IPOs of Loss-making Companies

Abstract

During the late '90s loss-making companies started going public to a greater extent than ever before. Some argue dubious motives were the reason behind this. This paper aims to shed light on the motives behind U.S. loss-making companies' decision to go public and how these companies perform operationally following the three and five years after their initial public offering, during the period 1982 to 2010. We find statistical significant results that these companies outperform their industries in terms of revenue growth, but not in terms of return on assets. This indicates that loss-making companies went public with motives of company growth rather than motives of selling the company.

Christopher Mafi
22996@student.hhs.se

Edwin Olsson
23106@student.hhs.se

Stockholm School of Economics
Bachelor Thesis in Finance
May 2016

Keywords: Initial Public Offering (IPO), IPO motive, Operational performance, Post-IPO performance, Loss-making companies.

Tutor: Dong Yan

Acknowledgments: We would like to express our sincere gratitude to our tutor Dong Yan for providing valuable guidance and support.

Contents

1. Introduction

Before the dot-com era, most publicly traded companies had to have proven track records and be profitable at the time they went public. Then in the late '90s during the dot-com era, many companies went public without earnings and with high expectations of future cash flows. These companies were often venture capital funded and made the founders and owners wealthy through the IPOs, leaving the small investors with a fading company when the earnings never showed up. For the founders, the IPOs were possibly a quiet way of doing an exit and cash in. In today's IPO market, investors' willingness to invest in IPOs of loss-making companies have reached the highest level since the dot-com era, showing that 71% of the U.S. IPOs in 2014 had negative earnings the year prior to the IPO, according to Ritter's statistics presented by Fox (2015). Considering the increase in this type of IPOs, it is appropriate to ask whether the history is repeating itself. Is this boom in the IPO market something that can be related to the earlier motive of founders exiting their positions, or is a growth strategy – meaning the IPOs are used to fund company growth – now the driving factor?

This paper studies the IPOs of loss-making companies. Initially, the post-IPO survival rates of the companies are analysed. Then, under the condition of survival, the aim is to shed light on the motives behind management's decisions to list loss-making companies.

Looking at previous research within the field of operating performance and the motives for going public, there are several studies focusing on U.S. IPOs. Jain and Kini (1994) use a sample of IPOs from 1976 to 1988 to find significant declines in operating performance post-IPO, measuring operating performance as operating cash flow deflated by assets and return on assets (ROA). When looking at all types of companies going public they find evidence of high post-IPO revenue growth when compared to other publicly traded firms. Mikkelson, Partch, and Shah (1997) look at IPOs from 1980 to 1983 and their ROA, and find that firms going public experience a decline in operating performance post-IPO compared to other publicly traded firms. They also observe that smaller and younger firms underperform industry-matched firms the first few years post-IPO, in contrast to larger and older firms. Relating to the motives for an IPO, both Jain and Kini (1994) and Mikkelson, Partch, and Shah (1997) observe a larger decline in operating performance post-IPO when the owners sell shares in the IPO process.

As far as we know, at the time of writing, previous research is focused on IPOs in general and measures the operating performance post-IPO as operating cash flow and ROA.

Moreover, the samples in aforementioned papers only consist of IPO firms from a range of three or twelve years. Given the lack of previous research within the topic of specifically loss-making companies going public and as this type of IPOs are increasing, this paper will solely study the IPOs of loss-making companies.

The data used are on U.S. IPOs of loss-making companies from 1982 to 2010 and their operating performance for the following five years, which is a sample of 634 firms. The operating performance is measured with two metrics: revenue growth deflated by total assets and ROA, used to capture growth and profitability respectively. Revenue growth is a suitable indicator of the operational performance when studying the motives of the IPOs, as it serves as a proxy for the development and expansion of the companies. As common practice in previous papers, see Jain and Kini (1994), revenue growth is deflated by total assets. ROA is used to capture the profitability of the company relative to its assets, showing the management's efficiency in utilizing the company's assets to generate earnings. Hence, by looking at ROA – in addition to revenue growth – a broader and more thorough picture will be presented.

The operating performance post-IPO, as measured by both above metrics, is computed as the companies' three- and five-year average. This is then compared to an industry benchmark, also computed as average, for the same time periods consisting of all publicly traded firms within the same four-digit Standard Industry Classification. Foucault and Frésard (2015) also approach the analysis of IPO firms in a similar way when comparing private and public firms. By using the same method, the difference between a company's performance and the industry benchmark will indicate if a company under- or overperforms relative to their industry post-IPO. Hence, a test to see whether it is statistically significant that the companies succeed operationally after the IPO can be conducted.

The first hypothesis, *The Difference Hypothesis*, is constructed to answer the research question whether it is statistically significant that loss-making companies succeed operationally after the IPO, compared to the industry they operate in. We believe these loss-making companies go public in higher extent in relation with the exit motive rather than with the growth motive, therefore showing worse operational performance post-IPO than their industry peers. The second hypothesis, *The Exit Hypothesis*, is constructed to provide further explanation to the findings in the first hypothesis by examining the 'bad firms' we believe go public with an exit motive. We believe firms with high cash balances pre-IPO go public in higher extent with an exit motive; hence they are referred to as 'bad'. A high cash balance (relative to total assets) before going public is an indicator of companies with less need of

capital and signals a lack of growth opportunities. The third hypothesis, *The Growth Hypothesis*, is constructed to provide further explanation by examining the 'good firms' we believe go public with a growth motive. We believe firms with high CAPEX pre-IPO go public in higher extent with a growth motive. A high CAPEX (relative to total assets) before going public is an indicator of companies that desire to grow and that are in need of capital in order to invest more. Also, a high CAPEX might indicate that the company is in a growth phase where more capital is needed.

The difference hypothesis is tested by conducting a t-test and a regression analysis. The exit and growth hypotheses are tested with the same regression model as the first, the only difference being the samples used. There, the samples will contain percentile grouping by relative cash balances and relative CAPEX.

The survival rate of loss-making companies going public during the five (three) years following their IPO is on average 96% (97%). The rest were liquidated or went bankrupt within the same period. Under the condition of survival, results indicate that loss-making companies outperform their industry post-IPO in terms of revenue growth. However, this is not the case when looking at ROA, as loss-making companies then underperform their industry post-IPO. This is expected when comparing loss-making companies to mostly profitable industry peers. The revenue growth results reject our hypothesis that loss-making companies would go public with an exit motive and show worse operational performance post-IPO. Instead, the results seem to suggest the opposite, that IPO firms experience better post-IPO performance than their industry, supporting the growth motive. Furthermore, when examining the exit hypothesis by looking at cash-to-assets pre-IPO, apart from the three-year average ROA differences, it appears that the ratio is not a significant factor when describing companies' operating performances post-IPO. More interesting is to study the growth hypothesis in particular by looking at CAPEX-to-assets pre-IPO, where a significant difference between high and low CAPEX-to-assets companies going public is found. The results indicate that CAPEX pre-IPO as a factor is positively correlated with post-IPO performance, which is in line with our growth hypothesis that companies which invest heavily before going public are in greater extent liable to use raised capital for further investments relative companies which do not invest as much before going public.

Our main results, that loss-making companies going public outperform their industry post-IPO in terms of revenue growth, shows that the IPO-decision is significantly based on the growth motive. This has at least three implications: it highlights the importance and efficiency of the stock market as a provider of capital, it illustrates that the lemon's problem is

not always applicable to loss-making companies, and it let long-term stock investors use these results to make well-informed investment decisions, as economic performance in the long-run to a large extent determines the price of a stock.

2. Previous literature

In this section, the literature related to the subject of this paper is reviewed. The section starts off with summarizing motives for why companies go public. Next, papers studying operating performance of newly public companies in the U.S. will be covered, however not specifically for loss-making companies.

2.1 Motives for going public

The motives for why companies go public is a well-researched field, stating several reasons. Geddes (2003) writes that there are mainly three motives for going public: to raise capital, as part of a strategic decision, or sale by existing shareholders. Capital raising IPOs are mainly undertaken in order to fund expansion or to improve the financial health of the company by reducing debt levels. When companies go public in order to raise funds for its own use, they often specify what they intend to use the proceeds for. Interesting is that in the tech boom of 1998-2000, there were often vague arguments of how companies intended to use the proceeds from the IPO. Relating to capital raising IPOs are the IPOs as a strategic motive, where the IPO process not only is a way of raising funds for expansion but also to catalyse the development of the company and the next growth phase of the business, particularly in the U.S. where an IPO is seen as a natural step of company development. Furthermore, Geddes explains that an IPO is also a way for existing shareholders to sell the company. When talking about the sale by an entrepreneur, the term ‘cashing in’ is used and when talking about a sale by institutional investors the term ‘exit’ or ‘exit strategy’ is commonly used. Both of these are cases concerning information asymmetry.

Similar to Geddes (2003), Zingales (1995) also argues that IPOs are about maximizing the shareholders proceeds from an eventual exit of the company and that the transfer of control is a key factor underlying the decision to go public. However, this interpretation has not always been the case. In the U.S. during the 1980s, the motive for going public was mainly to raise capital and considered as a necessary stage for future growth.

Except from looking at IPOs as a motive for either raising capital, as part of a strategic decision, or as an exit strategy, Ritter (1991) contributes with new insights relating to all of these motives in *The Long-Run Performance of Initial Public Offerings*. Using a sample of U.S. IPOs between 1975 and 1984, he shows that when an industry is overvalued, non-public companies in that industry have an incentive to go public as a window of opportunity in order

to maximize the proceeds from the IPO, regardless of the motive behind the decision of going public.

2.2 Operating performance post-IPO

Previous research with U.S. data indicates that a company's decision to go public affect the operating performance. Jain and Kini (1994) use a sample of IPOs from 1976 to 1988 and find significant declines in operating performance post-IPO, measuring operating performance by operating cash flow deflated by assets and ROA. Although IPO firms experience a decline in operating performance post-IPO, they find evidence of high revenue growth and CAPEX growth among these newly listed companies compared to other publicly traded firms in the same industry. Hence, they conclude that the decline in operating performance post-IPO can't be explained by absence of revenue growth. Furthermore, Jain and Kini (1994) produce interesting findings related to the motive of the IPO. Equity retention by the original owners positively correlates with operating performance post-IPO, meaning that when entrepreneurs decide to take their company public with an exit motive in order to cash in, the company experience a worse operating performance post-IPO than average.

Similar to previous findings from Jain and Kini (1994), Mikkelson, Partch, and Shah (1997) also find evidence that firms going public experience a decline in operating performance post-IPO compared to other publicly traded firms, in contrast to previously outperforming these firms before going public. Their findings are based on U.S. IPO firms between 1980 and 1983 and their operating performance before and up to ten years after they went public, defining operating performance as ROA. Notable is that they find significant evidence for a major decline in operating performance the first year after going public, with no further decline between the second and the tenth year. Furthermore, they find that smaller and younger firms underperform industry-matched firms the first few years post-IPO, in contrast to larger and older firms experiencing similar post-IPO performance as industry-matched firms. These findings on how size and age relate to performance are supported by Ritter (1991). Although he looks at stock performance post-IPO, he finds that the underperformers are young firms in the growth stage.

Mikkelson, Partch, and Shah (1997) also present interesting findings about the relationship between operating performance post-IPO and the motive for the IPO. They observe a larger decline in operating performance post-IPO when the owners sell shares in the IPO process, that is, when the motive for the IPO is to do an exit and 'cash in'.

A decline in operating performance post-IPO and that young and small firms suffer more than old and large ones, is also found in the field of secondary seasoning offerings by Loughran and Ritter (1997). They study the operational performance of issuing firms and find that named firms' operational performance is at their height at the time of the offering, but subsequently deteriorates, and that smaller firms suffer more than larger ones.

Relating to operating performance post-IPO is Foucault's and Frésard's (2015) paper about how corporate strategy change before and after going public. They compare IPO firms with publicly traded firms and find that firms chose differentiating strategies post-IPO in greater extent than pre-IPO.

3. Data

This section covers how the data are collected and how it is processed to fit the research.

3.1 Data collection

All data presented in this paper – IPO data, accounting data, and incorporation year data – are collected from three separate sources: SDC Platinum, Compustat, and Ritter's dataset of founding dates for IPOs between 1975 and 2015. The data are merged and matched into the same dataset.

All IPO data are collected from SDC Platinum. The IPO data consist of issue date, issuer, main Standard Industry Classification code (SIC code), and ticker symbol on all U.S. IPOs from 1/1/1980 to 31/12/2010. The number of IPOs obtained through SDC Platinum sums up to 12,393.

Accounting data are collected from Compustat and include the entire database's public and private (for one year pre-IPO) U.S. companies for the fiscal years 1979 to 2015, in order to cover the event window, see table 1. The collected accounting data consist of revenue, EBIT, net income, CAPEX, total assets, cash balance, and data on the reason for eventual deletion should a company no longer be active.

Table 1: Event window showing that accounting data are collected from one year before the IPO to five years after the IPO.

Pre-IPO	Event – IPO	Post-IPO				
T_{-1}	T_0	T_1	T_2	T_3	T_4	T_5

Industry benchmark data consisting of revenue, total assets, EBIT, and net income of all public U.S. companies are also collected from Compustat. The data consist of all public and private (for one year pre-IPO) U.S. companies in the database and their four-digit SIC codes for the fiscal years 1979 to 2015, in order to cover the event window.

Incorporation year data, necessary to determine the age of the IPO firms, are collected from Ritter's dataset of founding dates for firms going public in the U.S. between 1975-2015.

3.2 Data used for hypothesis testing

Initially, the separate datasets obtained are merged and matched by ticker or company name. Hence, a raw dataset consisting of all IPOs from 1980 to 2010 with firm specific information

and accounting data for all years in the event window is created. Companies that do not have complete data are excluded once their survival rate has been examined.

To answer the first research question about the survival rate of loss-making companies going public, the data set will be filtered so that only loss-making companies appear. The indicator if a company is loss-making before going public is the net income one year prior to their IPO (T_{-1}). Then the reason for deletion on the firms showing incomplete accounting data for the event window will be examined. This results in a sample of 2,061 IPOs of loss-making companies stretching from 1980 to 2010, which is used for providing descriptive statistics on the survival rates.

Under the condition of survival, three hypothesis tests will be conducted. First, it will be analysed whether if it is statistically significant that loss-making companies succeed operationally post-IPO compared to the industry they operate in. Following, two hypothesis tests to explain the findings will be carried out. In addition to the aforementioned data required for the descriptive statistics, the first tests require complete data on EBIT, net income, total assets, and revenue throughout the whole event window from T_{-1} to T_5, which is used for measuring the operating performance. Also, each company needs to have a four-digit SIC-code, necessary for comparing the companies' operating performance post-IPO to an industry benchmark.

The industry benchmarks representing each four-digit SIC-code are constructed by sorting all companies in the industry benchmark data into groups by matching their SIC codes. All companies' EBIT, net income, revenue, and total assets in an industry are then summarized on total industry basis, in order to generate SIC-code specific revenue growth and ROA.

In order to explain the findings and conduct the second and third hypothesis tests, data on cash balance and CAPEX in T_{-1} are also required. Hence, a sample of 634 IPO firms stretching from 1982 to 2010 is obtained. In order to be consistent throughout the research, this complete sample is used as a base throughout all the hypothesis tests.

4. Method

This section starts with specifying general methods used for all hypothesis tests: event window, performance measures, and regression model. Following, the methods used for each specific hypothesis test will be explained.

4.1 Event window

As described in table 1 in section *3.1 Data collection*, the event window covers the year before the IPO to five years after the IPO. Hence, the accounting data in the complete dataset stretches from 1981 to 2015. Further, all tests are done by looking at operating performance during the IPOs' three and five subsequent years.

4.2 Performance measures

Since the aim of this paper is to find indications whether the decision to go public was value creating for the loss-making companies, meaning that they succeeded operationally after the IPO growth wise, or if it merely was an exit strategy, two operating performance measures will be used to capture growth and profitability respectively; revenue growth and ROA.

The revenue growth is an indicator of the growth and survival of a company. In this case it will also serve as proxy for the development and expansion of the companies, which might reveal indications of the motive of their respective IPO. A high revenue growth post-IPO may indicate the motive was for expansion in order to make the company grow. Similar, a low revenue growth post-IPO could indicate an exit motive was present from the founders' and investors' point of view. As common practice in previous papers, see Jain and Kini (1994), revenue growth is deflated by total assets. By doing so, problems with revenue numbers of zero in the dataset that otherwise would cause missing revenue growth numbers are avoided.

In addition, another common measure of operating performance is the profitability measure ROA. In previous papers, Jain and Kini (1994) and Mikkelson, Partch, and Shah (1997), operating performance is measured as ROA. ROA is a good indicator of the profitability of the company relative to its assets, showing the management's efficiency in utilizing the company's assets to generate earnings. Hence, by looking at ROA in addition to revenue growth, more detailed and complete results will hopefully be presented. Two definitions of ROA will be considered, first net income over total assets followed by EBIT

over total assets. The second definition of ROA is applied to only capture the operating side of the company, in order to not take management's financing decisions into consideration since loss-making companies may recognise non-operating costs pre-IPO in higher extent because they already show a negative result.

The operating performance post-IPO, as measured by both above metrics, is computed as the companies' three- and five-year average. This is then compared to an industry benchmark – also computed as average – for the same time periods consisting of all publicly traded firms within the same Standard Industry Classification. Foucault and Frésard (2015) also approach the analysis of IPO firms in a similar way when comparing private and public firms. By using the same method, the difference indicating if a company under- or overperform relative to their industry is obtained. This enables a test used to examine whether it is statistically significant that the companies succeed operationally after the IPO.

Table 2: Definitions of performance measures. The definitions are used for the three- and five-year analyses, both for the individual firms and the industry benchmarks.

Measure	**Definition**
Revenue growth, deflated by total assets	$(Revenue_t - Revenue_{t-1})/Total\ assets_{t-1}$
Return on assets (ROA) (1)	$Net\ income_t/Total\ assets_{t-1}$
Return on assets (ROA) (2)	$EBIT_t/Total\ assets_{t-1}$

4.3 Regression model

Trying to explain the findings and the relationship between the IPO firms' losses pre-IPO and the post-IPO performance, Ordinary Least Squares (OLS) regression analyses will be conducted. Hopefully, they will make predictions of the operating performance of companies depending on its characteristics. The same regression model is used in all three following hypothesis tests, but applied to different samples.

$$Perf_i = \beta_0 + \beta_1 Loss + \beta_2 \ln Size_i + \beta_3 \ln Age_i + \beta_4 MarkCond_i + \beta_5 Year_i + \varepsilon_i$$

Table 3: Definitions of variables.

Notation	Variable	Definition
$\boldsymbol{Perf_i}$	Dependent variable	The operational performance post-IPO. Industry adjusted as it is computed as the difference between the IPO firms' performance and the industry they operate in. Computed as an average of three ($T_{1\text{-}3}$) and five ($T_{1\text{-}5}$) years respectively, for both revenue growth and ROA (1) and (2).
$\boldsymbol{Loss_i}$	Independent variable	The loss in year T_{-1}, deflated by total assets in T_{-1}. In negative numbers.
$\boldsymbol{Size_i}$	Independent variable (control)	Log of total assets in year T_{-1}.
$\boldsymbol{Age_i}$	Independent variable (control)	Log of age in year T_0, the year the company went public.
$\boldsymbol{MarkCond_i}$	Independent variable (control)	The market condition. Total number of U.S. IPOs in year T_0, the year the company went public, minus the median of IPOs between 1982 and 2010.
$\boldsymbol{Year_i}$	Independent variable (control)	Covering each year in our sample, from 1982 to 2010.

The sample is controlled for size, age, market condition when the company went public, and IPO year. As previous findings by Mikkelson, Partch, and Shah (1997), Ritter (1991), and Loughran and Ritter (1997) indicate how size and age correlates with post-IPO performance, controlling for that effect is natural. The third control variable represents the prevailing market condition when the company went public. Regardless of the motive of the IPO, it is always optimal to go public in a hot market where the valuations are high, people are willing to invest, and the overall market sentiment is satisfying. Consequently, the valuations of companies going public will differ depending on prevailing market condition at the time of the IPO, affecting the asset base in companies' financial statements. Although the operating performance is already industry adjusted and deflated by total assets, the market condition might affect the post-IPO performance numbers. Assume two IPO firms, similar in terms of pre-IPO numbers, go public in two different IPO market conditions, hot respectively cold

market. The company going public in a cold market will have a lower valuation and hence asset base post-IPO than will the company going public in a hot market. However, this does not necessarily mean that the revenue numbers will vary post-IPO since the company can show an equivalent operating performance in terms of sales post-IPO regardless if the IPO market is hot or not, because a hot IPO market may not correlate with operating performance like in the dot-com era. So, the asset base will expand in relative lower terms compared to the same firm going public in a hot market resulting in different operating performance numbers (both revenue growth and ROA). Given the effect on the performance measures of this, controlling for it is logical. Relating to the control variable for market condition which differs over time, a control variable for which year the company went public is imposed.

Relating to the regression analysis, tests for heteroscedasticity and multicollinearity is included. Heteroscedasticity is of concern as it possibly can nullify the significance of statistical tests that assume the residuals of a regression do not correlate. To check for this, the residuals are plotted in graphs and searched for patterns. Should a pattern appear – or in other words, should the residuals be non-random – then heteroscedasticity can be assumed. This would violate the assumption of homoscedasticity in classical linear regressions models, leading to biased results. Heteroscedasticity can be corrected for in STATA by including the 'robust' option in the model, meaning that robust regression analyses will be conducted.

Multicollinearity is when two or more independent variables correlate with each other, and not only with the dependent variable. The presence of multicollinearity does not affect the power of the model, but the estimate of an independent variable's effect on the dependent variable might be less precise than should the independent variables have no correlation to each other. This can be tested for in STATA by the variance inflation factor (VIF) command after running the regressions.

4.4 The Difference Hypothesis

The first hypothesis, *The Difference Hypothesis*, is constructed to answer the research question whether it is statistically significant that loss-making companies succeed operationally after the IPO, compared to the industry they operate in.

In previous papers, Jain and Kini (1994) and Mikkelson, Partch, and Shah (1997) observe a larger decline in operating performance post-IPO when the owners sell shares in the IPO process. Accordingly, a worse operational performance post-IPO compared to industry peers can be an indicator of the exit motive, giving rise to following hypothesis:

H_0: *Pre-IPO loss-making companies perform similar to their industry post-IPO.*
H_1: *Pre-IPO loss-making companies perform dissimilar to their industry post-IPO.*

The hypothesis will be tested by a t-test and a regression analysis. Due to the large sample of 634 observations, The Central Limit Theorem can be used to assume the average differences ($\bar{x}$) to be normal distributed and we can then conduct an unpaired t-test, where values are two different and unequal variables, meaning that the unpaired data are not assumed to have equal variances. The applied regression model is specified in section *4.3 Regression model*. The regression analysis is done on the same sample as the t-test. As revenue growth and ROA (1) are tested for the three- and five-year performances post-IPO, this yield four t-tests and four regression analyses. Further, two more t-tests for the second definition of ROA (ROA (2)) are conducted to see if there is any difference between the definitions.

4.5 The Exit Hypothesis

The second hypothesis, *The Exit Hypothesis*, is constructed to provide further explanation to the findings by examining the 'bad firms' we believe go public with an exit motive.

We consider a high cash balance (relative to total assets) before going public to be a good and suitable indicator of companies with less need of capital. Also, a high cash balance might indicate a lack of growth possibilities. Consequently, we believe firms with high cash balances pre-IPO to go public in higher extent with an exit motive, resulting in following hypothesis:

H_0: *Companies with high (low) cash balance before going public will overperform (underperform) their industry post-IPO.*
H_1: *Companies with high (low) cash balance before going public will underperform (overperform) their industry post-IPO.*

The hypothesis is tested by using the regression model specified in section *4.3 Regression model*, on two different segments – high respectively low cash balance relative to total assets before going public. The segments are grouped by the 70^{th} and 30^{th} percentile of cash balance to total assets and later compared to each other. This results in four regression analyses per group, eight in total.

4.6 The Growth Hypothesis

The third hypothesis, *The Growth Hypothesis*, is constructed to provide further explanation to the findings by examining the 'good firms' we believe go public with a growth motive.

Jain and Kini (1994) study CAPEX in the context of IPOs, a highly interesting measure. The decision to go public can be based on a growth motive, where the company raises capital to nurture growth by investing. We consider a high CAPEX (relative to total assets) before going public to be an indicator of companies being in need of capital. Hence, we believe firms with high CAPEX pre-IPO tend to go public in higher extent with the motive of growth:

H_0: *Companies with high CAPEX before going public will underperform their industry post-IPO.*
H_1: *Companies with high CAPEX before going public will overperform their industry post-IPO.*

The hypothesis is tested by using the regression model specified in section *4.3 Regression model*, on two different groups – high and low CAPEX relative to total assets before going public. Similar to the exit hypothesis, the two groups are grouped by the 70^{th} and 30^{th} percentile of CAPEX to total assets. This also results in four regression analyses per group, eight in total.

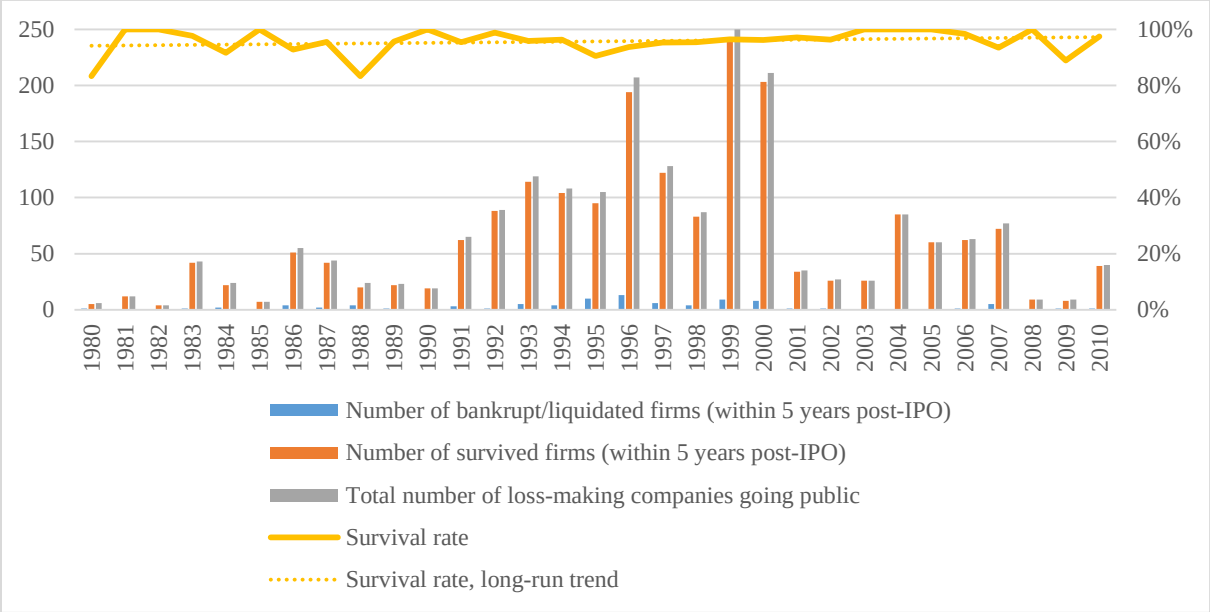
5. Results

In this section, the survival rates of loss-making companies going public within the event window are first presented. Then, under the condition of survival, the results of the hypothesis tests are presented.

5.1 Survival rates

The survival rates of loss-making companies the five (three) years following their IPO are on average 96% (97%). The rest were liquidated or went bankrupt within the same period. As seen in figure 1, the long trend indicates increasing survival rates.

Figure 1: Five-year post-IPO survival rates of loss-making companies which went public a certain year.



5.2 The Difference Hypothesis

Looking at revenue growth for three and five years' performance post-IPO respectively, results show that loss-making companies going public outperform their industry peers. The alternative hypothesis, that pre-IPO loss-making companies would perform dissimilar to the industry they operate in post-IPO, is failed to be rejected at the 5% significance level. Hence, we can be 95% sure that loss-making companies have higher average revenue growth performance (21.33% and 17.79% for three and five years respectively) than the industry they operate in (8.92% and 8.15% for three and five years respectively) post-IPO. In terms of

ROA, for both three and five years post-IPO respectively, results show that loss-making companies going public underperform their industry post-IPO. We can be 95% sure that loss-making companies have significantly lower average ROA (1) (-18.27% and -20.56% for three and five years respectively) than the industry they operate in (0.35% and 1.68% for three and five years respectively) post-IPO. This is intuitive because the loss-making companies have negative ROAs incorporated in their ROA averages and are compared to an industry where the majority of the companies are already profitable. Moreover, we examine ROA (2) and get similar results as in ROA (1) with significantly lower average (-14.73% and -12.71% for three and five years respectively) than the industry they operate in (8.75% and 8.84%). Due to this similarity, following regression analyses and hypotheses will only be tested by looking at ROA (1), from now on referred to only as ROA.

Table 4: T-test result of the five-year performance, measured as revenue growth.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
5y Avg Company	634	.177976	.0114658	.2887016	.1554604	.2004916
5y Avg Industry	634	.0815603	.0049402	.1243906	.0718591	.0912614
5y Avg Difference		.0964157	.0124848		.0719115	.1209199

Table 5: T-test result of the three-year performance, measured as revenue growth.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
3y Avg Company	634	.2133613	.0160379	.4038249	.1818673	.2448553
3y Avg Industry	634	.0892988	.0064709	.1629334	.0765917	.1020058
3y Avg Difference		.1240625	.0172942		.0901173	.1580077

Table 6: T-test result of the five-year performance, measured as ROA (1).

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
5y Avg Company	634	-.1827919	.0137269	.3456341	-.2097476	-.1558361
5y Avg Industry	634	.0168651	.0022935	.0577485	.0123613	.0213689
5y Avg Difference		-.199657	.0139172		-.2269836	-.1723304

Table 7: T-test result of the three-year performance, measured as ROA (1).

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
3y Avg Company	634	-.2056171	.0160736	.4047217	-.2371811	-.1740532
3y Avg Industry	634	.0035674	.0031138	.0784035	-.0025472	.0096821
3y Avg Difference		-.2091845	.0163724		-.241331	-.1770381

Table 8: T-test result of the five-year performance, measured as ROA (2).

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
5y Avg Company	634	-.1272422	.0127645	.3214032	-.1523081	-.1021762
5y Avg Industry	634	.0886589	.0020197	.0508554	.0846928	.0926251
5y Avg Difference		-.2159011	.0129234		-.2412766	-.1905256

Table 9: T-test result of the three-year performance, measured as ROA (2).

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
3y Avg Company	634	-.1476092	.014924	.3757759	-.1769157	-.1183027
3y Avg Industry	634	.0873448	.0023089	.0581365	.0828108	.0918788
3y Avg Difference		-.234954	.0151015		-.2646066	-.2053015

The result from looking at revenue growth rejects our hypothesis that loss-making companies would go public and show worse operational performance post-IPO and support the exit motive. Instead, the results seem to indicate the opposite; loss-making companies experience better post-IPO performance in terms of revenue growth than their industry, which supports the growth motive. This is similar to Jain and Kini's (1994) findings of high post-IPO revenue growth compared to other publicly traded firms, when looking at all types of companies going public.

All regressions show that the loss variable (net income in year T_{-1}, deflated by total assets in T_{-1}) is highly significant. Net income has a positive correlation to both three- and five-year performance post-IPO, both for revenue growth and ROA, meaning that the better net income a company has before going public – same as the smaller the loss is – the better its post-IPO performance will be. For example, an increase in the loss variable by 1 will lead to an increase in 5-year revenue growth by 3.1% and by 9.7% for 5-year ROA. In conclusion, the loss-making companies going public outperform their industry operationally post-IPO. In other words, same as in the t-test, the null hypothesis that loss-making companies perform similar to their industry post-IPO is rejected.

Table 10: Regression results of following operational metrics (set as dependent variables): the average revenue growth and the average ROA (1), for three and five years respectively.

Variable	3y AvgRevGrowth	5y AvgRevGrowth	3y AvgROA	5y AvgROA
Loss	0.041*	0.031**	0.088***	0.097***
	(0.02)	(0.01)	(0.02)	(0.02)
Size	-0.024*	-0.019**	0.041***	0.042***
	(0.01)	(0.01)	(0.01)	(0.01)
Age	-0.045**	-0.031**	0.040*	0.029
	(0.01)	(0.01)	(0.02)	(0.01)
Market condition	-0.000***	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Dummy IPO Year	Yes	Yes	Yes	Yes
Constant	0.392***	0.151***	-0.281***	-0.259***
	(0.05)	(0.04)	(0.06)	(0.05)
R-squared	0.093	0.086	0.212	0.223

* p<0.05, ** p<0.01, *** p<0.001

Further examining the regressions, it appears that company size has a significant negative effect on revenue growth but positive effect on ROA. The similar effect is observed on company age – significant negative effect on revenue growth performance but positive, less significant effect on three-year ROA and non-significant effect on five-year ROA. The results on ROA are in line with Mikkelson, Partch, and Shah's (1997) findings that smaller and younger firms underperform industry-matched firms the first few years post-IPO, in contrast to larger and older firms experiencing similar post-IPO performance as industry-matched firms. These findings on size and age are supported by Ritter (1991), although he looks at stock performance post-IPO, and Loughran and Ritter (1997) findings in the field of secondary seasoning offerings. Furthermore, market condition has a significant effect on dependent variables, but we consider these results to be neglectable and not of certain interest.

5.3 The Exit Hypothesis

Overall when dividing the sample into percentile groups by cash balances no significant distinctions between them are found. In other words, there are no significant performance differences for companies as to whether they belong to the top 30% or bottom 30% in cash-to-assets before going public when compared to their industries. It is only the three-year average ROA differences that show significance. There, companies from the top 30% percentile of cash holdings had worse ROA performance in the three years following their IPO compared

to companies in the bottom 30% percentile. This indicates that, apart from the three-year average ROA differences, pre-IPO cash-to-assets is not a significant factor when describing companies' operating performances compared to their industry in the follow three and five years. Hence, our hypothesis that firms with high cash balances tend to go public with a motive of exit rather than of growth is rejected.

Table 11: Regression results when including Cash-to-Assets percentile grouping of following operational metrics (set as dependent variables): the average revenue growth and the average ROA (1), for three and five years respectively.

Variable	3y AvgRevGrowth	5y AvgRevGrowth	3y AvgROA	5y AvgROA
Loss	0.041*	0.031**	0.084***	0.095***
	(0.02)	(0.01)	(0.02)	(0.02)
Size	-0.029**	-0.021**	0.039***	0.040***
	(0.01)	(0.01)	(0.01)	(0.01)
Age	-0.049***	-0.033**	0.035	0.025
	(0.01)	(0.01)	(0.02)	(0.02)
Market condition	-0.000**	-0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
Cash-to-assets, High	-0.060	-0.020	-0.078*	-0.053
	(0.05)	(0.03)	(0.04)	(0.04)
Cash-to-assets, Low	-0.041	-0.020	0.007	-0.000
	(0.04)	(0.03)	(0.03)	(0.03)
Constant	0.439***	0.184***	-0.260***	-0.236***
	(0.07)	(0.05)	(0.07)	(0.06)
R-squared	0.096	0.087	0.219	0.227

* p<0.05, ** p<0.01, *** p<0.001

5.4 The Growth Hypothesis

When dividing the sample into percentile groups by CAPEX relative to assets, a significant difference between them is found. Hence, our null hypothesis is rejected. Therefore, there are significant performance differences between companies as to whether they belong to the top 30% or bottom 30% in CAPEX-to-assets before going public when compared to respective industry. This indicates that CAPEX pre-IPO as a factor is positively correlated with post-IPO performance, which is in line with our hypothesis that companies which invest heavily before going public are in greater extent liable to use raised capital for further investments to grow their business relative companies which do not invest as much.

According to these findings a company in the top 30% percentile will on average perform better than its industry by 9.4% in terms of three-year average revenue growth, 7.8% in terms of five-year average revenue growth, and 10.2% in terms of five-year average ROA.

Table 12: Regression results when including CAPEX-to-assets percentile grouping of following operational metrics (set as dependent variables): the average revenue growth and the average ROA (1), for three and five years respectively.

Variable	3y AvgRevGrowth	5y AvgRevGrowth	3y AvgROA	5y AvgROA
Loss	0.044*	0.033***	0.090***	0.100***
	(0.02)	(0.01)	(0.02)	(0.02)
Size	-0.024*	-0.019**	0.042***	0.043***
	(0.01)	(0.01)	(0.01)	(0.01)
Age	-0.038**	-0.027*	0.045*	0.035*
	(0.01)	(0.01)	(0.02)	(0.02)
Market condition	-0.000***	0.000	0.000	0.000
	(0.00)	(0.00)	(0.00)	(0.00)
CAPEX-to-assets, High	0.094**	0.051	0.078*	0.102**
	(0.03)	(0.03)	(0.03)	(0.03)
CAPEX-to-assets, Low	0.010	-0.011	0.020	0.037
	(0.03)	(0.02)	(0.04)	(0.03)
Constant	0.272***	0.082	-0.380***	-0.385***
	(0.07)	(0.05)	(0.08)	(0.07)
R-squared	0.104	0.095	0.217	0.235

* p<0.05, ** p<0.01, *** p<0.001

5.5 Robustness tests

In the difference hypothesis test, the R-squared is bigger in the ROA regression models than in the revenue regression models. That means that the set of independent variables explains variability of ROA better than revenue growth, leading to better-fitted regression lines and less biased results. This remains true through all tests, and by including the percentile groupings in the regressions in the two subsequent hypotheses the R-squared has been slightly improved.

Table 13: Effect on R-squared when including percentile grouping in regressions.

Regression model	3y AvgRevGrowth	5y AvgRevGrowth	3y AvgROA	5y AvgROA
Original model	0.093	0.086	0.212	0.223
Grouping Cash-to-assets	0.096	0.087	0.219	0.227
Grouping CAPEX-to-assets	0.104	0.095	0.217	0.235

Furthermore, the first regressions showed that the residuals were non-random, indicating heteroscedasticity, see figure 2 in appendix. However, when running the regressions, this was taken into consideration and robust regression models were conducted by the 'robust' option in STATA in order to make all analyses and tests more reliable.

The tests for multicollinearity indicate that the market condition variable and the IPO year variable for 2000, 2001, 2004, 2005, 2006, and 2007 are correlated with other predictors, as their variance inflation factors are above 10. An interesting detail that arose is that the multicollinearity in the models was decreased by including the percentile groupings in the regressions. This decreased the average variance inflation factor by 12% (from 9.37 to 8.28), see table 14 in appendix.

The estimated power sizes are 0.5838 (0.4339) for the five-year (three-year) average ROA difference, and 0.2284 (0.1933) for the five-year (three-year) average revenue growth difference. Evidently the reliability of making the correct decision when the alternative hypothesis is true is not perfect, but the correct decision is more likely to be taken regarding the average ROA differences than with the average revenue growth differences.

6. Implications and conclusions

The main result, that loss-making companies going public outperform their industry post-IPO in terms of revenue growth, indicates that the IPO-decision is significantly based on the growth motive. This has at least three implications: the importance and efficiency of the stock market as a capital provider, how the lemon's problem is not always true, and how long-term stock investors can interpret these results.

Loss-making companies are often in need of capital. However, raising capital outside the stock market can sometimes be hard due to the companies' risk and lack of profitability. This paper's results indicate that loss-making companies succeed to grow their businesses once they manage to raise capital. This highlights the importance and efficiency of the stock market when it comes to the economic growth of the society. The stock market and the opportunity for companies to go public is important in the sense that it provides loss-making companies with capital so they may grow, which could have been impossible without the stock market.

The results also suggest that investors interested in the type of companies covered by this paper do not have to worry about the information asymmetry between a company's management and the market. Since most companies outperform their industry, the average loss-making firm can be labelled as a 'good' one. Hence, the lemon's problem appears to not be applicable in this case since the management – with their superior knowledge of the company's prospects – still choose to take the company public even though the theory suggests that only the 'lemons' will go public.

Companies outperforming their industry operationally may in the long-run be an indication of a good stock investment as the financial market in the long-run is driven by the economic performance of the securities in the market. This is an interpretation of the results which might be of interest for long-term stock investors, meaning that loss-making companies in the long-run can be a good investment as they experience high growth post-IPO. However, this is not supported by studying the actual stock performance, which could be an area for further research. Further research could also be to study if this paper's results hold for markets outside the U.S. or to study loss-making companies going public in specific industries.

7. References

Foucalt, T., & Frésard, L. (2015). Corporate Strategy, Conformism, and The Stock Market. *HEC Paris, Les Cahiers de Recherche*, 1099.

Fox, J. (2015). No '90s Nostalgia in Todays IPOs. *Bloomberg View*. Retrieved from http://www.bloombergview.com/articles/2015-02-13/ipo-boomlet-today-is-nothing-like-the-90s-dot-com-bubble

Geddes, R. (2003). IPOs and Equity Offerings. (Butterworth-Heinemann, Jordan Hill, GB). 6-18.

Jain, B. A., & Kini, O. (1994). The Post-Issue Operating Performance of IPO Firms. *The Journal of Finance*, 49 (5), 1699–1726.

Loughran, T., & Ritter, J. R. (1997). The Operating Performance of Firms Conducting Seasoned Equity Offerings. *The Journal of Finance*, 52 (5), 1823–1850.

Mikkelson, W. H., Megan Partch, M., & Shah, K. (1997). Ownership and Operating Performance of Companies That Go Public. *The Journal of Financial Economics*, 44 (3), 281-307.

Ritter, J. R. (1991). The Long-Run Performance of Initial Public Offerings. *The Journal of Finance*, 46, 3-27.

Ritter, J. R. (2015). Field-Ritter Dataset of Company Founding Dates. *University of Florida, Warrington College of Business*. Retrieved from https://site.warrington.ufl.edu/ritter/files/2015/08/Founding-dates-for-10266-firms-going-public-in-the-US-during-1975-2015-2015-07.pdf

Zingales, L. (1995). Insider Ownership and the Decision to Go Public. *The Review of Economic Studies*, 62, 425-448.

Appendix

Table 14: Effect on VIF by including percentile grouping in regressions.

Before including			After including		
Variable	VIF	1/VIF	Variable	VIF	1/VIF
Market condition	85.78	0.011657	Market condition	58.19	0.017185
IPO Year 2004	22.36	0.044716	IPO Year 2004	24.50	0.040815
IPO Year 2006	18.23	0.054851	IPO Year 2006	19.47	0.051370
IPO Year 2007	16.11	0.062062	IPO Year 2007	17.85	0.056027
IPO Year 2005	15.79	0.063319	IPO Year 2005	17.14	0.058334
IPO Year 2001	15.61	0.064058	IPO Year 2001	15.95	0.062682
IPO Year 2000	10.42	0.095993	IPO Year 2000	13.68	0.073107
IPO Year 2002	9.38	0.106576	IPO Year 1998	10.97	0.091197
IPO Year 1998	8.98	0.111304	IPO Year 2002	9.63	0.103871
IPO Year 1996	8.47	0.118102	IPO Year 1991	8.11	0.123300
IPO Year 2008	7.26	0.137824	IPO Year 2008	7.07	0.141461
IPO Year 2003	6.80	0.147068	IPO Year 2003	6.84	0.146119
IPO Year 1991	6.67	0.149981	IPO Year 1990	6.37	0.156909
IPO Year 1999	6.17	0.161984	IPO Year 1999	5.64	0.177347
IPO Year 1993	6.05	0.165348	IPO Year 2009	5.58	0.179271
IPO Year 1990	5.96	0.167654	IPO Year 1997	5.32	0.188078
IPO Year 2009	5.67	0.176452	IPO Year 1995	4.74	0.210783
IPO Year 1997	4.43	0.225518	IPO Year 1989	4.32	0.231697
IPO Year 1989	4.05	0.247179	IPO Year 1994	3.37	0.296819
IPO Year 1995	3.79	0.263572	IPO Year 1988	3.31	0.301835
IPO Year 1994	3.20	0.312642	IPO Year 1992	3.19	0.313236
IPO Year 1988	3.06	0.326403	IPO Year 1996	2.47	0.404580
IPO Year 1992	2.78	0.359678	Size	2.18	0.459605
Size	1.97	0.507881	IPO Year 1985	2.01	0.498258
IPO Year 2010	1.89	0.529677	Cash-to-assets, High	1.95	0.514051
IPO Year 1985	1.85	0.540572	IPO Year 1983	1.93	0.517972
IPO Year 1983	1.84	0.542359	IPO Year 2010	1.91	0.523328
IPO Year 1987	1.61	0.622363	IPO Year 1987	1.86	0.536458
Age	1.45	0.690375	Cash-to-assets, Low	1.77	0.563645
IPO Year 1984	1.43	0.699620	IPO Year 1986	1.57	0.636927
Loss	1.32	0.758006	IPO Year 1984	1.51	0.663861
			Age	1.49	0.672359
			Loss	1.33	0.751206
Mean VIF	9.37		Mean VIF	8.28	

Figure 2: Residual plotting indicating non-random residuals.