michaely and Shaw (1994) pointing out that the common way for the uninformed investors to increase their knowledge is to hire prestigious underwriters[4] (i.e. see Liu and Ritter (2011). In addition, Booth and Smith (1986), Chemmanur and Fulgheri (1994), Purnanandam and Swaminathan (2004),[5] Derrien (2005), Edelen and Kadlec (2005), Chahine (2007) and Kutsuna et al. (2009) focus on how offer prices relate to the long-run or intrinsic value.

Roosenboom and Van der Goot (2003) report that increased management ownership, independent supervisory directors, and monitoring by large non-management shareholders successfully

[4] Investment or commercial banks charging high fees, and with historically large numbers of listings and success rates (i.e. measured by a low level of underwriters) are considered reputable. If the underwriter is U.S.-based, the Liu and Ritter (2011) list is employed to make a judgement.

[5] Purnanandam and Swaminathan (2004) on the relation between underpricing and overpricing on the aftermarket, indicate a fair pricing of IPOs and overpricing after that.

reduce agency costs and increase IPO firm value. Further the empirical results of Lin et al. (2013) support the insurance effect of the lawsuit avoidance hypothesis. In an international cross-country framework Lin et al. find a significant positive relationship between litigation risk and underpricing. Their findings imply that the degree of litigation risk in a country affects the level of underpricing by firms that go public in this country.

B. Evidence of IPO performance in international developed markets

In this subsection, some studies on major international markets are reviewed. We focus on samples in the US, the UK, Germany, France and assess a Pan-European and Cross Country Listed IPOs Sample. Starting with Europe, Jenkinson et al. (2005) conclude on the basis of a sample of 740 European IPOs that on average 22.3% is underpriced (15.2% for 174 French IPOs, 47.5% for 224 German IPOs, 4.8% for 51 Italian IPOs, 9.0% for 124 UK IPOs, and 14.3% for 50 Dutch IPOs). Also Gajewski and Gresse (2006) confirm this level of European underpricing and report initial average returns of 22.06% for 2,104 IPOs from 15 countries (5.36% for 363 French IPOs[6], 38.93% for 415 German IPOs, 10.26% for 135 Italian IPOs, 21.27% for 454 UK IPOs, and 22.92% for 47 Dutch IPOs). Additionally, the authors provide information on the long-term performance of these European IPOs[7] [8].

Based on a sample of 12,246 US IPOs (issued between 1960 and 2011) and gross proceeds of $650 billion, Ritter (2009) reports that 16.8% of the initial public offerings are significantly underpriced. During the Internet bubble period of 1999-2000, the level of underpricing was extremely high, namely 64.1%. After that it significantly lowered to 11.5%. Cai et al. (2010) examine the underpricing of U.S. firms which went public globally (global IPOs). For a sample of 797 IPOs they report a mean first-day return of 46.20%.[9] The increased underpricing of globally listed US IPOs could be explained by an expanding investor demand under favorable overseas market conditions and an increasing visibility owing to global placement. Ritter (1991) has been the first researcher to provide evidence on the long-term performance of IPOs. Using various robustness benchmarks, he reports

[6] Chahine (2007) show a significant 3-day buy-and-hold abnormal return of 19.15%. Despite a high initial underpricing (11.1% for auction IPOs and 19.3 for book-built issues), the book-building procedure allows for more effective pricing and a lower divergence of opinion among investors in the aftermarket than the auction-like procedure.

[7] Gajewski and Gresse (2006) split their sample based on market segments, period of listing, and floatation mechanism. The 821 IPOs listed in traditional markets present first-day initial returns of 11.58% while the 947 listed in the new markets have initial returns of 28.46%. The initial returns of IPOs listed during the 'hot' period of 1998-2000 are 27.18% while for those listed during the 1995-1997 and 2001-2004 periods they are much lower, namely 15.86% and 12.195%, respectively.

[8] Evidence of underperformance for the one-year term is unclear (the average first-year CAR equals -21.59%, but the average first-year buy-and-hold abnormal return [BHAR] is only -1.52%), while a significant three-year underperformance of -32.61% is found for the BHAR benchmark, and of -87.19% for CAR. Per individual country the BHAR one- and three-year returns are 11.44% and -36.33% for France, -19.57% and -53.69% for Germany, -7.01% and -30.47% for Italy, and -10.96% and -27.74% for the UK.

[9] Cai et al. (2010) report a pre-bubble (1986-1997) underpricing of 11.97%, Internet bubble (1998-2000) first-day returns of 81.85%, and post-bubble initial returns of 14.21%.

average three-year holding period returns of 34.47%. In an update of the initial sample of 7,071 IPOs, Ritter finds an average BHAR of 21.8%. Once adjusted to the market, however, the returns turn negative at -20.3%.

Champers and Dimson (2009) present the longest period-study in the field of IPOs, which was conducted in the United Kingdom. The authors cover 4,540 firms listed from 1917 to 2007. The overall proceeds that UK IPOs managed to yield amounted to £131 billion while the mean initial return was 14.57%. Over the decades, there has been an increasing trend toward initial returns outperforming those during the 2000-2007 period by no less than 19.86%.[10] This trend specifically reflects the growth of London's alternative investment market, which facilitated numerous IPOs issued by very small companies, causing even higher average levels of underpricing. However, the overall post-WWII rise in underpricing cannot be attributed to changes in firm composition and occurred in spite of the improvements in the rules of regulation and disclosure, and the better reputation of IPO underwriters.

Using a sample of more than 8,700 IPOs in 36 countries, Banerjee et al. (2011) show that IPO underpricing (i.e. a cross country level of underpricing of 29.11%) is higher in countries with higher levels of information asymmetry, a lower country bias among the investors, a lesser number of effective contract enforcement mechanisms, and more accessible legal recourses.

Long-term performance indications confirm Ljungqvist's observations that one-year after-market returns follow the market movements and that "investors can benefit considerably by purchasing shares offered through IPOs". This trading strategy, however, becomes unprofitable if the shares are held for more than a year.

C. Effects of the recent financial crisis on the Venture Capitalists- (VCs) and IPO-markets

For high potential businesses in their early-stages, high risk organizations, growth start-up companies and especially those planning to issue IPOs, Venture Capital funding is absolutely crucial. In addition to the capital of their investments, venture capitalists bring managerial and technical expertise to the company. Among other qualities, they are characterized as patient investors who have a long-term view on capital gains, thereby allowing managers to focus on long-run rather than on short-term performance, as is often done by alternative investors (Brau et al., (2004)). Since VCs are focused on maintaining their good reputation in the market, they do not want to be associated with IPO failures. Therefore, they are less inclined to overprice the issue (Gompers (1994)).

Using a sample of 591 IPOs listed before the recent financial crises, Coakley et al. (2009) address the UK IPO underpricing in conjunction with the combination of venture capitalists and

[10] Champers and Dimson (2009) claim that compared to the periods 1917-1929 (8.96%) and the 1930s (5.43%), in the interwar decades the equally weighted mean level of underpricing subsequently rose to 11.86% (in the 1950s) and then to 14.01% (in the 1960s). After a decrease to 8.65% in the 1970s, it averaged 15.80% in the 1980s.

prestigious underwriters. This combination led to higher underpricing during the bubble years and featured a significant increase in money left on the table as well as a decline in operating quality. Belghitar and Dixon (2012) report that venture capitalists reduce uncertainty at the time of offering, but that in the long term VC-backed IPOs underperform.

Searching for studies which address venture capital funding in relation to the European sovereign debt crisis, we came upon the effort by Block and Sanders (2009) to analyse the effect of this crisis on the venture capital market in the case of US Internet start-up firms. Block and Sanders argue that the financial crisis has led to a 20% decrease in the average amount of funds raised per funding round. As a result, firms which need capital to survive in later financing rounds are faced with a reduction induced by the financial crisis, while firms which seek initial funding postpone their financing and expansion plans until the capital markets have stabilized. Moreover, firms in later phases of the venture cycle appear to be more negatively affected by the weak IPO market than firms still in the initial funding stage.

Block and Sanders (2011) explore the possibility that venture capital funding will actually be able to reach the pre-crises boom levels again. They report that the financial crisis has clearly favored the development of "winner-take-all" markets in the US Internet industry. The ventures that have survived the financial crisis are able to collect larger sums of money than they probably would have been capable of if the financial crisis had not occurred. Block et al. (2012) extend the previous research on venture capital and financial crises by conducting an empirical study across industries and countries. They show that the effects of crises differ across industries and are stronger in the US than in other countries. Their results show that a financial crisis can lead to a severe "funding gap" in the financing of technological development and innovation.

Having observed the initial reactions of both the venture capitalists and the markets to the measure by which survivors of the European sovereign debt crises are rewarded with more capital, we were wondering how the situation is for firms attempting to raise capital through an official listing in the stock exchange. Obviously the risk factor of failure in going public in the middle of a deep financial crisis is tremendous. This risk clearly differs from that in any 'cold' market condition period. Generally, the long-term performance literature (e.g. Loughran and Ritter (1995), Helwege and Liang (2004), Gwilym and Verousis (2010), Thomadakis et al. (2012)) argues that 'hot'-market-listed firms are lower quality businesses because their stock returns appear to be poorer than those of IPOs issued on 'cold' markets. Elaborating on these last findings, the current study will attempt to explore the short-and-long term performance of IPOs under extreme market conditions.

D. Previous IPOs financial crisis

The ramifications of the IPO Crisis extend well beyond the venture capital industry and affect "mom and pop" businesses as well. The non-venture capital and non-private equity segment of the market historically (over more than 20 years) has represented upwards of 50 percent of all IPO. Generally. there has been a number of IPOs financial crises that took place in the past. One of them was hidden by Dot com bubble, Weild and Kim (2009). Specifically there is a clear decline in the number of smaller IPOs beginning in the 1996/1997 time frame, which aligns perfectly with the introduction of the Manning Rule and other handling rules.

Burhop (2010) discuss financial crisis in Germany between 1873-1878. During this period, only 19 firms were newly listed on the market (Baltzer, 2007) while 225 corporations were delisted from the stock exchange, nearly exclusively caused by weak performance. Despite this substantial crisis, the 1870s saw a substantial net gain of listed corporations. Between 1879 and the enactment of Germany's first Stock Exchange Act in 1897, another 218 corporations went public, followed by 500 IPOs until World War I, Burhop (2010).

3. FORMULATION OF THE HYPOTHESIS

In a situation where different investors are differently informed, underpricing serves as a compensation instrument used by the more uninformed businesses to deal with the winner's curse problem (Rock, (1986), which increases depending on the degree of ex ante uncertainty about the issue's true value (Beatty and Ritter, (1986)). This degree of uncertainty, which significantly promotes information asymmetry, remains high in periods of intense financial risk (Banerjee et al., 2011). Jenkinson and Ljungqvist, (2001) and Ritter and Welch (2002) observe an increase in issue discount in the case of risk growth and the possibility of value loss. Welch's model (1992) implies that an increase in valuation risk leads to an inclination of early investors to use their market power for demanding underpricing. Ritter (2011) suggests that the quantitative magnitude of underpricing can be explained by a market structure in which underwriters are excessively focused on this approaching. Ekkayokkaya and Pengniti (2012) argue that any effort (i.e. governance reforms) aimed at reducing the valuation risk faced by uninformed investors should decrease the level of underpricing.

The above analysis suggests that a volatile financial environment increases the extent to which IPO investors price-protect themselves and support issue discounts, which leads to our first hypothesis:

H1: Underpricing is positively associated with financial risk, which in turn reflects the recent financial crisis.

IPO Market Conditions (Financial Crises): Ritter (1984) characterizes "hot issue markets" as periods in which the number of offerings is large and the level of average underpricing high. He suggests that some companies prefer to issue IPOs in a 'hot' market where the index of the stock market is high and rising, whereas other companies favor a 'cold' market period during which the general stock market level is stable or declining. IPOs tend to yield high (low) initial returns during the hot (cold) issue markets (e.g., Ritter, 1984).

The signaling models characterize hot markets as periods during which a larger number of high quality firms choose to go public (Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989)). In these models, firms are drawn to hot markets because here the offer prices are less affected by adverse selection costs. In contrast, the long-term performance literature argues that hot market firms are lower quality businesses because their stock returns are lower than those of the IPOs issued in cold markets (Loughran and Ritter (1995)). This literature tends to view hot markets as the result of the bullishness of irrational investors (Loughran and Ritter (1995), Lerner (1994) and Field (1997)), which creates chances for managers to issue IPOs by taking advantage of the "window of opportunity" as created by this type of environment.

Ibbotson et al. (1994) argue that the IPO's cyclicality follows the market "temperature". In "hot" markets, issuers can sell their stock at will, whereas in "cold" markets, they have difficulty selling stock at any 'reasonable' price. Comparing IPO cycles over time Helwege and Liang (2004) conclude that hot markets are not primarily driven by adverse selection costs, managerial opportunism or technological innovations, but are more likely the reflection of a greater investor optimism. Stoughton, Wong, and Zechner (2001), Benveniste, Busaba, and Wilhelm (2002) and Maksimovic and Pichler (2001) view hot markets as characterized by clusters of small, risky IPOs from particular industries.

Compared to cold-market IPOs, Boehme and Colak (2012) argue that hot-market IPOs are on average associated with stronger liquidity frictions, higher information constraints and more idiosyncratic risk. Thomadakis et al. (2012) show that IPOs listed during a 'cold' period produce better returns over the long term.

H2: IPOs listed in the midst of a financial crisis are expected to yield better long-term performance rates.

4. DATA AND METHODOLOGY

4.1 Data

We collected our IPO data directly from Euronext Amsterdam, including their dates, offering prices, first day closing prices and general index historical prices. Information on the independent variables was gathered from the Thomson Financial Datastream (TFD) and Bloomberg. Overall, the study covers 144 new companies listed at the NYSE-Euronext Amsterdam Stock Exchange over the period January 1990 to May 2012.[11] Of these companies, 20 went public during the recent financial crises. To determine the benchmarks, we collected the returns of all stocks traded during the observation period.

Table 1, Panel A, clearly shows two IPO peaks during the sample period. The first and major one occurred between 1997 to mid-2000 and is characterized by a large number of IPOs of growth stocks. This period was considered hot by the entire world, given the boom of Internet IPOs. The second peak occurred from 2005 until the end of 2007. Also this period is characterized by a considerable number of IPOs going public, although the amount was less extreme than during the first peak. A common feature of these two periods is that they both ended in a stock market crash. Especially at the end of the second period, the entire global financial system experienced the second largest crisis after the Great Depression of 1929.

Panels B-C of Table 1 present the summary statistics of 144 Dutch IPOs. The Dutch firms listed before the European Sovereign Debt Crisis (ESDC) raised an average capital of €1,129.8 million while that of those listed during the ESDC period averaged €342 million. The average age of companies listed before the ESDC is 28.92 years and that of businesses listed during the crisis 17.67 years. This fact indicates that the recent volatile global environment has attracted more firms with a relatively short operational history whereas it demotivated considerably old firms, which are not willing to risk failure. The time lag, the period between the last date of the stocks' public offering and the first day of their listing was on average as short as 4.57 days before and 9.2 days after the ESDC period, respectively, while the average market-adjusted initial returns amounted to 5.13% during the pre-ESDC era and 18.69% during the actual crisis. This situation provides a first signal that uncertainty in the financial market dramatically increases underpricing, which is mainly attributed to the public investors' reluctance in participating in new issues due to the high risk of failure. Their hesitation promotes in an increase in underpriced issues, which are more attractive to invest in.

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[11] During the period 1995-2004, we collected 85 IPOs, whereas the dataset of Gajewski and Gresse (2006) only includes 47 IPOs. It seems that theirs is incomplete. An explanation can be that Gajewski and Gresse only looked at IPOs with a constraint, for example a minimum amount of capital raised.

Please Insert Table 1 About Here

4.2 *Methodology*

The adjusted return for issue *i* is defined as the raw return minus the corresponding market return for the same time period as used for the raw return calculation:

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

where R_{it} is the IPO return i at time t and R_{mt} is the market portfolio return at time t.

The average adjusted return of a portfolio of *n* stocks for event month *t* is the equally weighted arithmetic average of the adjusted returns.

$$AR_{it} = \frac{1}{n}\sum_{i=1}^{n} ar_{it} \tag{1}$$

The abnormal IPO return for a certain period is defined as the cumulative abnormal return over a time period from the offer date, i.e.,

$$CAR_T = \sum_{t=0}^{T} AR_{it} \tag{2}$$

To calculate abnormal return $a_{i,t}$, the first benchmark applied is the standard Capital Asset Pricing Model, which uses beta to describe the returns of the portfolio. The second is the Fama–and-French-three-factors model (1993) which, in contrast with CAPM, uses two additional variables: 'small minus big market capitalization' and 'high (book to market ratio) minus low'. The third benchmark is a multi-index model consisting of factors specified by Carhart (1997), who has extended the Fama and French model for measuring momentum phenomena.

Model 1: CAPM

$$R_{it} - R_{ft} = a_{it} + \beta_i (R_{mt} - R_{ft}) + e_{it} \tag{3}$$

where R_{it} is the monthly return of each security, R_{mt} the return in the Dutch market in event month *t* as measured by the return according to the NYSE-Euronext Stock Exchange General Index (NYEGI), R_{ft} the treasury bill (T-bill) return in event month *t*, and β_i the CAPM beta of company *i*.

Fama and French (1993) show that whenever the standard three-factor model (without the momentum factor in Eq. (5)) is estimated in randomly chosen small-sized sample firms with low book-to-market ratios, the null hypothesis of a zero abnormal performance is over-rejected. In addition, Mitchell and Stafford (2000) suggest that the intercept under the null hypothesis may be biased when using the standard calendar-time approach. This is because, first, monthly returns are less susceptible to the bad asset pricing model problem. And second, because by forming monthly calendar-time

portfolios, all cross-correlations of event-firm abnormal returns are automatically accounted for in the portfolio variance. Finally, the distribution of this estimator is better approximated by the normal distribution, allowing for classical statistical inference.

Model 2: *Fama and French (1996) three Factors model (FF3F)*

$$(R_{pt} - R_{ft}) = a_p + \beta_p(R_{mt} - R_{ft}) + \gamma_p SMB_t + \delta_p HML_t + e_{pt} \quad (4)$$

This study follows the procedure used in Fama and French (1993) to construct the mimicking portfolios for the size and book-to-market equity (BE/ME) factors. Size is calculated as the share price times the number of shares, while the book-to-market ratio is computed as book common equity for the fiscal year ending in calendar year t-1, divided by market equity. The coefficient estimate of the intercept term *a* from the time-series regressions is used as an indicator of risk-adjusted performance for each sample. Given the assumption of normality of the residuals, statistical inferences can be made by checking the t-statistics of the intercepts.

The portfolio excess returns are regressed onto the four factors as introduced by Carhart (1997).

Model 3: Carhart four factors model (1997) extension of the Fama-French model, containing an additional momentum factor *(FF4F)*

$$(R_{pt} - R_{ft}) = a_p + \beta_p(R_{mt} - R_{ft}) + \gamma_p SMB_t + \delta_p HML_t + \varepsilon_p UMD_t + e_{pt} \quad (5)$$

where R_{pt} is the calendar-time portfolio return, R_{ft} (risk-free return rate) the return of a 1-month Treasury Bill, and (R_{mt}-R_{ft}) the return on the value-weighted portfolio, where SMB_t stands for "small minus big (market capitalization)" during month *t*, and HML_t is the return differential of "high (book-to-price ratio) minus low value-weighted portfolio firms" in a month, and UMD_t the difference between the returns of the portfolios of high-and-low momentum stocks.

We estimate a series of multiple-regression models, using buy-and-hold abnormal returns (BHAR) and Residuals from the FF4F model as the dependent variables for a period up to three years after the going public event. The regression model is as follows:

$$\text{(BHAR) or (FF4F Residuals)} = a + \beta_1 (MAR) + \beta_2(AGE) + \beta_3 Log(SIZE) + \beta_4 (UND) + \beta_5 (H/V) + \beta_6 (GO) + \beta_7 (TLAG) + \beta_8 (IND) + \varepsilon_i \quad (6)$$

5. DESCRIPTIVE STATISTICS

Table 2 shows the average BHARs of IPOs issued during the period 1990 - May 2012. Panels A and B present the unadjusted returns as derived from the offer price day and the end of the first day of trading. Panel C shows the adjusted returns,[12] calculated based on the listing price of new issues and the closing price of the NYSE-Euronext General Index (NYEGI) on the last day of the public offering period. Panels D and E report the BHARs computed based on the closing price at the end of the first day (month) of trading and the closing price of the NYEGI at the same date.

The initial excess return received by investors was low at 8.31%, which indicates that the Dutch stock market is mature while everyone involved in the IPO process delivers very good outcomes. As already mentioned, the ESDC resulted in a dramatic increase in the level of underpricing from 5.13% to 18.69%. Moreover, the one-year mean-adjusted return, calculated based on the listing price or the first-day closing price and the sixth-month closing price reached 4.17% (-3.46% before the ESDC and 58.44% during the ESDC) and -5.24% (-6.71% before the ESDC and 2.41% during the ESDC), respectively. The two-year returns were 0.03% (-0.52% before the ESDC and 9.59% during the ESDC) and -7.48% (-6.65% before the ESDC and -16.04% during the ESDC). Finally, the corresponding three-year returns were -34.96% (-32.98% before the ESDC and 45.15% during the ESDC), and -33.18% (-28.29% before the ESDC and 52.34% during the ESDC). These results reveal that new issues in the Netherlands stock market yield negative long-run adjusted returns even within one year after listing. The situation is different if our calculations start from the sixth month of trading, as now the returns remain positive for the following two years (until 30 months after going public) after which the outcomes severely decrease.

Please Insert Table 2 About Here

Table 3 indicates the average monthly AR and CAR returns with the associated t-statistics for the 36 months after going public. The results show that the Dutch IPOs consistently under-performed during the period of study. Both the AR and CAR show that the underperformance was more severe in the second year after the IPOs were issued. All returns were negative and suffered a decline. After the 14th month a steep slope developed and continued until the end of the study's 26th month. At the end of the 36th month, the cumulative adjusted monthly returns amounted at 28.93%.

Please Insert Table 3 About Here

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[12] The adjusted returns have been calculated as the raw returns minus the returns of the General Index of the A.S.E. for the same time period as used for the raw returns calculation.

Table 4 reports the times series estimates of the Fama-French three factor model in equation (4), the restricted version of the model (corresponding to the CAPM), and the extended version of Carhart (1997), including the momentum in equation (5). The results are quite revealing, as they show significant differences among periods as well as among benchmarks.

As in the event-time regressions, the FF4F benchmark produces a marginally statistically significant underperformance, but these negative excess returns are insignificant in the CAPM and the FF3F models. In all cases, the intercept term is negative, with abnormal returns for the 36-month portfolio of -0.42% per month according to the CAPM, -0.27% per month according to the FF3F, and -0.27% per month according to the FF4F model. However, in none of the cases the underperformance is statistically significant.

It starts to become significant in the 24-month portfolio as estimated by the CAPM with abnormal returns of -0.74%. In FF3F and FF4F the market effects start to be significant in the 12- and 24-month portfolios, while the beta coefficient has a tendency to drift downward over time in each of the models. In the Fama and French four factors models, the size effect is also significant. Finally, the momentum effect significantly diverges from zero for the 12- and 24-month portfolios but not for the 36-month portfolios.

The implication of the results in Table 4 is that much of the long-term underperformance can be attributed to the large proportion of the sample firms which went public in periods (such as in 1997-1999 and in 2006-2007) associated with highly negative abnormal returns. Averaging the event time returns across the IPOs therefore creates a high underperformance for the sample as a whole. However, when using the calendar approach by Espenlaub et al. (2000), which equally weighs the IPO returns for each monthly rolling portfolio, the underperformance is much less spectacular.

Please Insert Table 4 About Here

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6. EMPIRICAL ANALYSIS

For estimating the cross-sectional regression, we use BHARs, calculated based on the closing prices after the first day of trading. In Table 5, regressions 1 and 2 show the results during the short-term period, using MAIR/IR as dependent variables. Regressions 3 and 6 present the long-term returns. Because the dependent variable of the BHAR long-term returns is skewed, the residuals are highly non-

normal, with bootstrapped p-values as reported by, i.e. Barber and Lyon (1997) and Lyon et al.(1999).[13]

The results indicate that the listing board classification (MAR) variable is statistically significant in the long run (six-month period) and that it confirms the positive returns of the IPOs listed in the main market of the stock exchange. This outcome is consistent with Ljungqvist et al. (2003), who also report that IPOs traded in the primary market yield significantly high returns in the long run, whereas those listed in the secondary market tend to underperform in their market benchmarks by producing more negative results.

The coefficient for AGE_i is negative and statistically significant for MAIR, which indicates that IPOs with a short operation history before going public are highly associated with favorable short-term initial returns/underpricing. This result moves in exactly the opposite direction in the long term, and consistent with Ritter (1991), we observe that older IPOs yield better returns in a period up to six months after going public. Surprisingly, this effect becomes insignificant after longer periods.

Firm size, a proxy for ex ante uncertainty, is measured by the capital raised during the offering. To be consistent with Miller's (1977) estimation (i.e. a negative relationship between long-term performance and uncertainty), the regressions should yield positive coefficients for *Log(Size)* because the ex ante uncertainty is inversely related to a firm's size. Using BHAR as a dependent variable, Table 5 reveals that small IPOs produce significantly better long-term adjusted returns in the first six-month period while large IPOs perform better for up to and including three years. This last result is in line with the literature (Keloharju (1993) and Goergen et al. (2007), which predicts a better long-term performance for large IPOs.

Please Insert Table 5 About Here

The coefficient for underwriter reputation is positive in the short term, which indicates that listing IPOs on the NYSE-Euronext Stock Exchange with the aid of a reputable underwriter immediately rewards the investors with positive returns. In the long term, however, the results go into exactly the opposite direction, as the determinant in two of the four regressions (one and three years) is negative.

[13] Barber and Lyon (1997) report that positive skewness leads to negatively biased t-statistics. To conduct significance tests for the initial returns, we applied the skewness-adjusted t-statistic. Lyon, Barber, and Tsai (1999) argue that only the bootstrapped application of this skewness-adjusted test yields well-specified statistics. We followed their approach and calculated the adjusted t-statistics based on the distribution of bootstrapped resamples. Our hypothesis was that the number of positive initial returns observed equals the number of negative returns. The bootstrapping procedure as described by Noreen (1989) creates a coefficient vector under the null hypothesis of no relation by randomly reordering the 254 dependent variable observations and running an OLS regression. This is repeated many times, creating a distribution of least square coefficient vectors. The bootstrapped p-values are calculated by finding the location of the original coefficient vector in the ranked empirical distribution, variable by variable. The bootstrapped p-values reported are similar to the ordinary least squares values.

This finding suggests the possibility that although reputable underwriters foster high aftermarket prices in the short run (i.e. in the first month of trading), later they produce more pronounced negative returns.

Furthermore, another factor which influences the newly listed firms includes the market conditions during the listing period. In the short term, we find a strong association between IPOs listed during the cold period and positive returns for the investors. Our findings also show that in the long run 'hot' IPOs produce even significantly better returns. This positive sign indicates that IPO issuers should be very careful with the timing of the listing and only go public during a bullish period in the market. Our result opposes that of Loughran and Ritter's (1995), who argue that firms which go public during 'hot markets', are confronted with a higher long-term underperformance than other firms.

An interesting finding of this study relates to the time lag variable. In the case of a short period between the IPO announcement and the first day of trading, the level of underpricing is higher. With respect to the longer term, for example six months or one year, there is – however - no significant evidence for this effect. All changes seem to take place during the two-holding-years period whereby it is confirmed with a high statistical significance that a short period of waiting to go public promotes good long-term returns. Any delay in the 'start trading decision' after the completion of the shares allocation may cause damage in the long-term performance of the IPO, as this kind of behavior may imply that management is not ready for this big step in the firm's history.

European Sovereign Debt Crises Effect

The recent European sovereign debt crisis is unique in its kind. If differs from any other crisis explored over the past decades. Because it has such uncommon characteristics so far many finance researchers have not integrated this phenomenon in their studies. Luckily, in the context of the IPO topic, it has to be addressed and extensively researched. An interesting issue to examine is, for example, whether such a crisis is associated with opportunities for risk premium investors.

Table 6 presents the results as regards the effects of the financial crisis on the performance of IPOs. The dependent variable is a binary variable which has a value of one for IPOs which have gone public during the recent financial crisis and zero for IPOs which were listed prior to it. Model (1) only includes our main explanatory variables, the *IPO performance* indicators. The *given ownership* variable appears to be negatively related to the financial debt crisis, which indicates that during such times pre-IPO owners choose to sell a small proportion of their equity. Uncertainty, which is highly associated with crisis periods, forces the majority of issuers to employ a top-tier underwriter to realize a successful issuance. To control for the short-term returns, specification (2) includes the market-adjusted initial returns as an additional explanatory variable. As expected, the market-adjusted initial returns are

significantly negatively related to financial crisis (at the 10% level). Controlling for the underwriters reputation, top-tier advisors are associated with an increasing trend toward listings (the coefficient is significant at the 5% level).

Please Insert Table 6 About Here

Specification (3) addresses the *initial returns* as an additional control variable for the financial crisis. The results remain strong, which indicates higher returns for IPOs that go public within an unstable financial environment. Specifications (4) and (5) deal with long-term returns. We expected positive coefficients for both cases. The results, however, are inconclusive in this respect, which is why we can as yet not make any definite statements about this particular issue.

7. ROBUSTNESS CHECKS

The main conclusion of this study is that underwriters, when assisting issuers, have to determine lower offer prices for their newly listed stocks in order to compensate the investors for the risk in participating in the IPO process during what has been called a deep financial crisis. In this section, we check the robustness of this novel evidence.

A. Measurement of the Financial Crisis Effect

The first robustness check tested the sample of IPOs listed specifically during the financial crisis. The results in Table 7 are very similar to those reported in the paper in terms of signs and significance levels. We conclude that time lag is a strong indicator of the performance of IPOs on both the short- and the long-term horizons. Also the industry classification reveals that industrial-characterized newly listed firms perform better in the long run.

Please Insert Table 7 About Here

B. Other Sensitivity Tests

As table 8 shows, we also performed sensitivity tests using equal samples of IPOs listed before and after the European sovereign debt crisis. This was done to obtain a smaller but more homogeneous sample. The most interesting findings are shown in specification (4). Here we see that companies listed during the 'growth' period yield better long-term returns. Controlling for the age of the IPO, this

coefficient is significantly negatively related to the crisis period (at the 10% level). Thus, firms with a long operational history avoid going public during deep financial crises, such as nowadays, as they are aware of the fact they will not be able to sell their shares at a price sufficiently satisfactory to raise the capital they require. In sum, also when using this equally balanced sample, all our main results continued to hold.

Please Insert Table 8 About Here

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8. CONCLUSION

Contrary to the existing evidence, but consistent with the theoretical models of IPO underpricing, this paper provides new evidence regarding the returns as received by investors within a severe financial crisis environment. The findings indicate a continuously increasing level of underpricing, which is attributed to the efforts of underwriters to create demand and noise during the IPO process. Due to the high uncertainty in the future performance of businesses, these underwriters have a strong desire to reward the investors for their participation in risk bearing activities. In this context, the regressions reveal the significance of both the underwriter's reputation and the market condition in short- as well as in long-term cases.

This study has also examined the ownership structure, indicating a negative relationship between the percentage of ownership and short- as well as long-term returns. The finding that the loyalty of pre-IPO's owners indicates the IPO's quality is consistent with the seminal literature. With respect to the decision to list as defined by time lag, there is strong evidence that prolonging the waiting period damages the issuance, as underwriters have to set up a lower offer price. Furthermore, newly listed industrial firms perform better in the long term, which indicates that the quality of the businesses in this sector is generally higher. We tested the robustness of our results using alternative estimates of excess returns and alternative benchmark models (CAPM, Fama-French-Carhart models). To our satisfaction we found that our main findings were not influenced by these benchmarks and variable specifications.

Another issue we had to address is why the Dutch case differs from other studies in terms of such early negative long-term investor returns. One interpretation might be the information asymmetry, which is higher in most other cases, causing the market to be pragmatic about the initial public offerings. This explanation, however, contradicts Ritter's view (1991) that investors pay too much for an IPO in the immediate aftermarket period and then discover this "mistake" no earlier than in the

years after. Another interpretation might be the cunningness of managers to judge the suitable timing for the listing of their firms' stocks by observing the willingness of the market to pay too much for them. The strong negative three-year returns for the IPOs listed in the hot market period support this argument.

In response to the questions raised in the introduction, the findings of this paper imply that: (1) in support of Gao et al. (2012) the number of IPOs is dramatically reduced; (2) the European sovereign debt crisis has created a new trend within the arena of IPO underpricing, as there is strong evidence that any firm going public in an unfavorable financial environment will have to compromise its success by leaving more money on the table; (3) for IPOs listed in the midst of a financial crisis the level of underperformance is higher in the long term; (4) non-industrial IPOs suffer more from underpricing during a financial crisis but they perform better in the long run; and (5) experienced firms avoid going public during financial crises as they are aware that they will not be able to raise the capital required for their investment plans at the price they prefer. In conclusion, this paper provides new evidence as regards a topic that will increasingly attract the international interest, as investors will always remain focused on achieving good IPO returns, an important corporate finance topic.

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APPENDIX A: Variable Definitions

Panel A: Measures of Abnormal Returns

Variable Name in Abbreviation	Variable Definition
RIR	Measures the returns at the end of the first day of trading.
MAIR	Returns to investors at the end of the first day of trading adjusted to the returns of the market. Raw initial returns (RIR) are adjusted to market changes taking into account the NYSE-Euronext Stock Exchange General Index between the offer price closing date and the end of the first day of trading.
ER1Y1D,	Adjusted returns from first day price to first year after going public
ER2Y1D	Adjusted returns from first day price to two years after going public
ER3Y1D	Adjusted returns from first day price to three years after going public

Panel B: IPOs Characteristics

Variable Name in Abbreviation	Variable Definition
MAR	Dummy variable: 1 if an IPO is listed in Main Market and '0' if listed in Parallel or New Market.
AGE	Age of the firm starting from the year of its establishment until the year it goes public.
UR	Investment or commercial banks charging high fees, with historical large numbers of listings, lower risk offerings, and success of their listings (i.e. measured by low level of underwriters) are considered as reputable. In the Dutch case we use the dummy variable with value 1 for all IPOs issued by 'major" underwriter banks, as opposed to other smaller banks and syndicates.
H/C	IPOs listed in Hot Periods get a dummy of '1' and IPOs listed during Cold periods a dummy of '0'. Crises periods are considered as 'Cold Periods' (i.e. the 2000 Internet bubble, the 2008 global housing bubble, the financial crises from 2009 until now).
TLAG	Period between IPO announcement (the date of prospectus) and first day of trading.
SIZE	Market capitalization measured by log of the total number of outstanding shares after the IPO multiplied by price per share.
IND	This research defines 'industrial' IPOs as firms in the Chemical, Industrial (pure), Manufacturing, Metals, and Minerals & Shipyards sub-sectors, which are given a value of one. Non-industrial businesses are Conglomerate, Real Estate/Property and Transportation firms, Tourism/Hotels etc. They are given a value of '0'.

Table 1

Descriptive Statistics of the Dutch IPOs Sample

The table presents details of the Dutch IPOs and the control samples. Panel A provides the number of listed IPOs in each calendar year covered by this study. This panel contains further details on the total annual capital raised by IPOs. Panels B shows the descriptive statistics of the specific characteristics of Dutch IPOs not listed during the European the Sovereign Debt Crises (ESDC). The following IPO characteristics have been covered: the IPO's market classification, its *age* at the time of issuance, the IPO firm's *size* measured by market capitalization (Market value was computed as the number of listed shares times the offer price), the *underwriters' reputation* based on their prestige in the market, the *proportion of given ownership* by pre-the IPO shareholders, and the *time lag* between the last date of the public offering period and the first day of the stocks' listing (days). Panel C indicates the descriptive statistics of IPOs listed during the European Sovereign Debt Crises (ESDC).

Panel A: Number of observations in the Netherlands based on market listing

Event Year	IPO firms full sample	Event Year	IPO firms full sample
1990	4	2002	0
1991	2	2003	1
1992	2	2004	2
1993	1	2005	5
1994	5	2006	15
1995	6	2007	15
1996	7	2008	5
1997	15	2009	4
1998	22	2010	1
1999	17	2011	2
2000	9	2012	3
2001	1	**Total**	**144**

Panel B: Summary Statistics of Dutch IPO listed before the Recent Financial Crisis– 124 IPOs

	Mean	Median	Maximum
Market-adjusted Initial Return	5.13	2.33	90.98
Listing Board Classification	0.73	-	-
The age of the issuing firm (years)	28.92	12.08	208
Capital Raised (€ million)	1,129.8m	152.3m	26,450m
Underwriters' reputation (dummy)	0.52	-	-
Market Heat	0.81	-	-
Proportion of given ownership by the initial shareholders (%)	68.23	-	
Time lag between the last date of the public offering period and the first day of stocks' listing (days)	4.57	2	21
IPOs belonging in the industrial sector (dummy)	0.154	-	-
Offer Price	17.71	13.35	90.75

Panel C: Summary Statistics of the Dutch IPOs listed during the Recent Financial Crises– 20 IPOs

	Mean	Median	Maximum
Market Adjusted Initial Return	18.69	5.93	135.63
Listing Board Classification	0.55	-	-
The age of the issuing firm (years)	17.67	12.60	76
Capital Raised (€ million).	342 m	80 m	1,530 b
Underwriters' reputation (dummy)	0.51	-	-
Proportion of given ownership by the initial shareholders (%)	45.25	40	90
Time lag (days)	9.2	5	28
IPOs belonging in the industrial sector (dummy)	0.09	-	-
Offer Price	8.32	8.9	28.00

Table 2
Buy-and-Hold Adjusted Returns[14] for IPOs in the Euronext Amsterdam Stock Exchange in the Period Jan 1990- May 2012

Buy-And-Hold Adjusted Returns are defined as the unadjusted returns less the corresponding market returns: the returns of the General Index of the NYSE-Euronext (value-weighted index) for the same time period as for the unadjusted returns calculation. The IPO-adjusted returns taken in a three-year period (from the beginning of the first day of trading until 36 months after going public) are based on the IPO prices in the offer price period and at end of the first trading day. The differences in the number of firms in each panel are due to a lack of data for the period of study as regards three- and five-year returns. The total returns include both capital gains and dividends.

Panel A: Unadjusted Buy-And-Hold Returns based on the listing price

	Total Sample		Before ESDC		After ESDC	
Return of	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations
6 months	4.73	144	-1.09	124	46.66	20
12 months	2.76	141	1.53	124	16.02	17
24 months	-22.09	139	-20.65	124	-56.70	15
36 months	-24.41	136	-23.22	124	-29.02	12

Panel B: Unadjusted Buy and Hold Returns based on the first day closing price

Return of	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations
6 months	-0.54	144	-4.84	124	30.58	20
12 months	-5.17	141	-4.67	124	-10.24	17
24 months	-27.15	139	-25.28	124	-69.94	15
36 months	-24.85	136	-21.74	124	-48.84	12

Panel C: Excess or Adjusted Buy and Hold Returns based on the listing price

Return of	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations
6 months	4.17	144	-3.46	124	58.44	20
12 months	0.03	141	-0.52	124	9.59	17
24 months	-20.55	139	-18.02	124	-63.80	15
36 months	-34.96	136	-32.98	124	-45.15	12

Panel D: Excess or Adjusted Buy and Hold Returns based on the first day closing price

Return of	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations	Mean Return (%)	Number of observations
6 months	-5.24	144	-6.71	124	2.41	20
12 months	-7.48	141	-6.65	124	-16.04	17
24 months	-26.27	139	-24.10	124	-74.89	15
36 months	-33.18	136	-28.29	124	-52.34	12

[14] The IPO price changes which cause the adjusted returns include dividends and repurchases based on the (**ambiguous) final price formation.

Table 3
Abnormal returns for initial Public Offerings in Jan 1990-May 2012

Post-listing average-adjusted returns (AR_t) with associated *t* statistics and cumulative average returns (CAR_t) for the 36 months (where month one represents the market index-adjusted return from the last sale price on the day of listing to the end of that calendar month) after going public, excluding the initial return. Our final sample constituted 144 Dutch initial public offers of ordinary equity made between January 1990 and May 2012, calculated on the basis of an equal euro investment in each issue.

Month	No of firms trading	AR_t (%)	*t-stat*	CAR_t (%)
1	144	0.672	0.631	0.672
2	144	0.414	0.382	1.083
3	144	0.093	0.080	1.174
4	144	-0.092	-0.083	0.254
5	141	-1.247	-1.172	-0.997
6	138	-1.063	-0.982	-2.272
7	138	-0.933	-0.872	-2.992
8	137	-1.437	-1.363	-4.429
9	137	0.174	0.140	-4.255
10	136	-0.579	-0.496	-4.834
11	135	-0.215	-0.175	-5.048
12	135	0.129	0.096	-4.491
13	135	-1.094	-0.967	-6.009
14	134	-1.292	-1.142	-7.301
15	134	-1.844	1.702*	-9.145
16	134	-1.682	-1.592	-10.825
17	133	-2.172	-1.931*	-12.997
18	132	-1.245	-1.129	-14.242
19	132	-1.743	-1.639*	-15.982
20	132	-1.165	-1.048	-17.147
21	131	-1.821	-1.716*	-18.968
22	131	-0.521	-0.470	-19.446
23	130	-1.668	-1.572	-21.115
24	130	-1.994	-1.862*	-23.109
25	130	-2.162	-2.031**	-25.271
26	130	-1.603	-1.495	-26.874
27	130	-0.978	-0.903	-27.852
28	129	-0.231	-0.173	-28.082
29	128	0.674	-0.616	-27.408
30	128	1.131	1.054	-26.277
31	125	0.081	0.072	-26.193
32	124	-0.198	-0.145	-27.392
33	124	-1.057	-0.981	-27.442
34	124	-0.413	-0.364	-27.028
35	124	-0.815	-0.770	-27.843
36	124	-1.051	-0.972	-28.937

Table 4

Calendar-time regression for alternative benchmark models

Time-series models are the Capital Asset Pricing Model, the Fama and French 3 Factors Model, and the Carhart (1997) extension of the Fama and French (1993) model. The figures in brackets are the *t* statistics. The regressions in each case are estimated using monthly observations, with as the dependent variable the return on a 12-, 24-, and 36-month portfolio of IPOs minus the risk-free rate, and as the independent variables the benchmark factors. Alpha is the intercept term, Beta the sensitivity of the excess returns of the company to the excess return in the market (NYEGI), Gamma the sensitivity of the excess returns on the company to the "small firms premium" (taken as $(R_{sc}-R_{mt})$ and as SML for FF3F&FF4F), Delta the sensitivity to the HML factor in the FF3F&FF4F models, and Epsilon the sensitivity to the momentum factor in the FF4F model. In the case of the FF4F model, the dependent variable $(R_{pt}-R_{ft})$ is the excess return on an equally weighted (τ=12, 24 or 36 months) portfolio of IPOs issued up to month t;

Panel A: 12-month portfolio			
	CAPM	FF3F	FF4F
Alpha	0.0008	0.0003	0.0008
t-stat	(0.141)	(0.027)	(0.161)
Beta	0.261	0.274	0.239
t-stat	(2.110)	(2.130)**	(1.685)*
Gamma		0.005	0.029
T-stat		(0.034)	(0.191)
Delta		0.174	0.159
t-stat		(1.261)	(1.128)**
Epsilon			-0.086
t-stat			(-0.605)**
Adj R^2	0.068	0.098	0.103
Panel B: 24-month portfolio			
	CAPM	FF3F	FF4F
Alpha	-0.00743	-0.00637	-0.00603
t-stat	(-2.325)	(-1.626)	(-1.598)
Beta	0.011	0.221	0.378
t-stat	(0.078)	(1.420)	(2.197)**
Gamma		-0.409	-0.431
T-stat		(-2.607)***	(-2.815)***
Delta		-0.111	0.215
t-stat		(0.830)	(1.523)
Epsilon			0.309
t-stat			(1.931)**
Adj R^2	0.032	0.096	0.210
Panel C: 36-month portfolio			
	CAPM	FF3F	FF4F
Alpha	-0.00422	-0.00275	-0.00273
t-stat	(-1.264)	(-0.841)	(-0.837)
Beta	0.051	0.005	-0.010
t-stat	(0.793)	(-0.023)	(-0.046)
Gamma		0.024	0.030
T-stat		(0.113)	(0.140)
Delta		0.310	0.302
t-stat		(1.595)	(1.462)
Epsilon			-0.031
t-stat			(0.148)
Adj R^2	0.012	0.095	0.104

Table 5

Cross Sectional Regression Analysis of Short- and Long-term Dutch IPOs Performance

Note: Multivariate regression analysis of cross-sectional variation in long-run market index-adjusted (excess) returns; Intercept term from Fama and French (FF) four-factor model $Rpt-Rft = \alpha i + \beta i(Rmt-Rft)+\gamma$ iSMBt $+\delta$iHMLt $+\varepsilon$iUMDt $+\varepsilon$pt (over columns 3 and 6) subsequent to the listing of 144 Dutch initial public offers of ordinary equity made between January 1991 and May 2012; ER1Y1D: adjusted returns from the first day price to the first year after going public; ER2Y1D: adjusted returns from the first day price to two years after going public; ER3Y1D: adjusted returns from the first day price to three years after going public; MAR: listing Board Classification which obtains the value '1' if listed in the 'main market' and '0' if listed in the 'parallel market'; Ln (1+AGE): the natural log of the total of one plus the age of the company in years on the listing date; Size: market capitalization -log of the total number of listed shares during the IPO multiplied by price per share; UR: Underwriters reputation, which obtains the value '0' for non-reputable and '1' for reputable underwriters - Investment or commercial banks charging a high fee, with historical large numbers of listings and high listing success rates (i.e. measured by low level of underwriters) are considered reputable. If the underwriter is U.S.-based, the Liu and Ritter (2011) list is employed to make a judgement. H/C: IPO listed in a Hot Period obtains the value '1' and IPOs listed during Cold periods '0'; GO: proportion of given ownership during the going public process; TLAG: the time lag between the date of prospectus and the first day of trading; IND: identification of the sector of IPOs. Industrial businesses are firms operating in Chemicals, Industrial (pure), Manufacturing, Metals, Minerals & Shipyards subsectors. No industrial businesses are mainly Conglomerate, Property, Transportation, Tourism/Hotels firms, etc. The symbols a, b, and c denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Specifications	MAIR (1)	IR (2)	ER6M1D (3)	ER1Y1D (4)	ER2Y1D (5)	ER3Y1D (6)
				Intercept term from FF4F		
Constant	(1.914)	(1.690)	(1.841)	(-1.096)	(-0.802)	(-2.145)
MAR	-0.036	-0.045	0.329	0.011	-0.149	-0.132
	(-0.220)	(-0.334)	(2.332)[b]	(0.009)	(-1.524)	(-1.295)
AGE	-0.342	-0.079	0.531	0.078	0.041	0.048
	(-2.430)[b]	(-0.679)	(3.633)[a]	(0.675)	(0.261)	(0.273)
SIZE	-0.105	-0.194	-0.247	0.042	-0.044	0.193
	(-0.996)	(-1.645)	(-1.918)[b]	(0.351)	(-0.261)	(1.691)[c]
UND	0.361	-0.051	-0.037	-0.213	0.085	-0.312
	(2.622)[b]	(-0.390)	(-0.252)	(-1.791)[c]	(-0.710)	(-2.245)[b]
H/C	-0.287	0.019	-0.243	0.306	0.486	0.287
	(-2.049)[b]	(0.087)	(-1.966)[b]	(2.236)[b]	(3.494)[a]	(2.128)[b]
GO	-0.066	0.033	-0.157	0.096	-0.014	-0.027
	(-0.573)	(0.202)	(-1.572)	(0.898)	(-0.065)	(-0.159)
TLAG	-0.276	-0.082	0.016	0.052	-0.171	-0.069
	(-2.042)[b]	(-0.775)	(0.184)	(0.472)	(-1.676)[c]	(-0.599)
IND	-0.113	-0.197	-0.041	0.013	0.343	0.128
	(-1.116)	(-1.728)	(-0.197)	(0.009)	(2.430)[b]	(1.292)
Adj R^2	0.194	0.161	0.313	0.103	0.254	0.179
Obs.	144	144	141	138	132	121

Table 6
Results of multiple regressions based on period of IPOs listing

Note: Table 6 presents the results of the cross-sectional probit regression analysis focused on the European sovereign debt crises. It explores the short- and long-term performance and other specific characteristics for a sample of 144 Dutch IPOs. The dependent variables are binary variables valued one for IPOs which have gone public during the European Sovereign Debt Crisis and zero for IPOs which were listed prior to the crisis. The variables are defined in Appendix A. The Symbols a, b, and c denote the statistical significance at the 1%, 5%, and 10% levels, respectively.

Specifications	(1)	(2)	(3)	(4)	(5)
Constant	0.664[c]	0.682[c]	0.672[c]	-0.255	0.691
	(0.055)	(0.068)	(0.066)	(0.537)	(0.377)
MAR	0.081	0.102	0.114	0.120	-0.228
	(0.392)	(0.311)	(0.295)	(0.563)	(0.504)
AGE	0.0007	0.001	0.0009	0.0008	-0.0009
	(0.798)	(0.754)	(0.811)	(0.402)	(0.673)
SIZE	0.0015	-0.001	-0.0008	0.030	-0.014
	(0.931)	(0.948)	(0.965)	(0.177)	(0.569)
UND	0.129[b]	0.137[b]	0.149[b]	0.163	0.009
	(0.039)	(0.032)	(0.019)	(0.105)	(0.968)
HC	-0.662[a]	-0.650[a]	-0.652[a]	-0.367[b]	0.109
	(0.001)	(0.0001)	(0.0001)	(0.033)	(0.736)
GO	-0.002[a]	-0.002[a]	-0.003[a]	-0.002[b]	-0.003[c]
	(0.006)	(0.006)	(0.004)	(0.032)	(0.087)
TLAG	0.006[c]	0.007[c]	0.007[c]	0.014[c]	0.012
	(0.055)	(0.060)	(0.082)	(0.079)	(0.645)
IND	-0.019	-0.020	-0.034	0.046	-0.079
	(0.754)	(0.742)	(0.662)	(0.632)	(0.663)
MAIR		-0.006[c]			
		(0.077)			
IR			-0.0006[c]		
			(0.063)		
ER1Y1D				0.0009	
				(0.255)	
ER2Y1D					0.0008
					(0.343)
Obs.	144	141	139	114	107
Adj R^2	0.586	0.574	0.569	0.246	0.154

Table 7

Dutch IPOs performance during European Sovereign Debt Crises

Note: This table shows the results of the cross-sectional regression analysis of the effect of the European sovereign debt crisis on the short- and long-term performance and other specific characteristics of the Dutch IPOs. The dependent variable is a binary variable valued one for IPOs which have gone public during the recent financial crisis and zero for IPOs which were listed prior to the crisis. (1) is a general estimation of IPO-specific characteristics; (2)-(3) are estimations which employ short-term performance variables; (4) is a regression which explores the long-term performance up to and including a year after going public; (5): here the dependent variable is market-adjusted initial returns, for which we only tested the 20 Dutch IPOs listed during the Recent Financial Crisis. The variables are defined in Appendix A. The symbols a, b, and c denote the statistical significance at the 1%, 5% and 10% levels, respectively.

Variables	MAIR	IR	ER1Y1D	ER2Y1D	ER3Y1D
				Intercept term from FF4F	
Constant	-47.15	-45.96	7.713	-8.067	-8.094
	(0.339)	(0.410)	(0.922)	(0.915)	(0.811)
MAR	36.36**	23.23	3.522	0.631	3.198
	(0.021)	(0.155)	(0.717)	(0.951)	(0.625)
AGE	-0.029	-0.029	-0.046	-0.044	-0.029
	(0.464)	(0.506)	(0.465)	(0.474)	(0.300)
SIZE	-0.0007	0.632	-0.892	-0.676	-1.558
	(1.000)	(0.835)	(0.820)	(0.860)	(0.502)
UND	8.427	5.328	-2.452	1.524	12.73
	(0.539)	(0.714)	(0.852)	(0.889)	(0.358)
HC	36.96[b]	26.00[c]	10.47	13.12	31.51[a]
	(0.024)	(0.095)	(0.373)	(0.231)	(0.007)
GO	-0.107	-0.093	0.113	0.067	-0.155
	(0.345)	(0.457)	(0.503)	(0.638)	(0.329)
TLAG	3.301[a]	3.258[a]	-1.359[c]	-1.218[c]	-0.605
	(0.001)	(0.001)	(0.095)	(0.099)	(0.180)
IND	-10.91[c]	-17.04[a]	14.08[b]	15.50[b]	16.11
	(0.092)	(0.077)	(0.039)	(0.040)	(0.214)
Observations	20	20	20	20	18
Adj R^2	0.593	0.510	0.031	0.052	0.371

Table 8
European Sovereign Debt Crises effects on IPOs performance

Note: Table 8 presents the results of the cross-sectional probit regression analysis of the effect of the European Sovereign Debt Crisis (ESDC) on the short- and long-term performance and other specific characteristics of the Dutch IPOs. The dependent variable is a binary variable valued one for IPOs which have gone public during the European Sovereign Debt Crisis (ESDC) and zero for IPOs which were listed prior to the crisis. (1) is a general estimation of IPO-specific characteristics; (2)-(3) are estimations which employ short-term performance variables; (4) is a regression which explores the long-term performance up to and including a year after going public; (5): here the dependent variable is market-adjusted initial returns for which we only tested the 20 Dutch IPOs listed during the European Sovereign Debt Crisis. The variables are defined in Appendix A. The symbols a, b, and c denote the statistical significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	ESDC	ESDC	ESDC	ESDC	MAIR
Constant	1.002[a]	0.985[a]	0.985[a]	0.395	-47.17
MAR	-0.077	-0.087	-0.097	1.891	33.76[b]
	(0.310)	(0.316)	(0.319)	(0.142)	(0.044)
AGE	-0.009	-0.0001	-0.0001	-0.013[c]	-0.029
	(0.412)	(0.406)	(0.413)	(0.071)	(0.491)
SIZE	0.001	0.003	0.003	0.019	0.171
	(0.667)	(0.485)	(0.442)	(0.525)	(0.950)
UND	0.053	0.0484	0.042	2.204[c]	7.053
	(0.318)	(0.328)	(0.340)	(0.082)	(0.621)
HC	-0.983[a]	-0.989[a]	-0.987[a]	-1.457[b]	34.95[b]
	(0.085)	(0.090)	(0.088)	(0.037)	(0.036)
GO	0.0005	0.005	0.0005	-0.013	-0.105
	(0.339)	(0.341)	(0.349)	(0.192)	(0.365)
TLAG	-0.001	-0.002	-0.002	-0.021	3.293[a]
	(0.374)	(0.353)	(0.348)	(0.158)	(0.001)
IND	-0.037	-0.034	-0.028		-11.91[c]
	(0.325)	(0.335)	(0.370)		(0.099)
MAIR		0.009[c]			
		(0.092)			
IR			0.0003		
			(0.130)		
ER1Y1D				-0.005[c]	
				(0.069)	
Obs.	40	40	40	38	20
Adj R^2	0.427	0.424	0.420	0.392	0.391