



IPO of SMEs: Success and Failure

Paulo Samuel Rodrigues Nunes

120417006@fep.up.pt

Master in Finance

Supervisor

Miguel Sousa, PhD

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Abstract

The Initial Public Offering (IPO), one of the most widely used financial operations for a firm to raise capital, has a major impact on small and medium enterprises (SMEs), even more than for other companies, given their usual financial constraints.

Using a sample of IPOs taking place in the Alternative Investment Market (AIM), a survival analysis was conducted with the objective of studying the *ex-ante* characteristics that have a significant impact in the company's survival after the IPO. Our results show that penny stocks are keener to failure as well as stocks listing during bull cycles. Additionally, income statement related variables show irrelevant importance for survival, while balance sheet related variables appear to have a significant impact, with companies with lower debt and positive net cash showing higher propensity for success.

Key-words: IPO, SMEs, AIM, Success, Failure.

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1. Introduction

1.1 Introduction

The Initial Public Offering (IPO) is one of the most widely used financial operations for a firm to raise capital, becoming the subject of enormous attention given the well-known effect of underpricing (Benveniste and Wilhelm, 1990).

Although, most of the literature regarding this subject is concentrated on big companies and consequently on major stock exchanges, this financial operation is often used also by small and medium enterprises (SMEs) and has a more significant impact on them.

The present dissertation intends to study the IPO of SMEs, more specifically the factors that contribute for the success or failure of the company when it goes public. As so, it is the objective of this study to find the characteristics, successful and unsuccessful companies have when they go public, in order to get a better perspective of the future performance of an SME at the time of the IPO.

This study will be focused on the Alternative Investment Market (AIM), the hottest market for IPOs of SMEs worldwide. The AIM, within junior markets, experienced the most accentuated growth in the past years of foreign firms listing, as shown in Figure 1 (Nielsson, 2013), representing an outstanding increase in its competitiveness. Additionally, AIM is the stock exchange for SMEs with the higher market capitalization worldwide, as highlighted in Table 1 (Nielsson, 2013).

Figure 1 – Number of foreign firms listed 1995-2009 (Nielsson, 2013).

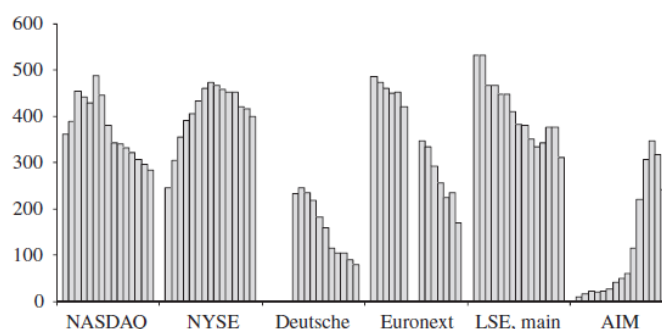


Table 1 – Number of firms and market capitalization – December 2009 (Nielsson, 2013).

Location	Exchange/segment	Number of companies			Market capitalization (USD M)	
		Domestic	Foreign	Total	Total	Average firm
Main markets						
US	NYSE	1832	400	2232	11,837,793	5304
US	NASDAQ	2569	283	2852	3,239,492	1136
France, etc.	Euronext	990	170	1160	2,869,393	2474
UK	LSE	2179	311	2490	2,796,444	1123
Germany	Deutsche Börse	704	79	783	1,292,355	1651
Junior markets						
UK	AIM	1052	241	1293	91,445	71
Korea	KOSDAQ	1020	6	1026	73,938	72
Canada	TSX Ventures	2375	0	2375	34,624	15
Japan	Mothers	183	2	185	15,939	86
Hong Kong	Growth enterprise	174	0	174	13,546	78
Germany	Entry standard	103	13	116	12,076	104
France, etc.	Alternext	115	10	125	5997	48
Singapore	SESDAQ	98	36	134	3793	28
Nordic (OMX)	Investor & NM List	126	3	129	2894	22
Ireland	Irish Enterprise	24	1	25	2314	93
Italy	Mercato Expandi	6	0	6	208	35

In Europe 99% of the companies are SMEs, being therefore the engine of the European economy. AIM is by far the most important growth equity market in Europe, becoming this way the best market to study the success and failure characteristics of SMEs that go public.

By examining the characteristics of success, SMEs will be able to see if they are ready to go public and get an estimate of the life cycle they're in, in order to grow with the aid of the equity capital markets.

1.2 Relevance and Motivation

According to Fama and French (2004), in the heart of the modern capitalism lies the market for publicly traded equity, representing the will of investors to bear residual corporate risks. Preceding the public equity market, the market for newly listed firms is the point of entry which allows the firms wide access to equity capital and, consequently, make possible their emergence and growth.

Small and medium companies present more often financial constraints than large companies (Samitas and Kenourgios, 2005). The 2008 global crisis made it even more difficult for companies to finance themselves. This phenomenon was well documented in euro area firms, and specially felt by SMEs as euro area banks tightened severely credit standards on loans to non-financial companies (Artola and Genre, 2011). This problem is

not completely solved in Europe, (where some countries are still under international financial aid programs), despite the quantitative easing (QE) measures taken by the ECB. Accessing the stock market is a way to surpass the financial constraints (Kim, 1999). However, according to St-Pierre (2000), the decision of going public is much more complex and important for an SME than for a big company. Despite the listing rules, SMEs have great difficulties to stabilise their performance and satisfy their investors. Given the small amount of stocks available, each transaction has a major impact in the stock price and, consequently, shareholder's return. Anyhow, after going public, performing well is fundamental for growth SMEs as it's highly probable they'll have to go to the market to finance themselves several times in order to keep their growth. In this line of thought, Schneider et al. (1983) highlighted that a good market performance allows a firm to get more favourable rates in loans, and maintain its capacity to go to the equity market to refinance itself.

Although IPOs are a topic very well studied and documented, the gap in the literature regarding IPOs of SMEs is wide, concrete results concerning success and failure are very scarce and only studied in a very limited way. In fact, only a few studies, very recently, deepen some aspects of IPOs of SMEs with particular accuracy. Three of the most important studies this work are: i) Capentier and Suret (2010), who analyse the survival and success of Canadian penny stocks, (which is not surprising given the fact that the TSX Ventures is the stock exchange for SMEs with more companies in the world), ii) Espenblaub et al. (2012) who analysed AIM IPOs with a major focus in the reputation of the financial advisor, among several other characteristics, and iii) Nielsson (2013) who deeply studied the AIM trying to understand if this market, being less regulated, attracted lower quality firms than markets with tougher rules.

IPOs can be a crucial operation and probability one of the most important steps, if not in many cases the most important, an SME will take during its life. Considering the financial constraints in Europe, going public can be an even more attractive operation to raise capital. As so, it is important to understand what dictates the success and failure of the company after this financial operation.

This is exactly what this study proposes: identify the company's characteristics at the time of the IPO that contribute to the company's success or failure after the IPO.

After this introductory chapter, the present work continues in Chapter 2 with the literature review around the theme. Chapter 3 provides all the information regarding the methodologies used, the sample and all the variables. All the results were presented and discussed in Chapter 4. Lastly, Chapter 5 presents the main conclusions of the study.

2. Literature Review

2.1 The Alternative Investment Market

AIM is the London Stock Exchange's (LSE) international market for smaller growing companies. Founded in 19th of June 1995, more than 3000 worldwide companies joined AIM, from early stage or venture capital backed companies to well established companies, in order to raise capital for their expansion.

According to Gajewski and Gresse (2006), AIM is governed only by the LSE, meaning that it is beyond the direct reach of the Financial Services Authority (FSA). Considering European regulations, AIM is considered a Multi-Trading Facility and is exempted from the Prospectus Directive.

The requirements to list in AIM are very loosen, as shown in Table 2. A firm does not need to meet any industrial characteristic or any minimum equity size, floating capitalisation or age. It is not mandatory to raise funds when going public and the lock-up periods are not imposed by the exchange. There is a special category of underwriters, the Nominated Advisors (Nomads), on which the admission authority is delegated. The Nomads, appointed and controlled by the LSE according to rigorous criteria, co-ordinate the due-diligence process, produce and approve admission documents and implement Floatation. On AIM, three days after the Nomad confirms that the firm is suitable for listing, the company is admitted.

Table 2 – Comparison of listing rules (Eспенblau et al., 2012).

Rules on	AIM	LSE Main Market	OTCQX US	Nasdaq
Public float	No minimum required	Minimum 25% of shares in public hand	No minimum required	300 shareholders; 1mn shares publicly held with minimum market value between \$4-5 mn
Trading record	None required	Three years trading record required	None required	0-2 years trading record
Minimum market capitalization	No minimum required	Minimum £10 million market capitalization	Minimum \$5 million market capitalization	Minimum \$50 million market capitalization
Profitability	No minimum requirement	No minimum requirement	No minimum requirement	No minimum or \$750k net income depending on listing standard
Role of advisors	Nomiated adisor Nomad required for all transactions at and post-IPO	No such requirement	Designated Advisor for Disclosure DAD required for all transactions at and post-IPO	No such requirement
Admission documents	Admission documents not examined by UKLA	Admission documents inspected by UKLA	Admission documents not examined by US SEC	Admission documents examined by US SEC

2.2 Post-IPO survival

Previous to the AIM there was a stock exchange (the UK Unlisted Securities Market – USM) with similar characteristics that, essentially, gave place to the AIM as it is known nowadays. Hutchinson et al. (1988), in a pioneer work, studied the financial characteristics of small firms that achieved quotation in the USM, with the objective to understand if these firms were different from smaller firms which do not reach quotation and to understand if the USM was providing access to the capital market for growth small firms. The authors found important differences between the two groups of companies, namely the sales growth rate, the use of debt financing, and the level of liquid assets. The group of firms that achieved USM quotation presented higher growth rate, used more debt financing and invested less in current assets than the group of small firms which have not achieved USM quotation. Regarding the access to capital in the market for the growth of small firms, the role played by the USM was positive. The small firms that achieved quotation were really growth small firms, as evidenced by their growth rate, their high gearing and low liquidity (indicative of the financial stress of growth).

Later on, St-Pierre (2000) investigated if it was possible to predict the success of recently listed firms utilizing the information from the offering prospectus. The sample used consisted in 94 Quebec companies with less than 500 employees that went public between 1983 and 1988 on the Montreal Stock Exchange (the author criticized the data stating that the sample is not representative of the population). Size of the firm, debt level, ROA and the percentage of voting shares sold by managers at the time the firms goes public were analysed. The results of the study, not surprisingly, were inconclusive and scarce. However, the author finds, in line with previous literature, that the age of the firm, voting rights sold by managers, sales growth potential and the subscription price could be good predictors in the stock market of the long-term performance.

One of the most relevant studies for this present work was developed by Carpentier and Suret (2011). The authors analysed the survival and success of a significant sample of Canadian penny stocks (market value under US 10\$ million) IPOs from 1986 to 2003, with the intention to find the economic consequences of allowing access to the stock market to small and unprofitable firms – trade-off between listing requirements and market quality.

Non-surviving firms were considered all the firms “whose stocks were delisted by the exchange or subject to an issuer cease trade order at the time of the analysis, along with failed companies that are not yet delisted, those whose stocks are only traded OTC or NEX and any stock which is used as a shell for a reverse takeover”, also a “stock which maintains a price lower than CAN\$0.1 for seven consecutive months” and firms acquired. Success is considered when a firm upgrades from a junior market to a senior market (TSXV to TSX) and when a company enters into merges with another.

The failure or success of a company was studied considering at the time of the IPO, revenues, positive earnings, shareholder’s equity over the threshold of CAN \$25 million and the initial listing requirements. Additionally, it was studied the impact of the intervention of venture-capitalists (VCs), prestigious auditors and prestigious investment bankers. As for control variables the authors used the age of the firm, size, industrial sector and the time of listing (hot issue markets). The results, summarized in Table 3, suggest that the level of listing requirements strongly influence their propensity to fail, but have little or none impact on their propensity to succeed. Carpentier and Suret (2011) also study the probability of failure and success (with a Kaplan-Meier estimator) and the time to failure and to success (with proportional hazard regressions). The conclusions are vague, nevertheless suggested that the probability of success of the firm is not linked to its financial situation at the time it goes public, and that the time to success present a weak relation with the characteristics of the issuers at the IPO.

Table 3 – Summary of results (Carpentier and Suret, 2011).

Proposition	Variable	Observed significant relation with propensity to	
		Fail	Succeed
1	Firm reports revenues at the IPO	Yes (-)	No
2	Firm reports positive earnings at the IPO	Yes (-)	No
3	Firm is profitable and reports more than CAN\$25 million in shareholders’ equity	Yes (-)	No
4	Level of listing requirement met at the IPO	Yes	No
5a	IPO backed by VCs	No	Yes (+)
5b	Prestigious Auditor involved	Yes (-)	Yes (+)
5c	Prestigious Investment Banker involved	Yes (-)	Yes (-)
6	Age at the IPO	Yes (-)	Yes (+)
7	Size at the IPO time	Yes (-)	Yes (+)
8	Industrial sector influence	Yes, natural resources	Yes
9	Hot Issue Market at the IPO time	No	Yes (-)

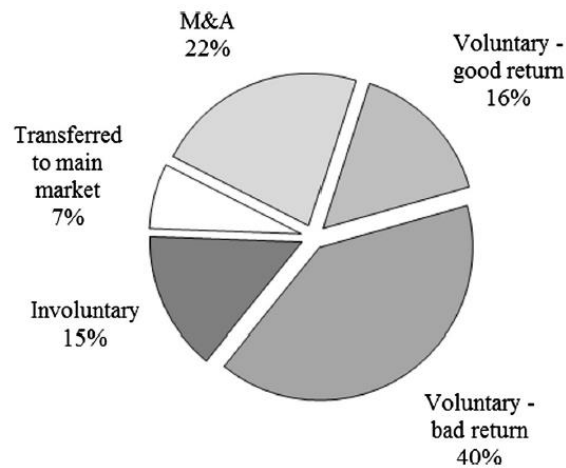
Espenlaub et al. (2012) studied the new listings in the AIM in order to determine the time of survival of IPOs considering the impact of the reputation of the Nomad. In this study the authors used a sample of the IPOs from 1995 until 2014 (918 IPOs in total), and tracked the results until the end of the year 2010. The authors considered survivor companies as those who “continue to be traded on AIM or transfer to another market” and by implication non-survivors as companies that “were delisted from Aim trading due to liquidation, merger/acquisition, permanent suspension or for any other reason except a move to another market”. Additionally, it was also made a distinction between companies delisting by reason, namely due to merger/acquisitions and other. Although the focus of this study concerned the reputation of the Nomad, the authors analysed the impact of the age of the firm, size, initial returns, public float, insider ownership, revenues, VCs, market cycle and sector.

The results suggested that the reputation of the Nomad (measured by the number of deals, proceeds of previous years, credit score, profitability and age) has a significant positive impact in IPO survival, companies survive longer (around two years) than those backed by other Nomads. Additionally, it was found that the rates of survival in AIM are similar to those in North American IPOs, (with the Kaplan-Meier approach the authors observed that median survival time was 80 months). Regarding other variables, by using and Accelerated Failure Time method as well as the Cox Hazard model, the authors found that companies that did a IPOs in hot cycles have more propensity to fail and that age and firm size impact positively survival times.

Very recently, Nielsson (2013) studied AIM questioning if less regulated markets attracted lower quality firms, providing with its study a very important insight of the survival of companies that decide to go public in that stock exchange. For this study the author used a sample period of 1995 until 2009, which included 1,469 companies. The results suggest that firms that list in the AIM are of the same quality as the ones that list in other places in Europe or in the US. Firms are only smaller in a matter of size, but equivalent in terms of profitability, growth and leverage, among others. Additionally, the failure rate among the AIM is similar to other markets, firms listed on AIM present higher market valuation (when measured in terms of Tobin's q). Lastly the author found that firms in AIM raise proportionally higher amounts of money. Besides the conclusions, the

study provides an important insight concerning the future of all the companies that listed on AIM, presented in Figure 2.

Figure 2 – Delistings from UK AIM (Nielsson, 2013).



2.3 Market Performance

Considering market performance, the literature is naturally wider. After listing, Jain and Kini (1994) verified that the operational performance of the company falls significantly, possibly due to three reasons: overlap of good operating performance of the company with the time of the offering; window dressing or increase of agency problems with dispersion of ownership.

McConaughy et al. (1995) verified an increase in operational performance only after five of six years after the IPO, whereas Mikkelsen et al. (1997) found that not only the age, but also the size of the company had an impact in the company operating performance.

Young and Zaima (1998) investigated if there was a positive risk-return relationship for small firm aftermarket returns (higher risk, higher aftermarket return), but only found a positive link between the age of the firm and the stock yields, aftermarket performance of older firms is favourable. Additionally, the authors searched for an industry effect, but did not find any statistically significant relation.

2.4 External Strengths and Liabilities

Externalities can have a major impact on the company after the IPO, as already highlighted in Carpentier and Suret (2011). Gulati and Higgins (2003) studied the

influence of VC firms, investment banks and strategic alliance partnerships in SMEs at the time they go public. During cold markets, the impact of VCs is very positive and, in other hand, during hot markets the impact of investment bankers may be very positive. Strategic alliances did not suggest any impact. The definition of success used lies only in financial indicators and the sample concerns the specific sector of biotechnology.

Bach et al. (2008) studied the role of superior knowledge and isolation mechanisms, defining success as the market value created in the venture up to the point of the IPO. The results suggest that superior knowledge of the top management team is an important determinant of IPO success, as well as the patent protection and the new ventures reputation. The tests were made in a 103 US computer related SMEs sample that went public until 1997.

3. Methodology

3.1 Failure and Success

The definitions of failure and success of the IPO provided in the literature are wide, different authors use different definitions according to the characteristics they intend to study.

One of the first and most important definitions of success of IPOs of SMEs is provided by St-Pierre (2000). The author links success to market performance, considering a company has a successful operation and performance when the stocks yields have a positive growth.

Gulati and Higgins (2003), when studying the inter-organizational relationships of young firms at the time of the IPO, measured success according to four different financial measures, that highlighted the success of the operation itself (in the short term). First they used the firm's net proceeds (amount raised at the IPO less costs incurred), second the pre-money market valuation (widely employed indicator), third and fourth were the 90-day market valuation and 180-day market valuation after the IPO.

Audretsch and Lehmann (2005), evaluating the effects of experience, ownership, and knowledge on IPO survival, used a very simple proposition to define the success of the company after the IPO, survival was the meaning of success.

Another simple proposition is presented by Jain et al. (2008), using company profitability after the IPO as a measure of success.

Bach et al. (2008), studying the knowledge-based capabilities in a high-technological industry of IPO companies, defined success as the "creation of market value above and beyond the resources invested in the venture since its inception".

Carpentier and Suret (2011) identify the success as a stock exchange "graduation", an upgrade of the one proposed by Audretsch and Lehmann (2005), meaning the passage of the firm listing in a stock exchange with low listing requirements to a senior stock exchange with more restrictive listing requirements, in this case from AIM to LSE. It is important to refer that this criterion is also used by stocks exchanges as well to measure success.

The definition of success adopted in the present work is the one defined by Espenblau et al. (2012), simply considering that a stock continues to trade on AIM or it graduates.

Measuring success for small and newly listed firms is very discussable in any case and it is far from consensus. Market-adjusted returns can be very deceiving since stocks usually present low trading volume and high volatility. The growth rates of earnings or revenues, when they are initially inexistent, are worthless. Profitability can only be used when the firms report positive earnings at the time of the IPO. Nevertheless, the graduation process also has some setbacks. Not all the companies that have the conditions to graduate go to a senior stock exchange, for several reasons, but mainly because they'll have to pay higher fees and taxes. This situation may blur the success companies achieved since they went public. The other way back is also visible, some companies listed in a senior stock exchange "downgrade" (passing from LSE to AIM) in order to reduce the fees and taxes paid, which does not mean necessarily the company failed or is failing.

On the other hand, failure is assumed as all the opposite events that define success. According to Figure 2, includes voluntary exit with good stock returns (well-established reasons), voluntary exit with bad stock returns (firms exit before being obliged to do it), involuntary exit (failure to raise necessary capital, failure to keep every time a Nomad, failure to comply with AIM rules, among others) and M&A.

Mergers and acquisitions are the most sensible and discussable subjects regarding success. Acquisitions are considered a failure, following the reasoning that the company failed to run its business in the most efficient way and therefore was bought. Mergers are a more particular case, and follow the reasoning indicated by AIM, considering them as "reverse takeovers". This kind of operations usually consists in a take-over of a non-listed company larger in size, that lead to major restructuring of the listed firm. There may be a change in the main function of the company, and therefore a change in the firm identity. Additionally, there may be new equity issues by the new firm to finance the operation and a new board (with members of the precedent non-listing company). Thus, the original firm is still running and listed in the AIM, but now with a new identity. Therefore, a merger is considered a negative event and consequently a failure as delisting.

3.2 Sample

The sample used in this study is constituted by 327 IPOs occurred in AIM from 1999 until 2010, of which 57 represent failures and 270 represent success. From the total companies with IPOs on AIM in this period, it was necessary to exclude all the stocks that were already trading in different markets and all the stocks with unavailable data. The availability of information was a major constrain of this study, leading the sample to be significantly reduced in comparison to the effective number of IPOs in the period of reference. In order to track the failure event companies were given at least three years of market performance (common time usually adopted in the literature), with the maximum date to be at the end of the year 2013.

All the information used came from three sources, Datastream, LSE and Google Finance. All the financial data was provided by Datastream namely, revenues, EBITDA, EBIT, net income, total assets, total debt and cash. Google Finance was used to define the market cycle according to FTSE100. The information from LSE was used to access the sector, country of incorporation, the stock issue price and the time to failure. It should be noticed that the time to failure was the most difficult variable to define (as there were several data overlaps and inconsistencies), therefore it was only used data from companies where there was an absolute certain of the correctness of dates of entry and exit, always cross-checked with Datastream financial data.

For the specific case of companies which graduate (almost neglectable number in the sample considered), it was considered the stocks continued to trade until the end of the period of reference.

At last, it is important to refer that within the 327 companies that constitute the sample in study, the variables are not fully available for all of them, constraining the number of variables used when studied separately and in a model (where the combination of all data availability was a more important impact).

3.3 Models

Survival analysis is a statistical procedure used to analyse a positive random variable, normally, the time to occurrence of a response of interest, or event, (in this case, failure

or success). This technique analyses the time of permanence of an element in its current state, so that it is possible to identify the variables that have an impact in the time to a response of interest. This methodology allows to consider the length of time a company survives, unlike the Logit and Probit methodologies that provide only binary information, whether a company survives or not.

Another characteristic of these models relies on the fact that they non-normal distributions in order to cope with “censored” data (even of interest is not observed during the period in study). In the present study the sample is “right censored” if the companies survive until the end of the period of reference (end of December 2013).

Within survival analysis there are two types of widely used methodologies, the Accelerated Failure Time models (AFT) and the Cox Hazard model. While in the first the risk is variable along time, the Cox Hazard model assumes that risk is constant, (given two observations, i and j , the risk rate ratio is a constant and the risk rates are proportional). Mathematically the dependent variable of the Cox Hazard model measures the risk of failure whereas the AFT measures the survival time. As risk variations are not relevant for the proposed objectives, the survival method applied was the Cox Hazard model.

3.3.1 Cox Hazard Model

The Cox Hazard model is used to model the time to failure and time to success of the IPO. The adoption of this model relies on the great advantage of not being necessary to assume anything about the underlying distribution of the data, which makes the model semi-parametric. The general form of the survival function is defined by Equation (1).

$$S(t) = pr(T > t) = 1 - F(t) \quad (1)$$

Where T is the length of the listing period on the original stock exchange. This expression represents the likelihood that a firm will continue to be in existence at time t , given the baseline rate of survival among observed firms and other characteristics that vary over time, if it has been in operation continuously in prior periods.

The time to success/failure distribution function is defined in Equation (2).

$$F(t) = pr(T \leq t) \quad (2)$$

The probability that an IPO issued at $t=0$ stays on this stock exchange (before delisting or graduation) longer than time t is a cumulative density function, measured from t to infinity, as defined by Equation (3).

$$f(t) = dF(t)/dt \quad (3)$$

The hazard rate, defined in Equation (4), measures the conditional probability that the IPO is “dead” instantaneously given that it has survived up to time t .

$$h(t) = \lim_{\Delta t \rightarrow 0} \left(\frac{\text{pr}(t \leq T < t + \Delta t \mid T \geq t)}{\Delta t} \right) = \frac{f(t)}{S(t)} = - \frac{S'(t)}{S(t)} \quad (4)$$

Although it is possible to model time to success and time to failure with the previous equations, according to Cox and Oakes (1984) it is more advantageous to rewrite the problem as the Equation (5) below.

$$h(t|X) = h_0(t) \exp(X'\beta) \quad (5)$$

Where:

$h_0(t)$ - is the base-line hazard;

t - is the time to success or failure;

X - is a vector of independent variables;

β - is a vector of parameters to be estimated.

The parameter β , that measures the coefficients that describe how each variable affects the time to success and time to failure, can be obtained from the relative orderings of the times to success or failure, rather than actual values (partial likelihood approach).

The base-line hazard function, $h_0(t)$, which represents the underlying hazard for all variables with covariates equal to zero ($X = 0$), is not necessary to specify. Parameters can be estimated without it, once it is used the partial likelihood function to infer β .

Finally, it is important to acknowledge that the results obtained by this model are of a counterintuitive reading. A positive coefficient results in a hazard ratio greater than one, meaning that an increase in the covariate increases the failure rate (or reduces survival

time. Whereas a negative coefficient results in a hazard ratio smaller than one, meaning that an increase in the covariate reduces the failure rate (or increases survival time).

3.3.2 The Kaplan-Meier Estimator

In order to estimate the survival rates of the companies in the sample, it was also adopted the Kaplan-Meier Estimator as defined below in Equation (6).

$$\hat{S}(t) = \prod_{t_i < t} \frac{n_i - d_i}{n_i} \quad (6)$$

Where:

$\hat{S}(t)$ – is the survival function;

n_i – is the number of firms at risk at the beginning of time t_i ;

d_i – is the number of firms who fail during time period t_i .

This model, based on the survival history of all the sample, provides the probability of a firm to survive at the time t .

3.4 Explanatory Variables

The main variable in study in the present work is time to failure (expressed in months) of an SME since its IPO in the AIM. In case of companies being still alive and, therefore, data is not censored, the time variable represents the interval between the IPO date and the last day of 2013. The time interval of IPOs is from 1999 to 2010 (included) and the time differential of at least 3 years concerns the time it was assumed necessary for a given company to perform in the market and also to be consistent with the time windows broadly used in the literature for similar studies (usually 3 to 5 years is used).

Given the significant constrains in data availability and gathering, it was only used a limited set of variables after running some initial tests, which were divided into three distinct categories, **General variables, P&L (income statement) variables and Balance Sheet variables.**

3.4.1 General Variables

The set of General variables comprehend all the variables used in the study that are not directly linked to the financial reporting of the companies. They concern a wider view of a company characteristics (the sector and country), the market (market cycle) and the IPO operation (issue price and money raised), as there are several aspects that affect a company's performance (failure and/or success) besides pure financial ones.

The company **Sector** of activity is a dummy variable used to define if the company operates in a cyclical or non-cyclical business (the variable assumes the value of 1 if a cyclical sector and 0 otherwise). Following the information provided by the LSE concerning the several sectors where companies operate, the information was condensed in order to facilitate the study, as the objective with the introduction of this variable is to verify if a company operating in a riskier business area (as it is consider operating in cyclical sector) is more affected and as more propensity to fail. The cyclical sector includes financial services, energy, internet, cyclical consumer goods and other smaller cyclical sectors, whereas non-cyclical included all the others. The separation between cyclical and non-cyclical follows the author's professional sensitivity and also the broad literature on the subject (the Sector where a company operates has been consistently studied by several authors in matters of survival, where companies exposed to more volatile sectors usually become hurting the most – Espanlaud et al 2012, Carpentier and Suret 2011).

The company **Country** of incorporation is a dummy variable used to define if the company is native from the UK or not (the variable assumes the value of 1 if from UK and 0 otherwise). As AIM is a low to inexistent barriers to enter stock market, companies from any geography may list there. Following this reasoning, it seems legit to assume that lower quality companies that are not able to list in their home country would seek to list in the AIM just because it would be (most probably) the only place they could do so. Contrary to what it was theorized, Espanlaud et al. (2012) found no evidence of different performances between native and foreign companies and Nielsson (2013) also found that companies from the US listing in AIM were about the same quality as the ones from Continental Europe.

The **Market Cycle** is a dummy variable used to define if the company's IPO was during a bull or bear market (the variable assumes the value of 1 if the IPO occurred during a bull market and 0 otherwise). Although it is naturally understood that companies IPOs are usually during bull markets (where investors are more willing to invest and pay more than in a reversed cycle), it was intended to understand if the market sentiment was significant and if companies are more resilient even if listing in downward periods. The evolution of FTSE100 during the period of study was used to define if the market was in bull or bear phase as it is represented in the Figure 3.

Figure 3 – FTS100 market evolution from 1998 to 2015 with Market Cycle definitions.



The **Issue Price** is a dummy variable used to define if the issue stock price is below 10 GBP (the variable assumes the value of 1 if the issue stock price is higher than 10 GBP and 0 otherwise). The utilization of this variable is to understand the penny stock effect in a company's propensity to failure, as usually penny stocks suffer from higher speculative movements and are associated with smaller and lower quality firms. The definition of penny stock is wide, with authors considering penny stocks all the stocks that are listed outside the main markets (which would be the case of AIM) while others consider all the stocks that trade below 5 USD (SEC definition). In order to better accommodate this effect to our database and considering the open listing criteria of AIM, we defined a penny stock as a stock that trades with a value below 10GBP. Carpentier and Suret (2011) concluded that Canadian penny stocks have lower failure rates than in the US for larger IPOs, probably due to more relaxed delisting rules and the market capacity to refinance non-profitable firms.

The **Money Raised** variable (log.moneyraised) is a logarithmic variable used to define the amount of capital raised by a company in its IPO. The introduction of this variable in this study had the objective to infer if the less the company is able to raise more propend it is to fail in its business (representative of investor's lack of confidence in the company). The ideal situation would be to use the ratio of money raised over the initial market capitalization in order to disregard any size effects (as for instance it is used in Espenblau et al, 2012 – evidence that companies that raise more money are keener to survive). However, as it was not possible to access all this information, it was used a logarithmic scale in order to try to minimize the best as possible any outliers.

3.4.2 P&L Variables

The P&L variables include revenues, operating profits (EBITDA and EBIT) and net results at the time of the IPO or in the closest prior date.

The **Revenue** variable (log.revenue) is a logarithmic variable used to measure the sales at the time of the IPO. Given the low requirements to list in AIM, it is possible for a company to list even in a pre-revenue phase, presenting therefore a higher risk and lacking the capacity to finance themselves. Therefore, this variable was used to understand if lower revenues in fact are more tilted to failure than others who present high revenues.

The operating profitability of the company at the time of the IPO was measured trough the **EBITDA and EBIT**, (as D&A and other one-offs may cause significant changes downwards the P&L). For EBIT(DA) we used a dummy variable that assumes the value of 1 if the EBIT(DA) is positive and 0 otherwise to reflect if the company had positive earnings at the time of the IPO or not. Additionally, the operating profit margins were also analysed through the use of the **EBITDA and EBIT Margins** (EBIT(DA)/revenues). If the company is struggling already at the operating profit level, usually it presents a higher risk profile or it is in an initial phase, requiring therefore external financing. Klein and Mohanram (2006) already highlighted that firms with negative or low operating profits are keener to failure.

The last variable studied from the P&L was the **Net Income**. As in the case of EBIT and EBITDA a dummy variable was used to define a positive or negative result, (the variable assumes the value of 1 if the net income is positive and 0 otherwise). Similarly, net

profitability was measured through the **Net Income Margin** (net income/revenues). The study of this variable is due to the fact that a company's profitability is a common metric to access the success of a business. Carpentier and Suret (2011) already found evidence that unprofitable firms at the time of the IPO are more likely to fail in the future.

3.4.3 Balance Sheet Variables

The Balance Sheet variables include total assets, total debt, cash and subsequent combination of these variables, at the time of the IPO or in the closest prior date.

The **Total Assets** variable ($\log(\text{totalassets})$) is a logarithmic variable used as proxy for the size of the company at the time of the IPO. The size of a company is widely studied to access its relation with success and failure, (as in Hensler et al. 2007, Chou et al 2006, Espenblau et al 2012 and Carpentier et al. 2011), where small companies are usually more unsuccessful.

The **Total Debt** variable ($\log(\text{totaldebt})$) is a logarithmic variable used to measure the total debt of the company at the time of the IPO. This variable allows to understand the impact of the total weight of the liabilities in the company. The introduction of debt and leverage is not common in the literature for this type of study. Given that the amount of debt and high leverage are usually associated with company hurdles, expectations were for innovative results and positive contribution for failure. Additionally, and following the same line of thought, the company leverage was measured also by the **Total Assets / Total Debt** ratio (totaldebttta).

Within the balance sheet, Cash was in focus, although its impact was not only measured directly, but also through net debt. **Net Debt** is a dummy variable (dum.netdebt) that assumes the value of 1 if the net debt is positive at the time of IPO and 0 otherwise. The ratio **Net Debt / Total Assets** (netdebttta) is another alternative measure used to access a company's leverage effects. In all cases, an increase in leverage is expected to increase the likelihood of failure. Lastly, the ratio **Cash / Total Assets** (cashta) was used to understand the effects of the cash weight on the company's balance sheet without its size bias, where an increase in cash percentage was expected to be associated with a lower probability of failure.

The following Table 4 resumes and completes all the information previously mentioned concerning the variables used in this study.

Table 4 – Description of all variables used.

Variable	Description	# Observations	Type	Expected Signal
sector	Cyclical or non-cyclical sector	327	dummy	+
country	UK or other country	327	dummy	-
marketcycle	Bull or bear market cycle	327	dummy	+
dum.issueprice	Issue stock price >10	327	dummy	-
log.moneyraised	Logarithm of money raised in the IPO	327	dummy	-
log.revenue	Logarithm of Revenues	299	logarithm	-
dum.ebitda	EBITDA positive or negative	321	dummy	-
ebitdamg	EBITDA margin	225	ratio	-
dum.ebit	EBIT positive or negative	317	dummy	-
ebitmg	EBIT margin	221	ratio	-
dum.netincome	Net Income positive or negative	322	dummy	-
netincomemg	Net Income margin	231	ratio	-
log.totalassets	Logarithm of Total Assets	301	logarithm	-
log.totaldebt	Logarithm of Total Debt	301	logarithm	+
totaldebtta	Total Debt / Total Assets	301	ratio	+
dum.netdebt	Net Debt positive or negative	322	dummy	+
netdebtta	Net Debt / Total Assets	301	ratio	+
cashta	Cash / Total Assets	301	ratio	-

4. Results

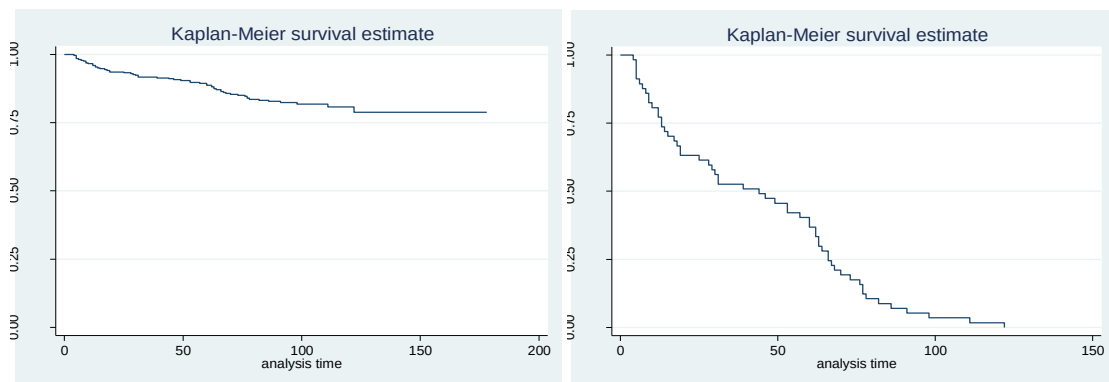
In order to better understand whether and how the variables influence the survival of the companies after the IPO, several survival tests and estimates were developed. First a univariate analysis was carried on, followed by a multivariate analysis, where the previous variables were combined in different models. Additionally, the Kaplan-Meier method was applied and the survival function results were analysed.

It is important to recall the counterintuitive reading of the Cox Hazard model results, where a positive sign in the coefficient represents an increase in the failure rate, while a negative coefficient sign represents a reduction of the failure rate.

4.1 Kaplan-Meier analysis

With the utilization of the Kaplan-Meier methodology it was possible to define graphically the survival function for the whole sample and for the companies who failed, as it is presented in Figure 4.

Figure 4 – (Left) Distribution function for all companies; (Right) Distribution function for non-survival companies.



The analysis of these charts provided a clear view of the failure/survival distribution along time for the sample. It is possible to observe that 100% of the companies survive at least 3 months, a catchy result. From the failing companies (right chart) it is possible to observe that 75% of the companies survive 24 months, 50% survive 48 months and 25% survive at least 65 months. Another important observable conclusion relies on the fact that companies are keener to failure at a faster rate in the short to medium term than in the

long term, (steeper slope of the curve until 45 months, where almost 50% of the companies fail, than in the remaining period of time length which is much wider).

The analysis of the whole sample (left chart), given the small amount of companies it comprises and even smaller failure group, is biased by an important “dilutive” effect, reflecting the impact of the failures along the period of reference.

4.2 Univariate Cox Hazard models analysis

The results for the univariate Cox Hazard models estimation are shown in Table 5. The majority of the results came in line with expectations in all subdivisions of variables, with the General variables group presenting all the results according to the expected signal, however with only Market Cycle and the Issue Price variables being statistically significance for a significance level of 10% and 1%, respectively. In the case of P&L variables none is statistically significant. Finally, within the Balance Sheet variables only one is against the expected signal (Total Assets) and two (Total Assets and the ratio Total Debt / Total Assets) are not statistically significant.

Table 5 – Results of univariate Cox Hazard models analysis.

Variable	Type	Coefficient	Std Deviation	pvalue	Significance	# Observations	# Failures	Expected Signal
sector	dummy	0,929	0,720	0,197	0,134	327	57	+
country	dummy	-0,264	0,405	0,514	0,528	327	57	-
marketcycle	dummy	0,815	0,525	0,121	0,082 *	327	57	+
dum.issueprice	dummy	-0,903	0,266	0,001	0,001 ***	327	57	-
log.moneyraised	logarithm	-0,323	0,212	0,128	0,123	327	57	-
log.revenue	logarithm	0,122	0,086	0,156	0,147	299	48	-
dum.ebitda	dummy	-0,096	0,277	0,728	0,728	321	53	-
ebitdamg	ratio	0,005	0,007	0,497	0,286	225	40	-
dum.ebit	dummy	-0,092	0,275	0,739	0,739	317	53	-
ebitmng	ratio	0,010	0,013	0,437	0,178	221	39	-
dum.netincome	dummy	-0,233	0,287	0,416	0,411	322	53	-
netincomemg	ratio	0,003	0,005	0,545	0,414	231	42	-
log.totalassets	logarithm	0,187	0,174	0,283	0,289	301	50	-
log.totaldebt	logarithm	0,230	0,075	0,002	0,003 ***	301	50	+
totaldebttta	ratio	0,779	0,596	0,191	0,241	301	50	+
dum.netdebt	dummy	0,496	0,287	0,083	0,092 *	322	53	+
netdebttta	ratio	0,801	0,294	0,006	0,005 ***	301	50	+
cashta	ratio	-0,789	0,341	0,021	0,014 **	301	50	-

*, ** and *** indicate statistical significance at the 10 %, 5 % and 1 % level, respectively.

4.2.1 General variables

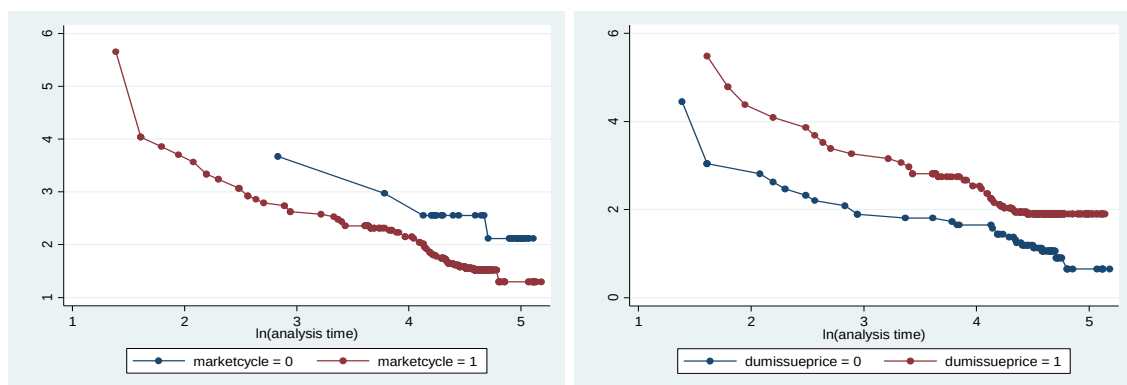
All the results in this variables group came in line with expectations, confirming the effects and importance of these variables in the post-IPO performance. However, only two presented statistical significance, Market Cycle and Issue Price, highlighting their

influence in survival time while other variables lack statistical support to confirm their significant impact.

The positive sign in the Market Cycle variable confirms that companies that IPO in a Bull market are more likely to fail, as these operations normally take place in these periods. The negative sign in the Issue Price variable indicates that a penny stock is likely to survive less than other stocks, as these stocks are subject to higher speculative moves and also associated with smaller and more fragile companies. These results however, came against the findings on Canadian penny stocks (Carpentier and Suret, 2011).

As for the other variables, although not statistical significant in our tests, their coefficient signal came in line with expectations. The positive coefficient sign in the Sector variable confirms that a company operating in a cyclical sector has a higher failure rate, as risk is usually higher in these activities. The negative coefficient sign in the Country variable indicates that a company with origin in other country rather than the UK has more propensity to fail than a native company. The negative sign in the Money Raised variable confirms that companies that raise higher amounts of cash in the IPO are more likely to survive longer, representative of the confidence of investors in the company and to another extent its size.

Figure 5 – Survival probability evolution according to the significant dummy variables Market Cycle and Issue Price.



4.2.2 P&L Variables

The results of this set of variables were the worst of the three groups analysed, where only the dummy variables coefficient signals came in line with expectations. Additionally, not a single variable presented statistical significance, setting aside an important contribution to survival times. These results are consistent with Carpentier and Suret (2011) that found success was not linked to financial conditions at the time of the IPO. Contrarily, Espenblau et al (2012) did find that companies with higher revenues have higher survival propensity and also Klein and Mohanram, (2006) found evidence that companies with positive earnings are keener to survive longer. It is recognizable though, that results may be biased by constraints of the sample, namely the quality and reduced size for this variable.

4.2.3 Balance Sheet Variables

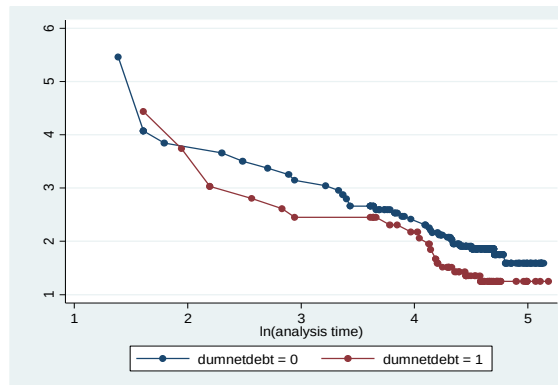
With the exception of one variable, all the results in this variables group came in line with expectations, suggesting a very important impact of this set of variables in the survival of a company.

The only result against expectations and literature came from the non-statistically significant variable Total Assets, with a positive coefficient signal suggesting that companies of smaller size have higher propensity to survive. Sample constraints, as for the variable Revenues, might have caused some bias in this result. Nonetheless, Carpentier and Suret (2011) did find that Canadian penny stocks have lower failure rates than in the US for larger IPOs.

Regarding total debt and both its related variables, Total Debt and Total Debt / Total Assets (the latest not statistically significant), the positive coefficient signal suggests that companies with a higher amount of debt, either in absolute terms or in relative terms to its total assets, have higher propensity to fail. Not only the weight of the debt in the balance sheet should be noticed in here, but also the importance of the financial charges in the P&L that can overcome the company's capacity of cash flow generation, leaving it less prepared to cope with the bumps in the way (fail its payments and bankrupt). Concerning net debt and both its related variables, dummy Net Debt and Net Debt / Total Assets, the positive signal in both coefficients suggests that companies that are net cash

and companies with lower net debt in relation to its total assets have higher propensity to survive.

Figure 6 – Survival probability evolution according to the significant dummy variable Net Debt.



Finally, the negative sign on the variable Cash / Total Assets suggests that companies with a higher amount of cash within its total assets are more likely to survive. The last three variables clearly highlight the importance of an “anti cash-out” financial strategy of companies in earlier stages. By having none or little leverage leave, the cash will be “free” to invest instead of being used for debt and financial charges payments, allowing the companies not only to survive (more prepared to face financial struggles), but also to grow.

This set of variables from the Balance Sheet group presented the higher number of statistical significant variables, with a total of four. With these results it was found that a sound balance sheet at the time of the IPO is a very important matter that should be taken into account when analysing the survival of a company.

4.3 Multivariate Cox Hazard models analysis

The multivariate analysis comprehends the combination of all the variables previously exposed. Several models were developed, the majority of which are reported in the annexes. Only the models which were found more relevant to explain the influence of the variables in study are presented and properly analysed in this chapter. Following this reasoning, Table 6 exposes six models focused in the different variables groups and significant variables, while Table 7 exposes four more comprehensive models.

Table 6 – Results of multivariate Cox Hazard models analysis (Models 1 to 6).

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
# Observations	327	221	221	301	301	301
# Failures	57	39	39	50	50	50
χ^2	14,800	10,270	4,330	11,390	11,300	22,680
pvalue	0,011 **	0,174	0,228	0,077 *	0,023 **	0,001 ***
sector	0,779 (0,723)					
country	-0,111 (0,407)					
marketcycle	0,736 (0,527)					1,058 * (0,603)
dum.issueprice	-0,813 ** (0,324)					-0,801 *** (0,292)
log.moneyraised	-0,030 (0,248)					
log.revenue		0,151 (0,198)	0,115 (0,193)			
dum.ebitda		0,129 (0,963)				
ebitdang		-0,091 (0,069)				
dum.ebit		-0,290 (0,753)	-0,590 (0,372)			
ebitmg		0,094 ** (0,04)	0,013 (0,016)			
dum.netincome		-0,555 (0,697)				
netincomemg		0,021 (0,059)				
log.totalassets				-0,049 (0,197)		
log.totaldebt				0,194 (0,122)	0,182 * (0,107)	0,177 * (0,106)
totaldebtta				-0,138 (0,887)		
dum.netdebt				-0,127 (0,428)	-0,140 (0,412)	-0,029 (0,415)
netdebtta				0,485 (0,776)	0,423 (0,557)	0,569 (0,559)
cashta				-0,070 (0,744)	-0,126 (0,597)	0,217 (0,613)

*, ** and *** indicate statistical significance at the 10 %, 5 % and 1 % level, respectively.

Model 1, which includes only the variables within the General group, is statistically significant. All the variable's coefficient signals came in line with the univariate analysis, whereas only the Issue Price variable appears statistically significant. These results reinforce the importance of the stock price (penny stock or not) in the explanation of the survival of a company post-IPO, with companies trading as penny stocks performing worse than other stocks.

Model 2, which includes only the variables within the P&L group, is not statistically significant. With the exception of the EBITDA related variables (dummy EBITDA and

EBITDA mg), all the other variable's coefficient signals came in line with the univariate analysis results. The lack of statistical significance of this model confirms the alleged lack of importance of these variables in company's survival, as seen in the univariate analysis. Surprisingly, the EBIT mg variable came statistically significant, although with a contrary coefficient signal from expectations. This result could have been attributed to sample constraints, however it was noticed that there is a possible multicollinearity bias with the net income related variables (as this effect takes place in all the models where the EBIT and net income variables coexist). Model 3 was developed to isolate the effect from EBIT in the P&L, with both the model and the variables showing no statistical significance and, therefore, confirming its lack of importance in our results. Despite the discredit of the influence of the EBIT variables, it is important to acknowledge that this effect could be possible under the perspective of companies listing in their top cycle (where margins peak) along with the top market cycle and window dressing. Additionally, it should also be noticed that profitability is a measure that can only be properly used when companies report positive earnings at the time of the IPO.

Model 4, which includes all the variables within the Balance Sheet group, is statistically significant. In this six variable model, only three variable's coefficient signals came in line with the univariate analysis results, (namely the Total Debt, Net Debt / Total Assets and Cash / Total Assets), and another three variables came in line with expectations (namely Total Assets, Total Debt and Cash / Total Assets). Unexpectedly none of them is statistically significant, which could have been due to multicollinearity between the variables in terms of balance sheet metrics representation. In order to better understand the influence of the balance sheet variables Model 5 was developed, a refined version of Model 4. Without the variables Total Assets and Total Debt / Total Assets, the model presented a higher statistical significance and the variable Total Debt appeared statistically significant, confirming the importance of leverage for survival. All the coefficient signals remained the same, from one model to the other. In further models exposed in this chapter and in the annexes, it was found several times statistical significance of some Balance Sheet group variables, suggesting they play an important role for a company's success, as seen in the univariate analysis.

Model 6, which includes all the statistically significant variables from the univariate analysis results, is statistically significant and the one with the best statistical fit. Of the

six variables in the model, only dummy Net Debt and Cash / Total Assets coefficient signals came opposite to expectations and previous univariate analysis results, although not presenting statistical significance, (it is possible, despite the variables “refining”, that multicollinearity within balance sheet variables could have biased the results). Market Cycle, Issue Price and Total Debt came in line with expectations and were statistically significant, reinforcing their importance for company’s survival. With this model it was found that a company that IPO’s in a bull cycle, is a penny stock and has higher debt is more likely to fail faster.

Table 7 – Results of multivariate Cox Hazard models analysis (Models 7 to 10).

Variable	Model 7	Model 8	Model 9	Model 10
# Observations	221	221	225	221
# Failures	39	39	40	39
χ^2	38,360	36,620	25,360	26,670
pvalue	0,004 ***	0,001 ***	0,008 ***	0,005 ***
sector	1,204 (0,988)	1,307 (0,974)	0,800 (0,7496)	0,787 (0,748)
country	0,748 (0,874)	1,044 (0,808)	1,030 (0,797)	1,028 (0,811)
marketcycle	0,909 (0,635)	0,880 (0,634)	0,936 (0,623)	0,825 (0,628)
dum.issueprice	-0,774 * (0,415)	-0,778 * (0,416)	-0,919 ** (0,411)	-0,760 * (0,418)
log.moneyraised	-0,003 (-0,01)	0,047 (0,317)	0,014 (0,315)	0,065 (0,322)
log.revenue	-0,316 (0,237)			
dum.ebitda	0,076 (1,076)	-0,120 (1,003)	-0,295 (0,371)	
ebitdamg	-0,074 (0,064)	-0,081 (0,061)	0,003 (0,006)	
dum.ebit	-0,275 (0,791)	-0,289 (0,784)		-0,523 (0,386)
ebitmng	0,092 ** (0,038)	0,092 ** (0,039)		0,009 (0,013)
dum.netincome	-0,121 (0,807)	-0,059 (0,736)		
netincomemng	-0,002 (0,052)	-0,001 (0,049)		
log.totalassets	0,165 (0,61)		0,115 (0,213)	0,197 (0,213)
log.totaldebt	0,280 * (0,153)	0,260 ** (0,132)		
totaldebttta	-0,740 (1,089)			
dum.netdebt	0,123 (0,477)	0,017 (0,445)	0,416 (0,377)	0,428 (0,381)
netdebttta	1,520 (0,95)	0,958 (0,657)	1,155 * (0,635)	1,102 * (0,651)
cashta	0,568 (0,848)	0,171 (0,759)	0,360 (0,744)	0,050 (0,791)

*, ** and *** indicate statistical significance at the 10 %, 5 % and 1 % level, respectively.

Model 7, which includes all the variables, is statistically significant. From the General group, only the Country variable coefficient signal came against expectations and contrary to the univariate analysis results. From the P&L group, dumb EBITDA and EBIT mg coefficient signal came against expectations. From the Balance Sheet group, Total Assets, Total Debt / Total Assets and Cash / Total Assets coefficient signals came against expectations, being the last two contrary to the results found in the univariate analysis. In this model there are three statistically significant variables which allegedly should have a more important role in survival, namely the Issue Price, Total Debt and again the EBIT mg issue. The first two already proved their importance both in the univariate and multivariate analysis, making sense for a Penny Stock and a more leveraged company to have higher propensity to fail. Regarding EBIT mg, the explanation for its result was already approached in previous models. In order to refine Model 7, Model 8 was developed where the variables Revenues, Total Assets and Total Debt / Total Assets were excluded due to possible multicollinearity with other variables (Revenues could also be considered a proxy of a company size). Model 8 presented a higher statistical significance, (showing a better fit), and so did the variable Total Debt, confirming the results found in Model 7.

Models 9 and 10, both proven statistically significant, include the majority of variables with refinements made in P&L and Balance Sheet variables in order to limit multicollinearity and to isolate specific effects. The main difference in these models lies in the earnings variables, in Model 9 were used EBITDA variables while in Model 10 the EBIT variables. In both models the Issue Price appears again as a significant variable, in line with previous observations. The variable Net Debt / Total Assets also came statistically significant in both models, (an event also confirmed by other models developed in the annexes), as in the univariate analysis, reinforcing the idea that more leveraged companies are have lower propensity to survive. By isolating earnings in these more integrated models P&L variables continued not to present statistical significance, confirming their lack of influence. Additionally, by changing the proxy of size variables, Revenues instead of Total Debt in comparison between Model 21 (in annexes) and Model 10, it was found no major difference. Model 10 presents a slightly better statistical significance and also has the variable Net Debt / Total Assets statistical significant.

The overall results allowed to obtain several conclusions regarding the impact of the analysed variables in company's survival. Despite constraints in the data and its punctual negative effects, it was possible to find several statistically significant information. It was clear that the General variables have an important role, as well as the Balance Sheet variables. The P&L variables presented the poorest results, suggesting a low impact in survival.

The General variables group presented results fully aligned with expectations in the univariate analysis, with two variables statistically significant, Market Cycle and Issue Price. In the multivariate analysis results came practically the same, with the exception of the variable Country. The statistical significance of the variable Issue Price was verified in all the models, confirming definitely its importance in a company's survival, indicating that a penny stock has more propensity to fail. The variable Market Cycle, although maintaining the same signal in all the models, it only proved statistically significant in the Model 6. Although not such a strong indicator, Market Cycle also proved to have an assignable negative influence in a company survival, possibly and simply justified by the fact that the majority of IPOs take place in bull markets.

The P&L variables group presented the most unexpected results, as they indicated a minor influence in a company's survival. In the univariate analysis none of the operational ratios came in line with expectations, only Revenues (suggesting higher sales have a positive impact in survival) and dummy variables (suggesting companies with positive earnings have a positive impact in survival) results were in line. Nevertheless, none of the variables proved statistically significant. In the multivariate analysis results were similar, with the highlight that Model 2 (only with P&L variables) didn't come statistically significant. Surprisingly, the variable EBIT mg appeared statistically significant in some of the models. However its influence was discarded with "tailored" models and literature background.

Lastly, the Balance Sheet variables presented a strong set of results, indicating a significant effect of leverage in a company's survival post-IPO. The univariate analysis presented all results in line with expectations, with the exception of the variable Total Assets, while four variables tested statistically significant. These results showed at first sight the importance of Debt for survival, where companies with lower debt, lower

financial leverage and positive net cash showed higher propensity for success. The results from the multivariate analysis were not so supportive though. Nevertheless the variable Total Debt tested statistically significant in several models, as well as the leverage ratio Net Debt / Total Assets, casting small doubts on their important impact for survival.

5. Conclusion

An IPO is one of the most important financial marks in the life of a company. The ability to finance itself in the equity capital markets is becoming more important every day, especially for SMEs as they usually face higher constraints regarding access to capital. The Alternative Investment Market (AIM) is one of the most recent, hot and important stock markets for SMEs, and especially too as it has very limited listing requirements. The literature studying IPOs of SMEs is per se limited, even more for AIM. Taking this into consideration, with the objective to understand the drivers for success (assumed just as survival in this study) and failure of these companies after the operation, several pre-IPO variables were studied to their importance in the success/failure of those companies in order to understand whether it can be possible to identify *ex-ante* if a company has a higher propensity to survive or not in the future.

A sample of 327 IPOs occurred in AIM from 1999 to 2010 was used, tracked for success until the end of 2013. Our results indicated that 100% of the companies survive at least 3 months and that, within the companies who fail, the median survival time is 48 months. It was also identified that companies are keener to failure at a faster rate in the short to medium term.

The Cox Hazard models showed that the General variables, such as issue price, market cycle, and Balance Sheet variables were the ones who had a more significant impact in the company's survival, while the P&L variables impact came surprisingly irrelevant.

Within the General variables group the Issue Price variable appears as the most relevant variable of the study to impact survival, suggesting that penny stocks have higher propensity to fail, possibly due to the fact that these companies are subject to higher speculative moves and also associated with smaller and more fragile companies. The Market Cycle variable also tested significant, indicating that companies that IPO in bull markets have higher propensity to fail. This result is not so relevant, as usually this operating takes place only in the bull cycles of the equity market.

Within the P&L variables it was not found significant impact from any variable in the survival of the companies, confirmed both in the uni and multivariate analysis. Despite similar findings from some authors, data constraints might have caused a significant bias.

Lastly, in the case of Balance Sheet variables, companies with lower debt, lower financial leverage and positive net cash showed higher propensity for success.

In conclusion, our study shows that penny stocks and stocks listing during bull cycles are keener to failure, while companies with lower debt and positive net cash show higher propensity for success.

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7. Annexes

Additional description of the variables used.

Table 8 – Descriptive statistics of all variables used.

Variable	# Observations	Average	Median	Std Deviation	Minimum	Maximum	Type
sector	327	0,92	1,00	0,28	0,00	1,00	dummy
country	327	0,89	1,00	0,31	0,00	1,00	dummy
marketcycle	327	0,88	1,00	0,33	0,00	1,00	dummy
dum.issueprice	327	0,74	1,00	0,44	0,00	1,00	dummy
log.moneyraised	327	0,70	0,70	0,62	-0,70	2,54	dummy
log.revenue	299	2,79	3,39	1,80	0,00	7,47	logarithm
dum.ebitda	321	0,45	0,00	0,50	0,00	1,00	dummy
ebitdamg	225	-12,70	0,00	74,17	-730,67	25,86	ratio
dum.ebit	317	0,49	0,00	0,50	0,00	1,00	dummy
ebitmng	221	-12,41	0,04	73,82	-722,11	19,04	ratio
dum.netincome	322	0,41	0,00	0,49	0,00	1,00	dummy
netincomemng	231	-11,89	-0,03	69,97	-701,44	32,21	ratio
log.totalassets	301	4,17	4,15	0,73	1,61	7,16	logarithm
log.totaldebt	301	1,54	0,00	1,79	0,00	7,08	logarithm
totaldebttta	301	0,08	0,00	0,16	0,00	1,14	ratio
dum.netdebt	322	0,26	0,00	0,44	0,00	1,00	dummy
netdebttta	301	-0,31	-0,29	0,39	-1,00	1,04	ratio
cashta	301	0,39	0,34	0,29	0,00	1,00	ratio

The additional models developed during the present study, along with the comprehensive results, are exposed in the Tables 9,10 and 11 bellow.

Table 9 – Results of multivariate Cox Hazard models analysis (Models 11 to 16).

Variable	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16
# Observations	221	327	225	231	301	301
# Failures	39	57	40	42	50	50
χ^2	25,980	13,220	3,000	2,620	11,360	19,910
pvalue	0,007 ***	0,001 ***	0,391	0,454	0,045 **	0,001 ***
sector	0,764 (0,75)					
country	0,825 (0,816)					
marketcycle	0,829 (0,628)	0,724 (0,523)				1,042 * (0,603)
dum.issueprice	-0,840 ** (0,407)	-0,874 *** (0,266)				-0,791 *** (0,286)
log.moneyraised	0,139 (0,312)					
log.revenue	-0,044 (0,198)		0,084 (0,183)	0,077 (0,174)		
dum.ebitda			-0,498 (0,369)			
ebitdamg			0,006 (0,009)			
dum.ebit	-0,416 (0,408)					
ebitmng	0,009 (0,015)					
dum.netincome				-0,496 (0,362)		
netincomemng				0,003 (0,006)		
log.totalassets					-0,050 (0,196)	
log.totaldebt					0,197 (0,121)	
totaldebtta						
dum.netdebt	0,527 (0,383)				-0,146 (0,412)	0,399 (0,34)
netdebtta	0,977 (0,638)				0,402 (0,563)	0,590 * (0,334)
cashta	-0,054 (0,802)				-0,141 (0,599)	

Table 10 – Results of multivariate Cox Hazard models analysis (Models 17 to 22).

Variable	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22
# Observations	301	221	225	221	221	231
# Failures	50	39	40	39	39	42
χ^2	18,750	32,790	25,350	31,590	25,980	22,230
pvalue	0,001 ***	0,005 ***	0,021 **	0,003 ***	0,007 ***	0,023 **
sector		1,365 (0,971)	0,791 (0,753)	1,230 (0,917)	0,764 (0,75)	0,790 (0,747)
country		0,851 (0,837)	0,916 (0,808)	0,954 (0,837)	0,825 (0,816)	0,354 (0,671)
marketcycle	0,971 (0,6)	0,837 (0,635)	0,886 (0,624)	0,820 (0,625)	0,829 (0,628)	0,985 (0,618)
dum.issueprice	-0,801 *** (0,291)	-0,915 ** (0,413)	-0,973 ** (0,399)	-0,896 ** (0,411)	-0,840 ** (0,407)	-0,867 ** (0,39)
log.moneyraised		0,122 (0,32)	0,059 (0,303)	0,112 (0,319)	0,139 (0,312)	0,026 (0,291)
log.revenue		-0,014 (0,208)	-0,058 (0,196)	-0,012 (0,209)	-0,044 (0,198)	-0,092 (0,189)
dum.ebitda		0,017 (0,989)	-0,190 (0,708)			
ebitdamg		-0,106 (0,068)	0,017 (0,044)			
dum.ebit		-0,326 (0,78)		-0,307 (0,576)	-0,416 (0,408)	
ebitm		0,111 ** (0,045)		0,095 ** (0,039)	0,009 (0,015)	
dum.netincome		-0,063 (0,739)	-0,012 (0,719)	-0,060 (0,571)		-0,148 (0,393)
netincomemg		0,014 (0,054)	-0,015 (0,046)	-0,082 *** (0,027)		0,002 (0,005)
log.totalassets						
log.totaldebt						
totaldebttta						
dum.netdebt		0,551 (0,386)	0,495 (0,38)	0,545 (0,386)	0,527 (0,383)	0,448 (0,368)
netdebttta	0,942 * (0,527)	1,116 * (0,646)	1,069 * (0,627)	1,069 * (0,647)	0,977 (0,638)	0,916 (0,616)
cashta	0,262 (0,616)	0,188 (0,797)	0,266 (0,753)	0,120 (0,798)	-0,054 (0,802)	0,248 (0,73)

Table 11 – Results of multivariate Cox Hazard models analysis (Models 23 to 29).

Variable	Model 23	Model 24	Model 25	Model 26	Model 27	Model 28	Model 29
# Observations	221	225	221	231	301	301	301
# Failures	39	40	39	42	50	50	50
χ^2	33,610	25,590	32,460	22,280	8,750	22,550	24,920
pvalue	0,004 ***	0,019 **	0,002 ***	0,022 **	0,068 *	0,007 ***	0,003 ***
sector	1,366 (0,97)	0,799 (0,754)	1,232 (0,915)	0,798 (0,747)		0,889 (0,737)	0,904 (0,736)
country	1,033 (0,827)	1,048 (0,802)	1,123 (0,825)	0,506 (0,668)		-0,070 (0,475)	-0,064 (0,460)
marketcycle	0,830 (0,634)	0,884 (0,624)	0,815 (0,624)	0,983 (0,618)		1,125 * (0,609)	1,135 * (0,609)
dum.issueprice	-0,834 ** (0,424)	-0,922 ** (0,411)	-0,815 * (0,422)	-0,818 ** (0,402)		-0,642 * (0,347)	-0,636 * (0,348)
log.moneyraised	0,045 (0,331)	0,007 (0,316)	0,037 (0,329)	-0,029 (0,305)		-0,188 (0,288)	-0,158 (0,272)
log.revenue							
dum.ebitda	0,046 (0,987)	-0,202 (0,705)					
ebitdamg	-0,102 (0,066)	0,018 (0,044)					
dum.ebit	-0,378 (0,779)		-0,349 (0,573)				
ebitmng	0,110 ** (0,044)		0,094 ** (0,038)				
dum.netincome	-0,137 (0,722)	-0,105 (0,702)	-0,120 (0,556)	-0,284 (0,358)			
netincomemg	0,010 (0,053)	-0,016 (0,046)	-0,082 *** (0,027)	0,001 (0,004)			
log.totalassets	0,198 (0,215)	0,122 (0,215)	0,203 (0,214)	0,114 (0,212)	0,084 (0,180)	0,112 (0,183)	
log.totaldebt							0,180 * (0,106)
totaldebttta							
dum.netdebt	0,465 (0,384)	0,417 (0,378)	0,457 (0,384)	0,364 (0,368)	0,252 (0,350)	0,385 (0,354)	0,011 (0,414)
netdebttta	1,235 * (0,66)	1,139 * (0,638)	1,195 * (0,66)	0,972 (0,627)	0,638 (0,545)	0,961 * (0,588)	0,732 (0,580)
cashta	0,282 (0,788)	0,337 (0,749)	0,222 (0,789)	0,323 (0,726)	-0,056 (0,610)	0,445 (0,661)	0,373 (0,630)