The Determinants of IPO Withdrawal - Evidence from Europe

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Abstract

Why do companies not follow through with an IPO after filing for one? This question is investigated by examining a very large sample of common stock IPOs for the largest countries in Europe. We cover 80% of the Western European IPO market over the 2001-2015 period. We establish that the IPO phenomenon of withdrawal is a common feature of equity markets and identify key characteristics that influence the probability of withdrawal. Key findings indicate that venture capital or private equity involvement, the presence of negative news, CEO duality, or the intent to retire debt *increases* the probability of IPO withdrawal. On the other hand, higher levels of corporate governance or trading volume *decreases* the probability of IPO withdrawal. We argue that imminent agency conflicts and the lack of of appropriate control mechanisms can force a company to withdraw from the IPO.

Keywords: Initial Public Offering, Europe, Withdrawal, Probit

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1. Introduction

One of the key moments in a company's life cycle is to go public: to launch an Initial Public Offering (IPO)[2]. While the benefits are clear, the IPO decision itself is always linked to costs, such as increased oversight or scrutiny for instance, which can act as a significant deterrent to the level of IPOs (Bessler et al., 2017). In the light of these costs, certain planned IPOs may even end up withdrawn. The IPO process is undoubtedly linked to agency problems in which potential investors and IPO insiders might come to diverging IPO valuations. Owen-Smith et al. (2015) argue that the process is influenced by a composition of status signalling as well as a combination of resource and information transfer.

In the light of these issues, the issuer reserves an option to change course at any time and withdraw the IPO before its completion (Busaba et al., 2001); particularly when the ex-ante uncertainty around a firm's value is high, the propensity for negative information perception by investors is higher and as a consequence the firm becomes a more likely candidate for withdrawal. As Boeh and Dunbar (2013) note, an IPO withdrawal is not necessarily a negative event; if the issuer has a superior option, withdrawing can be a positive outcome. Having withdrawn, a company can reissue. Research however shows that an IPO withdrawal reduces the probability and issue price of a second time IPO; indeed Dunbar (1998), Dunbar and Foerster (2008) and Lian and Wang (2012) find that issuers withdrawing their IPO are unlikely to return.

To date, all research on the extent and determinants of IPO withdrawals have been conducted on US data, drawing an empirical conclusion for a globalised world based on a limited sample and on a single institutional frame-

[2]Research suggests that companies are taken public to finance future endeavours (Benninga et al., 2005), adjust their capital structure (Baker and Wurgler, 2002), for insiders to exit, and to facilitate future acquisition (Brau and Fawcett, 2006) or due to non-financial reasons such as increased publicity and outsider monitoring (Ritter and Welch, 2002).

work. The determinants of an IPO withdrawal remain opaque - especially in Europe. How can we understand the puzzles around initial public offerings if we are unaware of 12% of the pieces and focus on a single economy? These 12% approximate the IPO withdrawal rate in Europe represented by a sample of 2,808 IPO filings in France, Germany, Italy, Scandinavia, Spain, and the United Kingdom from 2001 to 2015. In contrast to the USA, where the withdrawal rate is more than twice as high at 30%, in Europe only few larger capital markets attract IPOs. From 2001 to 2015 an aggregated amount of USD 563 bn and USD 529 bn was raised in initial public offerings in Western Europe and the USA, respectively. This highlights that Europe was the bigger IPO market in this time period; while investment opportunities of an accumulated USD 151 bn (Europe) and USD 152 bn (USA) were foregone as a consequence of IPO withdrawal.

This paper therefore aims to advance research in three areas. First, we test various theoretical concepts in explaining IPO withdrawal in a European setting while focusing on the interplay of agency, life cycle, and market timing based theories. Second, we document for the first time the extent of IPO withdrawal vs listing for the main European countries within a novel database unique in its extent and depth. Third, we extend the existing US based literature to a more heterogeneous setting, both geographically and qualitatively by including a variety of hand collected variables not previously considered in the determination of the withdrawal decision.

Most companies that withdraw blame unfavourable market conditions, indicating that market timing theories are explaining IPO withdrawal. In our research, however, we identify IPO offer and corporate governance characteristics to be the main drivers of IPO withdrawal. In general, we argue that IPO withdrawal is a common feature of the main markets in Europe just like in the USA while the determinants depend on the institutional and market setting.

We find that Venture Capital (VC) and Private Equity (PE) involvement

significantly *increases* the likelihood of withdrawal which is in stark contrast to previous findings for the USA (Busaba et al., 2001, Dunbar and Foerster, 2008). Furthermore, we find that the intent to retire debt with the IPO proceeds significantly *increases* the probability of withdrawal. Issuers that face negative news or have CEO duality prior to their IPO are more likely to withdraw. When insiders agree on longer lock-up periods as well as a higher board independence or disclose intellectual capital, issuers are more likely to follow through with the IPO. Better corporate governance characteristics *decrease* the probability of an IPO withdrawal, while the lack of appropriate mechanisms *increases* the chance to withdraw. The presence of a greenshoe option introduces price stability after listing and *decreases* the probability of IPO withdrawal. These symptoms signal the importance of agency based theories in explaining IPO withdrawal in Europe consistent with the theories of Jensen (1986) and Baker and Gompers (2003).

From a life cycle perspective, a larger firm size *decreases* the probability of withdrawal, whereas a larger offer size *increases* same. In terms of market timing characteristics, we find that a higher level of Rule of Law in the country *decreases* the probability of IPO withdrawal, likewise a higher trading volume. Given the empirical evidence, we hypothesize that agency and life cycle based theories explain IPO withdrawal better than market timing theories in Europe. Only in the UK we find evidence indicative of a window of market timing opportunity based on the decreased trading volume for withdrawn IPOs. We argue that imminent agency conflicts and the lack of of appropriate control mechanisms can force a company to withdraw from the IPO.

The remainder of the paper is structured as follows: Section 2 describes the factors influencing IPO withdrawal and the European IPO setting, Section 3 introduces the modelling approach as well as the dataset. Descriptive statistics and empirical evidence for the determinants of IPO withdrawal from analysing market and firm level data are presented in Section 4. Fi-

nally, the paper is concluded with a brief summary and discussion about the implication of this research in Section 5.

2. The IPO withdrawal

In order to examine the determinants of IPO withdrawals, we draw from three closely intertwined theoretical threads: agency based, life cycle and market timing theories.

In agency theory, we assume inherent conflicts for IPO companies between the management who control the firm's resources and the potential shareholders who own the firm's resources (Jensen and Meckling, 1976). The implied adverse selection and moral hazard issues in an initial public offering can stop the fund raising and must be addressed and mitigated (La Porta et al., 2006). Latham and Braun (2010) suggest that managerial, firm, and environmental risk factors need to be examined in order to understand the decision of IPO withdrawal. We assume that the ultimate decision to withdraw from the IPO resides with the CEO despite involvement of multiple other parties along the way to go public (Busaba, 2006). Agency conflicts might arise between any financial intermediaries, the company, and the potential investors (Baker and Gompers, 2003).

Chemmanur and Fulghieri (1999) hypothesise that when a firm grows sufficiently large, it implies an IPO as a conclusive step in a company's life cycle since a more dispersed ownership is required; while the IPO marks the most important public information event, opening a two-way information channel. Zingales (1995) argues that by going public, insiders facilitate the acquisition of their company. In Europe, we find an interesting institutional setting with a combination of main markets and the Alternative Investment Market (AIM) in the UK. This second market provides small and young companies a platform to raise funds to finance growth to advance in the life cycle (Vismara et al., 2012).

Under the market timing theory, and assuming asymmetric information,

the valuation of an IPO company is influenced by a variety of firm and non-firm specific characteristics (Allen and Faulhaber, 1989). Using the framework of Benveniste et al. (2002) on information revelation theory, we argue that signalling generally decreases a priori uncertainty about the success of an IPO company. While strong positive signals such as certification increase the aggregate demand for the shares of the firm going public, negative ones decrease same (Brau and Fawcett, 2006). Chemmanur and Fulghieri (1999) argue that companies that face higher uncertainty intrinsically are more difficult to value and therefore have higher evaluation costs. However, not all the companies trying to go public are successful, as the equilibrium offer price is noisy. Potential investors value the IPO company based on a subjective *probability* of expectation of future success derived from a network of strong and weak positive and negative signals represented by firm and non-firm characteristics (Owen-Smith et al., 2015). Information transfers through signalling possesses a key efficiency property since signalling incurs potential welfare costs. A reliable and credible signal must be too costly to be imitated by 'bad companies' (Leland and Pyle, 1977). According to Rock (1986) information can be revealed directly through the IPO prospectus or indirectly through price. In consequence, the IPO company can (falsely) signal the unobservable quality to the potential investor via observable proxies in the IPO prospectus or during the bookbuilding process for instance (Connelly et al., 2010)[3]. The IPO company and the underwriter trade-off the benefits and costs of information revelation (Sherman and Titman, 2002), but the IPO company could remain private if the potential investors incur significant information acquisition costs (Allen and Faulhaber, 1989). Edelen and Kadlec (2005) argue that underpricing an IPO decreases the probability of IPO withdrawal, where the issuer henceforth must trade-off the proceeds from the underpriced IPO against the probability of IPO with-

[3]Work on the IPO bookbuilding process in terms of information revelation casts doubt on the actual information production during same in Europe (Jenkinson and Jones, 2004).

drawal. This implies that IPOs are withdrawn when the equilibrium offer price is below a certain issuer's fundamental value threshold (Chemmanur and Fulghieri, 1999). This introduces an option like nature for the IPO withdrawal (Busaba, 2006).

Insert Figure 1 about here

As outlined in Figure 1, firms withdraw for a variety of reasons (Boeh and Dunbar, 2013). Over the last decade it has become more common for companies to operate a 'dual track' approach (see Field and Karpoff (2002) and Ewens and Farre-Mensa (2017), or more recently Greene (2016) and Aktas et al. (2017)) whereby concurrent with the IPO filing trade sale or private placement opportunities are sought (Boeh and Dunbar, 2016). In most cases the existence of a dual track approach is only observable ex post, typically defined as an instance whereby a withdrawn IPO is sold in a trade sale within one year of the withdrawal. The post withdrawal experience of IPO candidates has received limited attention. Much of this research has been in the areas of entrepreneurial finance, examples being Field and Karpoff (2002) and Brau et al. (2010). More recent work begins to evaluate the afterlife of withdrawn firms, surfacing the determinants of different post-withdrawal outcomes (Boeh and Dunbar, 2013). Of course, prior to the evaluation of a taxonomy of post withdrawal events it is necessary to lay groundwork in terms of numbers and determinants of withdrawals, as we do here. As to the best of our knowledge, there is no documentation on European IPO withdrawals. We simply do not know what determines IPO withdrawal in Europe, but can only infer from previous research based in a different institutional and regulatory setting.

2.1. The European IPO setting

In Europe and much in contrast to the USA, the 'event' of an IPO withdrawal is not formerly defined nor mentioned in the European Union (EU) or country specific directives. This means that the event of an IPO

withdrawal cannot be identified as to the exact date, henceforth any event window is very blurry. Given the reporting environment, we can only infer the event after the IPO filing date.

Compared to the USA, there are established differences in regulatory and financial market particularities (see online appendix for the regulatory development in Europe); the issuance process is comparable to the US. Generally, IPO companies in Europe are more diverse and comparatively older than in the USA (Ritter, 2003, Ritter et al., 2013). There are only marginal numbers of foreign listings as the IPO market in Europe can be defined as a series of domestic markets with low competition between the different exchanges (Vismara et al., 2012). When examining the decision to go public, Bancel and Mittoo (2009) find that European CFOs value outsider monitoring and the enhanced visibility as well as financial flexibility when deciding to go public in contrast to American CFOs which highlights the importance of agency based theories. In terms of costs that come with an IPO, Bancel and Mittoo (2009) argue that the American CFOs seem more concerned about the direct and indirect costs than their European counterparts.

It is important to note, that historically the different European financial markets were driven by national desires. This resulted in a fragmented and inflexible financial regulatory environment with a variety of regulatory structures and legal systems. In an effort to create a seamless financial market for the European Union and Economic Area (EEA), minimum standards were introduced through EU Directives. In 1999, the European Union initiated the Financial Services Action Plan (FSAP) in an attempt to create a single financial services market (Cumming et al., 2011). In particular, EU Directives such as 2001/34/EC or 2004/109/EC as well as the Markets in Financial Instruments Directive 2004 have shifted the focus of regulations to an alignment of investor protection and compatibility of stock exchanges to international market standards (Cattaneo et al., 2015). In line with La Porta et al. (2006), it is argued that the overall change of rule structure has miti-

gated insider trading and increased market liquidity (Cumming et al., 2011, Aitken et al., 2015).

Insert Table 2 about here

The IPO environment in the EU in general is characterised by less regulation (fewer regulatory documents and listing standards) compared to the detailed listing environment in the USA. As listed in Table 6 the number of required regulatory documents for the Official List in the UK are highest, the possibility of exceptions is pronounced most in France or Italy[4]. The EU directives are intended to establish obligatory minimum requirements in the European Economic Area in terms of listing standards including prospectus information, controlling bodies and transferability. Admittedly, due to the nature of the EEA, these directives are positioned in a rather generalist way ensuring a maximum of flexibility to the individual countries. The general IPO regulation is respectively homogeneous while the details on listing standards differ marginally; for instance corporate governance, timing, fees and liability are country-specific. A more detailed analysis is provided in the online appendix. Our paper aims to provide further empirical evidence in form of IPO withdrawals on the evolvement of the integrative financial markets in Europe with a focus on the harmonisation of regulatory standards as well as country specific financial customs. In the last years, the major European countries have aligned their listing requirements and standards exhibiting only low variability as portrayed in Table 6. We document that the IPO phenomenon of withdrawal is a common feature of the largest equity markets that exhibits similar determinants in Western Europe. European equity markets are more illiquid in nature, except for the UK. Especially, the IPO

[4]See a discussion on listing standards, market liquidity and IPO quality in Johan (2010) or Takahasi and Yamada (2015). Vismara et al. (2012) note that the majority of IPOs in Europe are domestic apart from the AIM in the UK where foreign listings constitute only a marginal number.

market in Continental Europe can be considered rather volatile and in some parts inopportune as evidenced in the numbers of IPOs (see Table 2).

Insert Table 2 about here

European IPO activity has been declining. Although not as drastically as in the USA due to the popularity of the second markets such as the AIM which provide the opportunity to undertake an IPO for growing and smaller firms (Ritter et al., 2013)[5]. These second markets represent a demand-side segmentation and are organised as an exchange-regulated market where the company's Nominated Advisor must ensure compliance (Vismara et al., 2012). This implies that formally, these second markets are not officially regulated through the European Financial Services Directives (Espenlaub et al., 2012). Given the particular regulatory, economic and market environment, we hypothesise that in Europe the event of an IPO withdrawal can be more likely explained by inherent agency conflicts compared to market timing arguments.

2.2. Factors influencing IPO withdrawal

An emerging, but US centred, literature tests the determinants on the decision to withdraw, starting with Busaba et al. (2001). This is extended by Dunbar and Foerster (2008) who broaden the set of possible market and firm level explanatory variables. From these and papers examining IPO listings we derive and identify a number of factors which may be relevant in the IPO withdrawal issue. The measures used to proxy these features are outlined in Table 1 and in more detail in the online appendix.

Insert Table 1 about here

[5]Vismara et al. (2012) show that the majority of IPO companies at the AIM were not eligible for the main market.

We can break the characteristics hypothesised to impact IPO withdrawal into a number of sets representing market, offer, and firm characteristics. **Market characteristics** can be broken into three subcategories. The predominant theoretical concept represented is based on market timing theories.

First, we consider the level of *regulatory environment* approximated by the country specific and time variant measures of the Rule of Law, Regulatory Efficiency, and the Market Openness Index provided by the Heritage Foundation as well as a Common Law Jurisdiction dummy variable which capture the differing international regulatory environments. It is argued that the market-friendly and standardised disclosure as well as liability standards are the main benefits of common law for equity markets (La Porta et al., 2006). La Porta et al. (1997) suggest that a higher level of political stability as well as a better legal framework can be considered as a favourable environment for investors. As the regulatory environment influences the uncertainty prior to an IPO (Engelen and van Essen, 2010), we expect that a better environment decreases the probability of withdrawal as it possibly reduces imminent agency conflicts in the IPO process (La Porta et al., 2006).

Second, we use the change in the country's Gross Domestic Product (ΔGDP), the monthly yield of ten-year government bonds, and the credit spread to represent *economic conditions* (Bergbrant et al., 2015). We expect a favourable economic environment and credit conditions to decrease the probability of IPO withdrawal.

Third, we examine equity *market conditions* since a multiplicity of research on market timing suggests that companies go public given favourable market conditions, therefore exploiting investor sentiment (Lowry, 2003). The change in the main stock market index (ΔIndex) signals positive information spillovers for potential issues. Since IPOs tend to come in waves, we examine a hotness as well as a trading volume dummy (Chemmanur and He, 2011). Recent research on market sentiment supports that (negative public)

news affects stock returns (Shi et al., 2016)[6]. Finally, we rely upon the market estimate of volatility (VIX) to further approximate investor sentiment.

Firm characteristics can be categorised into three areas. First, the *offer characteristics* include the offer size and the intent to retire debt with the IPO proceeds. From an agency based perspective, leverage reduces managerial opportunism (Jensen and Meckling, 1976) while an overreliance on debt can manoeuvre the company into a competitive disadvantage (Wright et al., 2000). We anticipate that a proposal to use IPO proceeds for debt retirement is a negative signal as it lowers the expectation about the future success of the IPO company and henceforth increases the risk for the investor (Busaba et al., 2001).

IPO research differentiates on the offer share structure, while findings of the effect of primary and secondary shares are not unanimous (Brennan and Franks, 1997). Klein and Li (2009) postulate that secondary shares send a negative signal as insiders cash out. In addition, we also include the greenshoe option in the offer structure. Greenshoe options are considered a stabilisation mechanisms for the underwriter who can in turn react with enhanced flexibility on price volatility (Benveniste and Busaba, 1997). Krigman et al. (2001) identify the underwriter reputation as vital to the success of issues which is supported by the findings of Dunbar and Foerster (2008) and Boeh and Southam (2011).

Another characteristic included is venture capital involvement as the VC sponsor potentially add value to its portfolio firms through operational gearing (Cumming et al., 2016). Given the fragmented risk capital market in Europe, we additionally include private equity involvement since previous research has not differentiated same. Research findings are not unanimous; under the agency theory, a conflict arises as the exit of dominants shareholders may not be in the best interest for the company (Baker and Gompers,

[6]The negative terms are defined by the LexisNexis Negative News Search. Please refer to the online appendix.

2003). Busaba et al. (2001) and Boeh and Southam (2011) identify VC backing as a certification of the IPO company as it reduces the probability of IPO withdrawal. Dunbar and Foerster (2008) identify venture capitalist certification as key for a successful return to a successful second time IPO. The European PE and VC market is not as developed and institutionalised as the US American market (Bessler and Thies, 2006). Given the different institutional setting in Europe, agency conflicts are imminent between these financial intermediaries and possible investors. Tykvova and Walz (2007) posit that PE and VC companies have an information advantage over investors which they will exploit. We expect that PE and VC investors pursue the most beneficial of the multiple exit routes.

Finally, as Chemmanur and Fulghieri (1999) hypothesise, cost of information production is essential in the IPO process. We expect that higher disclosure of the company's intangible assets or competitive advantage reduces the information asymmetry between issuer and potential investor and in consequence reduces the probability of IPO withdrawal [7]. This is denoted as intellectual capital disclosure in the IPO prospectus (IC dummy) in our analysis (Singh and van der Zahn, 2007).

Second, drawing from the life cycle theory, the *firm characteristics* include the firm size and age as we expect that larger and older issuers reduce the uncertainty about the long-term success of the IPO issue through positive signalling (Brau and Fawcett, 2006, Engelen and van Essen, 2010). We also include variables for a higher level of capital expenditure and net income (Lowry, 2003). Barry and Mihov (2015) state that financial intermediaries involvement such as bank debt-financing provides information to the investor and consequently reduces the uncertainty about the firm value prior to the IPO. Given agency related concerns when contrasting managerial and organisational risk, an overreliance of debt can lead to a competitive disad-

[7] Patent quality and extant is discussed comprehensively in Bessler and Bittelmeyer (2008), who show positive valuation and financing effects.

vantage (Wright et al., 2000). We consequently propose a negative signal of debt to investors as companies with too high a degree of leverage might also face costs of financial distress which increases the risk to investors. In addition, we suggest that the level of uncertainty prior to the IPO for high-tech companies will typically be more pronounced due to greater uncertainty in IPO issue valuation (Engelen and van Essen, 2010). Lastly, we expect more multinational companies to be perceived as less risky by investors due to the inherent operational hedge conferred by multinationality.

Third, the decision to undertake an initial public offering boosts potential agency problems as the ownership becomes dispersed (Latham and Braun, 2010). Consequently, we include *corporate governance characteristics*. Investors are likely to demand signals that reduce possible agency issues. To proxy these, the level of retained ownership by shareholders after the IPO, the lock-up period, the board size and independence, as well as the proportion of female board members are presumed to decrease the probability of IPO withdrawal (Howton et al., 2001, Djerbi and Anis, 2015, Brav and Gompers, 2003). CEO duality, a role combination of the chairman and CEO, is expected to increase the likelihood of IPO withdrawal (Bhagat and Bolton, 2008). Based on agency conflicts, CEO duality may cause additional monitoring costs and limits the board's ability of oversight (McGuiness, 2016, Bertoni et al., 2014). In Europe, we have an interesting setting with regards to corporate governance. The EU directives are fostering harmonisation of national corporate governance codes and hence on the EEA level there is a remarkable degree of agreement (Akyol et al., 2012). Bertoni et al. (2014) suppose a differentiation of the board structure across the life cycle. With a resource-dependency for younger companies, corporate governance acts as value creation mechanisms whereas the agency conflicts are more prominent with mature companies where corporate governance protects value. The average age of a company that files for an IPO in Europe is 16 years (22 years excluding the AIM), hence we expect the lack of adequate corporate gover-

nance mechanisms to result in a shortage of oversight and value protection. This idea is consistent with Bancel and Mittoo (2009) who document that outside monitoring is considered a major benefit of the equity market by European CFOs. A more detailed description of the variables can be found in Table 1 and in the online appendix.

3. Methods and Data

In light of the data and following academic convention, we employ a probit model to identify the determinants of IPO withdrawal (Busaba et al., 2001, Dunbar and Foerster, 2008). We apply a binary model, where the dependent variable y is the event of an IPO withdrawal and takes the value 1 if the IPO is withdrawn and 0 otherwise, so that our basic model is defined as:

$$Pr(y_j \neq 0|x_j) = \Psi(x_j\beta) \tag{1}$$

where x_j are the independent variables listed in Table 1 with their according β coefficient, and Ψ the cumulative normal distribution.

In order to interpret results, we consider the marginal effects (ME) of changes in x on the dependent variable y, expressed by a linear function ϕ:

$$ME = \frac{\partial Pr(y \neq 1|x)}{\partial x} = \phi(x\beta)\beta \tag{2}$$

Equation 2 is slightly modified in the presence of dichotomous dummies and specified as:

$$ME = \Big[\Psi(x\beta|x^k = 1) - \Psi(x\beta|x^k = 0)\Big] \tag{3}$$

therefore focusing on differences in the assumption that all dummies equal either 0 or 1 under a given specification.

This paper examines all IPO filings in the UK, France, Germany, Italy, Spain, and Scandinavia from January 2001 to December 2015[8]. Following

[8]Throughout the modelling process we tested for endogeneity in our estimates. In no case endogeneity was an issue, results are available on request.

usual practice in IPO literature (Ritter, 1987), we examine all common stock IPOs and therefore exclude Real Estate Investment Trusts (REITs), American Depositary Receipts (ADRs), closed-end or mutual funds, special purpose entities and rights issuance. Unlike other studies financial companies remain in the sample[9]. We retrieve the list of IPO filings from Bloomberg and validate the accuracy with the information provided by the respective stock exchange. The IPO prospectuses are downloaded from Bloomberg, Thomson Reuters, stock exchange or company's websites or from other public sources. Our dataset covers 82% of the Western European IPO market (see Figure 2) and consists of a total of 2,808 companies that filed for an IPO, of which 2,474 were successful and listed whereas 334 (11.89%) withdrew.

Insert Figure 2 about here

We use public sources such as Bloomberg and Thomson Reuters for economic and market specific characteristics but hand collect the majority of variables for the offer, firm, and corporate governance variables from the individual IPO prospectus given the lack of available information in Europe. This makes our dataset unique in its extent, detail and depth.

The majority of IPO filings in number and volume are in the UK given the Alternative Investment Market with 1,454 successful and 147 withdrawn IPOs overall (about 50% of sample), followed by France and Germany. We start in 2001 for two reasons. First, this provides us with a sample period post the dot.com bubble, yet covering at least two full economic cycles in Europe. Second, given the significant changes in regulation, European integration, and corporate governance, we felt that moving back into the 1990s and beyond would result in a dataset of considerably greater than needed heterogeneity. As outlined, the EU directive 2001/34/EC became effective as of early 2001, explicitly requiring minimum IPO listing requirements and

[9] As a robustness check we exclude financial and state-owned enterprises from the sample. Our findings remain broadly unchanged, results are available on request.

regulatory standards for all countries in the European Economic Area for the first time.

There is considerable variation in the level of European IPOs and IPO withdrawal as depicted in Table 2. The wave like nature of IPOs over time is evident here. The number of companies that file for an initial public offering were highest between 2004 and 2007 with a peak of 366 IPO filings in 2005. In contrast, after the latest global financial crisis erupted, there were as low as 18 filings in all countries together in 2009. The lowest IPO withdrawal rate is about 3.5% in 2003 with a peak of 22% in 2011. Significant variation is also evident across countries. In Figure 3, we show the country-specific extent of withdrawal and variation over the database. As a preliminary investigation, Table 3 reports the means and standard deviations of the variables, according to IPO status. We also provide a test for differences in means across status.

Insert Figure 3 and Table 3 about here

The majority of companies withdrawing typically blame unfavourable market conditions indicating that market timing theories might justify IPO withdrawal. Successful IPOs are associated with higher levels of regulatory environment metrics such as Rule of Law, Regulatory Efficiency or Common Law Jurisdiction which is consistent with expectation (La Porta et al., 1998). In line with Chemmanur and Fulghieri (1999), successful IPO listings are during 'hot' markets, where the market estimate for future volatility (VIX) and the credit market conditions are low. Market conditions, approximated by the change of the lead stock market index, GDP, or trading volume, are marginally positive for successful IPOs which support the idea of market timing (Benninga et al., 2005). In addition, market sentiment seems to have an effect: negative news coverage is significantly more frequent for companies that withdraw their IPO than for successful companies giving rise to agency related issues.

The offer size of withdrawn IPOs is significantly larger which enforces the claim that potential investors and IPO insiders have diverging views on the offer price and size (Benveniste and Spindt, 1989). While there seems to be no variation on the offer share structure for withdrawn IPOs, greenshoe options seem to be more frequent with filed IPOs. As anticipated, withdrawn companies display significantly higher mean levels of debt and are also more likely to use the IPO proceeds to retire outstanding debt. We find a surprising result when we examine the role of private equity and venture capital. Withdrawals are more likely to have had PE or VC involvement than successful IPOs.

Besides this, consistent with Boeh and Southam (2011), withdrawn IPOs tend to have poorer corporate governance which is represented in a shorter lock-up period. This is in accordance with Brav and Gompers (2003) who establish longer lock-up periods as a positive signal. Also, withdrawn IPOs have fewer independent board members. The lack of board independence is interpreted as an absence of a critical disciplining body of management, imminent agency conflicts might be perceived as risky by investors (Djerbi and Anis, 2015). We also find that corporate governance measures fail to act as a value protection mechanism (Bertoni et al., 2014) [10]. Finally, withdrawn issues disclose their intellectual capital and competitive advantage less often, which is consistent with previous findings (Singh and van der Zahn, 2007).

4. The Determinants of IPO Withdrawal

4.1. General findings

Table 4 provides results of the probit analysis. We report the probit coefficient estimates, the corresponding p-values and marginal effects[11]. The

[10] We have excluded these findings from reportage here but results are availabe in the online appendix

[11] The regressions appear reasonably well specified as shown in Table 4. The HL goodness of fit test and the Pseudo-r^2 suggest an adequate model.

results of the probit regression are largely consistent with the findings from the descriptive statistics. At a 5% significance level we find that 21 variables show explanatory power on the probability to withdraw an IPO.

Insert Table 4 about here

For ease of interpretation, Figures 4 and 5 illustrate the principal and secondary drivers of the IPO withdrawal which are significant at the 5% significance level.

Insert Figures 4 and 5 about here

Four offer characteristics come up as positive and significant. We find that the larger the offer size, the higher the probability of withdrawal. As mentioned above, one possibility is that larger issues are more likely to be withdrawn when they face scepticism at the aggregated demand from potential investors (Benveniste et al., 2002). We assume that this finding is driven by the determinants of IPO withdrawal in the UK and France as shown in Table 5. The presence of a greenshoe option introduces price stability after the IPO listing and decreases the probability of IPO withdrawal (Benveniste and Busaba, 1997). Disclosing intellectual capital in the prospectus decreases the probability of IPO withdrawal by almost 6% (van der Zahn et al., 2007). This reduces the information asymmetry between the potential investor and the insiders and consequently anticipated agency conflicts.

Insert Table 5 about here

We find further evidence for the importance of agency based theories in explaining IPO withdrawal as the following characteristics are significantly influencing the probability of IPO withdrawal. The intent to retire debt with the proceeds of the IPO imposes potential agency conflicts to the investor (Wright et al., 2000). This is confirmed by the probit findings suggesting that debt retirement increases the probability to withdraw by as much as 3%

according to the marginal effects in Table 4. Dunbar and Foerster (2008) hypothesise that debt signals the availability of alternative sources of finance, leading to a higher propensity of IPO withdrawal. In the European context, one can more likely conclude that debt and debt retirement serve as negative signals on the future success of the company. As Pagano et al. (1998) evidence, most companies intend to rebalance their accounts with the IPO in Europe. Especially when considering the role of debt in Italy or Germany, banks exert substantial control over the firms such as holding voting rights and being represented in the supervisory board (Chirinko and Elston, 2006). Despite potential benefits of bank concentrated ownership, control dilemmas are present in this construct (Elston and Rondi, 2006).

We find that VC and PE significantly and economically increase the probability of IPO withdrawal by almost 7% and 4%, respectively. We propose two marginally competing explanations. First, VC and PE partners exploit market timing. Tykvova and Walz (2007) argue that venture capitalists and private equity firms have an information advantage over investors; and as a consequence, they are more likely to withdraw from the IPO for the benefit of a more favourable option (Cumming, 2008). But what happened to the VC or PE backed company in our sample after the IPO withdrawal? We evaluate the aftermath of the PE and VC backed IPO withdrawal companies and find that about 63% of private equity backed and 57% of venture capital backed companies engaged in a presumably superior alternative. This means that the target companies went public or were sold in a trade sale or secondary buyout[12]. Our empirical evidence suggests that PE and VC partners pursue a dual track approach and try to exploit market timing. In fact, Gill and Walz (2016) argue that an IPO with venture capital backing can be interpreted as a delayed trade sale. The empirical evidence is more pronounced for private equity backed IPO companies than

[12]A supplemental analysis can be found in the online appendix.

for venture capital ones. Still, in half of the cases, there was no superior alternative, leaving some questions for the role of PE and VC in Europe. Second, on the contrary, we query the positive intrinsic value role of VC and PE involvement for Europe, considering the ineffective certification of VC in France for example (Chahine and Filatotchev, 2008) combined with the fragmented European market for risk capital (Goergen et al., 2009, Groh et al., 2010). We challenge possible imminent agency conflicts of VC and PE involvement for Europe. Compared to the USA, in general, the European market for venture capital and private equity is still seen as lagging behind (see for example Bessler and Thies (2006) and more recently Bertoni et al. (2015)). For a trade perspective on the persistent differences and relative lagging of the European markets, see Levin (2016) and Basta (2017). Particularly in France and Germany, the exit of VC or PE investors might not be in the best interest of the IPO company imposing agency conflicts between minority and those dominant owners (Baker and Gompers, 2003). This can be ascribed to the relatively lower level and complexity of PE and VC performance, reputation, and consistency in Europe as argued by Tykvova and Walz (2007). Proksch et al. (2017) undertake a qualitative analysis of German venture capital companies' business documentation showing that venture capital activity is rather heterogeneous in terms of value added activity within backed firms. While France and Italy score below average on the VC/PE attractiveness index, Germany scores average due to the bank-led capital market (Groh et al., 2010). Klein et al. (2016) attribute the banking system in Germany as the cornerstone of its capital market. PE and VC might not be independent from banks and thus be perceived as a riskier form of credit financing only. VC investment varies significantly in quality such that a lack of control negatively affects the performance of same and henceforth the certification (Cumming, 2008)[13].

[13]As proposed by Nahata (2008), time-variant venture capital quality and consistency seems to be a piece to the risk capital puzzle. Given the sample size of VC-backed IPOs in

Consistent with previous findings and in accordance with the life-cycle framework, the larger the firm size, the lower the probability of IPO withdrawal (Busaba et al., 2001, Boeh and Southam, 2011), as information production costs are decreased (Chemmanur and Fulghieri, 1999). While a higher level of debt statistically increases the probability of IPO withdrawal, the economic impact is marginal, however enforces our suggestion about the role of debt in Europe. There are several market characteristics that are statistically significant, but have no economic impact (see Table 4). Only two market characteristics have an economical impact on the probability of IPO withdrawal. First, an increased trading volume around the filing of the IPO is decreasing the likelihood of IPO withdrawal by about 4%. This result is mainly driven by the UK as this is the only European country where the trading volume turns out to significantly influence IPO withdrawal. We conclude that there does exist some form of opportunity window in the UK, given its liquid stock markets. We do not find evidence for this in other European countries, arguably because of the illiquid nature of stock markets. Second, as suggested by the statistical results, the presence of negative news prior to an IPO increases the probability to withdraw by as much as 14% which is a remarkably large effect. This result is not surprising considering the importance of market sentiment and the effect of negative signals (Shi et al., 2016). Negative news are easily accessible through the public press. Potential investors can incorporate this information to their expectation about the IPO company's future success which might reveal further agency conflicts. This expectation is most likely lowered when a company is mentioned negatively in the news as this potentially decreases reputation, sales, or in the worst case, reveals fraudulent behaviour.

The corporate governance metrics of lock-up period, board independence and CEO duality prove to be of significant explanatory power in accor-

Europe from 2001 to 2015, a qualitative approach seems most adequate which is beyond the limits of this paper.

dance with the descriptive statistics. This supports the finding of Boeh and Southam (2011) that good corporate governance is a positive signal to investors and reduces the IPO company's uncertainty and likewise the probability to withdraw. Appropriate control mechanisms are in place to mitigate agency conflicts and reduce agency costs (Latham and Braun, 2010). The CEO duality dummy reduces the probability of IPO withdrawal by almost 5% which is contrary to expectation (Bhagat and Bolton, 2008). In Table 5 it becomes evident that the results seem to be driven by France. We offer two competing explanations to contextualise the negative correlation between CEO duality and likelihood of IPO withdrawal. Our findings might support the stewardship theory which we deem unlikely. We identify a more compelling answer within behavioural finance. We suggest that the CEO is pushing through the IPO despite potential higher costs associated with underpricing as the diligence and control mechanisms do not function properly when the role of CEO and chairman is combined (Bertoni et al., 2014). Boulton and Campbell (2016) find evidence that managerial overconfidence is associated with higher underpricing. In the end the decision of IPO withdrawal resides with the CEO.

We then break the sample into country specific elements. We can establish a pronounced alignment of the country-specific determinants of IPO withdrawal. Given the harmonised European regulatory environment, this is as expected. Considering the country specific results of the probit analysis for the UK, France, Germany, Italy, and Scandinavia in Table 5 it becomes clear that corporate governance metrics indeed reduce the probability of withdrawal. Lock-up periods are important in Europe, while in Germany retained ownership appears to matter more. All countries except France value independence of the board. As outlined, the disclosure of intellectual capital or competitive advantages mitigates information asymmetries (Singh and van der Zahn, 2007). In particular, this result provides reasonable evidence for the benefits of information revelation. Companies that withdraw

their IPOs disclose their intellectual capital or competitive advantage less frequently imposing a higher evaluation cost on the potential investors. Information disclosure can serve as a differentiator between good and bad firms.

Summarising, the following characteristics are of statistical and economical power: while the presence of negative news, venture capital or private equity backing, and debt retirement increases the probability of IPO withdrawal, the disclosure of intellectual capital, a higher trading volume and better corporate governance decreases same. As it becomes evident, the country specific determinants of IPO withdrawal overwhelmingly coincide with the consolidated results for the European determinants of IPO withdrawal. The empirical evidence gives rise to the conclusion that, in Europe, agency and life cycle based theories are explaining IPO withdrawal better than market timing theories alone.

As a robustness check[14], we run probit regressions using dummy variables (see Table 1 and the online appendix), as opposed to logarithmic values, for firm size, offer size and firm age for the whole sample as well as the country specific sub-samples. The majority of variables are significant in both specifications for the European dataset as well as for the country specific ones which is consistent with regulatory efforts on the European capital markets integration (see the online appendix). We also run a probit regression excluding the UK and separating the AIM IPO filings as those IPOs constitute about 52% and 40% respectively of our sample data. The results in Table 4 indicate that the probit regression remains broadly unchanged. This also applies for the results we find when separating the AIM IPO filling in the UK specific regression. Further robustness checks can be reviewed in the online appendix.

[14]Given the large number of variables, we compute a correlation matrix which shows that multicollinearity is not present. Results are available on request.

4.2. Comparison with existing findings

As established earlier in the paper, we already know that there exist differences between the European and the American IPO markets (Ritter, 2003, Ritter et al., 2013). Interestingly we can identify different empirical manifestations when examining the IPO phenomenon of withdrawal. While most results for the largest European equity markets show similarities to US-based research, some of our findings are in contrast to Busaba et al. (2001), Dunbar and Foerster (2008) and Boeh and Southam (2011). This does not consequently lead to an overthrow of the findings for the US equity market, but it leads to the conclusion that, while a feature to European and US equity markets, the IPO phenomenon of withdrawal needs to be examined within an institutional setting.

Dunbar and Foerster (2008) as well as Boeh and Southam (2011) find that successful IPO companies have a significantly larger offer size when descriptively analysing the differences between successful and withdrawn IPOs. While it is argued that a smaller size is riskier (Busaba et al., 2001, Dunbar and Foerster, 2008), our results contradict these US-specific findings; withdrawn IPOs are of a significantly larger filing size. Busaba et al. (2001) find a positive relation between filing size and the probability of withdrawal.

The finding that is in starkest contrast to US studies is the role that venture capitalist and private equity involvement plays. Busaba et al. (2001) find that VC involvement significantly reduces the probability of IPO withdrawal in line with the certification hypothesis. Dunbar and Foerster (2008) identify venture capitalist involvement as key for a successful return to the equity market after IPO withdrawal. As already pointed out, compared to the USA, the European market for venture capital and private equity is still seen as lagging behind (Bessler and Thies, 2006). For half of IPO withdrawals, we find that PE and VC investors are more likely to withdraw from the IPO for the benefit of a more favourable option (Cumming, 2008). We uncover further evidence to cast doubt on the causal mechanisms of

certification proposed for the USA consistent with Chahine and Filatotchev (2008)'s findings for France alone. Our empirical evidence suggests that PE and VC partners pursue a dual track approach and try to exploit market timing, giving rise to potential agency problems between the dominant and potential minority shareholder.

The variables that do not appear as significant are also of interest in comparison to previous US studies. Carter and Manaster (1990) and Krigman et al. (2001) established the positive signalling effect of the underwriters' reputation for the USA. Unlike in the study of withdrawals for the US market by Dunbar and Foerster (2008) the underwriters' reputation and market share do not appear to matter in the European market. Klein et al. (2016) argue that companies chose their underwriter not on reputation but by previous linkages. Therefore, the certification role of underwriters that is observed in the USA does not apply to Germany, Italy, Scandinavia or the UK due to the specific universal operations of banks.

5. Conclusion

We analyse a dataset of all IPO filings from 2001 through 2015 in France, Germany, Italy, Scandinavia, Spain and the UK. New empirical and theoretical implications crystallise from our results. Given the different regulatory and institutional setting, we postulate that Europe is different from the USA when it comes to the level and determinants of IPO withdrawals. We do not find compelling evidence in favour of the market timing theory to explain IPO withdrawal. The level of trading volume and the presence of a greenshoe option *decrease* the probability of IPO withdrawal. The effect however is limited to the UK, the most liquid equity market in Europe. In line with life cycle ideas, a larger firm size reduces the probability that a company withdraws its IPO. We find that market sentiment does matter since negative news about an issuer *increases* the probability of IPO withdrawal. Likewise, good corporate governance and the disclosure of intellectual cap-

ital reduce the probability of IPO withdrawal. We argue with managerial overconfidence in explaining why CEO duality *decreases* the likelihood of IPO withdrawal. We find that debt retirement, venture capital and private equity involvement significantly *increase* the probability of withdrawal which is driven by the German and French markets. We explain this phenomenon with the less advanced role of these in Europe compared to the USA and with the dual track approach of VC and PE companies. These findings signal the importance of agency based theories in explaining IPO withdrawal in Europe.

Drawing from the empirical evidence we can suggest the following theoretical implications of determinants of IPO withdrawal. First, we can enforce the argument by Owen-Smith et al. (2015) that the process of IPO withdrawal is affected by a network of strong, weak, positive and negative signals of the determinants defined in Table 1. As to whether the IPO withdrawal itself is a negative or a positive signal, this must be uncovered in further investigations. Second, imminent agency conflicts and the lack of appropriate control mechanisms can force a company to withdraw from the IPO. Third, the dominance of firm-level determinants on the probability of withdrawal indicates that the life cycle theory is of importance. As firms grow, a more dispersed ownership from insiders is required which is closely interlinked with potential agency conflicts (Chemmanur and Fulghieri, 1999). Finally, we shed light on the difference and similarities of determinants of IPO withdrawal under the lens of an European equity market integration.

Further evidence and research on the precise role played by VC and PE is be required to surface the causal mechanisms. But what do the results tell us? That the IPO process in a globalised world is too complex to be generalised by single country study, and that especially the role of VC and PE involvement cannot be captured through broad generalisation. Indeed, VC and PE involvement underlines the key question of the IPO withdrawal per se; as the withdrawals themselves cannot be generalised. What happens

with a company after it withdraws? Did the withdrawal lead to a better outcome for the company? Future research should focus on companies post-withdrawal and uncover new theories: that an IPO withdrawal backed by a VC or PE company might after all be a success dressed as a failure.

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Table 1a: Data Description and Sources - Regulatory, Economic, and Market Environment

Variable	Variable Name	Source	Definition	Predicted Effect
Regulatory Environment				
x_1	Rule of Law	The Heritage Foundation	Provides annual data on how the rule of law and its enforcement is experienced by the general public including dimensions such as property rights and freedom from corruption.	Negative
x_2	Regulatory Efficiency	The Heritage Foundation	Provides annual data on how the regulatory efficiency is experienced by the general public including quantitative measures such as labour, business and monetary freedom.	Negative
x_3	Market Openness	The Heritage Foundation	Provides annual data on how the openness of the markets is experienced by the general public including dimensions such as trade, investment and financial freedom.	Negative
x_4	Common Law Dummy	Prospectus	This dummy variable takes the value of 1 if the IPO is in a common law jurisdiction and 0 otherwise.	Negative
Economic Environment				
x_5	10 year Government Bond	Thomson Reuters Datastream	The basis points of the 10 year Government Bond yields are provided on a monthly basis and approximate the cost of lending.	Negative
x_6	Credit Spread	Thomson Reuters Datastream	The monthly difference between the 10 year Government Bond and the 1 year Government Bond yields signals the credit conditions.	Positive
x_7	ΔGDP - change of the Gross Domestic Product	Bloomberg	An aggregate measure of production equal to the sum of the gross values added of all resident, institutional units engaged in production. It provides information on the economic performance of a country.	Negative
Market Environment				
x_8	VIX - Chicago Board Options Exchange SPX Volatility Index	Bloomberg	This index represents a market estimate of the future volatility.	Positive
x_9	ΔIndex - change of the stock market index	Bloomberg & Thomson Reuters Datastream	It is the change of the corresponding main stock market index providing information on the equity market (bull or bear market).	Negative
x_{10}	Hotness Dummy	Bloomberg	The rolling averages of the number of filings 180 days prior to the IPO are computed. If the company faces a higher competition than average, the dummy variable takes a value of 1 and 0 otherwise. This dummy is not complimentary to a coldness dummy.	Negative
x_{11}	Trading Volume Dummy	Bloomberg	The rolling averages of the trading volume 180 days prior to the IPO are computed. If the company files for an IPO during intensive trading, the dummy variable takes a value of 1 and 0 otherwise.	Negative
x_{12}	Negative News Dummy	LexisNexis (handpicked)	If the IPO company is mentioned in the same paragraph with specific negative terms given by the LexisNexis Negative News Search one year prior to the IPO or withdrawal, the dummy takes the value of 1 and 0 otherwise.	Positive

Table 1b: Data Description and Sources - Offer Characteristics

Variable	Variable Name	Source	Definition	Predicted Effect
Offer Characteristics				
x_{13_a}	Offer Size	Prospectus / Bloomberg	The natural logarithm of the company's offer size is computed.	Positive
x_{13_b}	Offer Size Dummy	Prospectus / Bloomberg	The 180 days rolling averages of the offer sizes are computed. This dummy takes the value of 1 if the size of the offer is above average and 0 otherwise.	Positive
x_{14}	Primary Shares	Prospectus	The percentage of newly created shares being sold in the IPO.	Negative
x_{15}	Secondary Shares	Prospectus	The percentage of existing shares being sold in the IPO.	Negative
x_{16}	Greenshoe Option	Prospectus	The percentage of extra shares that the underwriter is granted to sell additionally in the IPO depending on the demand.	Negative
x_{17}	Debt Retirement Dummy	Prospectus	This dummy variable takes the value of 1 if the IPO company intends to retire debt with the IPO proceeds and 0 otherwise.	Positive
x_{18}	Private Equity Dummy	Prospectus	This dummy variable takes a value of 1 if the company mentions private equity involvement in the prospectus and 0 otherwise.	Positive
x_{19}	Venture Capital Dummy	Prospectus	This dummy variable takes a value of 1 if the company mentions venture capital involvement in the prospectus and 0 otherwise.	Positive
x_{20}	Intellectual Capital Dummy	Prospectus	This dummy variable takes a value of 1 if the company discloses the intellectual capital or its competitive advantage in the prospectus and 0 if the IC is not mentioned or disclosed.	Negative
x_{21}	Underwriter	Prospectus / Bloomberg	The underwriter reputation is classified according to the European ranking of Migliorati and Vismara (2014) which ranges from 0 to the highest reputation of 1. In case of a consortium of underwriters, the average of the underwriter reputation is taken.	Negative

Table 1c: Data Description and Sources - Firm Characteristics

Variable	Variable Name	Source	Definition	Predicted Effect
Firm Characteristics				
x_{22_a}	Firm Size	Prospectus / Bloomberg	The natural logarithm of the company's total assets is computed.	Negative
x_{22_b}	Firm Size Dummy	Prospectus / Bloomberg	The rolling averages of the firm sizes measured by total assets are computed. This dummy takes the value of 1 if the size of the company is above average and 0 otherwise.	Negative
x_{23_a}	Age	Prospectus / Bloomberg	The natural logarithm of the company's age is computed.	Negative
x_{23_b}	Age Dummy	Prospectus / Bloomberg	The rolling averages of the firm ages are computed. The dummy takes a value of 1 if the firm age is above average and 0 otherwise.	Negative
x_{24}	CapEx	Prospectus / Bloomberg	The position of capital expenditures is divided by the total assets of the IPO company to get the CapEx ratio.	Negative
x_{25}	Return on Assets	Prospectus / Bloomberg	The position of net income is divided by the total assets of the IPO company to get the return on assets.	Negative
x_{26}	Leverage	Prospectus / Bloomberg	The position of total debt is divided by the total assets to compute the level of leverage of the IPO company.	Positive
x_{27}	High-Tech Dummy	Prospectus / Company Register	This dummy variable takes the value of 1 if the IPO company belongs to the high-tech industry and 0 otherwise. The categorisation of high-tech is based on the Eurostat definiton.	Positive
x_{28}	Multinationality	Prospectus	The scale of Aggarwal et al. (2011) is taken to quantify the degree of multinationality which includes for instance the revenue created abroad or foreign assets. In case no country-level information can be gathered, the presence of subsidiaries are taken. The scale differentiates between seven categories of multinationality where the highest level of MNAT is the cumulation of all classifications up to the value of 1.	Negative

Table 1d: Data Description and Sources - Corporate Governance Characteristics

Variable	**Variable Name**	**Source**	**Definition**	**Predicted Effect**
Corporate Governance Characteristics				
x_{29}	Retained Ownership	Prospectus	The proportion of ownership in shares hold by insiders post IPO (Djerbi and Anis, 2015).	Negative
x_{30}	Lock-up	Prospectus	Number of days the pre-IPO owners agree not to sell their shares.	Negative
x_{31}	Board Size	Prospectus	This variable accounts for the absolute number of board members.	Negative
x_{32}	Board Independence	Prospectus	This variable accounts for the ratio of board members that have no link to the IPO company.	Negative
x_{33}	Female Board Members	Prospectus	This variable accounts for the ratio of female board members.	Negative
x_{34}	CEO Duality Dummy	Prospectus	This dummy variable takes the value of 1 if the roles of a CEO and chairman are combined and 0 otherwise.	Positive

Table 2: Withdrawn and successful IPOs 2001 - 2015

	Successful IPOs		Withdrawn IPOs		
Year	**Absolute**	**Percentage**	**Absolute**	**Percentage**	**Total**
2001	192	83.48%	38	16.52%	230
2002	112	84.21%	21	15.79%	133
2003	81	96.43%	3	3.57%	84
2004	261	91.90%	23	8.10%	284
2005	366	91.73%	33	8.27%	399
2006	360	89.11%	44	10.89%	404
2007	283	91.00%	28	9.00%	311
2008	88	82.24%	19	17.76%	107
2009	16	88.89%	2	11.11%	18
2010	112	81.16%	26	18.84%	138
2011	99	77.95%	28	22.05%	127
2012	58	85.29%	10	14.71%	68
2013	95	89.62%	11	10.38%	106
2014	175	87.94%	24	12.06%	199
2015	176	88.00%	24	12.00%	200
Total	2,474	88.11%	334	11.89%	2,808

Note: The database includes 2,808 observations from 2001 to 2015. This table reports the absolute number and percentage of IPO filings for each year in Denmark, France, Germany, Italy, Norway, Spain, Sweden, and the United Kingdom.

Table 3: Descriptive Statistics

	Successful IPOs		Withdrawn IPOs		
Variable	**Mean**	**SD**	**Mean**	**SD**	**p-value successful vs. Withdrawn IPO**
Regulatory Environment					
x_1 Rule of Law	81.82	11.10	78.15	13.88	0.0000
x_2 Regulatory Efficiency	79.35	5.95	78.47	5.89	0.0109
x_3 Market Openness	78.92	8.46	78.55	7.62	0.4533
x_4 Common Law	0.53	0.50	0.44	0.50	0.0025
Economic Environment					
x_5 10yr Government Bond	3.89	1.19	3.86	1.18	0.6443
x_6 Credit Spread	0.88	1.17	1.23	1.22	0.0000
x_7 ΔGDP	0.02	0.01	0.02	0.01	0.0737
Market Environment					
x_8 VIX	17.04	5.55	18.66	6.28	0.0000
x_9 ΔIndex	0.00	0.03	0.00	0.04	0.0003
x_{10} Market Hotness	0.63	0.48	0.58	0.49	0.0661
x_{11} Trading Volume	24.80	21.30	20.50	18.70	0.0005
x_{12} Negative News	0.07	0.25	0.31	0.46	0.0000
Offer Characteristics					
x_{13} Offer Size (mn)	175	2,529	505	2,913	0.0281
x_{14} Primary Shares	0.78	0.34	0.76	0.34	0.2100
x_{15} Secondary Shares	0.22	0.34	0.24	0.34	0.2724
x_{16} Greenshoe Option	0.05	0.08	0.04	0.08	0.0519
x_{17} Debt Retirement	0.14	0.35	0.27	0.45	0.0000
x_{18} Private Equity	0.16	0.37	0.24	0.43	0.0003
x_{19} Venture Capital	0.06	0.23	0.10	0.30	0.0033
x_{20} Intellectual Capital	0.34	0.47	0.19	0.39	0.0000
x_{21} Underwriter	0.24	0.26	0.25	0.27	0.7456
Firm Characteristics					
x_{22} Firm Size (mn)	1,683	16,821	6,645	59,782	0.0011
x_{23} Age (years)	16	26	22	34	0.0001
x_{24} CapEx	0.20	4.43	0.13	1.28	0.7780
x_{25} Return on Assets	-0.07	6.48	0.55	13.81	0.1700
x_{26} Debt	0.62	1.22	3.07	40.08	0.0025
x_{27} High-Tech	0.24	0.43	0.21	0.41	0.2878
x_{28} Multinationality	0.29	0.18	0.31	0.20	0.1832
Corporate Governance Characteristics					
x_{29} Retained Ownership	0.56	0.26	0.52	0.29	0.0033
x_{30} Lock-up (days)	251	175	127	165	0.0000
x_{31} Board Size	5.62	2.63	5.87	3.91	0.1160
x_{32} Board Independence	0.26	0.27	0.15	0.22	0.0000
x_{33} Female Board Members	0.09	0.14	0.09	0.15	0.5873
x_{34} CEO Duality	0.15	0.36	0.14	0.35	0.6840

Note: The database includes 2,474 observations of successful IPOs and 334 withdrawn IPOs. This table reports the means and standard deviations for 34 variables broken down by successful and withdrawn IPO filings. All variable definitions can be found in Table 1.

Table 4: Determinants of IPO Withdrawal

	Europe				Continental Europe			
	Levels		Dummy Variable		Levels		Dummy Variable	
Variable	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**
Intercept	9.994	145.67	4.696	70.83	133.500	2,103.77	128.800	2,055.37
x_1 Rule of Law	-0.009**	-0.13	-0.010**	-0.15	-0.009*	-0.14	-0.009*	-0.15
x_2 Regulatory Efficiency	0.005**	0.07	0.004*	0.06	0.004	0.06	0.003	0.05
x_3 Market Openness	0.014***	0.20	0.016***	0.24	0.015***	0.24	0.017***	0.27
x_4 Common Law	-0.709***	-10.33	-0.751***	-11.32	N/A	N/A	N/A	N/A
x_5 10yr Gov. Bond	0.001**	0.02	0.001*	0.01	0.003***	0.05	0.003***	0.05
x_6 Credit Spread	0.001**	0.02	0.001**	0.02	0.001	0.01	0.001	0.01
x_7 ΔGDP	0.006**	0.09	0.006**	0.09	0.006*	0.09	0.006*	0.10
x_8 VIX	0.003***	0.04	0.002***	0.04	0.002	0.03	0.001	0.02
x_9 ΔIndex	0.001*	0.02	0.001	0.01	0.001	0.02	0.001	0.01
x_{10} Market Hotness	0.081	1.18	0.075	1.13	-0.028	-0.43	-0.038	-0.60
x_{11} Trading Volume	-0.248***	-3.62	-0.239***	-3.60	-0.241**	-3.80	-0.235**	-3.75
x_{12} Negative News	0.897***	13.08	0.939***	14.17	1.064***	16.77	1.151***	18.37
x_{13} Offer Size (mn)	0.002***	0.03	0.375***	5.66	0.002***	0.03	0.396***	6.32
x_{14} Primary Shares	-0.015	-0.21	-0.008	-0.12	-0.269	-4.24	-0.260	-4.14
x_{15} Secondary Shares	-0.015	-0.22	-0.008	-0.12	-0.269	-4.23	-0.259	-4.13
x_{16} Greenshoe Option	-0.001***	-0.01	-0.001***	-0.01	-0.001***	-0.02	-0.001***	-0.02
x_{17} Debt Retirement	0.237**	3.46	0.226**	3.41	0.318**	5.02	0.354***	5.64
x_{18} Private Equity	0.264***	3.85	0.259***	3.90	0.217*	3.42	0.229*	3.65
x_{19} Venture Capital	0.488***	7.12	0.502***	7.57	0.663***	10.44	0.654***	10.43
x_{20} Intellectual Capital	-0.405***	-5.90	-0.395***	-5.97	-0.285**	-4.50	-0.277**	-4.42
x_{21} Underwriter	-0.001	-0.02	-0.001	-0.01	0.000	0.00	0.000	0.01
x_{22} Firm Size (mn)	-0.001***	-0.02	-0.298**	-4.50	-0.001***	-0.02	-0.467***	-7.45
x_{23} Age (years)	0.002	0.03	-0.082	-1.24	0.002	0.03	-0.068	-1.08
x_{24} CapEx	-0.002	-0.02	-0.001	-0.01	0.004	0.07	0.004	0.06
x_{25} Return on Assets	0.000	0.00	0.000	0.00	-0.001	-0.02	-0.001	-0.01
x_{26} Debt	0.002**	0.03	0.003***	0.04	0.000	0.01	0.001	0.01
x_{27} High-Tech	0.029	0.42	0.013	0.19	0.061	0.96	0.010	0.16
x_{28} Multinationality	0.030	0.44	0.047	0.71	0.039	0.61	0.066*	1.05
x_{29} Retained Ownership	0.000	0.00	-0.001	-0.02	-0.003	-0.04	-0.004**	-0.07
x_{30} Lock-up (days)	-0.002***	-0.04	-0.002***	-0.04	-0.002***	-0.03	-0.002***	-0.03
x_{31} Board Size	-0.014	-0.21	0.007	0.10	-0.012	-0.19	0.015	0.24
x_{32} Board Independence	-0.018***	-0.26	-0.018***	-0.27	-0.014***	-0.23	-0.014***	-0.23
x_{33} Female Board Members	-0.003	-0.04	-0.001	-0.01	-0.004	-0.06	-0.002	-0.03
x_{34} CEO Duality	-0.342***	-4.98	-0.288***	-4.35	-0.724***	-11.42	-0.752***	-11.99
HL Statistic	16.592 (0.0347)		8.309 (0.4039)		3.722 (0.8813)		12.697 (0.1227)	
McFadden R^2	0.275		0.249		0.286		0.280	

Note: The dependent variable equals 1 for IPO withdrawals and 0 otherwise. *, ** and *** denote significance at 10%, 5% and 1% respectively. Marginal Effects are defined as follows: the probit employs normalisation that fixes the standard deviation of the error term to 1 where each coefficient represents the marginal effect of a unit change on the probability that the dependent variable takes the value of 1 (IPO withdrawal) given that all other independent variables are constant (Aldrich and Nelson, 1984). The McFadden R-squared is defined as 1 less the log likelihood for the estimated model divided by the log likelihood for a model with only an intercept as the independent variable. While the Hosmer-Lemeshow Statistic represents the goodness of fit that observed events match estimated events in ten subgroups of the model population, with the p-value reported in brackets. The database includes 2,808 observations.

Table 5: Determinants of IPO Withdrawal - By Country

	United Kingdom				France				Germany				Italy				Scandinavia			
	Levels		Dummy		Levels		Dummy		Levels		Dummy		Levels		Dummy		Levels		Dummy	
Variable	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**ME in %**	**Coef.**	**Marg. Effect %**	**Coef.**	**ME in %**	**Coef.**	**Marg. Effect %**	**Coef.**	**ME in %**
Intercept	1.303	15.58	0.725	9.14	-3.267	-33.53	2.179	24.38	-139.900	-1506.00	-139.300	-1420.71	1.252	13.38	1.494	15.73	-2.358*	-30.27	-3.205**	-40.68
x_1 Rule of Law	0.021	0.25	0.021	0.27	-0.188**	-1.93	-0.129*	-1.44	0.099	1.07	0.189	1.93	-0.111	-1.18	-0.118*	-1.24	-0.067	-0.86	-0.053	-0.68
x_2 Regulatory Efficiency	-0.005	-0.06	-0.005	-0.07	0.032	0.33	-0.038	-0.43	0.046	0.50	0.021	0.22	-0.118	-1.26	-0.130	-1.37	0.053**	0.68	0.049**	0.62
x_3 Market Openness	0.008	0.10	0.015	0.19	0.064	0.65	0.033	0.37	-0.043	-0.47	-0.075	-0.76	-0.098	-1.05	-0.106	-1.12	0.000	0.00	0.014	0.17
x_5 10yr Gov. Bond	-0.004	-0.04	-0.005	-0.06	-0.013	-0.13	-0.007	-0.07	0.005	0.05	0.006	0.06	0.010	0.11	0.010	0.10	0.007	0.09	0.006	0.07
x_6 Credit Spread	0.003	0.04	0.003	0.04	-0.004	-0.04	-0.004	-0.04	0.003	0.03	0.006	0.07	0.008	0.09	0.001	0.01	0.012***	0.15	0.012***	0.15
x_7 ΔGDP	0.017	0.20	0.022	0.27	0.049	0.51	0.067	0.75	0.011	0.12	0.004	0.04	0.014	0.15	0.005	0.05	-0.007	-0.08	-0.003	-0.04
x_8 VIX	0.004**	0.04	0.003**	0.04	0.008	0.08	0.000	0.00	0.007	0.08	0.006	0.06	0.002	0.02	0.007	0.07	0.003	0.04	0.005	0.06
x_9 ΔIndex	0.006	0.07	0.005	0.06	0.007	0.07	0.004	0.04	0.006	0.07	0.007	0.07	0.006	0.07	0.011	0.12	0.000	0.00	-0.001	-0.01
x_{10} Market Hotness	0.098	1.18	0.068	0.86	-0.273	-2.80	-0.133	-1.49	-0.631	-6.79	-0.996*	-10.16	-0.556	-5.95	-0.347	-3.66	0.224	2.88	0.237	3.01
x_{11} Trading Volume	-0.264**	-3.16	-0.258**	-3.25	0.035	0.36	0.060	0.67	-0.436	-4.70	-0.341	-3.48	-0.266	-2.85	-0.198	-2.09	-0.073	-0.94	-0.028	-0.35
x_{12} Neg. News	0.828***	9.90	0.843***	10.63	0.980***	10.06	0.904***	10.12	1.321***	14.22	1.535***	15.65	1.653***	17.68	1.944***	20.47	2.911***	37.37	2.975***	37.76
x_{13} Offer Size (mn)	0.002***	0.03	0.372**	4.68	0.012***	0.13	0.986***	11.04	0.005	0.05	0.419	4.27	0.001	0.01	-1.032*	-10.86	0.002	0.02	0.194	2.46
x_{14} Primary Shares	-0.008	-0.10	-0.006	-0.08	0.014	0.14	-0.010	-0.11	0.999	10.75	0.991	10.10	0.003	0.03	0.005	0.05	-0.001	-0.01	0.000	0.00
x_{15} Secondary Shares	-0.009	-0.11	-0.007	-0.09	0.015	0.16	-0.008	-0.09	0.997	10.73	0.990	10.09	0.012	0.13	0.016	0.17	N/A	N/A	N/A	N/A
x_{16} Greenshoe Option	-0.002	-0.03	-0.003	-0.03	-0.002	-0.02	0.000	0.00	-0.008**	-0.09	-0.011***	-0.11	-0.018***	-0.19	-0.018***	-0.19	-0.002	-0.03	-0.002	-0.03
x_{17} Debt Retirement	0.238	2.85	0.142	1.80	0.555*	5.69	0.669**	7.49	0.965**	10.39	1.111**	11.33	0.762*	8.15	1.009**	10.63	-0.248	-3.18	-0.437	-5.55
x_{18} Private Equity	0.330	3.95	0.266*	3.35	0.181	1.86	0.362	4.05	0.664*	7.14	0.718*	7.32	-0.006	-0.06	0.083	0.87	0.535	6.87	0.549	6.97
x_{19} Venture Capital	0.444**	5.31	0.461**	5.81	0.685	7.03	0.851*	9.53	2.635***	28.36	2.769***	28.23	1.177*	12.58	1.482*	15.60	0.167	2.14	0.159	2.02
x_{20} Intellectual Capital	-0.957***	-11.45	-0.925***	-11.65	-0.686**	-7.04	-1.002***	-11.21	-0.274	-2.95	-0.123	-1.26	-0.930*	-9.94	-0.939**	-9.89	0.085	1.09	0.164	2.08
x_{21} Underwriter	0.001	0.01	0.000	0.00	-0.012*	-0.12	-0.007	-0.08	0.009	0.10	0.013	0.14	0.020*	0.21	0.027**	0.29	0.081	1.04	0.061	0.78
x_{22} Firm Size (mn)	-0.002***	-0.03	0.017	0.22	-0.001	-0.01	0.030	0.33	-0.004*	-0.05	-1.452***	-14.80	0.006	0.06	0.489	5.15	-0.009***	-0.12	-1.404***	-17.82
x_{23} Age (years)	-0.001	-0.01	-0.156	-1.97	-0.010	-0.11	-0.504	-5.63	-0.005	-0.05	-0.641	-6.53	0.000	-0.01	0.844*	8.88	0.006	0.08	0.018	0.22
x_{24} CapEx	-0.010*	-0.12	-0.007	-0.09	-0.008	-0.09	-0.006	-0.07	0.074***	0.80	0.063***	0.64	-0.132**	-1.41	-0.128**	-1.35	0.015	0.20	0.014	0.18
x_{25} Return on Assets	0.001	0.01	0.001	0.01	-0.003	-0.04	-0.002	-0.02	-0.002	-0.03	0.003	0.04	0.014	0.15	0.022	0.23	0.001	0.01	0.002	0.03
x_{26} Debt	0.003**	0.04	0.004***	0.05	0.005	0.05	0.000	0.00	0.003	0.04	0.006	0.06	0.007	0.07	0.009	0.10	-0.004	-0.05	-0.002	-0.03
x_{27} High-Tech	0.071	0.84	0.100	1.26	-0.116	-1.19	-0.169	-1.89	-0.332	-3.57	-0.424	-4.32	-0.002	-0.03	-0.001	-0.01	0.116	1.49	0.161	2.04
x_{28} Multinationality	0.045	0.54	0.035	0.44	0.066	0.67	0.104	1.16	0.186*	2.00	0.287***	2.93	-0.097	-1.04	-0.079	-0.83	-0.150	-1.92	-0.158	-2.00
x_{29} Retained Ownership	0.003*	0.04	0.002	0.03	-0.008	-0.08	-0.011*	-0.12	-0.012*	-0.12	-0.014**	-0.14	-0.014	-0.15	-0.019	-0.20	0.001	0.01	0.000	0.00
x_{30} Lock-up (days)	-0.003***	-0.03	-0.003***	-0.03	-0.005***	-0.05	-0.003**	-0.04	-0.001	-0.01	-0.001	-0.01	-0.005***	-0.05	-0.006***	-0.06	-0.002***	-0.03	-0.002***	-0.03
x_{31} Board Size	-0.002	-0.03	-0.004	-0.04	-0.130**	-1.34	-0.075	-0.83	0.064	0.68	0.105**	1.07	0.017	0.18	-0.004	-0.04	0.154**	1.98	0.147*	1.86
x_{32} Board Independence	-0.043***	-0.52	-0.049***	-0.61	-0.029	-0.29	-0.031	-0.34	-0.030*	-0.32	-0.037**	-0.38	-0.027	-0.29	-0.022	-0.23	-0.052***	-0.66	-0.053***	-0.68
x_{33} Female Board Members	0.003	0.04	0.007	0.09	-0.010	-0.10	-0.015	-0.17	-0.034	-0.36	-0.003	-0.03	-0.047*	-0.50	-0.046	-0.48	0.028	0.36	0.025	0.31
x_{34} CEO Duality	0.119	1.43	0.149	1.88	-0.639**	-6.56	-0.616**	-6.89	N/A	N/A	N/A	N/A	-0.302	-3.23	-0.503	-5.29	-5.775	-74.14	-5.610	-71.22
HL Statistic	8.457 (0.3901)		11.775 (0.1616)		1.577 (0.9913)		12.636 (0.1250)		71.612 (0.0000)		35.253 (0.0000)		1.470 (0.9932)		1.367 (0.9947)		4.021 (0.8553)		8.953 (0.3463)	
McFadden R^2	0.335		0.299		0.409		0.359		0.534		0.561		0.649		0.656		0.308		0.313	

Note: The dependent variable equals 1 for IPO withdrawals and 0 otherwise. *, ** and *** denote significance at 10%, 5% and 1% respectively. Marginal Effects are defined as follows: the probit employs normalisation that fixes the standard deviation of the error term to 1 where each coefficient represents the marginal effect of a unit change on the probability that the dependent variable takes the value of 1 (IPO withdrawal) given that all other independent variables are constant (Aldrich and Nelson, 1984). The McFadden R-squared is defined as 1 less the log likelihood for the estimated model divided by the log likelihood for a model with only an intercept as the independent variable. While the Hosmer-Lemeshow Statistic represents the goodness of fit that observed events match estimated events in ten subgroups of the model population, with the p-value reported in brackets. The database includes 2,808 observations.

Table 6: Differences in European Listing Requirements

	Business Activity	Market Capitalisation	Share Distribution	Working Capital	Corporate Governance
Denmark	At least three annual reports	At least €1 million	Minimum 25% shares distributed to the public, each holding less than 10% of the shares	Sufficient working capital for at least 12 months	*compile and explain principle* with the Corporate Governance Code of Denmark
France	Two to three years financial audited accounts	At least €2.5 million	Minimum 25% free float (5% if less than €5 million)	None	Recommendation of AFEP/MEDEF Corporate Governance Code
Germany	At least three annual reports and, if available, interm financial information	At least €1.25 million; Minimum 10,000 shares	None	None	German Corporate Governance Code, dual board system, exceptions for European Company (SE)
Italy	At least three annual reports, latest one is subject to audit	At least €40 million	Minimum 25 to 35% free float; 80% to institutional and 20% to retail investors	Sufficiency of working capital	Recommendation of Borsa Italiana S.p.A. Corporate Governance Code
Norway	At least three years of business activity	At least €1 to €40 million	Minimum 25% free float	Sufficient working capital for at least 12 months	*compile and explain principle* principle with the Norwegian Code of Practice for Corporate Governance
Spain	At least three annual reports	At least €6 million	Minimum 25% free float	None	*compile and explain principle* principle with the Spanish Corporate Governance Code
Sweden	At least three annual reports	At least €1 to €10 million	Minimum 10 to 25% free float	Sufficient financial resources for at least 12 months	Recommendation of the Swedish Corporate Governance Code
UK - Official List	At least three annual reports must represent at least 75% of its business	At least £700,000	Minimum 25% free float	Sufficient working capital for at least 12 months	*compile and explain principle* principle with the UK Corporate Governance Code
UK - AIM	Financial accounts not older than 18 months (audited), 15 months (unaudited), no minimum operating history	None	None	Sufficient working capital for at least 12 months proposed by company	UK Corporate Governance Code does not apply

Figure 1: Why Firms Withdraw from IPO's, Boeh and Dunbar (2013)

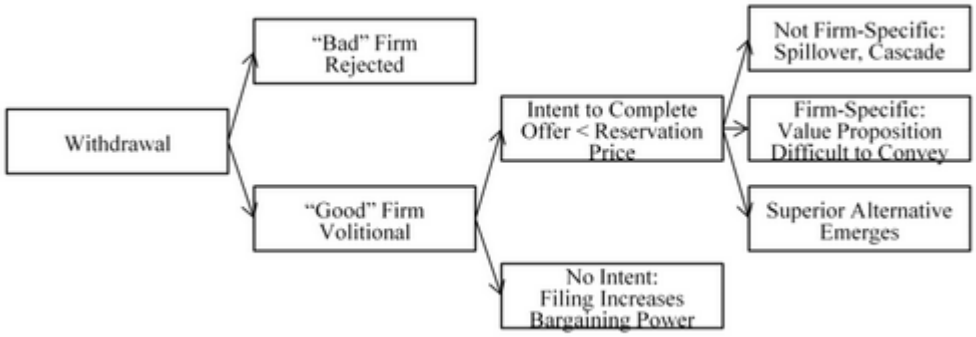
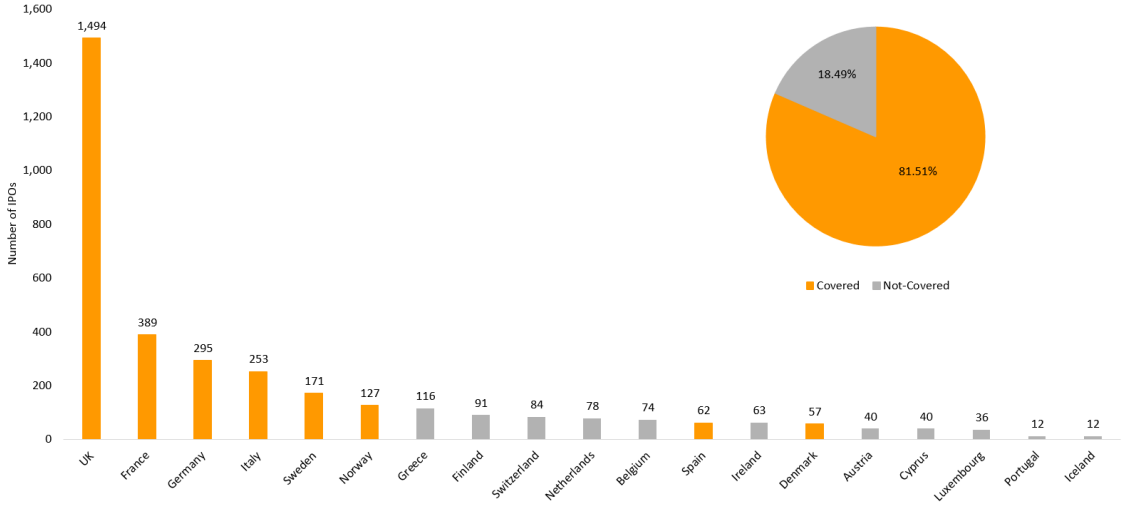
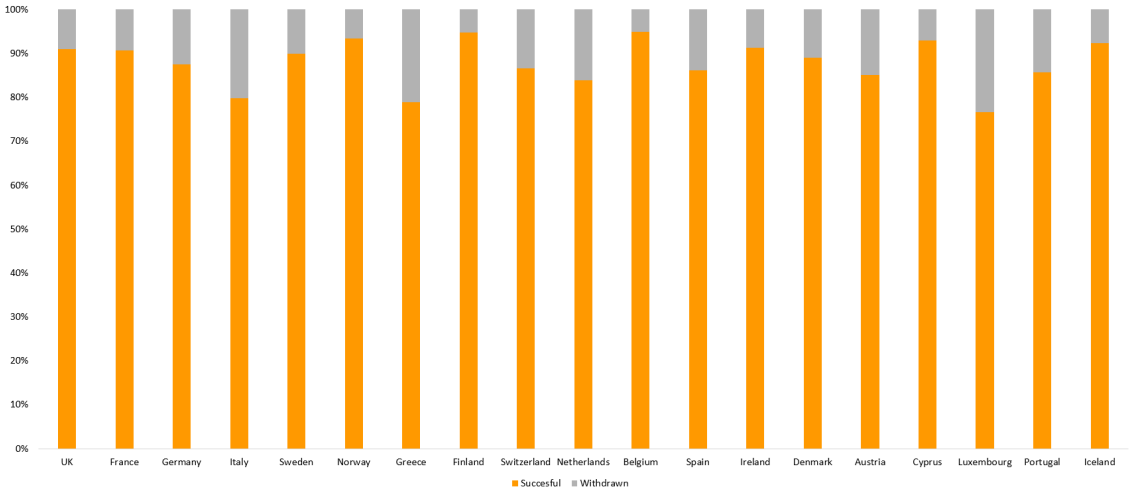


Figure 2: Coverage of our Hand Collected IPO Data



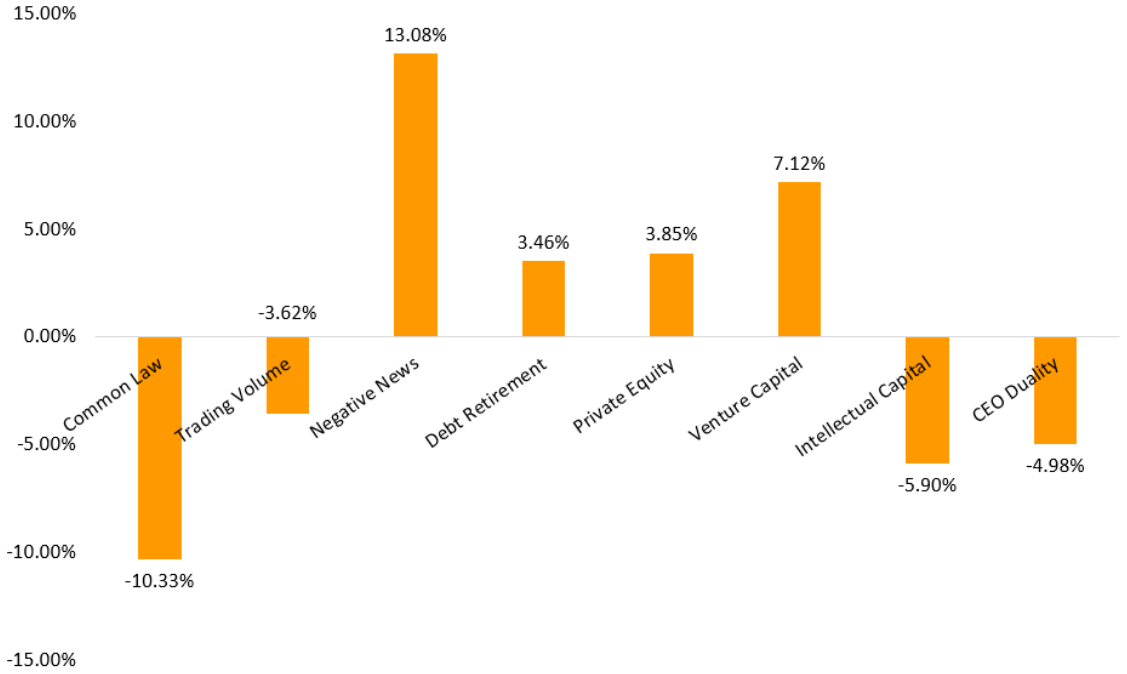
Note: The chart shows the absolute numbers of IPO filings in Western Europe between 2001 and 2015. As indicated by the golden columns the collected IPO data covers nearly 82% of the Western European market.

Figure 3: Percentage of listed vs. withdrawn IPOs



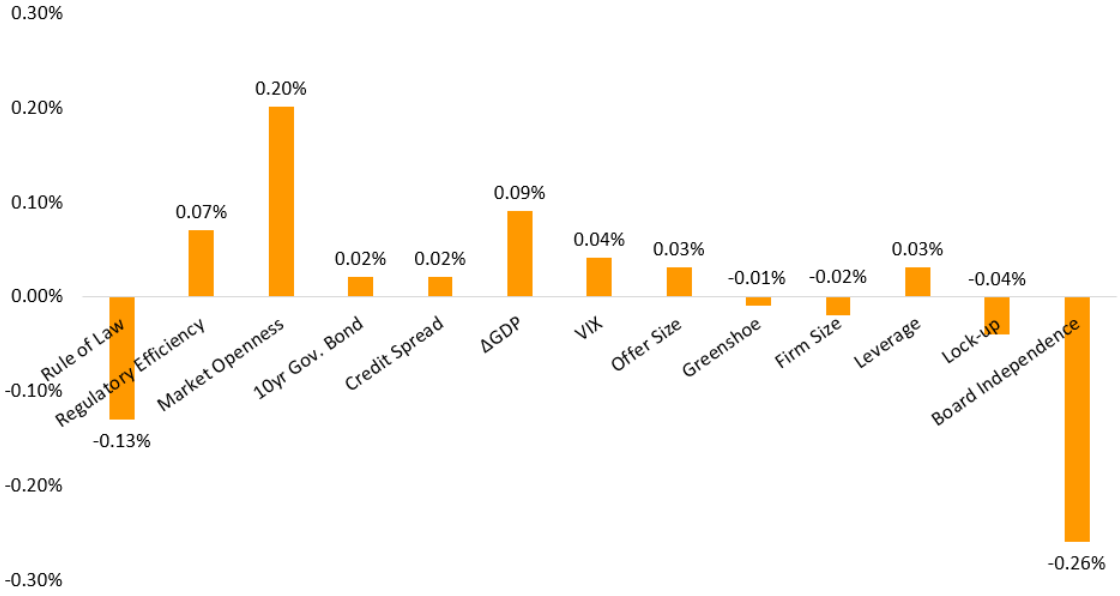
Note: The chart shows the % distribution of companies, finally listed and withdrawn, by country in Western Europe from 2001 to 2015.

Figure 4: Prinicpal Determinants of IPO Withdrawal



Note: The variables are significant at the 5% significance level.

Figure 5: Secondary Determinants of IPO Withdrawal



Note: The variables are significant at the 5% significance level.

Online Appendix
The Determinants of IPO Withdrawal - Evidence from Europe

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Abstract

This online appendix provides supplemental discussion and analysis for our manuscript *The Determinants of IPO Withdrawal - Evidence from Europe*. The supplemental information, tables and tests are provided in addition to the paper. We organise this online appendix by sections. Please cite as Helbing, Pia, and Brian M. Lucey. "The Determinants of IPO Withdrawal-Evidence from Europe." (2018).

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1. Data Description and Sources

We provide an extension to Table 1 in order to describe the database creation process and to shed more light on the data and the sources. Given poor information quality for European IPO filings from 2001 to 2015, we construct our own database to assure data reliability which makes this study unique in its extent and depth of information on IPO filings and IPO withdrawals in Europe. We retrieve the list of IPO filings as well as the status of the listing from Bloomberg and validate the accuracy with the information provided by the respective stock exchanges. We categorise the status of the listing into successful which means that the IPO company listed, regardless if public trading develops; and withdrawn which entails that the IPO company did not issue shares despite its intent. IPO prospectuses are downloaded from Bloomberg, Thomson Reuters, stock exchange websites or through other internet sources. Based on these data, our data frame consists of a total of 2,808 companies that filed for an IPO between 2001 and 2015, of which 2,474 were successful and listed whereas 334 (11.89%) withdrew. Our dataset covers 82% of the Western European IPO market. We arrange the variables in our dataset into six environments: Regulatory, Economic, Market, Offer, Firm, and Corporate Governance. We use monthly observations, due to data restriction in Europe, where in contrast to the USA, the event of an IPO withdrawal is not formerly defined or mentioned in EU or country-specific directives. This means the event of an IPO withdrawal cannot be linked to an exact date.

The **Regulatory Environment** includes yearly changing data on the country-specific Rule of Law, Regulatory Efficiency, and Open Markets. A Common Law dummy is also included. This information is provided by the Heritage Foundation (`https://www.heritage.org/index/`) and captures the overall regulatory environment in a given year and country. Rule of Law describes the perception by the general public of law enforcement (property rights, freedom from corruption etc.) in the given country. Regulatory Efficiency is an estimate of how this is experienced by the general public including dimensions such as labour, business, and monetary freedom. Market Openness describes how the openness of markets is perceived by the general public considering trade, investment, and financial freedom. Despite all being in Europe, the countries in our database experience yearly changes and differences.

The **Economic Environment** includes monthly variables such as the 10 year Government Bond, the Credit Spread, and the quarterly change of the Gross Domestic Product. Monthly basis points for country-specific 10 year Government Bonds approximate the cost of lending. We define the respective Credit Spread as the difference in basis points between the 10 year Government Bond yields and the 1 year Government Bond yields in the month of the corresponding IPO filing. The change of the Gross Domestic Product is provided

on a quarterly basis and is the aggregated measure of production equal to the sum of the gross values added of all residents and institutional units engaged in production.

The **Market Environment** includes the monthly variables of the VIX which is the Chicago Board Options Exchange SPX Volatility Index indicating the market estimate of future volatility. Given that there is no equivalent index in Europe, we rely on the VIX arguing that equity markets are contagious. The monthly change of the main stock market index is a country-specific variable and reflects changes in equity prices of the country where the IPO is filled. The monthly Hotness Dummy indicates the number of IPO filings in the specific country. The Trading Volume Dummy measures the monthly trading volume of the country-specific main stock market index. Both dummies are created as follows: the country-specific rolling averages of the number of filings (Hotness) or of the trading volume 180 days prior to the IPO filings month are computed. If the IPO filing takes place in a month where there is a higher number of IPO filings than the 180 days average, the company faces higher competition and the Hotness Dummy takes the value of 1. This dummy is not complimentary to a coldness dummy. If the IPO filing is in a month with higher than average trading volume, the Trading Volume Dummy takes the value of 1. Finally, the Negative News Dummy takes the value of 1 if the IPO company is subject to negative news one year prior to the IPO filing month. Here we use of the LexisNexis database including main international and national newspapers, practitioner journals, and announcements. LexisNexis provides negative terms and we manually search for the appearance of the IPO company in connection with those negative terms in English and the country-specific language. The code for the English LexisNexis negative terms is available here: `http://help.lexisnexis.com/tabula-rasa/lninexis/searchnegativecompanyinfo_hdi-task?lbu=GB&locale=es_ES&audience=business`.

The **Offer Characteristics** are hand collected from the respective IPO prospectus. We account for the Offer Size with the logarithmised offer size value while also creating an Offer Size Dummy to mitigate possible inflation influences. The 180 days rolling average of the country-specific offer sizes is computed where the Offer Size Dummy takes the value of 1 if the firm specific offer size value is larger than the average. The offer structure is approximated with the percentage of newly created shares for the IPO which are the Primary Shares, while the percentage of existing shares being sold in the IPO are measured by Secondary Shares. The percentage of the extra shares to the total shares offered in the IPO is measured with the Greenshoe Option. The Debt Retirement Dummy accounts for the intention of the IPO company to use the IPO funds to deleverage, and takes the value of 1 if this is stated in the IPO prospectus or otherwise. The Intellectual Capital Disclosure Dummy accounts for extra information provided by the IPO company. It takes the value of 1 if the company discloses its competitive advantage, patents, licenses or any other form of intellectual capital in the IPO prospectus. The Private Equity and Venture

Capital Dummy takes the value of 1 if the IPO company is backed by private equity or venture capital sponsors respectively during the IPO filing. The Underwriter variable measures the underwriters' reputation in the European countries using the Migliorati and Vismara (2014) list which ranges from 0 to the highest reputation of 1.

The **Firm Characteristics** are hand collected from the respective IPO prospectus. We account for the Firm Size with the logarithmised firm size value while also creating a Firm Size Dummy to mitigate possible inflation influences. The 180 days rolling average of the country-specific firm sizes is computed where the Firm Size Dummy takes the value of 1 if the firm specific firm size value is larger than the average. The Age is measured through the natural logarithm of the IPO company's age since foundation. We also create an Age Dummy consistent with the other dummies. The 180 days rolling average of the country-specific age is computed where the Age Dummy takes the value of 1 if the IPO company is older than the sample average. The CapEx is a ratio of the position of capital expenditure to the total assets of the IPO company. The Return on Assets is measured with the ratio of the IPO company's Net Income to total assets; while the Leverage is the ratio of total debt to total assets of the IPO company. The High-Tech Dummy takes the value of 1 if the IPO company is categorised as high-tech based on the Eurostat NACE code. Finally, the degree of Multinationality is measured by the scale of Aggarwal et al. (2011) which includes for instance the revenue created abroad or foreign assets. The scale differentiates between seven categories of multinationality where the highest level of all classification is 1.

The **Corporate Governance Characteristics** are hand collected from the respective IPO prospectus and approximate the potential agency conflicts inherent in a public company post IPO. We include Retained Ownership which is the proportion of ownership in shares hold by insiders post IPO, in other words: how much control do insiders retain. The Lock-Up period is measured in days and accounts for the period that insiders agree to not dispose of any shares. The Board Size measures the total number of members on the Board post IPO while the Board Independence is the ratio of defined independent board members that do not have a link to the IPO company. Same rule applies for Female Board Members which accounts for the ratio of female board members post IPO. The CEO Duality Dummy measures the independence of CEO and chairman of the Board and takes the value of 1 if both roles are reside with the CEO of the IPO company.

2. Regulatory Environment in Europe

This appendix provides an overview on the EU and country-specific regulatory environment in terms of IPO filings. It is noted that the EU Directive record the content from the previous EU Directives while adding new or explicitly changing content. EU Directives henceforth organically emerge and show path-dependencies. Purposely kept simple, this appendix only provides spotlights of the directives which are deemed most interesting in the context of the IPO issuance process. It is noted that in Europe, in contrast to the USA, the 'event' of an IPO withdrawal is not formerly defined nor is it mentioned in the EU or country-specific directives.

The EU Directive 80/390/EEC from 1980 establishes the minimum information requirement that IPO companies must disclose and accentuate the efforts for maximum coordination between national stock exchanges. This is, in unison, continued with more details on the information provision in the EU Directive 89/298/EEC from 1989. In 1999, the European Union initiated the Financial Services Action Plan (FSAP) in an attempt to create a single financial services market (Cumming et al., 2011). In response, the Lamfalussy architecture was introduced to fast-track the financial convergence in the European Union which divided the realisation into four staggered levels. At the first level the directives establish a framework of principles as proposed by the European Commission while technical implementation measures are the focus at level 2. At the third level, the national supervising bodies issue guidelines on the implementation of the new rules. Finally, level 4 ensures the appropriate enforcement of the EU rules by the national governments. The implementation of the FSAP through the Lamfalussy process witnessed a fast-track procedure of European harmonisation and convergence of financial service industry regulation.[1]

In 2001, the EU Directive 2001/34/EC on the admission of securities to official stock exchange listing and on information to be published on those securities became effective. This directive emphasizes on the minimum conditions for admission such as the minimum float while allowing for sufficient flexibility in the Member States with enhanced mutual recognition of listing particularities. EU Directive 2001/34/EC focuses on the compatibility of stock exchanges to international market standards. The Prospectus Directive (EU Directive 2003/71/EC) highlights the information provision as a key factor for investor protection and insists on the diligence of the national stock exchanges. While the Transparency Directive (EU Directive 2004/109/EC) aims at greater harmonisation provisions of national law to enhance investor protection and market efficiency on a European level.

[1] Market Abuse Directive in 2002, Prospectus Directive 2003/71/EC, MiFID 2004, Transparency Directive 2004/109/EC; `https://ec.europa.eu/info/node/11713/`

The character of the minimum requirements for an IPO listing turns into a maximisation of efforts such that Member States can allow for more stringent diligence requirements.

Following the SOX Act in the USA, the Markets in Financial Instruments Directive (MiFID) was introduced as a major part of the FSAP for the European exchanges in November 2007 in an effort to enhance more detailed rules and transparent investor protection (Cumming et al., 2011). Before the implementation of the MiFID, the trading rules showed some degree of heterogeneity for the different European stock exchanges. Since the MiFID became effective, the specific exchange trading rules are further integrated leaving very little variation. Finally, the EU Directive 2010/73/EU challenges the market efficiencies during the IPO process and emphasises the harmonisation of provisions through reduction of national competences to a necessary minimum. Beyond our sample period from 2001 to 2015 there have been further efforts by the European Union to foster a single financial services market.[2]

[2]These can be reviewed on the resourceful website of the European Commission, `https://ec.europa.eu/info/law/law-topic/eu-banking-and-financial-services-law_en`

3. Extreme Bound Analysis

To test for the robustness of our results, we build upon the linear specification ϕ of Equation 1 to investigate whether the different variables x drawn from the entire set of variables X are robustly correlated with y:

$$y = \beta_1 + \beta_j X_j + \epsilon$$

where X_j is a vector of a maximum three variables (Levine and Renelt (1992) and Achen (2005))[3], and ϵ is the error term.

The corresponding standard errors $\hat{\sigma}_j$ are collected and stored. Furthermore, following Sala-I-Martin (1997) we calculate the weighted mean of the regression coefficients $\bar{\beta} = \sum_{j=1}^{M} w_j \hat{\beta}_j$ and of the variances $\bar{\sigma}^2 = \sum_{j=1}^{M} w_j \hat{\sigma}_j^2$; where w_j represents weights that are applied to results from each estimated regression model.

While Equation 1 assumes a cumulative normal distribution, the cumulative distribution function of the Extreme Bounds Analysis (EBA) is produced by estimating the cumulative density function from each regression separately and pooling them into an aggregate cumulative density function of the form:

$$\Phi(0) = \sum_{j=1}^{M} w_j \zeta_j(0|\hat{\beta}_j, \hat{\sigma}_j^2)$$

where individual cumulative density functions from each regression coefficient $\hat{\beta}_j$ are denoted as $\zeta_j(0|\hat{\beta}_j, \hat{\sigma}_j^2)$.

The analysis allows us to surface the extent to which each variable influences the probability of IPO withdrawal across a wide variety of possible specifications. When evaluating the coefficients of the elements, we test whether these variables retain statistical significance across a wide range of the estimated models. As depicted in Table 1 and Figure 1 below, we can see that the significant variables from the probit regression of the European sample in Table 4 mostly retain significance in the EBA formulation.

For instance, the Extreme Bound Analysis makes evident that the presence of negative news, venture capital or private equity, a higher level of debt or the intent to retire debt with the IPO proceeds, as well as a higher credit spread increases the probability of IPO withdrawal.

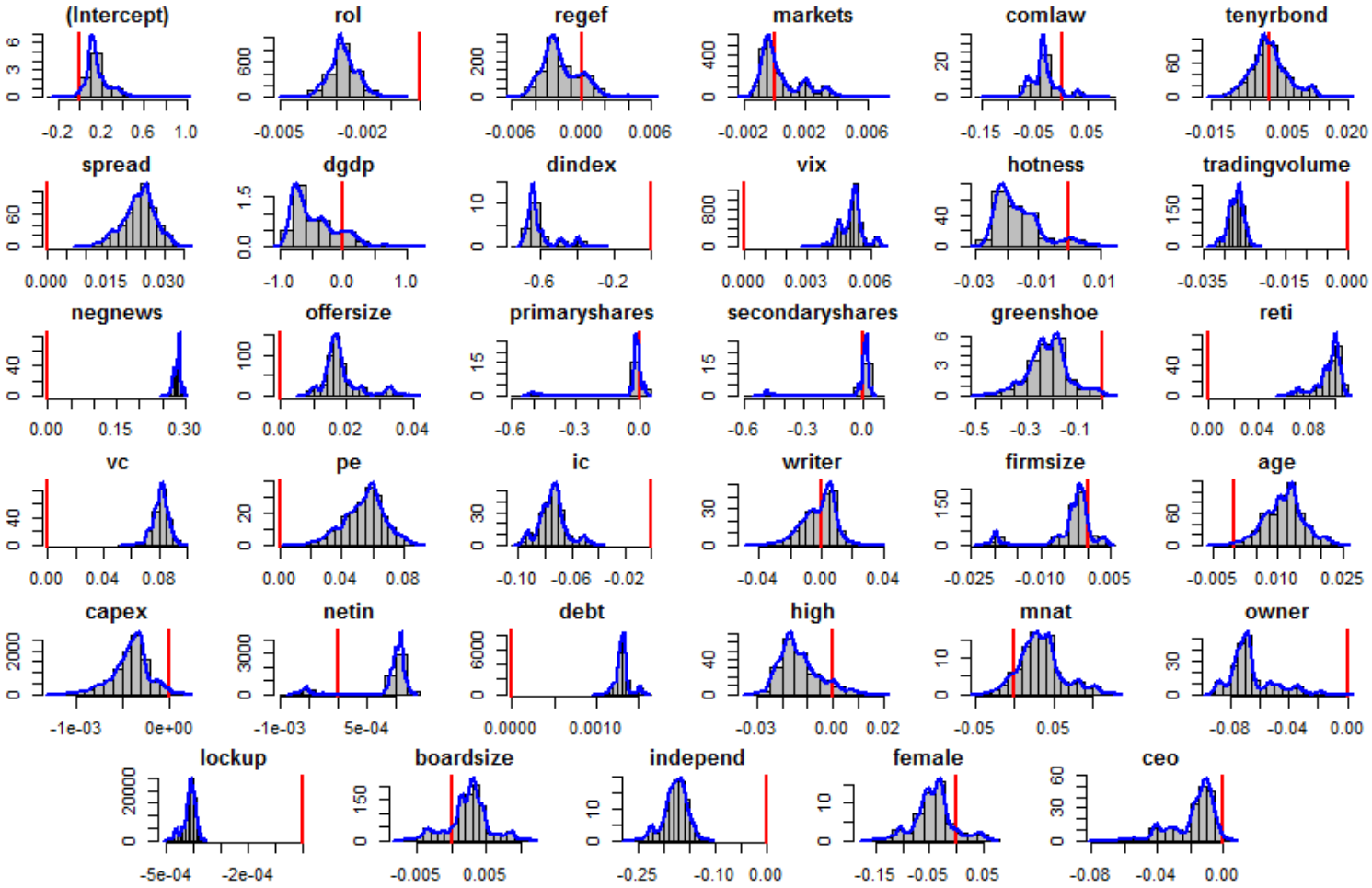
[3]Results for up to 5 variables are available upon request.

Table 1: Determinants of IPO Withdrawal - Extreme Bound Analysis

	Normal Distribution		General Distribution	
Variable	**Positive**	**Negative**	**Positive**	**Negative**
Intercept*	0.03	99.97	3.753	96.247
x_1* Rule of Law	100	0	99.973	0.027
x_2 Regulatory Efficiency	93.652	6.348	81.147	18.853
x_3 Market Openness	30.289	69.711	48.369	51.631
x_4* Common Law	98.968	1.032	88.343	11.657
x_5 10yr Gov. Bond	50.79	49.21	51.917	48.083
x_6* Credit Spread	0.001	99.999	0.053	99.947
x_7 ΔGDP	85.071	14.929	79.865	20.135
x_8* VIX	0	100	0.002	99.998
x_9* ΔIndex	99.967	0.033	99.79	0.21
x_{10} Market Hotness	89.992	10.008	86.645	13.355
x_{11}* Trading Volume	98.722	1.278	98.639	1.361
x_{12}* Negative News	0	100	0	100
x_{13}* Offer Size (mn)	0	100	0.001	99.999
x_{14} Primary Shares	77.781	22.219	74.746	25.254
x_{15} Secondary Shares	66.963	33.037	37.25	62.75
x_{16}* Greenshoe Option	99.626	0.374	97.091	2.909
x_{17}* Debt Retirement	0	100	0	100
x_{18}* Private Equity	0.039	99.961	0.514	99.486
x_{19}* Venture Capital	0.053	99.947	0.069	99.931
x_{20}* Intellectual Capital	100	0	99.999	0.001
x_{21} Underwriter	52.464	47.536	52.059	47.941
x_{22} Firm Size (mn)	93.303	6.697	75.852	24.148
x_{23}* Age (years)	0.381	99.619	3.071	96.929
x_{24} CapEx	61.023	38.977	60.9	39.1
x_{25} Return on Assets	13.105	86.895	14.797	85.203
x_{26}* Debt	0.166	99.834	0.177	99.823
x_{27} High-Tech	82.308	17.692	79.546	20.454
x_{28} Multinationality	16.203	83.797	22.155	77.845
x_{29}* Retained Ownership	99.814	0.186	98.958	1.042
x_{30}* Lock-up (days)	100	0	100	0
x_{31} Board Size	13.802	86.198	23.107	76.893
x_{32}* Board Independence	100	0	100	0
x_{33} Female Board Members	83.722	16.278	78.299	21.701
x_{34} CEO Duality	83.889	16.111	79.052	20.948

Note: Following Sala-I-Martin (1997) the Extreme Bound analysis identifies the extent to which each variable influences the probability on IPO withdrawal across 52,955 estimated models. Variables marked with a * are statistically significant at a 5% significance level. Normal Negative/Positive represents the % of occurrences of the coefficient on the variable being negative or positive, given that the error terms are normally distributed. While General is the same, except with the error terms following a General Error Distribution.

Figure 1: Extreme Bounds Analysis



Note: Following Sala-I-Martin (1997) the Extreme Bound analysis identifies the extent to which each variable influences the probability on IPO withdrawal across 52,955 possible models. The grey columns are the bins for the estimated coefficients, and the red vertical line is at zero, facilitating easy visual inspection of the sign of the coefficient.

4. Stepwise Probit Regression

A selection process is employed to derive the best subset of variables of a given size. One major advantage of a backwards selection or step-down analysis is that only variables are eliminated whose elimination do not heavily adversely affect the goodness of fit (Mantel, 1970).

The logic of the selection procedure is as follows: Firstly, we specify the complete probit model we want to fit to the data set. Secondly, for the first iteration the model considers to drop the first variable, then to drop the second variable and so forth. Thirdly, the model finds the term that is least significant which will be removed from the model at a 5% significance level. This procedure is re-iterated until all the best subset is derived. A forward selection works similar just instead of dropping the model is adding variables (Gorman and Toman, 1966). Stepwise regressions can be fit to a variety of specifications. I fit the stepwise regression to the probit model specified in the manuscript.

A backward selection search is proposed in order to test for the robustness of the results of the our probit model defined in the manuscript. We run a stepwise probit regression, allowing us to treat each variable as its own term and therefore consider each one separately. The result is assumed to be the best subset of the probit regression. By comparing the results of the probit regression and the stepwise probit regression, the adequacy can be assessed.

The majority of variables found to influence the probability of IPO withdrawal in the main analysis in the manuscript, are also listed in the results of the stepwise regression at a 5% significance level shown in the Table below using all 34 variables. Comparing the stepwise probit regression using the dummy variables for firm size, offer size and age in Table 2, our findings using the logarithmic values of same are confirmed. We also include a series of dummy variables representing the OECD estimated recession periods for Europe. The dummy variables are not significant nor are there material changes in the estimated coefficients. All tests and databases are available on request.

Table 2: Determinants of IPO Withdrawal: Stepwise Probit Regression on full sample

	Probit Regression (Levels)		**Probit Regression (Dummy)**	
Variable	**Coef.**	**ME**	**Coef.**	**ME**
Intercept	-1.471	-18.36%	65.471	69.14%
x_1 Rule of Law	-0.018	-0.17%	-0.016	-0.15%
x_2 Regulatory Efficiency	-0.015	-0.02%	-0.015	-0.03%
x_3 Market Openness	0.033	0.12%	0.035	0.15%
x_5 10yr Gov. Bond	0.058	0.01%	0.062	0.01%
x_6 Credit Spread	N/A	N/A	0.054	0.01%
x_7 ΔGDP	8.762	0.07%	8.470	0.07%
x_8 VIX	0.027	0.05%	0.023	0.04%
x_{11} Trading Volume	-0.219	-3.31%	-0.214	-3.45%
x_{12} Negative News	0.963	13.20%	0.921	13.97%
x_{13} Offer Size (mn)	0.132	0.03%	0.358	5.64%
x_{14} Primary Shares	N/A	N/A	-67.230	-0.11%
x_{15} Secondary Shares	N/A	N/A	-67.254	-0.11%
x_{16} Greenshoe Option	-1.125	-0.01%	-0.994	-0.01%
x_{17} Debt Retirement	0.243	3.20%	0.212	2.92%
x_{18} Private Equity	0.223	3.74%	0.239	3.83%
x_{19} Venture Capital	0.427	6.90%	0.450	7.26%
x_{20} Intellectual Capital	-0.306	-3.79%	-0.280	-4.16%
x_{22} Firm Size (mn)	-0.106	-0.02%	-0.248	-4.02%
x_{23} Age (years)	0.046	0.04%	N/A	N/A
x_{26} Debt	0.026	0.03%	0.048	0.04%
x_{27} High-Tech	0.330	0.57%	0.356	0.81%
x_{30} Lock-Up (days)	-0.003	-0.04%	-0.003	-0.04%
x_{32} Board Independence	-0.997	-0.23%	-1.013	-0.22%
x_{34} CEO Duality	-0.390	-5.41%	-0.341	-4.78%
HL Statistic	22.648 (0.0038)		24.902 (0.0016)	
McFadden R^2	0.257		0.235	

Note: The database includes 2,808 observations. This stepwise probit regression is executed at a 5% significance level and started off including all 34 variables outlined in Table 1. The stepwise probit regression on dummies includes the variables outlined in Table 1 while using the dummies for firm size, offer size and age instead of the logarithmised values.

5. Regulatory Change - MiFID

In particular, it must be identified if a binary outcome arises from groups where each company in our sample may be correlated with another group's members. We consider main markets as well as the exchange-regulated AIM. A population-average panel data model using generalized linear models helps to assess any effects of regulatory changes in the treatment group compared to the untreated control group. What are our rationals to identify the AIM IPO companies as our control group to identify any effects from MiFID?

In 1999, the European Union initiated the Financial Services Action Plan in an attempt to create a single financial services market (Cumming et al., 2011). Following the SOX Act in the USA, the Markets in Financial Instruments Directive was introduced as a major part of the FSAP for the European exchanges in November 2007 in an effort to enhance more detailed rules and transparent investor protection (Cumming et al., 2011).

The AIM represents a demand-side segmentation and is organised as an exchange-regulated market where the company's Nominated Advisor must ensure compliance (Vismara et al., 2012). Technically, a company files for admission on the AIM which does not constitute a public offer since the shares are exclusively offered to qualified institutional investors. The qualified institutional investor can resell the shares to individual investors without restrictions (Ritter et al., 2013). Since an admission or to say IPO at the AIM is not equivalent to a public offer, this implies that the AIM is not officially regulated through the European Financial Services Directives. The exchange-regulated Alternative Investment Market can operate *outside* the EU directives. The majority of regulatory oversight is delegated to the Nominated Advisor (Espenlaub et al., 2012). Akyol et al. (2012) exploit this regulatory environment and uses the AIM as a control group compared to the main markets in Europe to examine the consitution of corporate governance codes on underpricing.

To take advantage of the exogenous shock of the MiFID within the difference-in-differences framework (Wing et al., 2018), we identify two groups, $g = 1, 2$, in two time periods, $t = 1, 2$. Accounting for the Parallel Path' assumption that both groups are comparable, where one group receives a treatment at time t while the control group is not affected by the treatment. The first time interval represents the pre-MiFID period, while the the second period represents the post-MiFID interval where the treatment is rolled out for g_2 but not in g_1. In that sense, a time-invariant dummy variable identifying observations on g_2 is defined as $T_g = [g = 2]$ where $P_t = [t = 2]$ represents the observations in period two. Now, the treatment variable is created with the product of these two dummy variable $D_{gt} = T_g x P_t$. Now, the three treatment variables can be incorporated into the probit model (see Table 3. The dummy variable x_{35} Treatment takes the value of 1 if the IPO company was affected by the MiFID and 0 otherwise. The dummy variable x_{36}

MiFID takes the value of 1 after the MiFID went into effect in November 2007 and 0 before that time. The interaction term x_{37} Treatment$x$MiFID is the combination of the previous two dummy variables and the variable of interest.

Consistent with Nelder and Wedderburn (1972), in the probit model defined in the manuscript we can identify a linear basis: the parameter β is a function of likelihood Y which itself is linear on the input or some function thereof. Given a linear aspects to most of estimation models, the generalized linear models provide a unified procedure for fitting the best model based on likelihood. In the presence of within-group or within-cluster correlation a problem arises to model correlated binary data such as my IPO withdrawal data (Pendergast et al., 1996).

In order to specify within-group correlation structures of our data set, we propose a population-average panel-data model relying on generalised estimating equations according to (Liang and Zeger, 1986). We fit a generalised model of $y_{i,t}$ with the covariates $x_{i,t}$ as a probit link function g, the inverse of the normal cumulative distribution of y:

$$g\{E(y_{i,t})\} = x_{i,t}\beta$$

with $i = 1, ..., m$ and $t = 1, ..., n_i$, for which there are n_i observations for each group identifier i.

As the results in Table 3 show, the interaction term is insignificant. We can draw the conclusion that the exogenous shock of the MiFID did not have a significant effect on the probability of IPO withdrawal. Likewise, comparing the significant variables in the Table below, we identify high similarity to the main results in the manuscript such as the increasing effect of private equity or venture capital backing.

Table 3: Difference-in-Difference Model

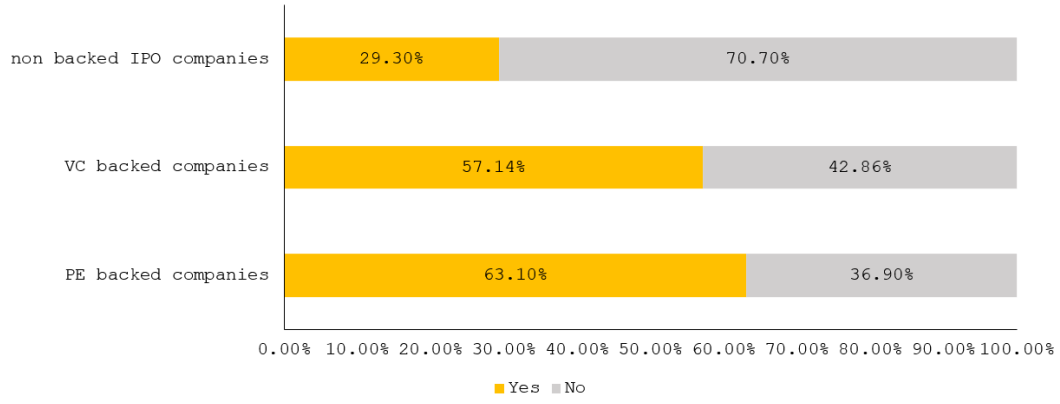
Status	**Coef.**	**Std. Err.**
x_{35} Treatment	0.386***	0.134
x_{36} MiFID	0.117	0.150
x_{37} Treatment x MiFID		
0 1	0.191	0.170
1 0	0	(omitted)
1 1	0	(omitted)
Intercept	2.026	15.306
x_1 Rule of Law	-0.015***	0.004
x_2 Regulatory Efficiency	-0.006	0.010
x_3 Market Openness	0.034***	0.008
x_5 10yr Gov. Bond	0.114**	0.048
x_6 Credit Spread	0.020	0.041
x_7 ΔGDP	9.980***	3.039
x_8 VIX	0.019***	0.007
x_9 ΔIndex	-0.659	1.066
x_{10} Market Hotness	-0.022	0.080
x_{11} Trading Volume	-0.213***	0.073
x_{12} Neg. News	0.956***	0.100
x_{13} Offer Size	0.129***	0.026
x_{14} Primary Shares	-4.927	15.277
x_{15} Secondary Shares	-4.994	15.276
x_{16} Greenshoe Option	-1.250**	0.573
x_{17} Debt Retirement	0.257***	0.093
x_{18} Private Equity	0.215**	0.097
x_{19} Venture Capital	0.432***	0.133
x_{20} Intellectual Capital	-0.343***	0.091
x_{21} Underwriter	-0.177	0.147
x_{22} Firm Size	-0.108***	0.019
x_{23} Age	0.038	0.030
x_{24} CapEx	-0.015	0.029
x_{25} Return on Assets	0.000	0.006
x_{26} Debt	0.029	0.021
x_{27} High-Tech	-0.021	0.093
x_{28} Multinationality	0.287	0.213
x_{29} Retained Ownership	0.040	0.138
x_{30} Lock-up (days)	-0.003***	0.000
x_{31} Board Size	0.013	0.015
x_{32} Board Independence	-1.163***	0.186
x_{33} Female Board Members	-0.006	0.266
x_{34} CEO Duality	-0.364***	0.109

Note: The dependent variable equals 1 for IPO withdrawals and 0 otherwise. *, ** and *** denote significance at 10%, 5% and 1% respectively. The control group, AIM, has 1,127 and the treatment group has 1,681 observations between 2001-2015.

6. Private Equity and Venture Capital Dual Track Exploration

Given the importance of risk capital providers, we furthermore contrast the post-IPO withdrawal outcomes for VC and PE backed vs. non-backed companies in Figure 2. We manually investigate through Thomson Reuters Eikon, Lexis Nexis or country specific company registrars what happens to the company after it withdraws from the IPO. We assign each post-IPO withdrawn company a certain outcome as of September 2018 (private, inactive, trading, acquired). Given the empirical evidence from the probit regression in the main manuscript together with descriptively examining the post-IPO withdrawal outcomes, we argue that PE and VC indeed exploit market timing. Tykvova and Walz (2007) posit that venture capitalists and private equity firms have an information advantage over investors; and as a consequence, they are more likely to withdraw from the IPO for the benefit of a more favourable option (Cumming, 2008). We evaluate the aftermath of the PE and VC backed IPO withdrawal companies and find that about 63% of private equity backed and 57% of venture capital backed companies engaged in a presumably superior alternative. This means that the companies were acquired, went public, or sold in a secondary buyout - compared to only 29% of non-backed IPO withdrawal companies (see Figure 2). Our empirical evidence suggests that PE and VC partners pursue a dual track approach and try to exploit market timing. In the end the institutional setting of PE and VC companies aim for an exit, either through an IPO or otherwise. In fact, Gill and Walz (2016) argue that an IPO with venture capital backing can be interpreted as a delayed trade sale.

Figure 2: Post-IPO withdrawal outcomes for PE and VC backed IPO withdrawals



7. The Interplay of Corporate Governance and Age

The age distribution for our sample of 2,808 IPO filings in Europe between 2001-2015 is listed below in Table 7. The mean age for the company at IPO filing in years is 16.31, when excluding the AIM the mean increases to 22.17 years while the mean for the AIM is 7.56 years. Looking at the age distribution according to Bertoni et al. (2014) the picture becomes even clearer: almost 80% of our sample IPO companies is older than 5 years and only 6% are younger than 1 year when excluding the AIM (65%, 20% when including). It is very insightful to compare the relationship of the board structure across its life cycle. The majority of young companies files an IPO at the AIM, making this an answer about second market vs. main market. Considering the descriptive in Table 7 as well as our probit results in Table 5, we can establish that value protection focus of the agency theory applies to Europe. For both, young and mature companies, the corporate governance characteristics are the same, longer lock-up periods and a higher proportion of independent board members decreases the probability of IPO withdrawal, while for mature companies CEO duality also reduces same. While the companies at the AIM can be subsumed under the resource-dependency theory, we need to bear in mind that the AIM has no formal requirement for IPO companies to compile with the corporate governance code. As mentioned also in the manuscript, the results of the AIM regression compared to the rest of Europe do not differ substantially. The in-depth examination of the relationship between the board structure across its life cycle and country can be of special interest in a separate analysis which is beyond the scope of this paper and online appendix. Given the empirical evidence, we argue that this is concerning AIM vs. non-AIM.

Table 4: Age Distribution from 2001-2015

	Europe		**Without AIM**		**AIM**	
Age at IPO in years	Number	%	Number	%	Number	%
Age <1	329	11.70	103	6.12	226	20.01
1 <Age <5	696	24.80	294	17.48	402	35.70
5 <Age <10	644	22.90	403	23.96	241	21.40
Age >10	1139	40.60	882	52.44	257	22.80
	2808		1682		1126	

Table 5: Determinants of IPO Withdrawal - mature, young and AIM results

	Mature		Young		AIM	
Variable	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**	**Coef.**	**Marg. Effect %**
Intercept	-0.947	0.00	1.152	0.00	-9.570	0.00
x_1 Rule of Law	-0.019***	-0.25	0.005	0.06	0.083	0.25
x_2 Regulatory Efficiency	0.013	0.17	0.002	0.02	0.000	0.00
x_3 Market Openness	0.058***	0.77	0.020	0.23	0.030	0.09
x_4 Common Law	-0.787***	-9.35	-0.255	-3.10	n/a	n/a
x_5 10yr Gov. Bond	0.110**	1.45	0.009	0.10	-0.304*	-0.91
x_6 Credit Spread	0.083*	1.10	0.069	0.77	0.103	0.31
x_7 ΔGDP	10.746***	142.53	6.658	74.12	12.409	37.34
x_8 VIX	0.012	0.16	0.030***	0.34	0.036**	0.11
x_9 ΔIndex	-1.916	-25.41	0.139	1.54	7.396	22.26
x_{10} Market Hotness	-0.008	-0.10	0.162	1.72	0.083	0.24
x_{11} Trading Volume	-0.224**	-3.01	-0.172	-1.95	-0.108	-0.33
x_{12} Negative News	0.942***	20.22	0.947***	18.85	0.912***	6.67
x_{13} Offer Size	0.087***	1.15	0.196***	2.18	0.147***	0.44
x_{14} Primary Shares	-4.353	-57.73	-4.597	-51.18	-0.043	-0.13
x_{15} Secondary Shares	-4.497	-59.65	-4.571	-50.89	n/a	n/a
x_{16} Greenshoe Option	-1.054	-13.98	-2.040*	-22.71	-1.885	-5.67
x_{17} Debt Retirement	0.284**	4.30	0.173	2.14	0.233	0.86
x_{18} Private Equity	0.271**	4.02	0.302	4.05	0.638**	3.70
x_{19} Venture Capital	0.499***	8.97	0.393*	5.71	0.412	1.90
x_{20} Intellectual Capital	-0.479***	-5.88	-0.223	-2.27	-1.028***	-1.76
x_{21} Underwriter	-0.166	-2.20	0.224	2.49	-0.319	-0.96
x_{22} Firm Size	-0.046*	-0.61	-0.178***	-1.99	-0.182***	-0.55
x_{23} Age	0.060	0.79	0.063	0.70	-0.009	-0.03
x_{24} CapEx	-0.025	-0.33	-0.025	-0.27	-1.112*	-3.35
x_{25} Return on Assets	-0.007	-0.09	0.103***	1.14	0.017	0.05
x_{26} Debt	0.073**	0.97	-0.029	-0.32	-0.007	-0.02
x_{27} High-Tech	-0.094	-1.21	0.112	1.32	0.008	0.02
x_{28} Multinationality	0.293	3.89	-0.251	-2.80	-0.241	-0.73
x_{29} Retained Ownership	-0.046	-0.61	0.188	2.09	0.319	0.96
x_{30} Lock-up	-0.003***	-0.04	-0.002***	-0.03	-0.003***	-0.01
x_{31} Board Size	0.010	0.13	-0.022	-0.24	-0.062	-0.19
x_{32} Board Independence	-1.182***	-15.68	-1.316***	-14.65	-1.073**	-3.23
x_{33} Female Board Members	-0.150	-1.99	0.337	3.75	0.253	0.76
x_{34} CEO Duality	-0.417***	-4.50	-0.236	-2.29	-0.054	-0.16
HL Statistic	25.16 (0.0015)		5.64 (0.6875)		6.40 (0.6012)	
McFadden R^2	0.3053		0.2785		0.3551	

Note: The dependent variable equals 1 for IPO withdrawals and 0 otherwise. *, ** and *** denote significance at 10%, 5% and 1% respectively. Marginal Effects are defined as follows: the probit employs normalisation that fixes the standard deviation of the error term to 1 where each coefficient represents the marginal effect of a unit change on the probability that the dependent variable takes the value of 1 (IPO withdrawal) given that all other independent variables are constant (Aldrich and Nelson, 1984). The McFadden R-squared is defined as 1 less the log likelihood for the estimated model divided by the log likelihood for a model with only an intercept as the independent variable. While the Hosmer-Lemeshow Statistic represents the goodness of fit that observed events match estimated events in ten subgroups of the model population, with the p-value reported in brackets. The database includes 2,808 observations of which 1,155 are classified as young, 1,652 are mature and 1,126 are at the AIM.

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